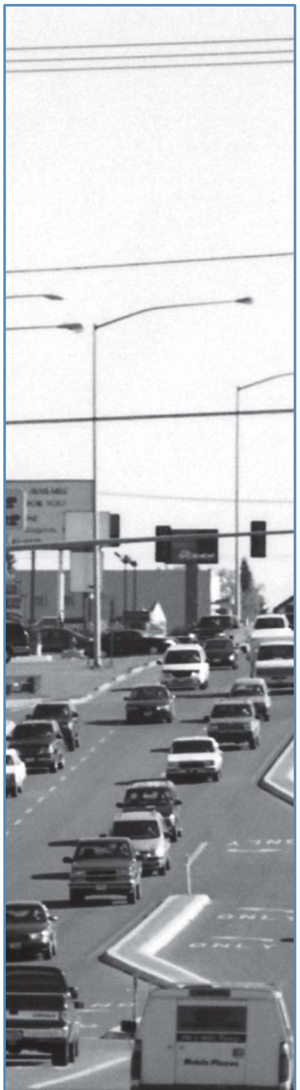
GREAT FALLS AREA

Long Range Transportation Plan - 2018 Update

APPENDIX E:

Existing and Projected TransportationConditions



EXISTING AND PROJECTED TRANSPORTATION CONDITIONS

March 12, 2018

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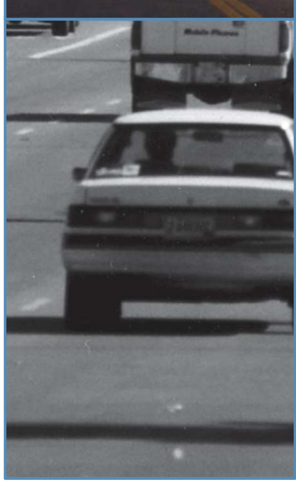

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EXISTING AND PROJECTED TRANSPORTATION CONDITIONS

1.0 INTRODUCTION

To clearly understand a transportation network, it is important to evaluate both the existing and projected conditions and use that information to identify any potential problem areas. Existing traffic data were used to establish the existing conditions on major road segments within the study area. The existing data were then projected out to the year 2038 using growth rates derived from a travel demand model built for Cascade County by the Montana Department of Transportation (MDT). Utilizing the existing and projected data, the operational characteristics and potential traffic issues over the planning horizon were determined. A variety of data were used to help evaluate the system, including:

- Existing functional classification,
- Existing traffic data,
- Existing bicycle and pedestrian data,
- Existing roadway corridor size,
- Current intersection turning movement counts,
- Current traffic signal operation information,
- Existing intersection and roadway configurations, and
- Historic crash data.

2.0 EXISTING TRANSPORTATION SYSTEM

Current information about the transportation system was analyzed to establish the existing traffic conditions and to determine potential problem areas. Existing data was provided in the 2014 LRTP and updated as appropriate using information provided by MDT, the City of Great Falls, and Cascade County. New data was not collected as part of this Update as the available data was determined to accurately represent current transportation conditions. The combination of data from the 2014 LRTP and the updated available data was used to determine the existing conditions of the transportation system.

2.1. Transportation Network

A transportation network is made up of many individual road segments which are connected in ways which permit vehicular movement. However, this network is not limited to personal vehicles, it is also meant to accommodate public transportation, bicycles, pedestrians, freight, rail, and other modes of transportation. Gaining a thorough understanding of each component of the transportation network will help ensure that all modes of transportation are able to navigate the transportation network safely and efficiently.

2.1.1. Major Street Network

To understand a community's existing transportation system, it is first necessary to identify which roadways will be evaluated as part of the larger planning effort. A transportation system is made up of a hierarchy of roadways, with each roadway being classified according to certain parameters. The parameters include, but are not limited to, geometric configuration, traffic volumes, spacing in the community's transportation grid, speed, and adjacent land use. Each of these characteristics helps define the role that each segment of roadway plays within the overall network. The method by which these roles are defined is widely known as functional classification. Travel through a community involves movement through a network of roads. Functional classification defines the nature of travel within the network in a logical and efficient manner by defining the objectives that any particular road or street should meet to effectively move trips through the entire network.

For this evaluation, emphasis was placed on roadways within the study area that are functionally classified as collectors, minor arterials, or principal arterials. The local streets, the lowest ranking roadways, were not examined in detail due to the assumption that if the major street network (i.e. collectors and above) is functioning at an acceptable level, the local roadways should not be used beyond their intended function. However, if problems begin to occur on the major street network, then the resulting issues will begin to infiltrate the local road network. As such, the overall health of a community's transportation system can be characterized by the health of the major street network.

Included in the study area are roadways with the functional classifications of interstate system, principal arterial, minor arterial, collector street, and local street. For the purpose of this Plan, these functional classifications are neither limited to, nor defined by, "urban" or "rural" settings, though some entities often make a distinction between urban and rural functional classes. Rural roadways in the study area generally carry a smaller volume than their urban counterparts. Although traffic volumes may differ between urban and rural sections of a roadway, it is important to still maintain coordinated right-of-way standards to allow for efficient operation and potential urban development. **Figures 1** and **2** present the major street network for the study area. The figure shows existing roadway classifications. Note that the functional classifications shown in the figure may not represent the "Federally approved" functional classification system, rather, it shows the locally adopted classifications. These classifications are used for planning purposes and may not be representative of actual conditions. The following list provides general descriptions of these functional classifications.

Interstate Highways

The main purpose of an interstate highway is to provide for both regional and interstate transportation of people and goods. Primary users include all types, ranging from local residents and commuters, to travelers and freight operators. Interstate highways characteristically have fully controlled access (provided by a limited number of interchanges), high design speeds, and place a high priority on driver comfort and safety. The interstate system has been designed as a high-speed facility with all road intersections being grade separated.

Principal Arterial System

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 an area. This classification of roadway carries a high proportion of the total traffic. Most of the vehicles entering and leaving the area will utilize principal arterials. Significant intra-area travel, such as between central business districts, outlying residential areas, and major suburban centers, is typically served by principal arterials.

The spacing between principal arterials may vary; from less than one mile in highly developed areas, to five miles or more on the urban fringes. Principal arterials mainly connect to other principal arterials or to the interstate system. The major purpose of the principal arterial is to provide expedient movement of traffic, not access to abutting lands.

Minor Arterial Street System

The minor arterial street system interconnects with and supplements the principal arterial system. Minor arterials accommodate trips of moderate length at a somewhat lower level of travel mobility, as compared to principal arterials. They distribute travel to smaller geographic areas in addition to providing some access to adjacent lands.

The spacing of minor arterial streets may vary; from several blocks to half a mile in highly developed areas of a town, to several miles in the urban fringes. They are typically spaced more than one mile apart in fully developed areas.

Collector Street System

The collector street network provides links from residential, commercial, and industrial areas to the arterial street network. 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 the user's ultimate destinations while also collecting traffic from local streets in the residential neighborhoods and channeling the traffic to the arterial system. The collector street system should intersect arterial streets at a uniform spacing of one-half to one-quarter mile in order to maintain good progression on the arterial network. Ideally, collectors should be no longer than one to two miles and should be continuous for their entire length.

Local Street System

The local street network comprises all facilities not included in the higher functional classes. The primary purpose of local streets is to permit direct access to abutting lands and connections to higher systems. Most local streets also provide residential and commercial access. Usually, service to through-traffic movements is intentionally discouraged either through low speeds or other traffic calming measures.

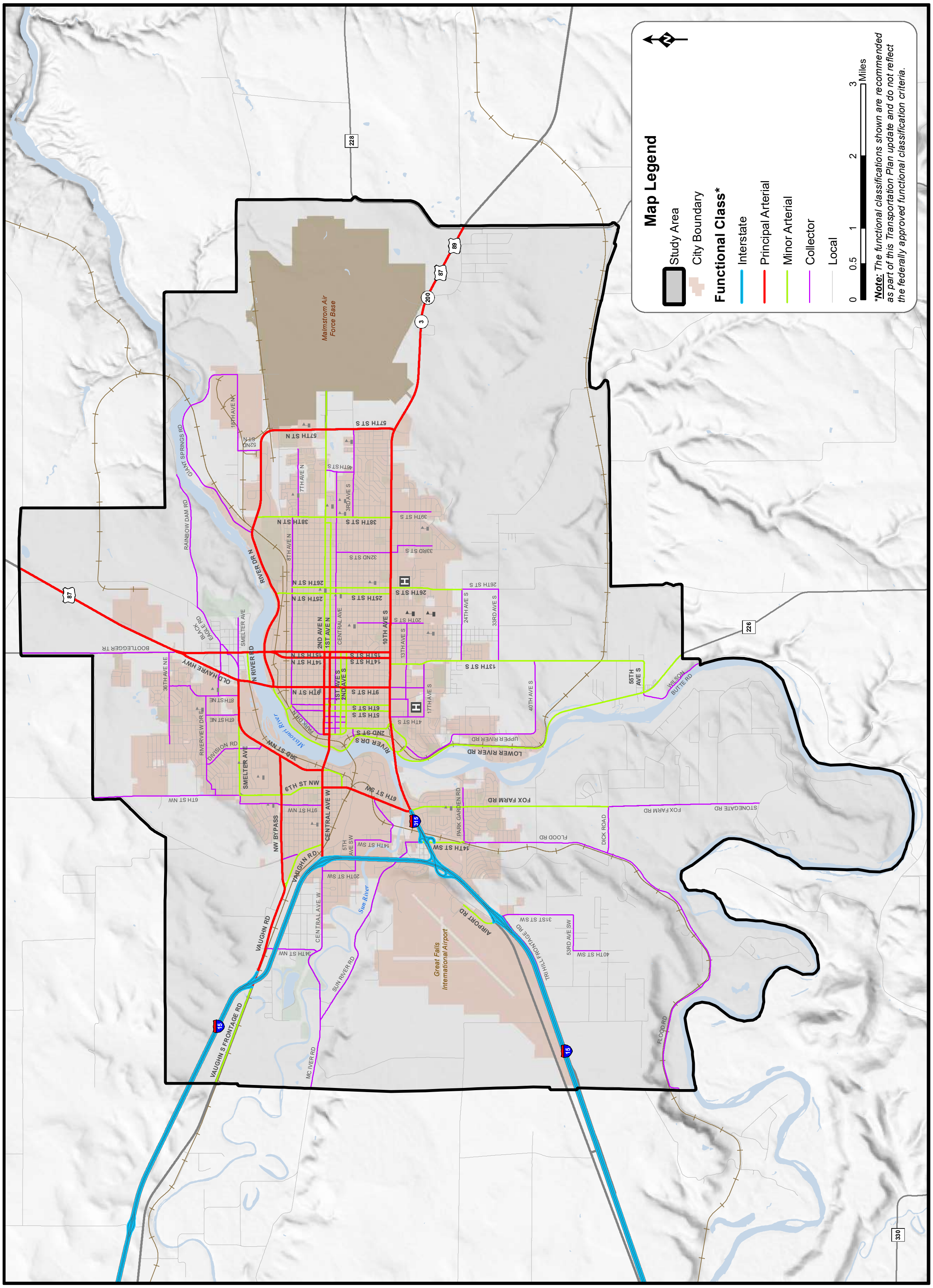

Figure 1: Existing Major Street Network

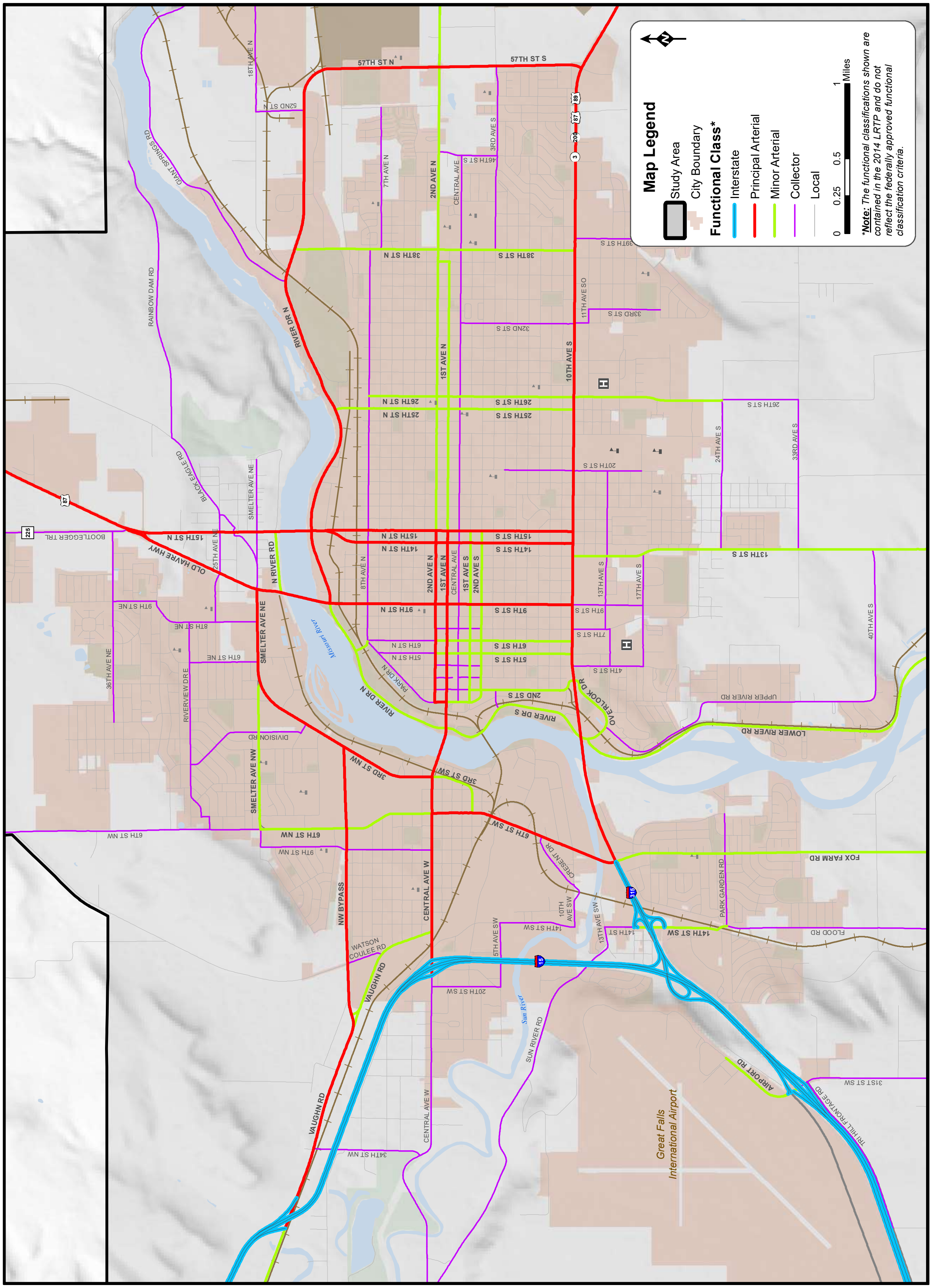

Figure 2: Existing Major Street Network (Detail Area)

2.1.2. Non-Motorized Transportation Network

An extensive effort was put forth for the 2014 LRTP to assess the existing non-motorized network conditions and determine the community's non-motorized needs. This assessment was performed by Alta Planning + Design and resulted in a thorough analysis detailing the existing facilities, policies, programs, and system deficiencies. The memo is included in **Appendix A** is summarized in this section. The content of the memo has been reviewed and any necessary updates were made in this section to ensure an accurate representation of current conditions.

Bicycle and Pedestrian Facilities

The Great Falls Area is fortunate to boast an approximately 60-mile off-street bicycling and walking system along the banks of the Missouri River. In general, Great Falls' older core neighborhoods and grid street system with small blocks lend themselves to walking and non-motorized transportation. Pedestrians use sidewalks, trails, alleys, and bridges in and around the City, however, there is a relative lack of designated on-street bicycle infrastructure. The city's first bike lane was installed in Summer 2013. Some additions to the existing bike and pedestrian facilities have taken place since the development of the 2014 LRTP. As such, there are many opportunities for improvement to the non-motorized transportation network, especially improvements to the bicycle network. The following list describes the existing bicycle and pedestrian facilities in the study area. A map of the existing bicycle and pedestrian facilities is presented in **Figure 3**.

Shared Lane Markings

Shared lane markings, or sharrows, are stenciled markings installed as an on-street facility where bicycles share the travel lanes with cars. Typically, these facilities occur on local roadways or on roadways with low traffic volumes and speeds. These facilities are used to connect other bikeways – usually bike lanes - or designate preferred routes through high-demand corridors. In implementation, roadways with shared lane markings are accompanied by a Bike Route designation and appropriate signage. Examples of routes with shared lane markings in the Great Falls Area are those along 4th Avenue North and 8th Avenue North.

Bicyclist riding on the 4^{th} Ave N shared roadway

57th St N/2nd Ave N bike lanes

Bike Lanes

Bike lanes are a type of separated bikeway that uses signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movement by both bicyclists and motorists. The Great Falls Area currently has 2.6 miles of bike lanes. The 57^{th} Street N/2^{nd} Avenue N bike lanes were installed in June and July 2013 between the 2^{nd} Ave N gate of Malmstrom Air Force Base on the east, west to the intersection of 57^{th} St N and 2^{nd} Ave N, and then north and northwest till 38^{th} St N & the River's Edge Trail extension.

Natural Surface Trails

The River's Edge Trail (RET) is the most notable natural surface trail in the Great Falls Area. In general, natural surface trails serve as both transportation and recreational facilities. The RET is nearly 60 miles long and 35+ miles of the trail are made up of natural surface trail. These parts of the trail are primarily used for singletrack mountain bike riding and walking/hiking.

River's Edge Trail northwest of Downtown Great Falls

Paved portion of the River's Edge Trail

Shared Use Paths

Shared use paths are off-street paved trails that are designated for the use of bicyclists, pedestrians, and other non-motorized users such as skateboarders and rollerbladers. Approximately 25 miles of the RET is paved paths and trails.

Sidewalks

Most of the established areas of Great Falls have a very cohesive and continuous sidewalk network. On the outskirts and in new or fringe developments, however, such connectivity is lacking. Much of the latter areas were subdivided and built before being incorporating into the City (if at all), and most of the sidewalk gaps occur here. Developers and builders in unincorporated areas were not required to build sidewalks and they weren't included in the design of these neighborhoods. At the time of the 2014 LRTP, there were 37.62 miles of sidewalk gaps out of the 196 miles of potential sidewalk mileage within the City limits.

There are some locations in Great Falls where sidewalks end

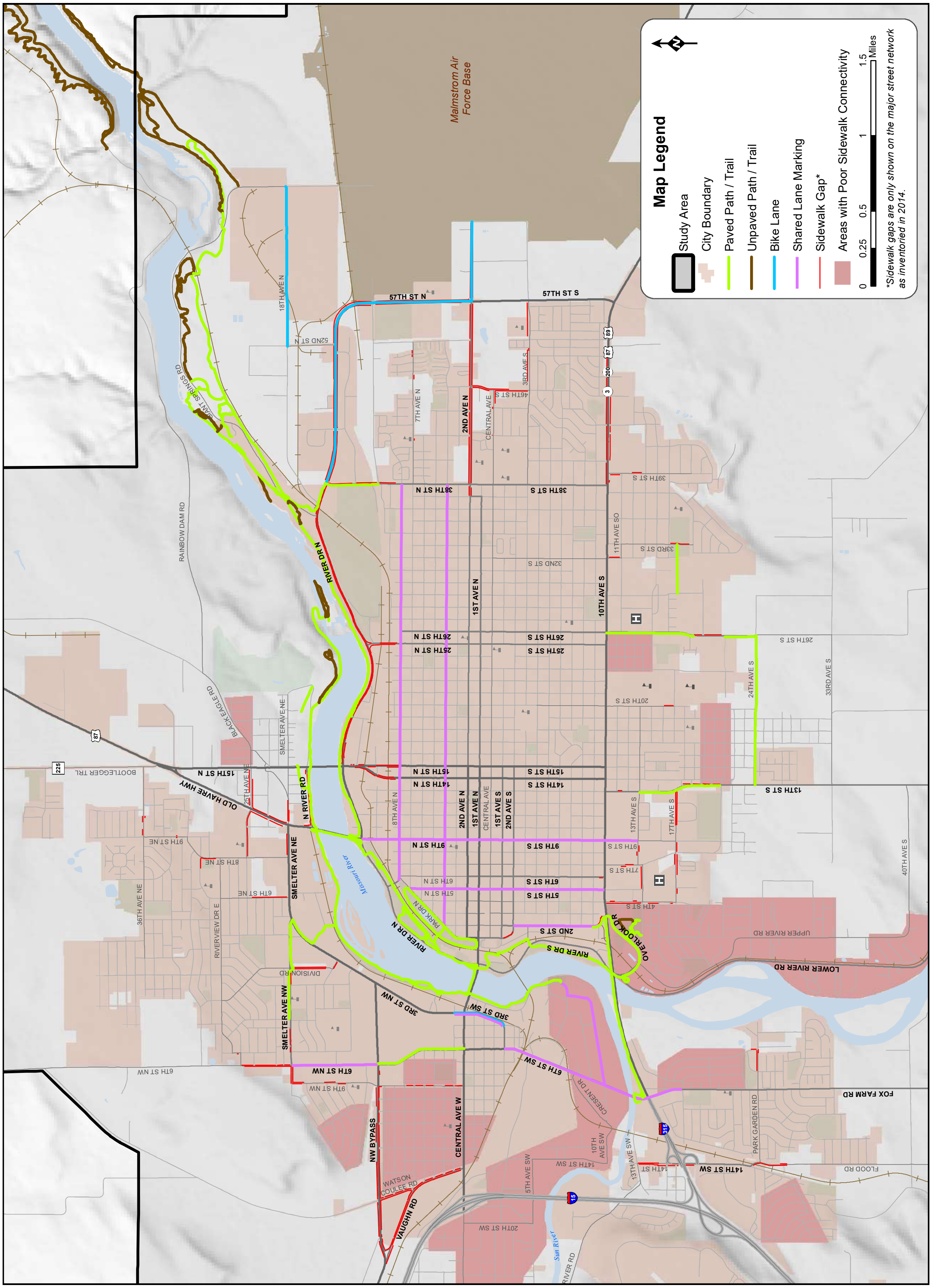

Figure 3: Existing Non-Motorized Network (Detail Area)

NON-MOTORIZED PROGRAMS

RIVER'S EDGE TRAIL

According to the River's Edge Trail website, the almost 60-mile trail system is the result of nearly 30 years of cooperative partnership efforts by the City of Great Falls, Cascade County, Montana Department of Fish, Wildlife & Parks (FWP), Montana Department of Transportation, electric utility PPL Montana, a volunteer trail advocacy group Recreational Trails, Inc., and a supportive community. As a result of this work, the RET has grown into a treasured community asset. Since 1989, the trail has grown to nearly 60 miles. The RET system is composed of 25 miles of paved paths and trails, and 35+ miles of unpaved or natural trails (primarily used for singletrack mountain bike riding and walking/hiking).[1]

The history of the River's Edge Trail began with a conceptual plan for a riverside recreational trail in Great Falls (as developed by the City-County Planning Board staff in 1989). Dubbed the "Riverfront Recreational Corridor", the trail was to extend 7 miles from the Broadwater Bay area downstream to Rainbow Falls. The trail, re-named the River's Edge Trail following a Name-the-Trail contest in the Great Falls Tribune, captured the interest and support of the community. A volunteer group that advocated local bike trails, also in 1989, as part of the *Vision 2000* community planning process, began working with the City to develop the first segments of the trail. That group was formalized as a non-profit 501 c3 corporation named Recreational Trails, Inc. (RTI).

Over the last 26 years RTI has continued to work with the City, County, FWP, PPL Montana and many other partners, agencies, groups and individuals to extend and improve the 60-mile trail. In 2015, the City of Great Falls assumed full management of the trail, hired a trails coordinator in 2016, and RTI transitioned into the River's Edge Trail Foundation.[2] Much of the trail has been constructed on abandoned railroad and road rights-of-way and structures. Miles of new trail connecting these segments have been constructed, as have many new tunnels, underpasses, bridges and trailheads. Volunteers have undertaken an on-going intensive cleanup of riverfront lands that had been littered with debris over the past decades, and have spent thousands of hours on weed control, tree planting, maintenance, and enhancement projects.[3]

GET FIT GREAT FALLS

Get Fit Great Falls (GFGF) is a group that desires to have a healthier and more active community that is also more economically vibrant and physically active. Get Fit Great Falls is made up of representatives from 20 community organizations and agencies and although it is not officially a non-profit organization, it has been successful in its initial initiatives to encourage more walking and bicycling to Great Falls Voyagers baseball games, overall walkability of the City, and improving the relationship between pedestrians and other roadway users. Bicyclists and pedestrians sharing sidewalks can be dangerous according to GFGF and an improvement on the current situation is another goal of the organization. Focusing also on wheelchair accessibility and safety concerns for disabled users, GFGF has sought to work with the City to close sidewalk gaps and improve ADA access.

ADA ACCOMMODATIONS

An ADA ramp is an inclined ramp that allows access for those in wheelchairs, with other disabilities (including the elderly), and those pushing carts or strollers to transition gradually and safely between the

[1] *Jenn Rowell. Changes to the trail: City will play larger role. Great Falls Tribune, 6 Feb. 2016,* www.greatfallstribune.com/story/news/local/2016/02/04/rivers-edge-trail-great-falls-gem/79858560

[2] *"Formalizing River's Edge Trail Foundation's partnership with the City of Great Falls." The River's Edge Trail. Web. 5 Jan. 2017.* http://thetrail.org/formalizing-rivers-edge-trail-foundations-partnership-city-great-falls

[3] *"History of the Trail." The River's Edge Trail. Web. 5 Aug. 2013.* http://thetrail.org/history.html

sidewalk and the street, similar to the way a driveway curb cut allows a car to access a driveway and the roadway.

The City of Great Falls has made a significant effort in creating curb ramps or ADA ramps in recent years. In 2017, the City released the *Public Right of Way ADA Transition Plan*[4] which identifies barriers to accessible transportation on City properties and in the public rights of way and outlines methods to remove these barriers. To date, the City of Great Falls has:

- 5,626 corners total
- 1,074 ADA compliant ramps
- 1,843 non-compliant ramps
- 2,709 corners without ramps
- 90 traffic signals
    - 37 signals without pedestrian push buttons
- 600+ miles of sidewalk

The Plan concluded that, based on field inventory and analysis, 63 percent of curb ramps in the City are non-compliant with ADA regulations. Twenty-eight ADA program methods have been established to help meet compliancy standards. The methods are broken down into three categories: (1) Administration, (2) Communications, and (3) Right-of-way related methods which are further broken down into ADA Inventory, Project Identification, Design and Construction, and Operation and Maintenance. Each year an Annual Action Plan will be completed which will include an implementation plan and schedule depending on that years available funding mechanisms.

The Great Falls Transit District ADA advisory committee is currently without effective guidance or leadership, but its role has traditionally been to advise the Board of Trustees or Directors on issues regarding wheelchair access and accommodating and providing services for those with disabilities who use the transit system. In the past, their priority was a curb cut, or ADA ramp, program. Once that began to pick up speed and more ADA ramps were installed on sidewalks, interested members of that committee dwindled and stopped coming to meetings.

Facility Maintenance

River's Edge Trail

Maintenance of the River's Edge Trail is shared between the Great Falls Parks and Recreation Department, Region 4 of Montana State Parks, and The River's Edge Trail Foundation with funding for maintenance provided by city funds and grants, private donations, and funds raised by the foundation. Maintenance includes resurfacing, weed abatement, riverbank work, signage, equipment, and labor.

The new trail coordinator position is funded by the city's general fund and transportation funds from the city planning department with the two funds splitting the $70,000 cost. In addition to funding the coordinator position, yearly maintenance of the trail is approximately $120,000+. Maintenance funds are primarily provided by the RET Foundation, however funds are also contributed by the City of Great Falls. The City's Trail Division budget for the 2017 fiscal year was $122,273.

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[4] *"Public Right of Way ADA Transition Plan 2017." City of Great Falls. June 6, 2017.*

STREET SWEEPING

Currently, there is no preferential treatment for streets with designated (separated or otherwise) bikeways. In the case of 8th Ave N (bike route), however, it is on a preferential schedule due to its nature as a snow route and a collector street.

In the fair-weather seasons in Great Falls, sweeping is done from west to east in the older City core (grid system), and then continues into the surrounding areas (e.g. south of 10th Ave S, and in the Riverview and Valley View neighborhoods). The Downtown core is on an enhanced schedule that includes 4 am sweeping so as to take advantage of the lack of motorized traffic and on-street parking (in commercial areas). Sweeping may also be performed as needed after heavy summer storms to clean up impacted areas (fallen branches, leaves, and other debris).

The City of Great Falls also sweeps in the winter in order to clear debris from the streets. It is done during breaks in the snowfall and preference is give (as mentioned before) to snow routes and arterials and collectors.

MDT sweeps all of the routes over which they have jurisdiction as needed. With the introduction of salt brine as a preventative measure, their sweeping has been cut down considerably. Although most sweeping is for spot improvements, maintenance crews do pay more attention to high usage routes such as 10th Ave S, 14th/15th St, and other major roadways.

ON-STREET SNOW REMOVAL

The Great Falls area receives approximately 62 inches of snow per year, receiving the most snow in March. The River's Edge Trail gets plowed before most streets because it is maintained by the Parks and Recreation Department, which is responsible for fewer routes than the Public Work Department, which maintains most roads.

SIDEWALK MAINTENANCE

Within the Great Falls city limits, there are no programs for sidewalk maintenance or replacement. Per Montana state law, sidewalk maintenance including tree root heaves, crumbling, etc., is the responsibility of the adjoining property owner(s) and is only enforced by the City or the jurisdictional authority. In the case of sidewalks inside of Great Falls city limits, this authority would be the City. Otherwise, it would be Cascade County. At the City level, at least, this process is complaint-driven and is thus reactive, and not proactive. After receiving a hazardous sidewalks complaint, a member of the City's Engineering Department staff performs a site inspection to determine if it is, in fact, a condemnable defect. If that is the case, a letter is then issued to the property owner notifying them of the defect and that they will be allowed 30 days for repairs. In 90 percent of cases, according to the City of Great Falls, the owner complies and the defect is remedied. The remaining 10 percent require a condemnation process that continues with the City hiring a contractor to do the repairs and the owner being charged for any labor and materials needed. If the owner does not pay for the repairs after they have been completed, then a lien is place on the property.

In some cases where the defect is very minor, like small rises (usually less than one inch) in sidewalks sections that turn into "toe stubbers", especially in Downtown, grinding the concrete level has been done. Grinding, however, is limited to very minor offsets and to strong or newer concrete because old or deteriorated concrete tends to shatter.

In rare cases, the City or MDT has paid for sidewalk replacement or repair in full when it was part of a larger project, like the addition of ADA ramps, asphalt milling, and overlay projects on 1st and 2nd Ave N.

For MDT, their involvement in the issue depends on the extent of the repair required by the offset or deterioration. Their rule of thumb is that if is more than six linear feet of repair, then they will consider it more than “maintenance” and will fix it with public funds. Even with this program, businesses have also fixed larger repairs on their own.

NON-MOTORIZED NEEDS ANALYSIS

A public survey was created as part of the 2014 LRTP plan in order to collect information about the preferences and key identifiers of different types of people interested in bicycling and walking in the Great Falls area. The survey was not statistically valid (because of the reach and response) and were distributed and promoted primarily by stakeholder groups in the transportation planning process and advertised in the newspaper. A total of 298 people responded to the “Bicycling Survey” and 192 people responded to the “Walking Survey”.

BICYCLING SURVEY

When considering responses from all 298 respondents, they all self-identified as the following types of bicyclists or potential bicyclists:

- **Strong and Fearless: 19 percent**
  Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles - over separate bikeways such as shared use paths.

- **Enthused and Confident: 39 percent**
  This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.

- **Interested but Concerned: 34 percent**
  This user type comprises the bulk of the population and represents bicyclists who typically only ride on low traffic streets or shared use paths under favorable weather conditions. These people perceive significant barriers to increased cycling, specifically traffic and other safety issues. These people may become “Enthused & Confident” with encouragement, education and experience.

- **No way No how: 8 percent**
  Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

Survey takers were given the chance to select which facilities and types of bikeways they preferred or wished to have in their community (on a scale of 1-5, with one being least desirable and five being the most, depending on how much they liked it and how desirable it was). Most of the bikeways types received an average score of 3.5, but shared use paths received a 4.3, which is indicative of the fact that Great Falls residents are familiar with this type of facility (River’s Edge Trail) and may not be familiar with other types.

When asked what their normal destinations are in Great Falls, respondents showed that trails, open space, and community spaces are among the most visited and cherished. The top 5 destinations among respondents were:

- River's Edge Trail
- Downtown Great Falls
- Gibson Park
- Giant Springs Interpretive Center
- Riverfront parks

When asked what methods they would prefer in order to improve bicycling in Great Falls, the only choice that received a higher score than 4 (on a scale of 1 to 5), was "Maintain existing bike paths" with all other options receiving an average score of 3.6, the lowest being 3.34 ("Traffic calming to slow cars"). This does not mean that survey respondents don't want bicycling improvements and different methods to accomplish a cohesive system, but it does mean that improving maintenance of existing facilities, especially paths and trails, is the number one priority for them right now.

Walking Survey

Respondents were asked about their walking habits. About half (49 percent) of respondents walk a few times per week, the next most common response was "5+ times per week" with only a cumulative 10 percent of respondents saying that they walk a few times per month or never.

Most respondents walk primarily for exercise and the next reasons are, in this order: spending time outdoors, transportation to a destination, social visits, and walking to school.

An overwhelming amount of people surveys responded that they currently enjoy walking on the River's Edge Trail, with the next most popular responses being "riverfront parks", "Downtown Great Falls", and "grocery stores".

Nearly 50 percent of respondents say that it only takes one to five minutes to walk to a park or playground, 30 percent have a 6- to 10-minute walk to a small grocery store, and 35 percent have an 11- to 20-minute walk to a supermarket. There was an even split of about 18 percent of respondents who lived 21 to 30 minutes walking from a supermarket, fast food restaurant, pharmacy, or trail or greenway. Only 10 percent of respondents lived within a one- to five-minute walk from a trail or greenway.

Approximately 70 percent of respondents said that they would walk more often if there were more sidewalks, greenway trails, and safe roadway crossings (in that order) according to the preference survey question.

Automobile speed & traffic, lack of sidewalks & trails, and a lack of pedestrian crossings at intersections were the top 3 reasons why people surveyed choose not to walk. Connectivity was also a big draw for respondents who said that they would like to see more pedestrian connectivity between neighborhood, shopping centers, park, and other destinations more than any other improvement. Marked crosswalks and sidewalks rounded out the top three.

Interestingly, 10th Ave S and Fox Farm Rd seemed to pop up more than others in open-ended questions that asked for additional thoughts on locations or corridors that could be improved for pedestrians. Respondents cited these as routes and barriers that were difficult to use and were unattractive as a pedestrian.

2.1.3. Transit Network

The history of the existing public transit system in Great Falls goes back to 1978 when, by voter referendum, the establishment of a Transit District was approved. The purpose of the Transit District is to provide an alternative form of transportation to city and county residents in the Great Falls area. Funding for the district is provided through a combination of fare collections, property tax revenue, and Federal funds. The latter is administered by MDT and goes towards operating and capital costs. Passenger service started in February of 1982.

Since the creation of the Great Falls Transit District (GFTD), a variety of studies and plans have been created to assist the District with operations, and specific measures to improve financial sustainability and customer needs were identified. A comprehensive *Transit Development Plan (TDP)* was completed by LSC Consultants on October 9, 2010. Much of the existing and proposed information presented herein relies heavily on the TDP.

Transit Facilities

The GFTD operates seven regular fixed routes. The fixed routes operate from roughly 6:30 AM to 6:30 PM on weekdays and from 9:30 AM to 5:30 PM on Saturday. Six of the seven routes, with the exception of Route 7-Southwest, operate on 30-minute headways during the morning and afternoon peaks (6:30 AM to 9:30 AM and 2:30 PM to 6:30 PM). This allows for extensive coverage during both school hour and commuter business hour travel times. Saturday service is hourly on every line. There is no transit service provided on Sundays.

The seven lines radiate from a timed-transfer point downtown at 1st Avenue South and 4th Street (referred to as the Downtown Transfer Station). Lines one thru four make a timed connection at 10th Avenue South and 57th Street South (in the "Walmart East" parking lot). Lines five and six also make a timed connection at Division Road & 23rd Avenue NE.

A short description of the seven transit routes, along with their primary service market and basic ridership characteristics, is contained below. The seven routes are also shown graphically on **Figure 4**.

Route 1 (Southeast): This route serves various medical facilities, shopping destinations, lower and higher educational facilities, and residential areas. The presence of all these components makes Route 1 one of the strongest lines in the Great Falls system. Route 1 achieves this performance despite being very slow and circuitous. This route snakes its way through the area on minor streets, rather than running straight along an east – west roadway route. Route 1 gets relatively strong ridership all day, without a significantly strong morning or evening peak.

Route 2 (Central): This route serves Central Avenue from the Central Business District (CBD) to 44th Street, then turns south and east along 3rd Avenue South to the East End Timed Transfer Hub. Route 2 serves numerous public and private schools, some commercial areas, and extensive residential areas. This route has an average demand when compared to other routes, and primarily serves the schools on Central Avenue. Route 2 is comparatively consistent in its productivity throughout its entire length, with boardings occurring along the entire route, with primary focus centered around the various adjacent schools.

Route 3 (Northcentral): This route primarily runs along 8th Avenue North and has consistently low ridership when compared to the boardings of Routes 1 and 2. Route 3 runs adjacent to residential areas, a few small commercial centers, and services the Malmstrom Air Force Base. Ridership is generally low along the entire route, with the exception of each end. Route 3 is the only line that has a significant morning and evening peak at typical work-commute hours, with virtually no school hour peak.

Route 4: (Southcentral): Route 4 has its highest boarding counts between the CBD and 20th Street South. Daily activity is strongest in the early morning and mid-afternoon. These times correspond with school arrivals and releases. Additionally, there is a slight peak in the late evening, including some commuter traffic. However, as a whole this route has the lowest boardings of all routes.

Route 5 (Northwest): Route 5 has high boardings around CM Russell High School, and in the older west side neighborhood around 3rd Avenue Northwest and 14th Street Northwest. Except for these two areas, each end of the route and Central Avenue West are the only areas of any significant activity. Ridership peaks in the early morning and in the mid-afternoon, corresponding to the beginning and end of school.

Route 6 (Northeast): Ridership on Route 6 occurs primarily at a few locations: the transit center, North Middle School, Skyline School, and Wal-Mart. There are also a number of boardings around the node of commercial land uses at the intersection of 10th Avenue North and 14th Street North, which includes the Women's Transition Center. Other than these points, the route has few boardings on the rest of its length. Daily activity on Route 6 is greatest in the morning and in the mid-afternoon, corresponding with school hours.

Route 7 (Southwest): This line provides service to the Marketplace Shopping Center on 14th Street Southwest, via Fox Farm and Park Garden Roads. As development has increased in these areas, the route has grown over the past decade, and now realizes boardings on par with other routes, on average.

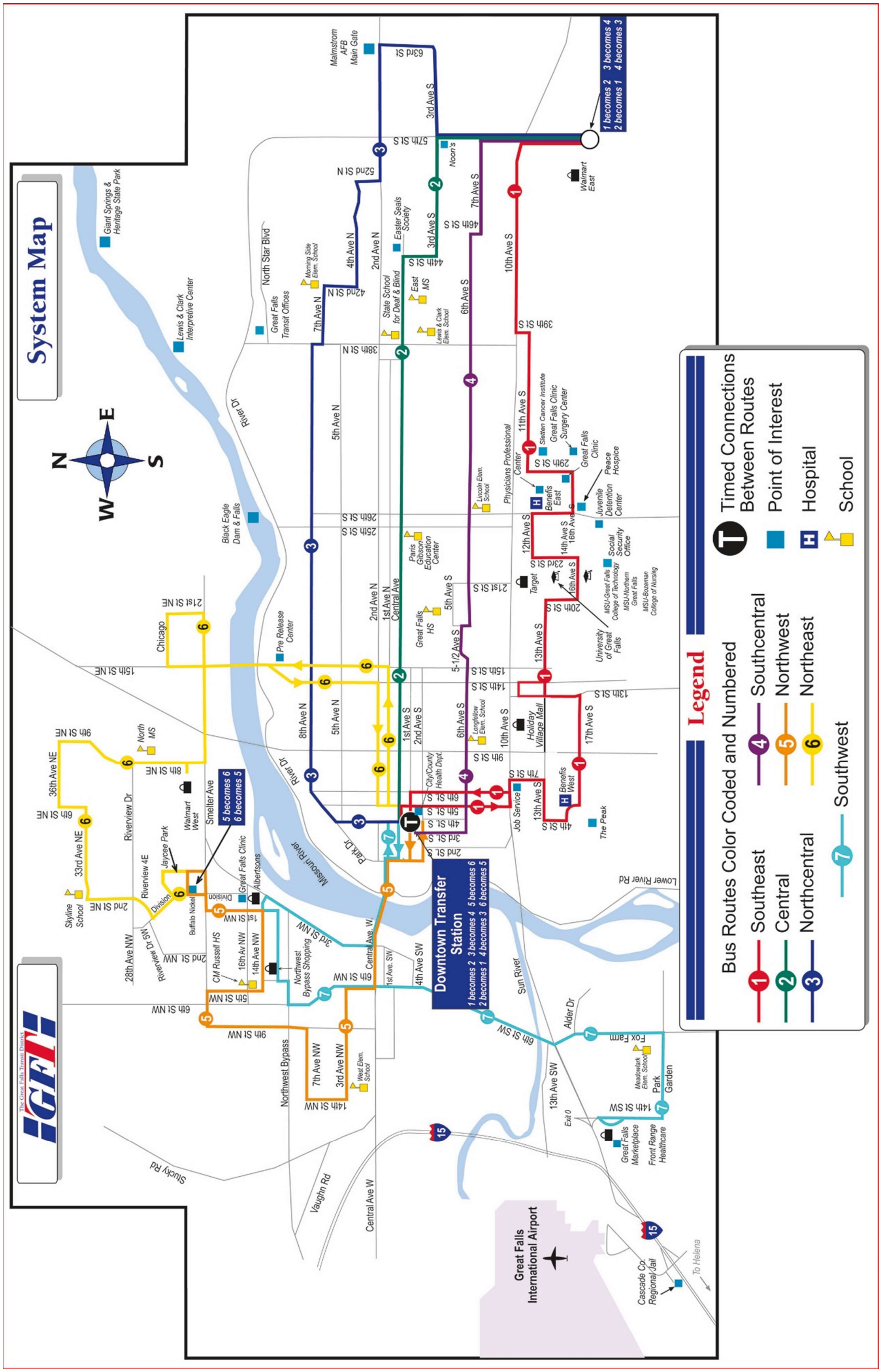


Figure 4: Existing Transit System Route Map

The current transit rate schedule is shown in **Table 1**.

Table 1: Transit Rate Schedule (2018)

Fare / Pass	Current Rate
Fare	
Adult	$1.00
Student (Full-time with ID)	$0.75
Senior Citizen (60 yrs or older)	$0.50
Disabled (with I.D.)	$0.50
Children (5 yrs and Under)	FREE
Transfers	FREE
Paratransit Service Clients (with I.D.)	FREE
Pass	
Regular Punch Pass	$10.00
Student Punch Pass	$10.00
Senior Citizen Punch Pass	$10.00
People with Disabilities Punch Pass	$10.00
Regular Monthly	$30.00
Student Monthly	$25.00
Monthly Pass for Seniors and People with Disabilities	$21.00
Day Pass	$4.00

Source: http://www.gftransit.com/fares_&_passes.htm (accessed January 4, 2018)

Paratransit Operations

There are a number of paratransit operators that provide an alternative transit mode of travel to system users in the community. First and foremost is the paratransit known as the "Access Transportation Service", which is the ADA paratransit service provided by Great Falls Transit. The service is restricted to eligible registrants based on a functional assessment administered by the Great Falls Transit staff. The service is provided under contract by Diamond Cab and Diamond Wheelchair Services.

In addition to the service provided by the Diamond Cab Company, there are several retirement developments that provide service to residents of the various retirement facilities. Some of the facilities that are served by Aging Services are the Lodge, Cambridge Court, Cambridge Place, and Rainbow Retirement Center.

Connectivity to Transit

Trips by transit (in Great Falls' case, by bus) often begin and end on foot or bicycle or both. When connectivity to transit is poor, ridership and ease of use of the system is also negatively affected. By improving sidewalks at and near bus stops, constructing bus shelters for waiting patrons, and planning routes near popular bicycling and walking routes, citizen connectivity to transit can improve.

The GFTD bus route network is mostly a flag-down system, but there are plans and programs now in place to include fixed stops and the amenities that go along with them. A completely fixed stop system has been discussed internally at GFTD, but a plan for implementation has not been created yet. The advantages of a fixed stop system, especially for bicyclists and pedestrians, would be, among others, improved predictability of route time tables and scheduling, both for the user and the Transit District.

Bicycling

Nearly all GFTD buses now have bike racks mounted on the front of the bus that allow users to use buses to connect longer legs of a trip, in case of an emergency or breakdown, or to avoid inclement weather or difficult topography. GFTD has not, however, tracked or counted their use to determine demand on certain routes, or where bicyclists board and alight most.

Walking

The GFTD is currently focused heavily on addressing connectivity to newly implemented fixed stops via sidewalks and applicable improvements. The City's Planning Department expressed interest in seeing GFTD provide a priority analysis on Safe Routes to Schools and sidewalks and their relationship with transit accessibility. According to the City and GFTD, there are transit users with limited mobility who use paratransit and other transit services because there are not sidewalks where they want to go or that access traditional bus stops and not necessarily because they require a paratransit ride.

Transit Goals

One of the immediate goals of the GFTD is to work towards implementation of the service design changes recommended in the current TDP. Local governments should continue to support the Transit District to the greatest extent possible. In some cases, this may be in the form of requirements that a new development provide some sort of infrastructure compatible with transit facility usage. It may also mean expansion of Transit District boundaries as development occurs around the perimeter of the community. The mission of the GFTD as articulated in their current TDP is as follows:

"The mission of the Great Falls Transit District is to provide a safe, reliable, affordable, and fiscally sound transportation system for the people of Great Falls and Black Eagle, Montana."

The five basic goals that govern the day-to-day operation of the system, and which were presented in previous study efforts, are as follows:

- Maintain the existing ridership base while attracting new riders;
- Continue to enhance the environmental sustainability of the transit system;
- Provide high quality, customer-oriented service;
- Provide efficient, effective, and safe services; and
- Promote the transit service.

2.2. Transportation Conditions

In order to get an accurate representation of the existing roadway network in the Great Falls Area, it was necessary to collect and analyze a significant amount of data. The data aids in the understanding of how the current road network is operating and gives a basis for determining future planning needs.

2.2.1. Existing Roadway Volumes and Capacity

Existing roadway traffic data were collected by MDT, the City of Great Falls, and Cascade County. The data were used to establish traffic conditions and to provide reliable data on historic traffic volumes. The existing facility size for the major street network is presented in **Figure 5**. Facility size is a qualitative observation of the number of travel lanes and physical divisions of the roadway. The existing Average Annual Daily Traffic (AADT) along the major street network is presented in **Figure 6.**

The capacity of the roadways is of critical importance when looking at the growth of the community. As traffic volumes increase, vehicle flow deteriorates. When traffic volumes approach and exceed the available capacity, users experience congestion and vehicle delay. As such, it is important to investigate the size and configuration of the existing roadways and to determine if these roads need to be expanded to accommodate the existing or projected traffic demands. The capacity of a roadway is based on various features including the number of lanes, intersection function, access and intersection spacing, vehicle fleet mix, roadway geometrics, and vehicle speeds. Individual roadway capacity varies greatly and should be calculated on an individual basis. However, for planning and comparison purposes, theoretical roadway capacities were developed based on the existing roadway configuration. **Table 2** presents the capacities, given in vehicles per day, that have been used for this work. The values given in the table are not intended to be used to set any thresholds for roadway performance, but rather provide general information to be used for comparison purposes.

Table 2: Theoretical Roadway Capacity

Road Configuration	Capacity (vpd) [(a)]
2 Lane	12,000
2 Lane - Divided / TWLTL	18,000
3 Lane	18,000
3 Lane - Divided / TWLTL	24,000
4 Lane	24,000
4 Lane - Divided / TWLTL	32,000
6 Lane - Divided / TWLTL	48,000
Interstate	68,000

[(a)] Values represent planning level daily capacities developed for this Transportation Plan and are intended for comparison purposes only. Actual physical roadway capacity can vary greatly depending on road design features and access control.

A roadway's capacity, and associated volume-to-capacity (v/c) ratio, can be used as a comparison tool when looking at the transportation system. The v/c ratio of a roadway is defined as the traffic volume on the roadway divided by the capacity of the roadway. **Figure 7** presents the resultant v/c ratios for the existing major street network.

A v/c ratio that exceeds 1.00 is typically a sign that the volumes on the roadway are greater than the available capacity on the roadway. When this occurs, higher than normal vehicle delay is generally experienced. However, as mentioned previously, the theoretical roadway capacities are used for comparison purposes and actual physical roadway capacity can vary greatly. Consequently, the v/c ratios in **Figure 7** should be used to help identify potential capacity deficiencies on the transportation system.

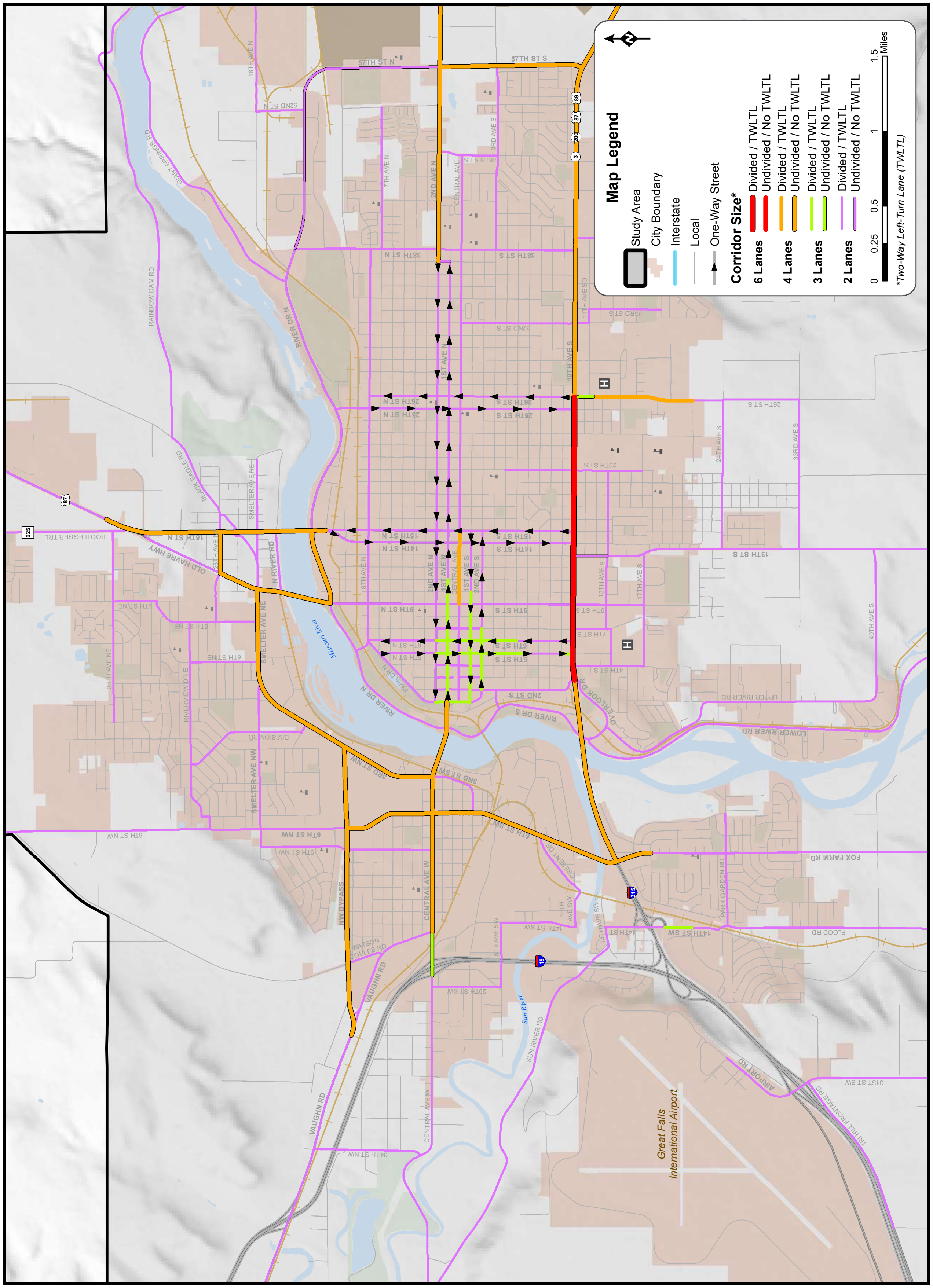


Figure 5: Existing Corridor Facility Size

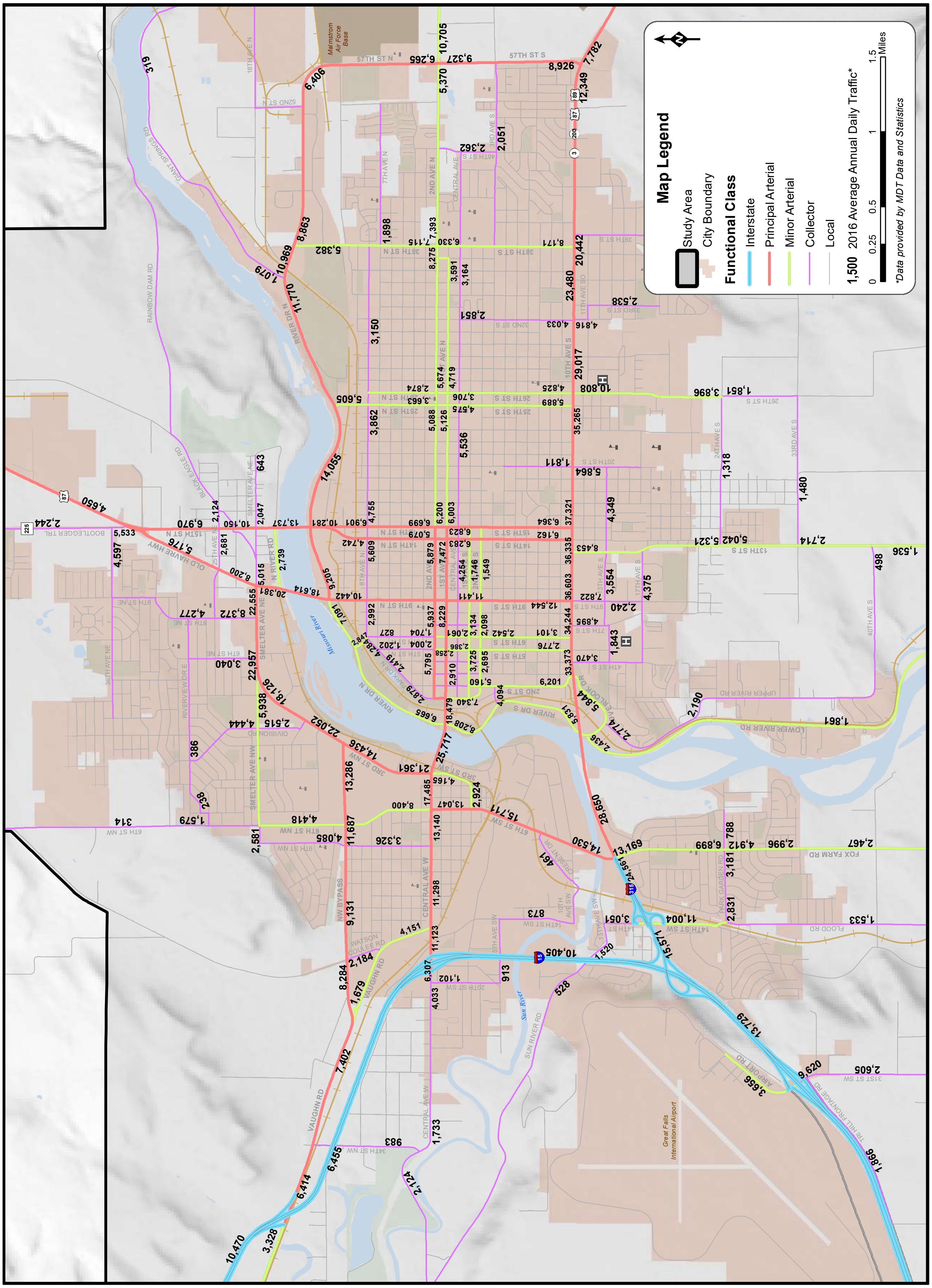


Figure 6: Existing Average Annual Daily Traffic

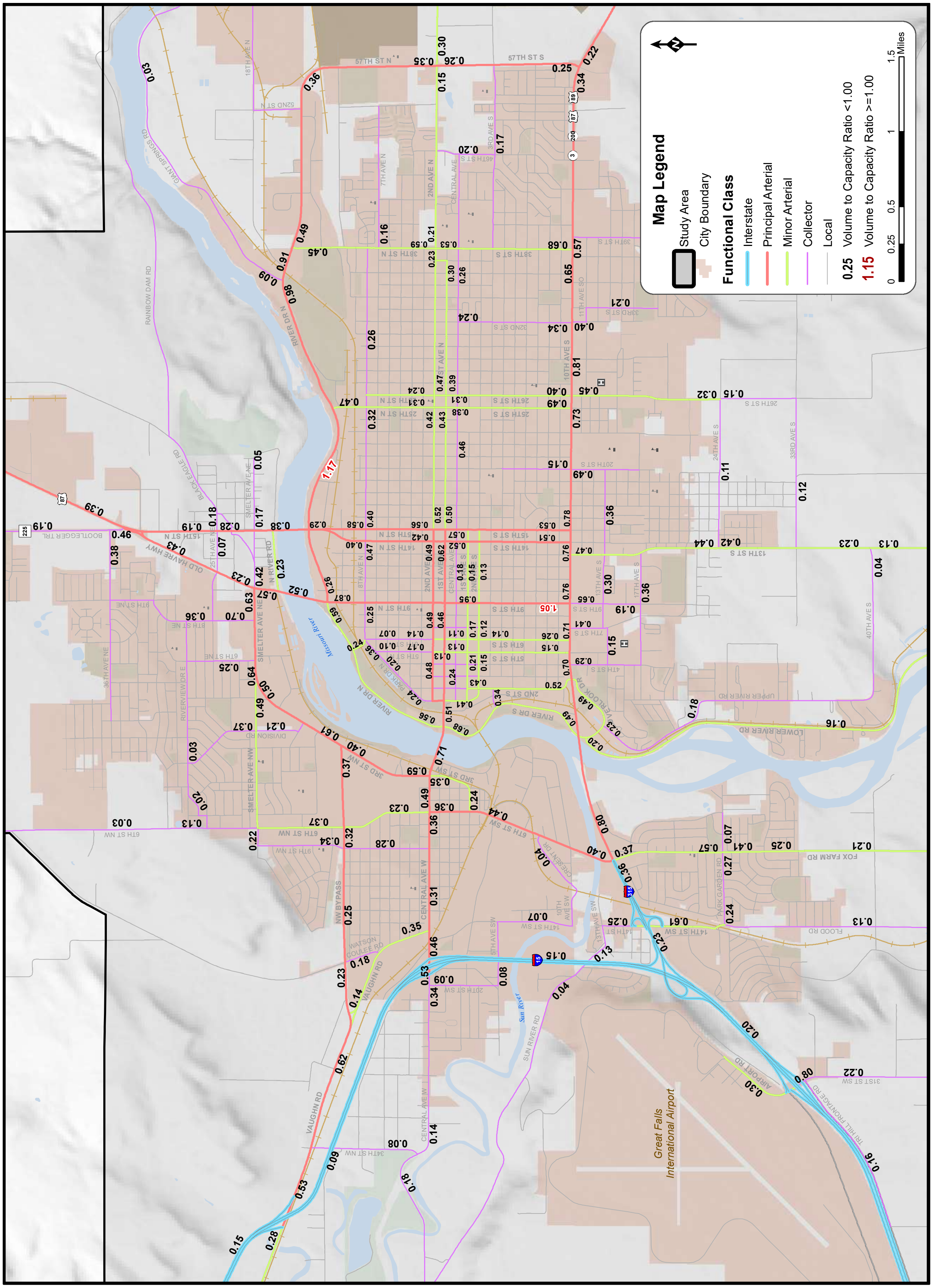


Figure 7: Existing Volume to Capacity Ratios

2.2.2. Intersection Operations

Urban road systems are ultimately controlled by the efficiency of the major intersections. High amounts of vehicle delay at major intersections directly reduces the number of vehicles that can be accommodated along the road during peak hours. As a result of this strong impact on corridor function, intersection improvements can usually be a cost-effective means of increasing a corridor's traffic volume capacity. In some circumstances, corridor expansion projects may be able to be delayed with targeted intersection improvements. Due to the significant portion of total expense for road 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 improvements. If adequate design life can be achieved with only improvements to the intersections, then a corridor expansion may not be the most effective solution. With that in mind, it is important to determine how well the major intersections are functioning by evaluating their performance.

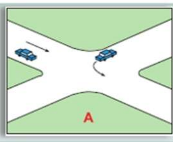
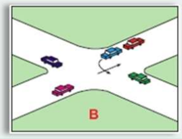
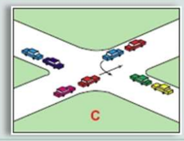
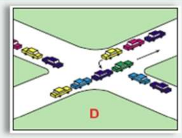
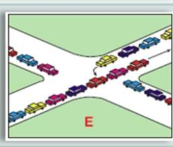
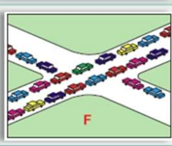
Intersection performance is evaluated in terms of vehicle delay. The amount of vehicle delay experienced at an intersection correlates to a measure called level of service (LOS). LOS is used as a means for identifying intersections that are experiencing operational difficulties, as well as a means for comparing multiple intersections. The LOS 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 the intersection. The scale ranges from "A" which indicates little, if any, vehicle delay, to "F" which indicates significant vehicle delay and traffic congestion. **Table 3** portrays a graphical representation of LOS.

The Transportation Research Board's *Highway Capacity Manual* (HCM) is the most widely used reference in determining the performance of existing roads and intersections, and for providing input into estimating future performance. As such, the HCM methods are implemented in the intersection operational analysis. Key inputs for the analysis include intersection layout, traffic volumes, traffic control, and signal timings. The observed volumes are adjusted by peak hour and seasonal adjustment factors and are used to calculate the ideal flow rate through the intersection. This flow rate helps calculate the true capacity of the intersection. With this information, total vehicle delay and LOS can be calculated for the intersection.

Data from various sources were compiled to display LOS for intersections in the study area. Intersections having poor operations or safety concerns were identified by the City as needing analysis and were therefore included herein. Data from recent corridor planning studies conducted by MDT (I-15 and River Drive Corridor Studies) were used to provide a more current LOS analysis than that provided in the 2014 LRTP. Additionally, there are count locations where more current (year 2016 or 2017) data is available, in these locations a new LOS analysis was performed using the updated turning movement counts. For many of the intersections counted for the 2014 LRTP there is no new data available, in which case the LOS calculations from the 2014 LRTP remained the same for the current LRTP.

In total, 50 intersections have been included in the LOS analysis. Of those intersections, 33 locations use the LOS data from the 2014 LRTP. An additional 14 locations were from the *River Drive Corridor Study* or the *I-15 Gore Hill to Emerson Junction Corridor Study*. There are only three locations where new data is available. Each intersection was analyzed for the peak hours, defined as 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. **Figure 8** shows the intersections where peak hour turning movement counts are available.

Table 3: Intersection LOS Descriptions

LOS	Intersection	Signalized Delay (sec)	Unsignalized Delay (sec)	Description
A		<10	<10	• Free flow • Low Volumes • <1 vehicle in queue • **Signalized:** most vehicles do not stop • **Unsignalized:** Very easy to find acceptable gap
B		10-20	10-15	• Mostly free flow • Somewhat low Volumes • Occasionally 1+ vehicles in queue • **Signalized:** vehicles clear in one green phase • **Unsignalized:** Very easy to find acceptable gap
C		20-35	15-25	• Smooth flow • Moderate Volumes • Standing queue of at least 1 vehicle • **Signalized:** Individual cycle failures may occur • **Unsignalized:** Acceptable gaps found regularly
D		35-50	25-35	• Approaching unstable flow • High volume/capacity ratios • Standing queue of vehicles upon arrival • **Signalized:** Individual cycle failures are noticeable • **Unsignalized:** Hard to find acceptable gap
E		50-80	35-50	• Unstable flow • Volumes at or near capacity • Standing queue of vehicles upon arrival • **Signalized:** Individual cycle failures are frequent • **Unsignalized:** Hard to find acceptable gap
F		>80	>50	• Saturation condition • Volumes over capacity • Standing queue of vehicles upon arrival • **Signalized:** Many individual cycle failures • **Unsignalized:** Very hard to find acceptable gap

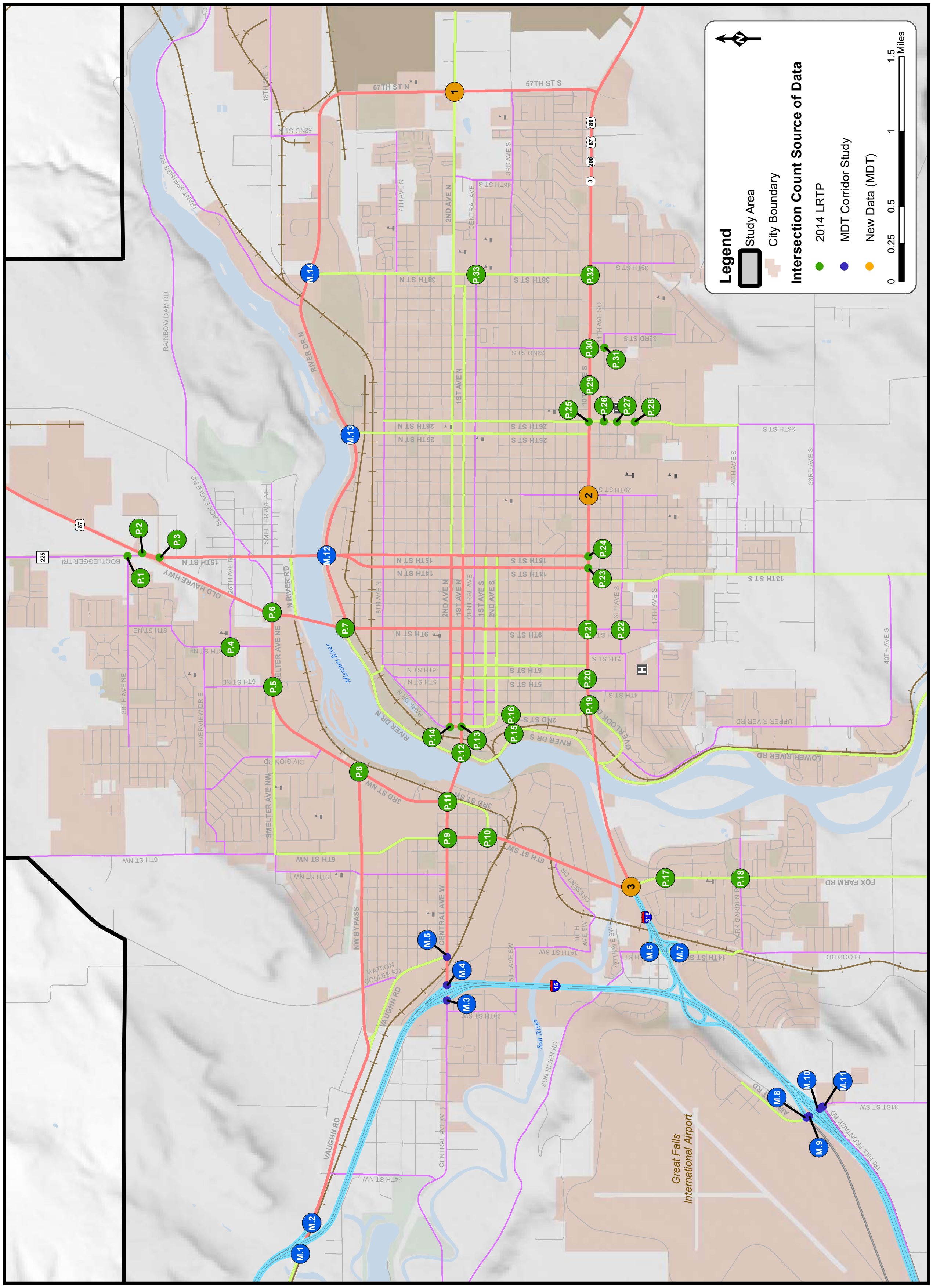


Figure 8: Intersection Count Locations

For signalized intersections, the LOS is based on the average stopped delay per vehicle. The relationship between LOS and average stopped delay per vehicle is shown in **Table 3**. The procedures used to evaluate signalized study intersections use detailed information on geometry, lane use, signal timing, peak hour volumes, arrival types, and other parameters. An intersection is determined to be functioning adequately if it is operating at LOS C or better.

LOS for two-way stop (TWS) controlled intersections are based on the delay experienced by each individual movement within the intersections, rather than on the average 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 expectation and perceptions are entirely different. For two-way stop-controlled intersections, the through traffic on the major (uncontrolled) street experiences little to no delay at the intersection. Conversely, vehicles turning left from the minor street experience more delay than other movements and at times can experience significant delay. Vehicles on the minor street which are turning right or going across the major street generally experience less delay than those turning left from the same approach. Due to this situation, the intersection LOS is based on the average delay incurred at the worst performing movement.

For all-way stop (AWS) controlled intersections, LOS is based on average vehicle delay experienced at the intersection since all approaches are given similar opportunity to move through the intersection. This methodology is similar to that of signalized intersections.

Table 4 presents the intersection LOS and average vehicle delay during the AM and PM peak hours. The existing intersection LOS is also shown in **Figure 9**. Detailed results are provided in **Appendix B**.

Table 4: Existing Intersection LOS

ID	Intersection	Control Type	AM Peak Hour		PM Peak Hour	
			Delay (Sec)	LOS	Delay (Sec)	LOS
Intersections with New Count Data Available						
1	2nd Avenue N / 57th Street N	Signalized	21.0	C	21.7	C
2	10th Avenue S / 20th Street S	Signalized	14.2	B	21.9	C
3	10th Avenue S / Fox Farm Road	Signalized	37.6	D	49.7	D
Intersections Counted for MDT Corridor Studies						
M.1	I-15 SB / Vaughn Road	TWS	10.1	B	10.1	B
M.2	I-15 NB / Vaughn Road	TWS	7.3	A	7.3	A
M.3	I-15 SB Ramps / Central Avenue W	TWS	28.0	D	42.0	E
M.4	I-15 NB Ramps / Central Avenue W	TWS	19.9	C	29.1	D
M.5	Vaughn Road / Central Avenue W	TWS	27.1	D	65.0	F
M.6	14th Street SW / I-315 WB	Signalized	23.0	C	19.4	B
M.7	14th Street SW / I-315 EB	Signalized	14.4	B	13.0	B
M.8	I-15 SB Off Ramp / Airport Drive	TWS	12.7	B	35.5	E
M.9	I-15 SB On Ramp / Airport Drive	TWS	8.6	A	11.0	B
M.10	I-15 NB Ramps / Airport Drive	TWS	16.9	C	55.4	F
M.11	Tri Hill Frontage Rd / Airport Drive	TWS	13.5	B	14.5	B
M.12	River Drive N / 15th Street N	Signalized	37.5	D	31.3	C
M.13	River Drive N / 25th Street N	TWS	31.4	D	92.7	F
M.14	River Drive N / 38th Street N	Signalized	8.6	A	8.3	A
Intersections Counted in 2014 LRTP						
P.1	36th Avenue NE / Bootlegger Trail	TWS	13.4	B	14.5	B
P.2	Bootlegger Trail / U.S. 87	TWS	15.4	C	47.8	E
P.3	Old Havre Highway / 15th Street N	TWS	20.3	C	18.1	C

ID	Intersection	Control Type	AM Peak Hour		PM Peak Hour	
			Delay (Sec)	LOS	Delay (Sec)	LOS
P.4	25th Avenue NE / 8th Street NE	TWS	47.2	E	32.1	D
P.5	Smelter Avenue / 6th Street NE	Signalized	12.9	B	10.4	B
P.6	Smelter Avenue / 10th Street NE	Signalized	58.2	E	70.3	E
P.7	River Drive N / 9th Street N	Signalized	25.3	C	29.6	C
P.8	NW Bypass / 3rd Street NW	Signalized	12.3	B	14.2	B
P.9	Central Avenue NW / 6th Street NW	Signalized	22.4	C	25.4	C
P.10	6th Street SW / 4th Avenue SW	TWS	18.1	C	48.3	E
P.11	Central Avenue W / 3rd Street NW	Signalized	31.5	C	37.8	D
P.12	River Drive N / 1st Avenue N	Signalized	30.2	C	109.1	F
P.13	Park Drive N / 1st Avenue N	Signalized	14.9	B	20.2	C
P.14	Park Drive N / 2nd Avenue N	TWS	60.7	F	221.3	F
P.15	River Drive S / 3rd Avenue S	TWS	12.7	B	44.4	E
P.16	2nd Street S / 3rd Avenue S	TWS	12.3	B	24.6	C
P.17	Fox Farm Road / 18th Avenue SW	TWS	328.8	F	27.4	D
P.18	Fox Farm Road / Park Garden Road	TWS	48.2	E	20.5	C
P.19	10th Avenue S / 2nd Street S	Signalized	20.4	C	36.9	C
P.20	10th Avenue S / 5th Street S	Signalized	14.0	B	28.0	C
P.21	10th Avenue S / 9th Street S	Signalized	15.3	B	25.4	C
P.22	13th Avenue S / 9th Street S	AWS	15.5	C	25.4	D
P.23	10th Avenue S / 14th Street S	Signalized	17.9	B	21.2	C
P.24	10th Avenue S / 15th Street S	Signalized	7.1	A	12.6	B
P.25	10th Avenue S / 25th Street S	Signalized	19.4	B	24.1	C
P.26	11th Avenue S / 26th Street S	TWS	24.2	C	16.3	C
P.27	13th Avenue S / 26th Street S	TWS	12.7	B	16.3	C
P.28	15th Avenue S / 26th Street S	TWS	15.7	C	16.7	C
P.29	10th Avenue S / 29th Street S	TWS	97.7	F	87.4	F
P.30	10th Avenue S / 32nd Street S	Signalized	18.3	B	25.9	C
P.31	32nd Street S / 11th Avenue S	TWS	13.7	B	14.8	B
P.32	10th Avenue S / 38th Street S	Signalized	16.7	B	19.2	B
P.33	38th Street / Central Avenue	AWS	19.1	C	18.3	C

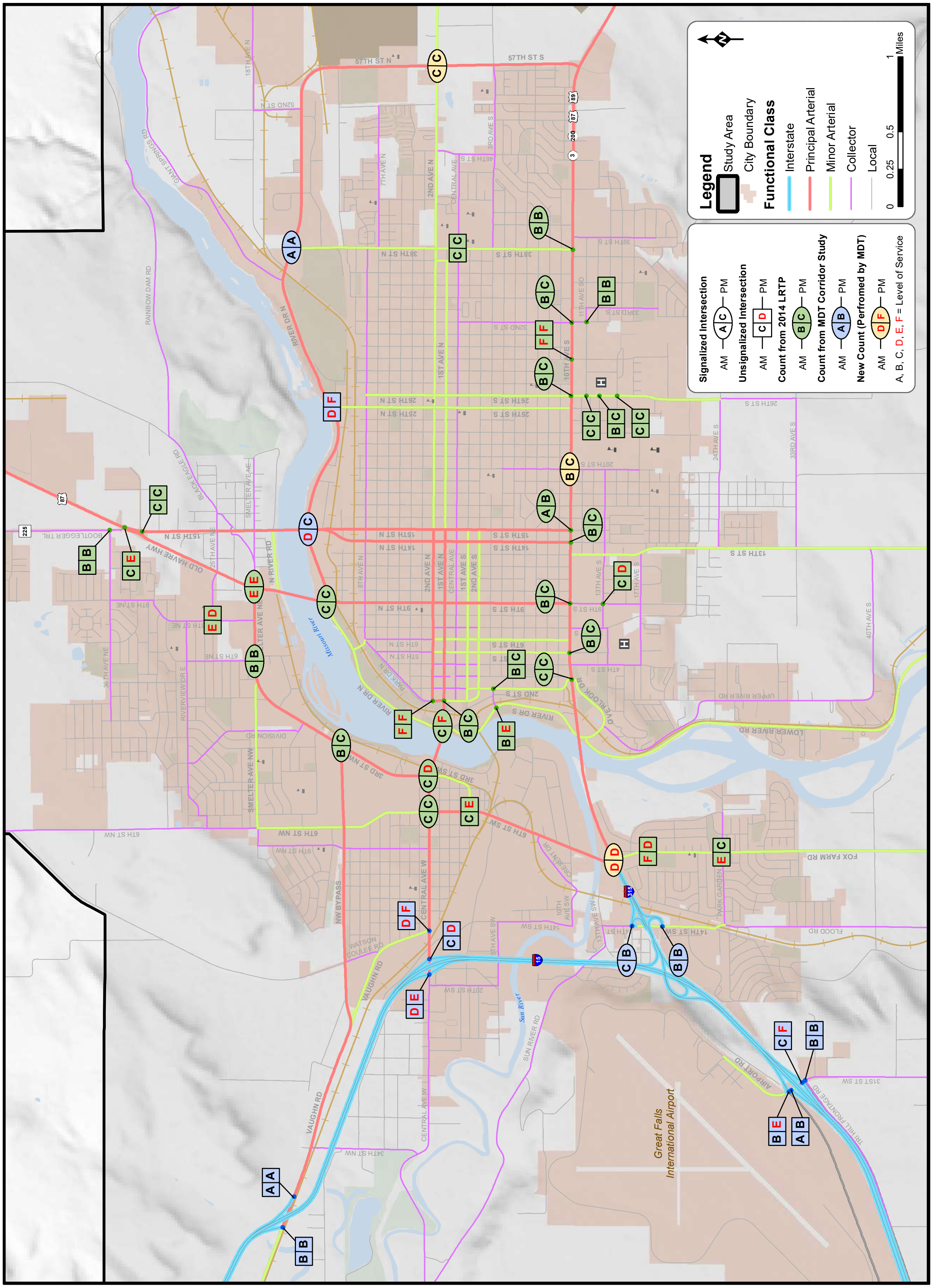


Figure 9: Existing Intersection Level of Service

2.2.3. Active Transportation Data

Providing an accurate picture of pedestrian and bicycle activity within any community is difficult. Data are typically not available or not comprehensive enough to form a complete picture of active transportation behavior. Data for vehicles is, by comparison, much more readily available. The following subsections summarize available data pertaining to active transportation.

JOURNEY TO WORK/COMMUTING (ACS)

The US Census has long been one of the only readily available sources of data to measure general levels of transportation choices. The data are limited to commute based trips and do not reflect the spectrum of potential trip types available. The American Community Survey (ACS) has supplemented the 10-year cycle of the US Census to provide additional annual data. For communities the size of Great Falls, annual data are not statistically valid, therefore five-year averages are used. This method provides some insight; however, it is slow to note changes over time. **Figure 10** provides a comparison of commuting modes in Montana's largest communities.

BICYCLING

Five-year ACS averages show that approximately 0.5 percent of commuters choose to travel to and from work by bicycle in Great Falls. This is similar to the 0.5 percent when measured during the 2000 Census. When compared to the rest of the United States, this figure is lower than the average, (0.6 percent) but is less than Montana's average mode share for bicycling to work (1.4 percent). In comparison to other major cities in Montana, Great Falls has fewer bike-to-work commuters than all other large Montana cities.

WALKING

About 3.1 percent of commuters in Great Falls walk to and from work. This is higher than the national (2.8 percent) and state (5.1 percent) averages, and the same as the 2000 Census when 3.1 percent of commuters walked. Compared to the other major cities in Montana, Great Falls has fewer bike-to-work commuters than Billings, Missoula, Bozeman, and Helena but outperforms Butte and Kalispell.

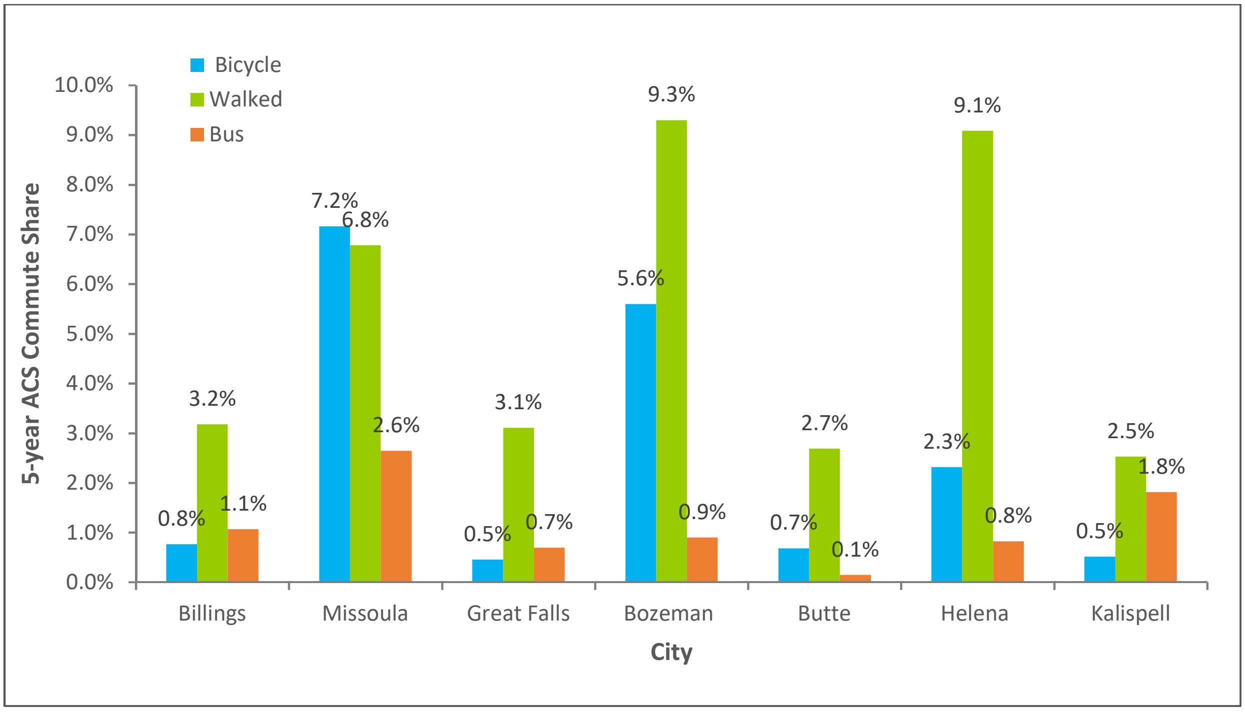


Figure 10: 5 Year ACS Commute Share of Seven Largest Montana Cities

ALL TRIPS (NHTS)

Data from the National Household Travel Survey (NHTS) provides mode share data aggregated at the national level for all trips and not just commute to work trips. For example, NHTS indicates that for every bike to work trip, there are another 1.6 utilitarian bike trips (shopping, personal trips, transporting others, medical or dental visits, meals, or other reasons), 0.5 bike to school trips, and 4.8 social or recreational trips. Overall bike to work trips represent only approximately 7.5 percent of all bike trips nationally. It should be noted that approximately 41 percent of bike trips counted by NHTS are return home trips, indicating many bicyclists perform the initial part of their round trip by other means. **Figure 11** provides a comparison of NHTS data for Montana's largest cities.

BICYCLING

Bicycle mode share for all trips in Great Falls is estimated at 1.4 percent, which is higher than the national average (1.0 percent) but lower than the statewide average for Montana (2.5 percent). In comparison to other Montana cities, Great Falls' total bicycle mode share is higher than Billings and Butte, but lower than the other four larger cities highlighted.

WALKING

An estimated 5.5 percent of all trips in Great Falls are walking trips, which is much higher than the ACS data outlining walking to and from work (2.7 percent), but it still remains lower than all six Montana cities in the graph and also lower than the national (6.1 percent) and Montana (10.6 percent) averages.

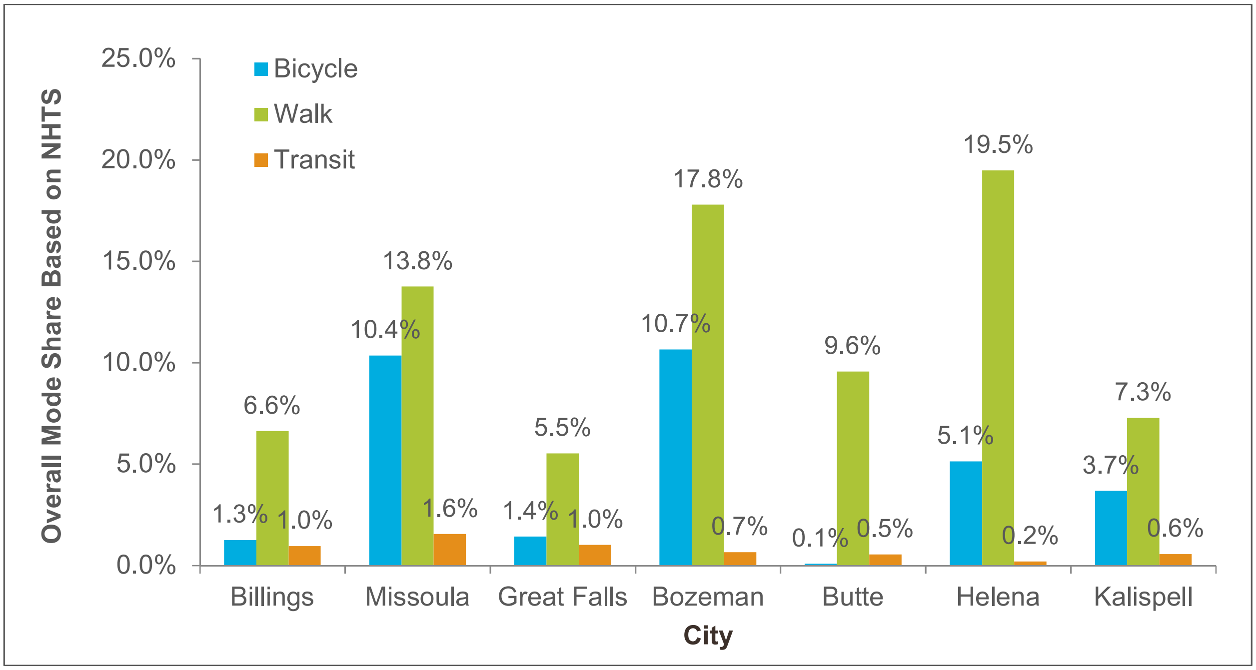


Figure 11: Overall Mode Share Based on NHTS of Seven Largest Montana Cities

3.0 PROJECTED TRANSPORTATION CONDITIONS

An analysis of the projected transportation system was performed to estimate how traffic patterns and characteristics may change from the existing conditions in the future. The inputs for this analysis include known existing conditions and anticipated land development expected to occur out to the year 2038. Provided in this section is a description of the traffic modeling effort that was conducted to forecast future travel conditions. The results of the model were used to identify areas of the transportation system where growth and congestion may occur due to forecasted development.

3.1. Travel Demand Model Development

A travel demand model was developed by MDT for Cascade County. The model was developed using *TransCAD* software. The model used a combination of information from the Census Bureau, GeoResults, Department of Labor and Industry, and Cascade County. The model was developed to represent 2015 baseline traffic conditions. A comparison of the model to known 2015 traffic data was performed to validate the model. The model was adjusted and calibrated to best represent 2015 conditions.

After developing the baseline 2015 model, future conditions were developed to evaluate the planning year 2038. Housing units and employment were added to census blocks to distribute growth that is projected to occur out to the year 2038. Known roadway infrastructure projects expected to be constructed within the next five years ("committed" projects) were also included as part of the 2038 future model.

One assumption that was built into the model is that traffic characteristics will remain similar to those that are seen today. Many factors can influence this assumption, such a fuel prices, technological advances, and other unknown circumstances. The model also assumes that the socioeconomic projections will be realized by the year 2038. Although projections are based upon local knowledge and past growth trends, they may not be completely accurate. Ultimately, the model for the projected conditions was used as a planning tool to help evaluate how traffic patterns might be affected by anticipated future development.

3.2. Projected Roadway Volumes and Capacity

Projected traffic volumes were estimated using the travel demand model. A comparison of the existing and projected conditions models was made to determine the percent change in traffic volume. The percent changes were then applied to known existing AADT count sites to estimate future daily traffic volumes. **Figures 12** and **13** show the projected AADT volumes and v/c ratios along the major street network, respectively. Note that the values shown in the figures assume that no changes to the transportation system will be made other than those currently committed to.

Additionally, to visualize where growth is projected to occur in Great Falls, and to aid in the planning process, a map of the projected traffic volume growth on the major street network was prepared. **Figure 14** shows where high traffic growth is expected to occur given the future land use assumptions made. The volumes shown are the difference between the volumes in the 2015 and 2038 travel demand models. In other words, the volumes shown represent additional traffic that could be added to the network should development occur in the manner projected. This visualization helps identify which roads may need additional investment to accommodate future growth. While some roads currently have little traffic volume and do not currently have capacity issues, future growth may greatly increase traffic volumes and could cause capacity issues if road improvements are not made.

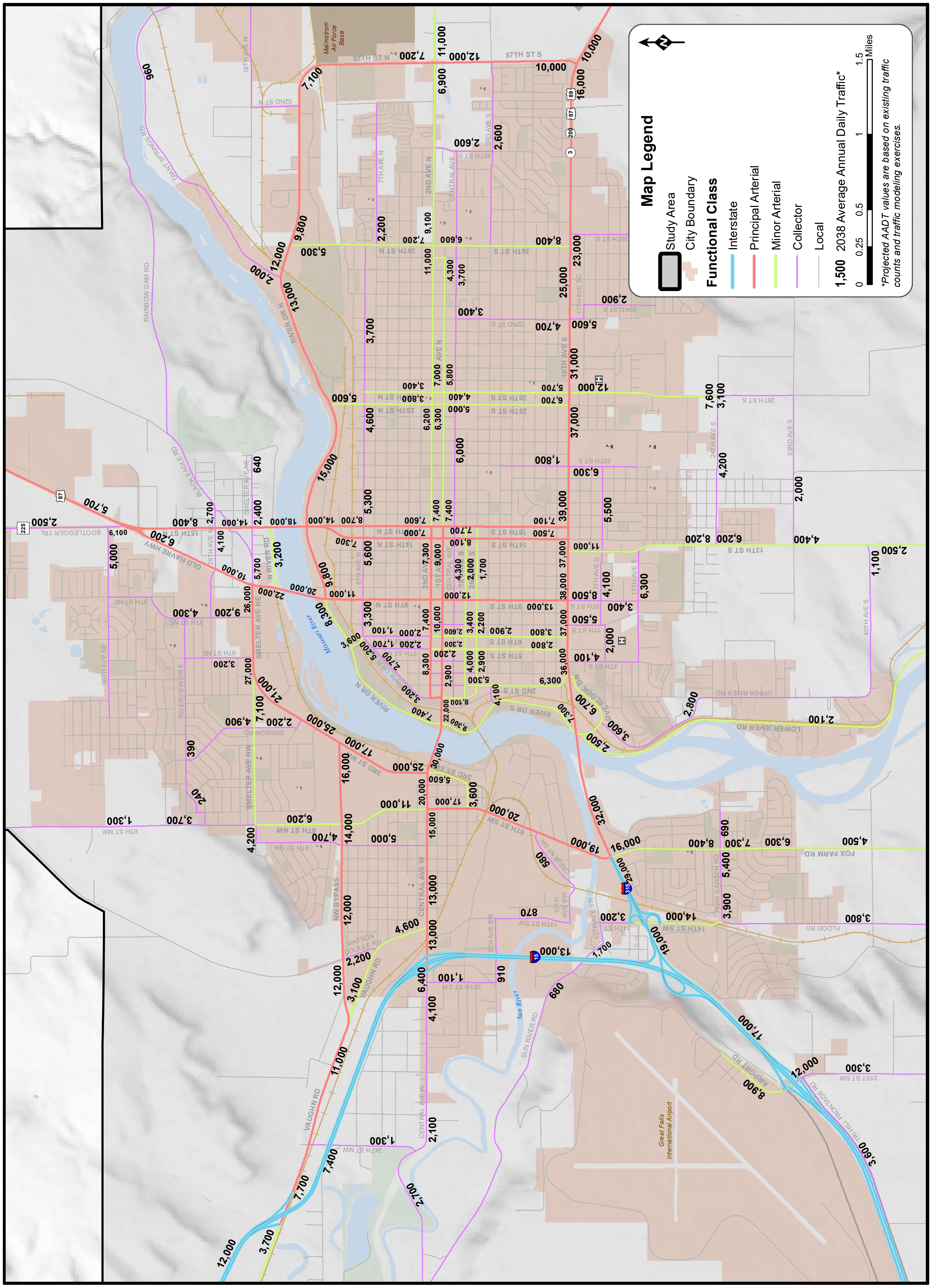


Figure 12: Projected Average Annual Daily Traffic

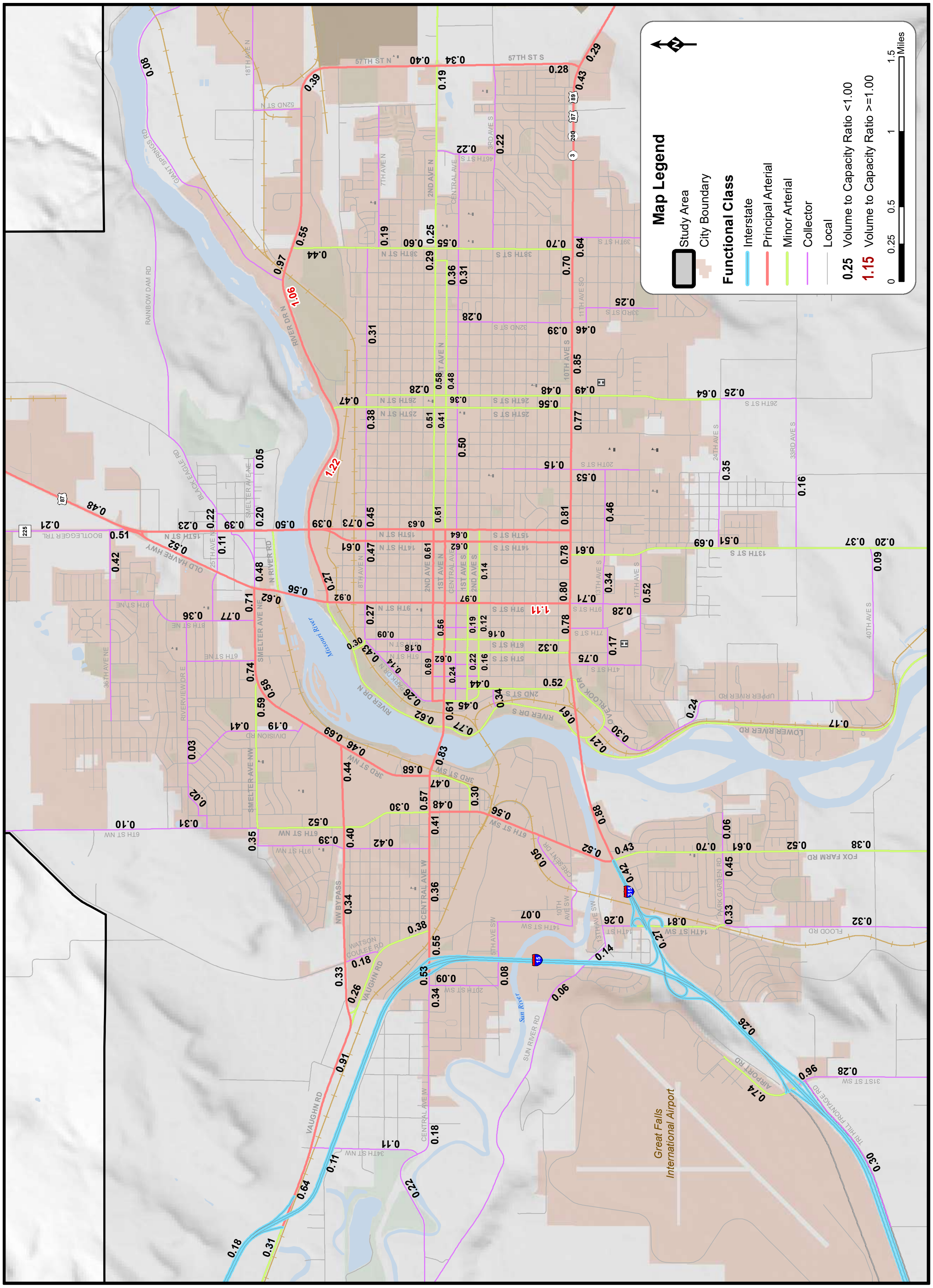


Figure 13: Projected Volume to Capacity Ratios

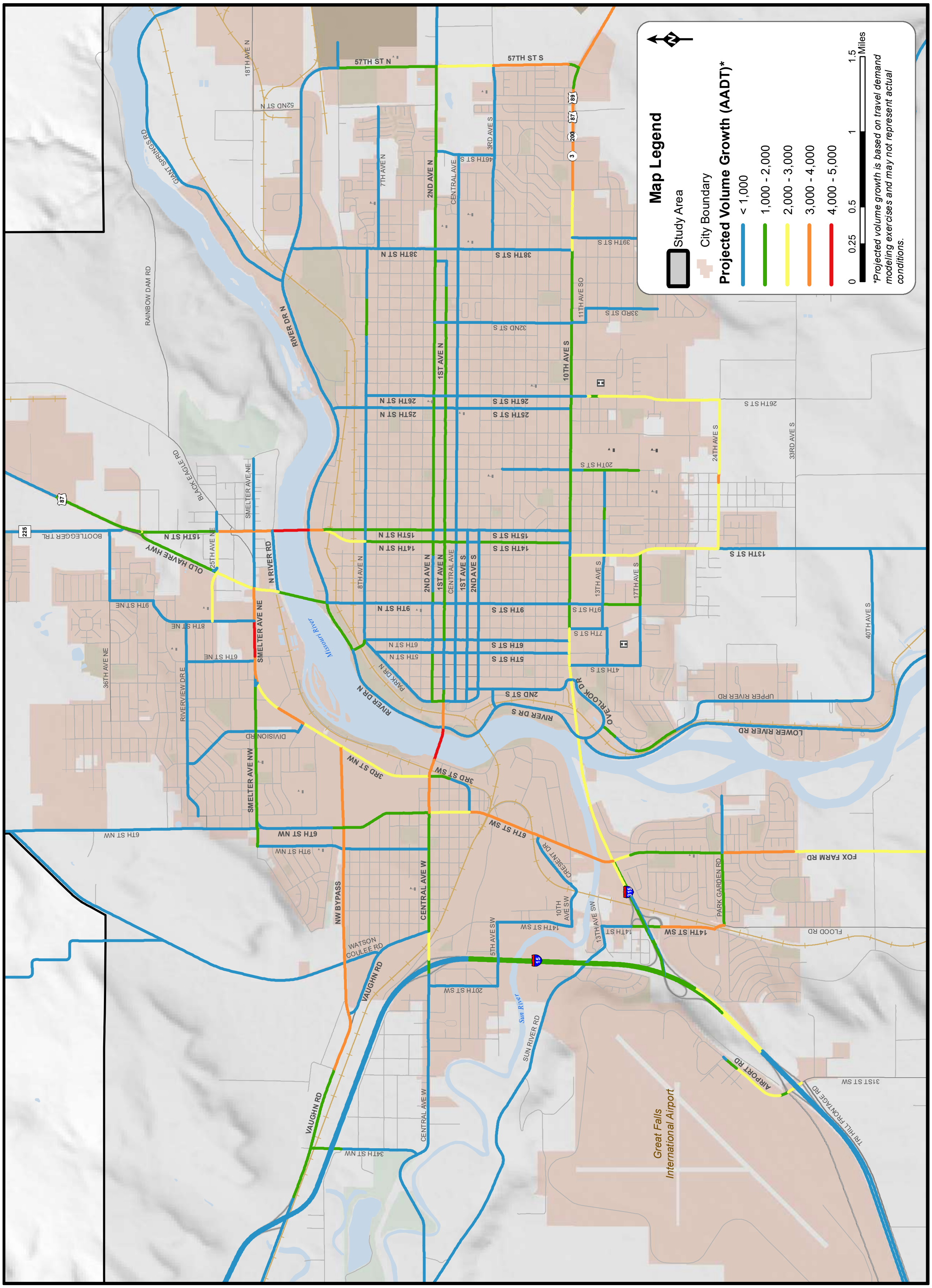


Figure 14: Projected Volume Growth

3.3. Projected Intersection Level of Service

Projections for intersection traffic volumes were made for the 50 intersections analyzed previously in **Section 2.2.2**. These projections were based on percent growth rates calculated from the travel demand model for the year 2038. A growth rate determined for the intersection as a whole was applied to each individual turning movement to represent projected conditions. The intersection LOS was calculated using the existing street layouts, lane-use configurations, and traffic control devices. The results of the analysis are shown in **Table 5** and **Figure 15**. More detailed information is provided in **Appendix C**.

Table 5: Projected Signalized Intersection LOS

ID	Intersection	Control Type	AM Peak Hour		PM Peak Hour	
			Delay (Sec)	LOS	Delay (Sec)	LOS
Intersections with New Count Data Available						
1	2nd Avenue N / 57th Street N	Signalized	21.6	C	22.3	C
2	10th Avenue S / 20th Street S	Signalized	13.8	B	27.5	C
3	10th Avenue S / Fox Farm Road	Signalized	45.6	D	80.4	F
Intersections Counted for MDT Corridor Studies						
M.1	I-15 SB / Vaughn Road	TWS	11.0	B	11.0	B
M.2	I-15 NB / Vaughn Road	TWS	7.3	A	7.4	A
M.3	I-15 SB Ramps / Central Avenue W	TWS	178.9	F	314.9	F
M.4	I-15 NB Ramps / Central Avenue W	TWS	113.1	F	445.2	F
M.5	Vaughn Road / Central Avenue W	TWS	406.0	F	1422.7	F
M.6	14th Street SW / I-315 WB	Signalized	22.2	C	19.6	B
M.7	14th Street SW / I-315 EB	Signalized	13.3	B	12.4	B
M.8	I-15 SB Off Ramp / Airport Drive	TWS	121.8	F	3138.9	F
M.9	I-15 SB On Ramp / Airport Drive	TWS	10.4	B	23.5	C
M.10	I-15 NB Ramps / Airport Drive	TWS	44.2	E	*OCB*	F
M.11	Tri Hill Frontage Rd / Airport Drive	TWS	27.3	D	43.7	E
M.12	River Drive N / 15th Street N	Signalized	58.7	E	58.3	E
M.13	River Drive N / 25th Street N	TWS	73.8	F	517.9	F
M.14	River Drive N / 38th Street N	Signalized	11.3	B	11.7	B
Intersections Counted in 2014 LRTP						
P.1	36th Avenue NE / Bootlegger Trail	TWS	139.1	F	358.8	F
P.2	Bootlegger Trail / U.S. 87	TWS	117.8	F	1105.0	F
P.3	Old Havre Highway / 15th Street N	TWS	181.2	F	171.8	F
P.4	25th Avenue NE / 8th Street NE	TWS	176.1	F	34.5	D
P.5	Smelter Avenue / 6th Street NE	Signalized	14.8	B	11.9	B
P.6	Smelter Avenue / 10th Street NE	Signalized	110.5	F	130.4	F
P.7	River Drive N / 9th Street N	Signalized	25.9	C	35.4	D
P.8	NW Bypass / 3rd Street NW	Signalized	17.3	B	58.5	E
P.9	Central Avenue NW / 6th Street NW	Signalized	24.5	C	30.1	C
P.10	6th Street SW / 4th Avenue SW	TWS	21.4	C	87.1	F
P.11	Central Avenue W / 3rd Street NW	Signalized	46.4	D	64.3	E
P.12	River Drive N / 1st Avenue N	Signalized	37.1	D	170.1	F
P.13	Park Drive N / 1st Avenue N	Signalized	16.3	B	23.4	C
P.14	Park Drive N / 2nd Avenue N	TWS	121.4	F	480.7	F
P.15	River Drive S / 3rd Avenue S	TWS	16.4	C	199.1	F
P.16	2nd Street S / 3rd Avenue S	TWS	12.8	B	32.6	D
P.17	Fox Farm Road / 18th Avenue SW	TWS	1382.0	F	379.2	F
P.18	Fox Farm Road / Park Garden Road	TWS	710.4	F	49.4	E
P.19	10th Avenue S / 2nd Street S	Signalized	21.4	C	63.9	E

ID	Intersection	Control Type	AM Peak Hour		PM Peak Hour	
			Delay (Sec)	LOS	Delay (Sec)	LOS
P.20	10th Avenue S / 5th Street S	Signalized	15.5	B	34.3	C
P.21	10th Avenue S / 9th Street S	Signalized	18.6	B	32.9	C
P.22	13th Avenue S / 9th Street S	AWS	16.6	C	31.0	D
P.23	10th Avenue S / 14th Street S	Signalized	19.7	B	24.6	C
P.24	10th Avenue S / 15th Street S	Signalized	8.1	A	17.1	B
P.25	10th Avenue S / 25th Street S	Signalized	21.4	C	24.9	C
P.26	11th Avenue S / 26th Street S	TWS	43.2	E	32.9	D
P.27	13th Avenue S / 26th Street S	TWS	20.4	C	37.9	E
P.28	15th Avenue S / 26th Street S	TWS	780.7	F	1430.0	F
P.29	10th Avenue S / 29th Street S	TWS	305.0	F	533.2	F
P.30	10th Avenue S / 32nd Street S	Signalized	21.8	C	36.9	D
P.31	32nd Street S / 11th Avenue S	TWS	15.5	C	17.3	C
P.32	10th Avenue S / 38th Street S	Signalized	19.3	B	27.0	C
P.33	38th Street / Central Avenue	AWS	19.1	C	15.7	C

OCB- Outside Computational Bounds of software

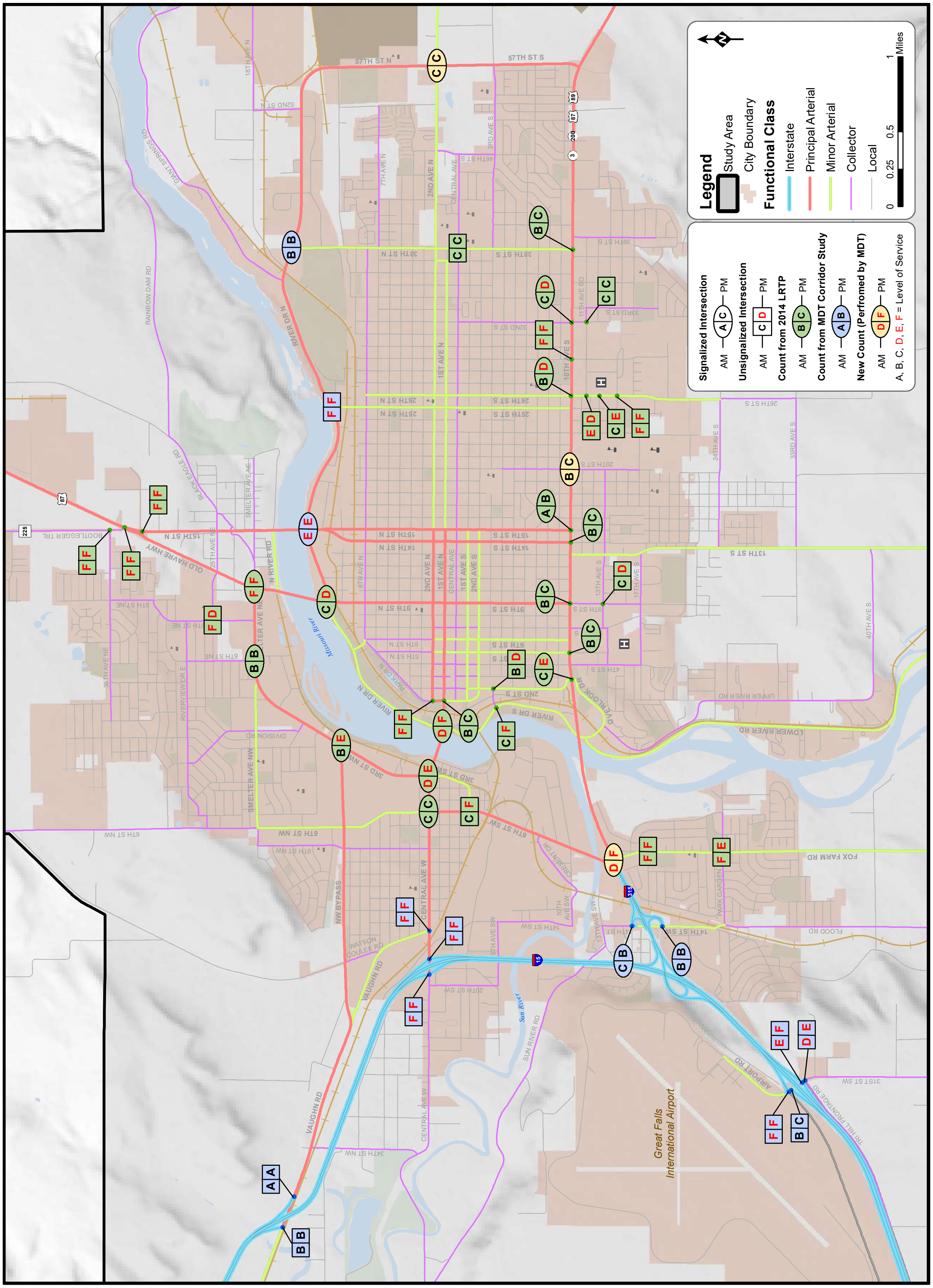


Figure 15: Projected Intersection Level of Service

4.0 SAFETY

Improving transportation safety requires more than just fixing a road or increasing police patrols. In order to be the most effective, safety improvements need to consider the "four E's" of transportation safety: Education, Enforcement, Engineering, and Emergency Services.

Crash data within the study area was analyzed to determine problem areas, "hot-spot" crash locations and behavioral characteristics. Trend analysis comparisons were also made for the City of Great Falls, Cascade County, and the State of Montana to help identify unique trends. The following sections provide an analysis of available crash data to help identify crash trends and contributing factors.

4.1. Study Area Crash Analysis

The MDT Traffic and Safety Bureau provided crash data for the five-year period from January 1st, 2012 to December 31st, 2016. The crash reports are a summation of information from the scene of the crash provided by the responding officer. As such, some of the information contained in the crash reports may be subjective.

According to the MDT crash database, there were 8,558 crashes reported within the study area during the analysis time period. The crash database was plotted spatially based on the XY coordinates recorded for each crash. **Figures 16** and **17** show the density of crashes within the study area based on the spatial data. Crash clusters are generally noted at intersections with the highest traffic volumes.

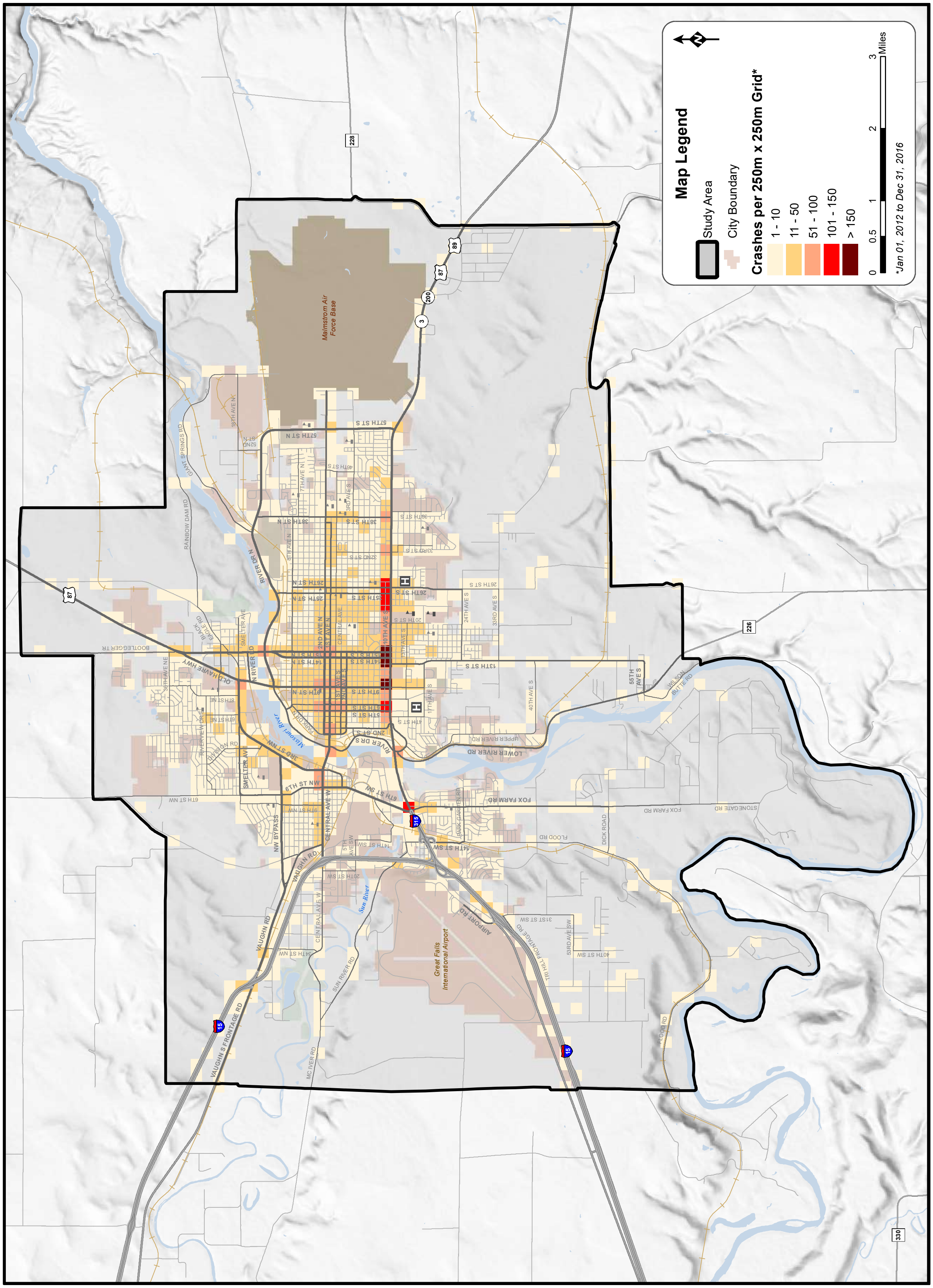


Figure 16: Crash Density

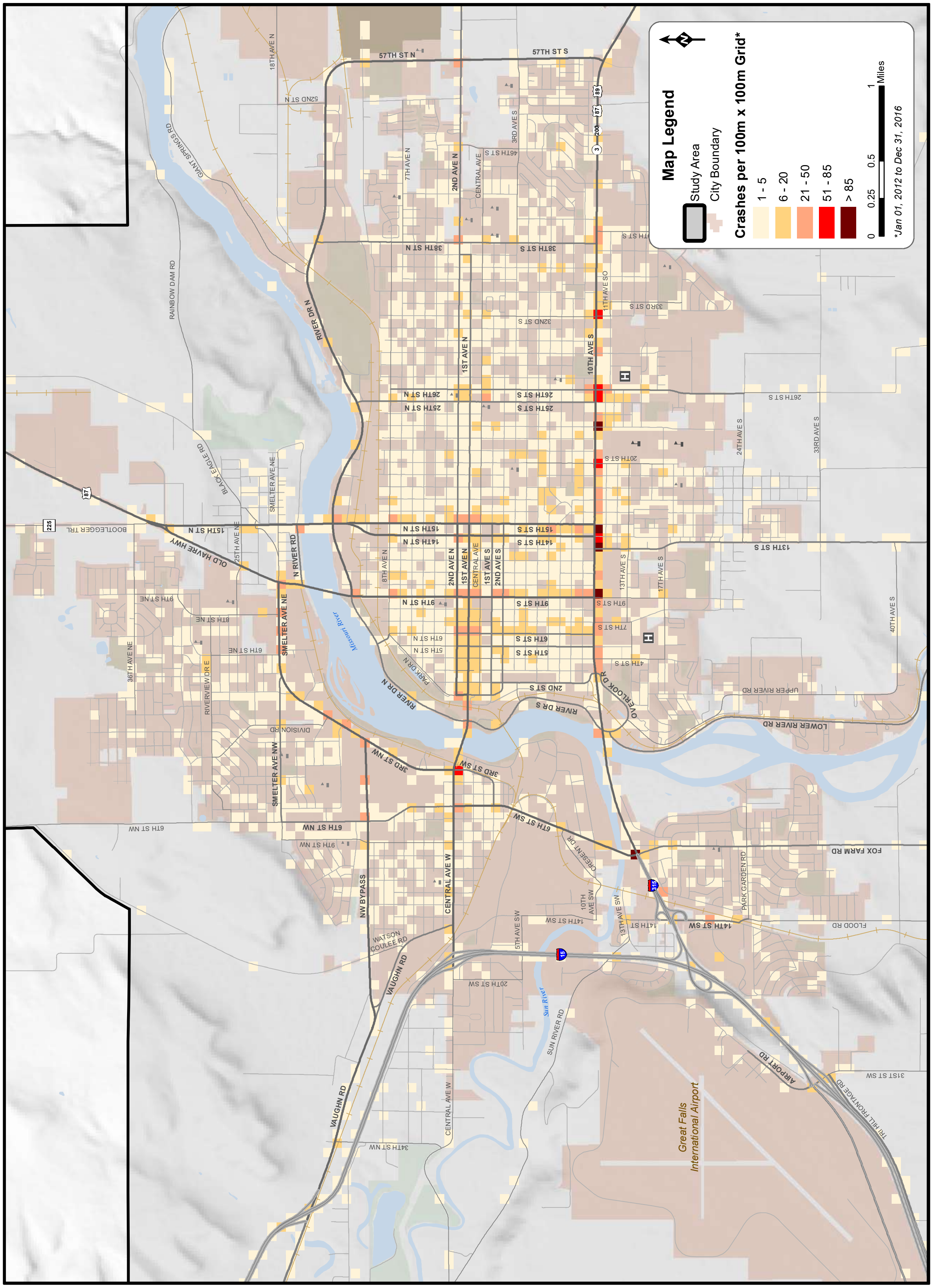


Figure 17: Crash Density (Detail Area)

4.1.1. Crash Period

Crash data for the study area was evaluated based on the period of time when the crash occurred. With regards to time of day, spikes in the number of crashes occur during the peak hours. Over 50 percent of crashes were reported between 12:00 PM and 6:00 PM. The PM peak hours (3:00 PM to 6:00 PM) accounted for approximately 31 percent of reported crashes.

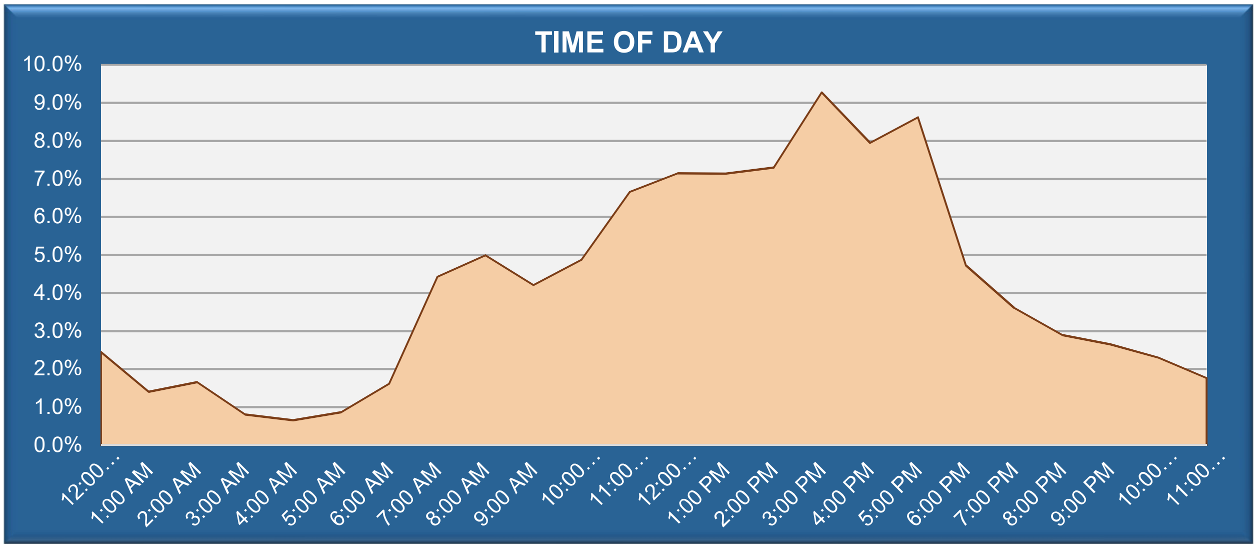
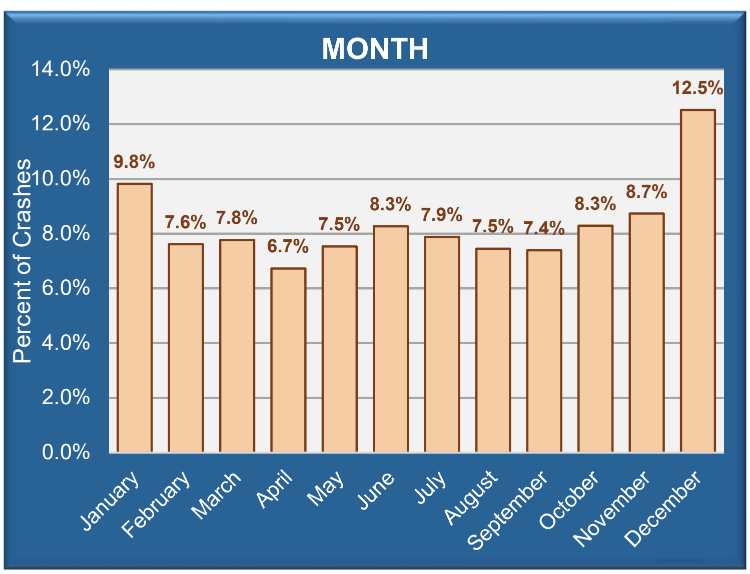


Figure 18: Crash Statistics for Time of Day

The most common month for crashes is December, followed by January and November. During these months, inclement weather conditions often exist which can contribute to an increase in the number of crashes. Traffic volumes also commonly increase during the month of December due to increased holiday related traffic. Over 78 percent of crashes occur on a weekday, with Friday being the most common day with 18.1 percent of crashes. The fewest number of crashes were reported on Sundays.



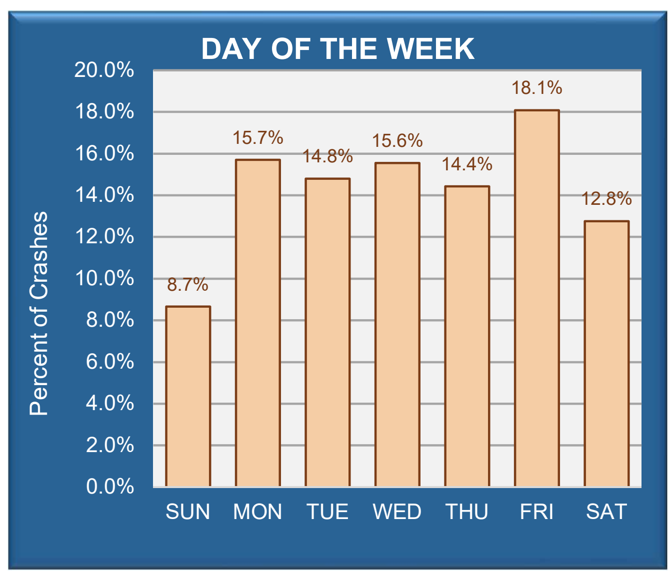


Figure 19: Crash Statistics for Month and Day of the Week

4.1.2. Environmental Factors

Crash data was reviewed to see if any trends exist related to environmental factors such as weather, roadway surfacing, and light conditions. Approximately 68 percent of the reported crashes occurred while road surfacing was dry while 31 percent occurred on wet, icy, snowy or slushy surfacing. Inclement weather conditions (i.e. rain, snow, sleet, or fog) were present for approximately 14 percent of crashes. Over 71 percent of reported crashes occurred during the daylight, while almost 17 percent were reported as under dark lighted conditions.

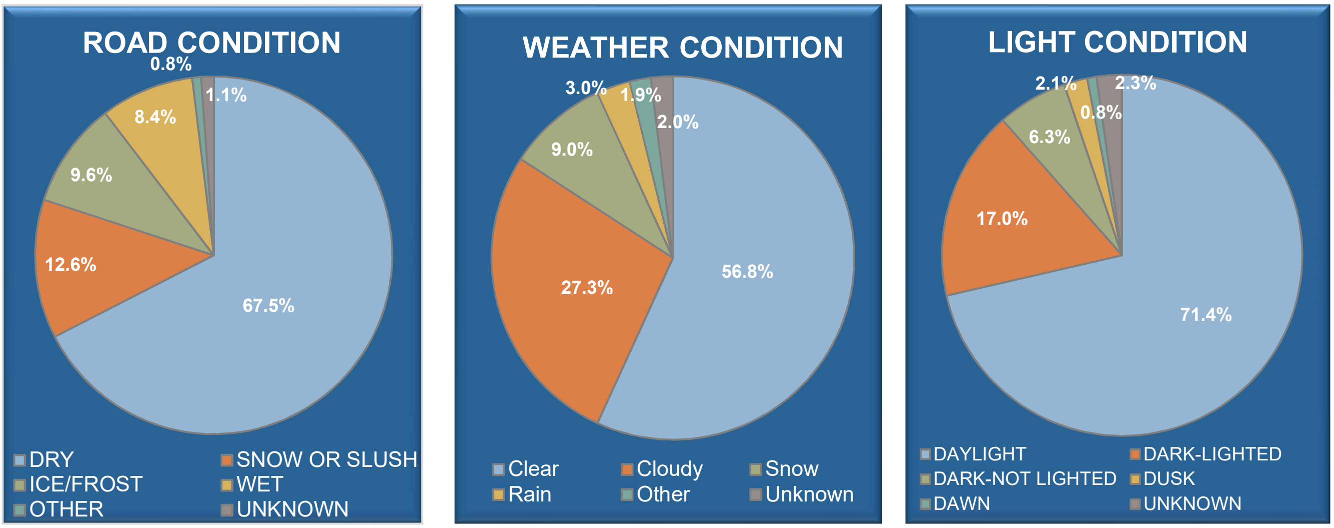


Figure 20: Crash Statistics for Environmental Factors

4.1.3. Crash Type

Almost 43 percent of crashes occurred at non-junction locations, while just over 50 percent of crashes occurred in an intersection or were related to an intersection. About 87 percent of crashes occurred on the roadway, while approximately 5 percent occurred on the shoulder. Single vehicle crashes accounted for just over 16 percent of crashes.

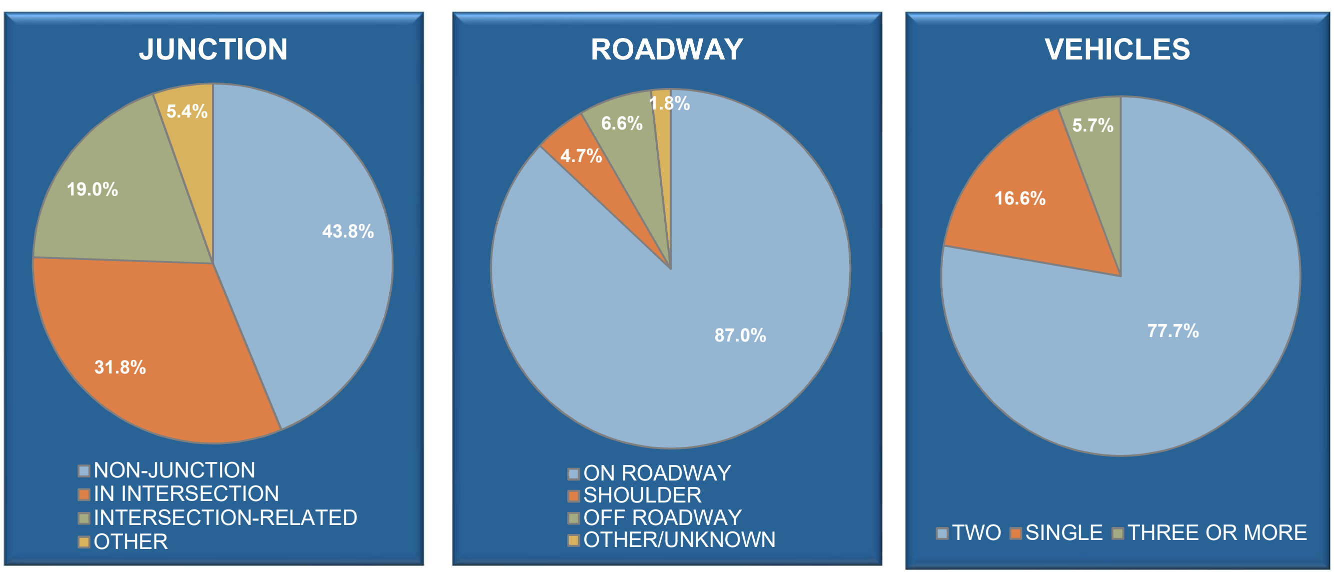


Figure 21: Crash Statistics for Location and Number of Vehicles

The most common manner of collision was rear-end crashes which accounted for approximately 28 percent of reported crashes. Right angle crashes and sideswipe crashes were the next most common manners of collision accounting for approximately 26 and 16 percent of crashes, respectively.

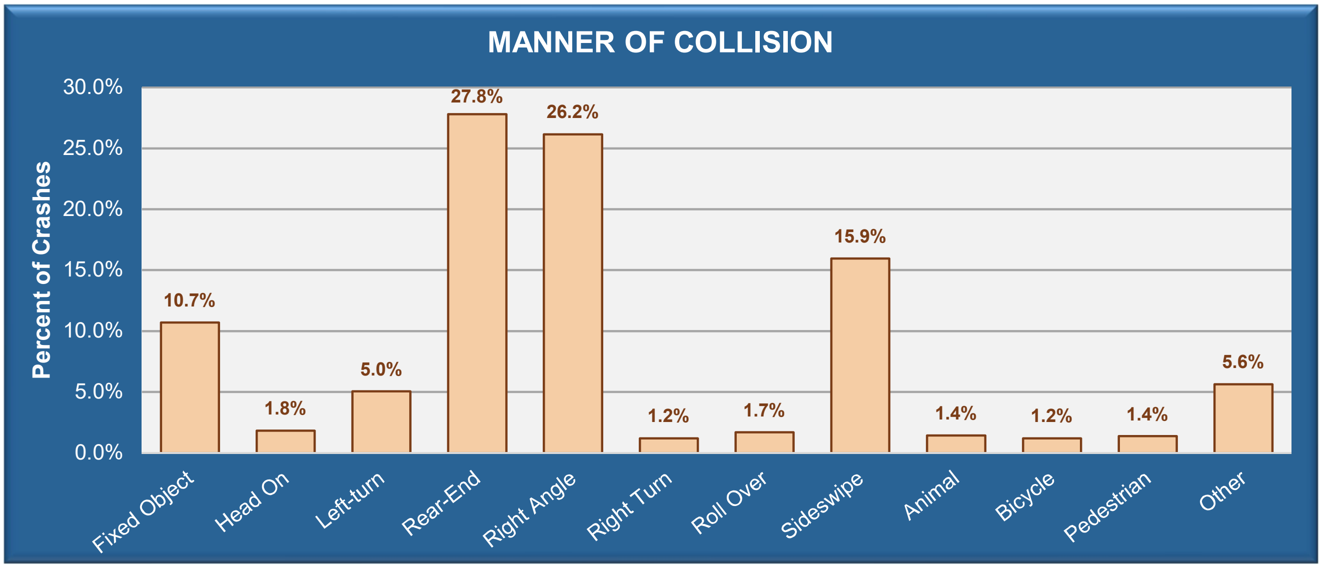


Figure 22: Crash Statistics for Collision Type

4.1.4. Crash Severity

Reported crashes are categorized by crash severity. The most severe injury defines the severity of the crash. For example, if a crash results in a fatality and an injury, the crash would be defined as a fatal crash. During the five-year analysis period, there were 1,860 injury crashes (22 percent) which resulted in 2,589 injuries. Of the injury crashes, 82 (1.0 percent) resulted in incapacitating injuries. In addition, there were 17 fatal crashes (0.2 percent) resulting in 19 fatalities.

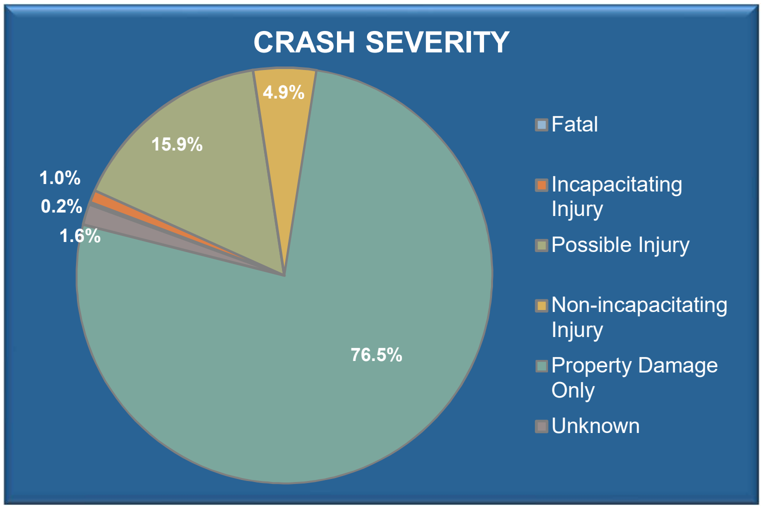


Figure 23: Crash Statistics for Severity

Figures 24 and **25** show the location of the crashes which resulted in incapacitating injuries and/or fatalities. An incapacitating injury is defined as an injury, other than a fatality, which prevents the injured person from walking, driving or normally continuing the activities they were capable of performing before the injury.

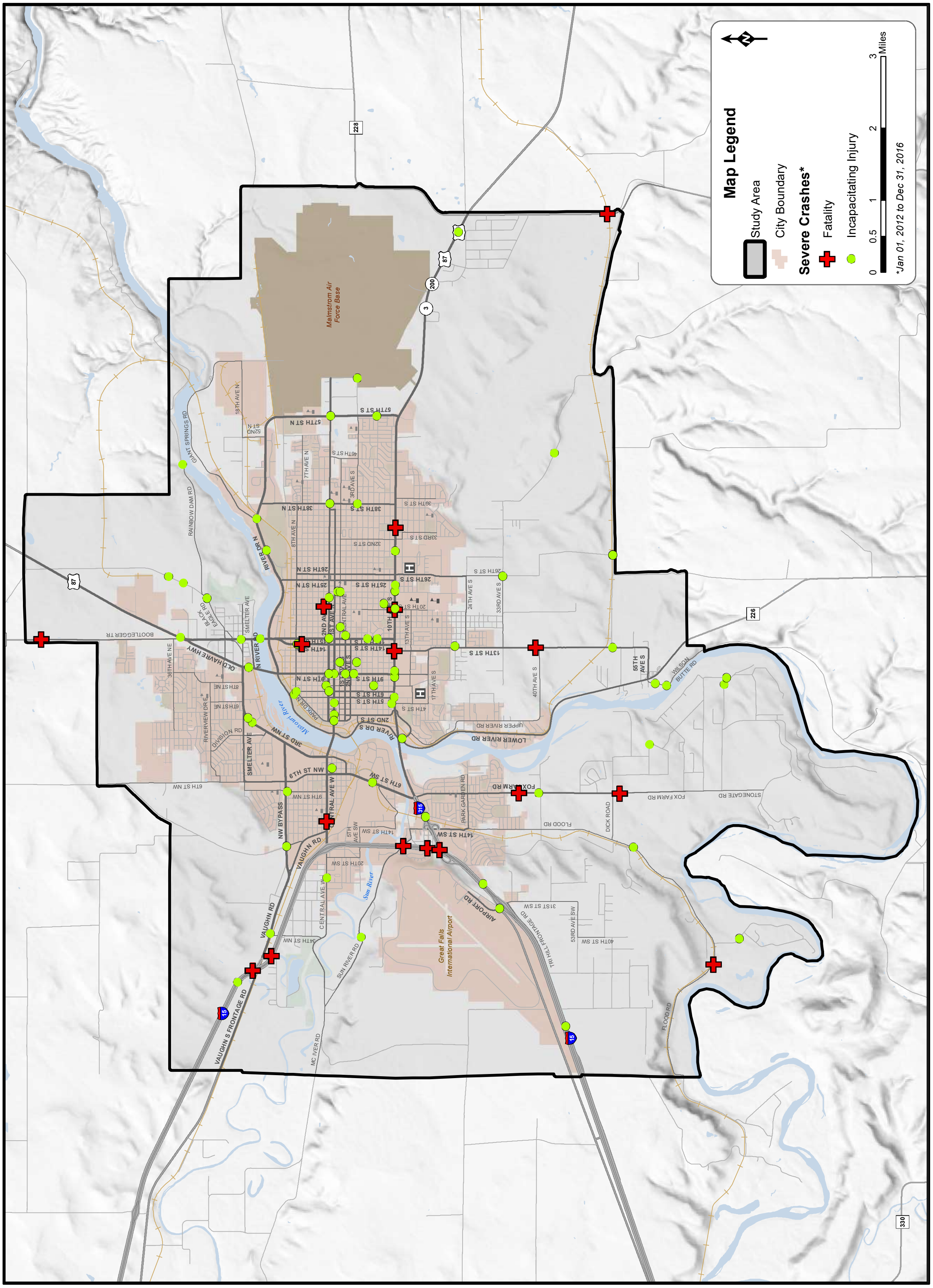


Figure 24: Severe Crash Locations

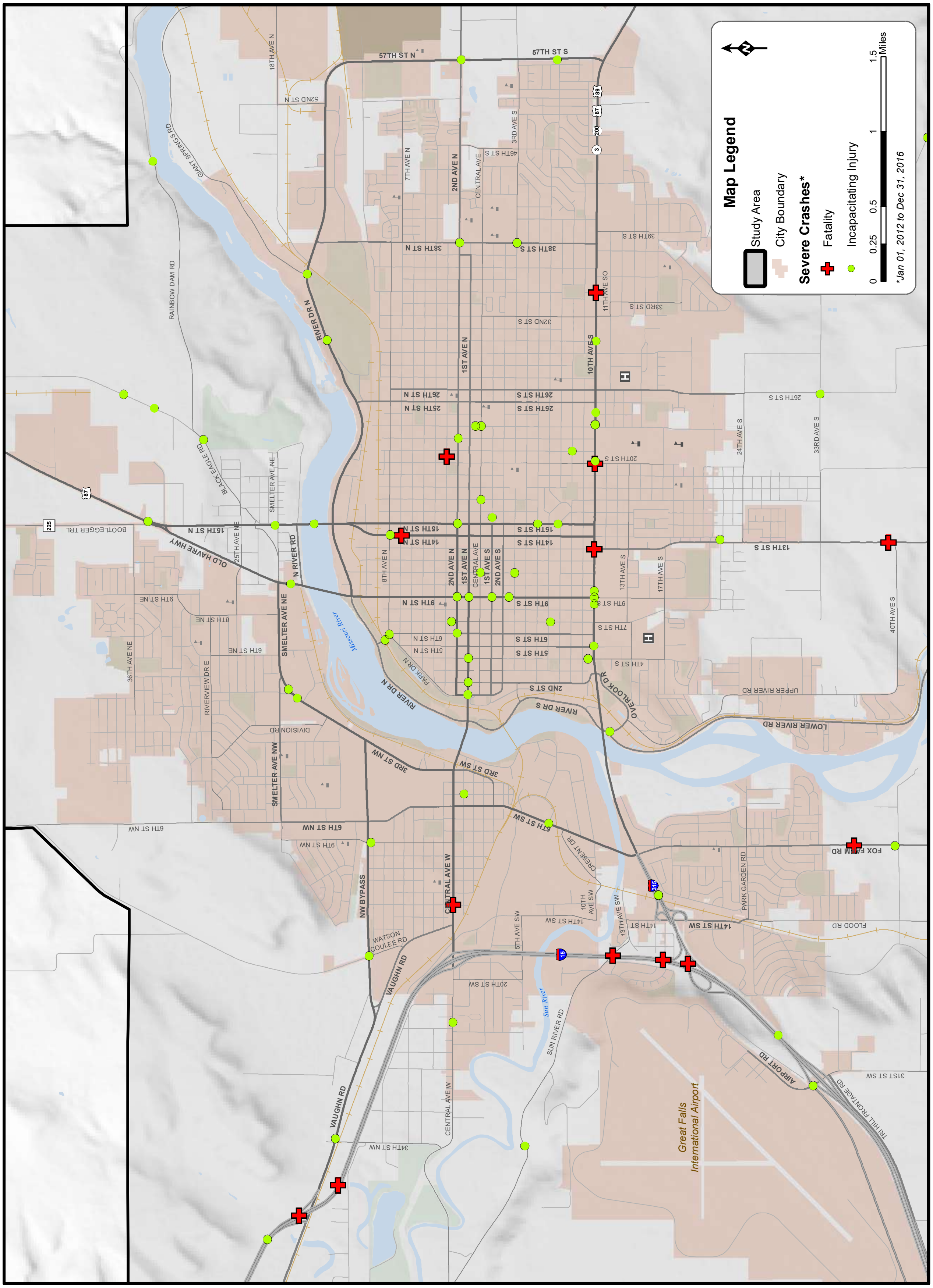


Figure 25: Severe Crash Locations (Detail Area)

4.1.5. Intersection Crashes

The 50 intersections that were studied for LOS were also evaluated for crash statistics. The crash information was analyzed to identify those intersections with crash characteristics that may warrant further study.

The number of crashes at each intersection was determined spatially from the GIS crash database. Any crash located within 150 feet was counted for that intersection. Intersection traffic volumes were determined from PM peak hour turning movement counts. A design hourly vehicle (DHV) factor of 9.42 percent was applied to the peak hour counts to estimate daily volumes based on MDT permanent count sites located within the study area.

The crash rate represents the number of crashes against the daily traffic volumes of the intersection. The rate is expressed as the number of crashes per million entering vehicles. The following equation is used to calculate crash rate:

$$\frac{Total\ Number\ of\ Crashes\ \times 1{,}000{,}000\ vehicles}{Vehicles\ per\ day \times Number\ of\ Years\ \times 365\ days/year} = Crash\ Rate$$

The severity index is calculated by applying multipliers to crashes based on severity. For the severity index, crashes were broken into three categories of severity: property damage only (PDO), non-incapacitating injury, and fatality or incapacitating injury crashes. Each of these three types is given a different multiplier: one (1) for PDO, three (3) for injury, and eight (8) for fatality or incapacitating injury crashes. The following equation is used to calculate severity index:

$$\frac{(\#PDO \times 1) + (\#Injury \times 3) + (\#Fatal\ or\ Incap \times 8)}{Total\ Number\ of\ Crashes} = Severity\ Index$$

The severity rate was determined by multiplying the crash rate by the severity index. **Table 6** lists the crash statistics for the studied intersections.

Table 6: Intersection Crashes

ID	Intersection	Total Crashes	Fatal	Incap. Injury	Injury	Crash Rate	Severity Index	Severity Rate
Intersections with New Count Data Available								
1	2nd Avenue N / 57th Street N	21	0	1	5	0.80	1.81	1.45
2	10th Avenue S / 20th Street S	63	1	1	19	0.82	1.83	1.51
3	10th Avenue S / Fox Farm Road	106	0	0	24	1.36	1.45	1.98
Intersections Counted for MDT Corridor Studies								
M.1	I-15 SB / Vaughn Road	5	0	0	1	1.04	1.40	1.46
M.2	I-15 NB / Vaughn Road	0	0	0	0	0.00	0.00	0.00
M.3	I-15 SB Ramps / Central Avenue W	1	0	0	1	0.06	3.00	0.19
M.4	I-15 NB Ramps / Central Avenue W	2	0	0	0	0.10	1.00	0.10
M.5	Vaughn Road / Central Avenue W	10	0	0	1	0.45	1.20	0.54
M.6	14th Street SW / I-315 WB	1	0	0	0	0.04	1.00	0.04
M.7	14th Street SW / I-315 EB	0	0	0	0	0.00	0.00	0.00
M.8	I-15 SB Off Ramp / Airport Drive	8	0	1	2	0.63	2.38	1.50
M.9	I-15 SB On Ramp / Airport Drive	2	0	0	1	0.17	2.00	0.34
M.10	I-15 NB Ramps / Airport Drive	5	0	0	1	0.31	1.40	0.44

ID	Intersection	Total Crashes	Fatal	Incap. Injury	Injury	Crash Rate	Severity Index	Severity Rate
M.11	Tri Hill Frontage Rd / Airport Drive	5	0	0	2	0.49	1.80	0.88
M.12	River Drive N / 15th Street N	39	0	0	10	0.77	1.51	1.17
M.13	River Drive N / 25th Street N	11	0	0	3	0.35	1.55	0.54
M.14	River Drive N / 38th Street N	7	0	0	1	0.28	1.29	0.37
Intersections Counted in 2014 LRTP								
P.1	36th Avenue NE / Bootlegger Trail	4	0	0	0	0.38	1.00	0.38
P.2	Bootlegger Trail / U.S. 87	7	0	1	0	0.37	2.00	0.74
P.3	Old Havre Highway / 15th Street N	11	0	0	6	0.64	2.09	1.33
P.4	25th Avenue NE / 8th Street NE	4	0	0	0	0.28	1.00	0.28
P.5	Smelter Avenue / 6th Street NE	3	0	0	0	0.07	1.00	0.07
P.6	Smelter Avenue / 10th Street NE	40	0	0	5	0.81	1.25	1.01
P.7	River Drive N / 9th Street N	41	0	0	13	1.03	1.63	1.68
P.8	NW Bypass / 3rd Street NW	35	0	0	13	0.79	1.74	1.37
P.9	Central Avenue NW / 6th Street NW	36	0	0	9	0.80	1.50	1.20
P.10	6th Street SW / 4th Avenue SW	12	0	0	0	0.44	1.00	0.44
P.11	Central Avenue W / 3rd Street NW	53	0	0	17	0.92	1.64	1.51
P.12	River Drive N / 1st Avenue N	44	0	0	7	1.17	1.32	1.54
P.13	Park Drive N / 1st Avenue N	20	0	1	7	0.31	2.05	0.63
P.14	Park Drive N / 2nd Avenue N	21	0	0	3	1.42	1.29	1.82
P.15	River Drive S / 3rd Avenue S	5	0	0	1	0.27	1.40	0.37
P.16	2nd Street S / 3rd Avenue S	2	0	0	0	0.12	1.00	0.12
P.17	Fox Farm Road / 18th Avenue SW	8	0	0	3	0.35	1.75	0.61
P.18	Fox Farm Road / Park Garden Road	4	0	0	1	0.22	1.50	0.33
P.19	10th Avenue S / 2nd Street S	20	0	0	8	0.29	1.80	0.53
P.20	10th Avenue S / 5th Street S	54	0	1	12	0.76	1.57	1.20
P.21	10th Avenue S / 9th Street S	143	0	2	40	1.80	1.66	2.98
P.22	13th Avenue S / 9th Street S	4	0	0	1	0.28	1.50	0.42
P.23	10th Avenue S / 14th Street S	65	0	0	13	0.89	1.40	1.25
P.24	10th Avenue S / 15th Street S	106	0	0	22	1.41	1.42	2.00
P.25	10th Avenue S / 25th Street S	73	0	0	23	1.09	1.63	1.77
P.26	11th Avenue S / 26th Street S	20	0	0	3	0.95	1.30	1.24
P.27	13th Avenue S / 26th Street S	3	0	0	0	0.21	1.00	0.21
P.28	15th Avenue S / 26th Street S	13	0	0	4	0.93	1.62	1.50
P.29	10th Avenue S / 29th Street S	25	0	0	5	0.47	1.40	0.66
P.30	10th Avenue S / 32nd Street S	56	0	0	15	1.06	1.54	1.63
P.31	32nd Street S / 11th Avenue S	2	0	0	0	0.20	1.00	0.20
P.32	10th Avenue S / 38th Street S	25	0	0	11	0.53	1.88	1.00
P.33	38th Street / Central Avenue	13	0	0	4	0.67	1.62	1.07

4.2. Safety Data Trend Analysis

In 2006, MDT developed its first *Comprehensive Highway Safety Plan* which involves a data driven approach to identifying areas where safety of the highway system can be improved. Then, in 2014, MDT announced the "Vision Zero" campaign, an initiative aimed at eliminating deaths and injuries on Montana's highways. The current update of the Highway Safety Plan, 2015, incorporates Vision Zero and identifies three emphasis areas, or factors which have the greatest contribution to severe accidents; Roadway Departure and Intersection Crashes; Impaired Driving Crashes; and Occupant Protection.

For the LRTP, it is important to identify safety trends and analyze how the City of Great Falls compares to both the Cascade County and the State of Montana. This analysis can show where the City's crash trends are similar or different than statewide trends, which can help identify areas for improvement in roadway safety.

For the analysis, the MDT Highway Traffic Safety Section supplied statewide crash statistics for January 1st, 2012 to December 31st, 2016. A safety data trend analysis was conducted to compare the crash characteristics of the City of Great Falls (only crashes within city limits), Cascade County, and the State of Montana.

4.2.1. Crash Severity

The emphasis areas were identified based upon a data analysis which compared crash severity with the cause of the crash. Those crash types that caused the most severe crashes were selected as the emphasis areas. Detailed crash statistics for the emphasis areas are provided in the following sections.

Comparison of crash severity statistics revealed that fatal and serious injury crashes accounted for a lower percentage of crashes within Great Falls as compared to both Cascade County and the State of Montana. Less than 1.0 percent of crashes resulted in a fatality for Belgrade, Gallatin County, and the State of Montana. **Table 7** tabulates the number and percentage of fatal and incapacitating injury crashes that occurred within Great Falls, Cascade County, and the State of Montana.

Table 7: Crash Severity Statistics

Location	Total Crashes	Fatal Crashes		Serious Injury Crashes	
City of Great Falls	7,979	6	*0.1%*	57	*0.7%*
Cascade County	10,211	50	*0.5%*	155	*1.5%*
State of Montana	106,268	947	*0.9%*	3,956	*3.7%*

4.2.2. Roadway Departure and Intersection Crashes

Roadway departure crashes occur when a vehicle leaves the travel lane, either crossing into an opposing lane, or leaving the roadway. These crashes often occur at high speeds and are therefore likely to be severe. The crash may include impact with an object on the side of the road or overturning. Intersections are the locations where the highest potential for conflict occurs, as vehicles, bicycles, and pedestrians often cross paths. These crashes may occur at highway interchanges, signalized or stop-controlled intersections, or intersections without traffic control. Mitigation strategies include problem identification, education, and enforcement of proper road use behaviors.

Great Falls has a much lower reported roadway departure crash rate than both the County and State with 9.4 percent of crashes being roadway departure crashes, as compared to 17.0 percent and 28.8 percent, respectively. Roadway departure crashes are typically less likely in urban areas due to lower travel speeds and the presence of curbing on the roadside.

Crash records show that Great Falls has a higher reported percentage of intersection crashes as compared to both the County and the State at 43.8 and 32.4 percent, respectively. These statistics indicate that focus should be directed to intersection safety in Great Falls. **Table 8** tabulates the total reported crashes and the percentage of crashes involving roadway departure or occurring at an intersection.

Table 8: Crash Type Statistics

Location	Total Crashes	Roadway Departure Crashes		Intersection Crashes	
City of Great Falls	7,979	754	*9.4%*	4,200	*52.6%*
Cascade County	10,211	1,740	*17.0%*	4,476	*43.8%*
State of Montana	106,268	30,587	*28.8%*	34,398	*32.4%*

4.2.3. Impaired Driving Crashes

Impaired driving is defined as operating a vehicle while under the influence of drugs or alcohol. There has generally been a greater focus on alcohol impairment, however, attention paid to drug impairment is increasing as awareness of impacts and methods for detection improve. Mitigation strategies include improved processes and regulations, enforcement, and prevention education.

Of the reported crashes, both Great Falls and Cascade County had a lower rate of alcohol/drug related crashes (6.4 and 7.5 percent, respectively) as compared to the State of Montana (10.0 percent). **Table 9** tabulates the total reported crashes and the percentage of crashes involving an impaired driver.

Table 9: Crash Statistics for Alcohol/Drug Related Crashes

Location	Total Crashes	Impaired Driver Involved	
City of Great Falls	7,979	510	*6.4%*
Cascade County	10,211	765	*7.5%*
State of Montana	106,268	10,643	*10.0%*

4.2.4. Occupant Protection

Occupant protection refers to the use of a safety belt or child protection seat by vehicle occupants. Seat belts offer the best chance for surviving or reducing the severity of injury in a crash. Overall, more than a quarter of people do not consistently use a seat belt in Montana. Improvement in seat belt use is imperative to achieve a goal of zero fatalities and zero serious injuries. Mitigation strategies include support policies, education, training, programs and activities, enforcement, and evaluation of the effectiveness of already implemented strategies.

Safety belt use data were reported on a per individual basis. As such, individuals involved in some crashes did not have the option to use a safety belt, for example motorcycles, pedestrians, or bicyclists. The data were adjusted to account for these users. Safety belt usage is approximately 95 percent in each City, County, and State. **Table 10** gives statistics for safety belt use.

Table 10: Crash Statistics for Safety Belt Use

Location	Number of Individuals	Using Restraints		Not Using Restraints	
City of Great Falls	18,780	17,747	*94.5%*	1,033	*5.5%*
Cascade County	22,935	21,715	*94.7%*	1,220	*5.3%*
State of Montana	226,127	213,597	*94.5%*	12,530	*5.5%*

4.2.5. Vehicle Type

Another area of concern, although not a defined emphasis area, is the type of vehicle involved in the crash. Although they generally occur less often, crashes involving either a motorcycle or a large vehicle can be very severe. As such, consideration should be given to these types of crashes.

Motorcycles were involved in less than 2 percent of all crashes in each the City, County and State with only 0.2 percent of crashes in the County involving a motorcycle. Large vehicles, i.e. semi-trucks, were involved in 3.6 percent of crashes within the City, less than both the County and the State with 4.7 and 6.1 percent, respectively. **Table 11** presents crash statistics based on vehicle type.

Table 11: Crash Severity Statistics

Location	Total Crashes	Crashes Involving a Motorcycle		Crashes Involving a Large Vehicle	
City of Great Falls	7,979	92	*1.2%*	287	*3.6%*
Cascade County	10,211	159	*0.2%*	479	*4.7%*
State of Montana	106,268	2,054	*1.9%*	6,524	*6.1%*

5.0 AREAS OF CONCERN

This section provides a list and description of areas of concern within the study area which should be taken into consideration as recommendations are developed for the LRTP. These areas were identified through review of existing traffic data, travel demand model projections, field review, public comment, and other resources. More discussion has already been provided in the previous sections and is reiterated here as appropriate.

5.1. Existing Transportation Conditions

The following roadways are currently either approaching or exceeding capacity (VOC ≥ 0.85):

- **9th St S** – 10th Ave S to Central Ave
- **River Dr N** – 15th St N to 25th St N

The following intersections experience a LOS of D or worse under existing conditions:

- 10th Avenue S / Fox Farm Road
- I-15 SB Ramps / Central Avenue W
- I-15 NB Ramps / Central Avenue W
- Vaughn Road / Central Avenue W
- I-15 SB Off Ramp / Airport Drive
- I-15 NB Ramps / Airport Drive
- River Drive N / 15th Street N
- River Drive N / 25th Street N
- Bootlegger Trail / U.S. 87
- 25th Avenue NE / 8th Street NE
- Smelter Avenue / 10th Street NE
- 6th Street SW / 4th Avenue SW
- Central Avenue W / 3rd Street NW
- River Drive N / 1st Avenue N
- Park Drive N / 2nd Avenue N
- River Drive S / 3rd Avenue S

- Fox Farm Road / 18th Avenue SW
- Fox Farm Road / Park Garden Road
- 13th Avenue S / 9th Street S
- 10th Avenue S / 29th Street S

5.2. Projected Transportation Conditions

The following roadways are projected to either approach or exceed capacity (VOC ≥ 0.85):

- **9th St N** – Central Ave to River Dr N
- **River Dr N** – 15th St N to 38th St N

The following intersections are projected to experience a LOS of D or worse by the year 2038:

- 10th Avenue S / Fox Farm Road
- I-15 SB Ramps / Central Avenue W
- I-15 NB Ramps / Central Avenue W
- Vaughn Road / Central Avenue W
- I-15 SB Off Ramp / Airport Drive
- I-15 NB Ramps / Airport Drive
- Tri Hill Frontage Rd / Airport Drive
- River Drive N / 15th Street N
- River Drive N / 25th Street N
- 36th Avenue NE / Bootlegger Trail
- Bootlegger Trail / U.S. 87
- Old Havre Highway / 15th Street N
- 25th Avenue NE / 8th Street NE
- Smelter Avenue / 10th Street NE
- River Drive N / 9th Street N
- NW Bypass / 3rd Street NW
- 6th Street SW / 4th Avenue SW
- Central Avenue W / 3rd Street NW
- River Drive N / 1st Avenue N
- Park Drive N / 2nd Avenue N
- River Drive S / 3rd Avenue S
- 2nd Street S / 3rd Avenue S
- Fox Farm Road / 18th Avenue SW
- Fox Farm Road / Park Garden Road
- 10th Avenue S / 2nd Street S
- 13th Avenue S / 9th Street S
- 11th Avenue S / 26th Street S
- 13th Avenue S / 26th Street S
- 15th Avenue S / 26th Street S
- 10th Avenue S / 29th Street S
- 10th Avenue S / 32nd Street S

5.3. Safety

There were 8,558 reported crashes within the study area between January 1st, 2012 and December 31st, 2016. Spikes in the number of crashes occur during peak hours on weekdays. Almost 50 percent of reported crashes occurred between 12:00 PM and 6:00 PM; over 78 percent of crashes occur on a weekday. In addition, over 50 percent of crashes occurred in an intersection or were related to an intersection. Rear-end and right-angle crashes accounted for almost 55 percent of crashes. A total of 82 incapacitating injury crashes and 17 fatal crashes occurred during the analysis time period.

The following are the intersections with the highest number of crashes per million entering vehicles:

1. 10th Avenue S / 9th Street S 1.80
2. Park Drive N / 2nd Avenue N 1.42
3. 10th Avenue S / 15th Street S 1.41
4. 10th Avenue S / Fox Farm Road 1.36
5. River Drive N / 1st Avenue N 1.17
6. 10th Avenue S / 25th Street S 1.09
7. 10th Avenue S / 32nd Street S 1.06
8. I-15 SB / Vaughn Road 1.04
9. River Drive N / 9th Street N 1.03
10. 11th Avenue S / 26th Street S 0.95

The following are the intersections with the highest severity index:

1. I-15 SB Ramps / Central Avenue W 3.00
2. I-15 SB Off Ramp / Airport Drive 2.38
3. Old Havre Highway / 15th Street N 2.09
4. Park Drive N / 1st Avenue N 2.05
5. Bootlegger Trail / U.S. 87 2.00
6. I-15 SB On Ramp / Airport Drive 2.00
7. 10th Avenue S / 38th Street S 1.88
8. 10th Avenue S / 20th Street S 1.83
9. 2nd Avenue N / 57th Street N 1.81
10. Tri Hill Frontage Rd / Airport Drive 1.80

The following are the intersections with the highest severity rate:

1. 10th Avenue S / 9th Street S 2.98
2. 10th Avenue S / 15th Street S 2.00
3. 10th Avenue S / Fox Farm Road 1.98
4. Park Drive N / 2nd Avenue N 1.82
5. 10th Avenue S / 25th Street S 1.77
6. River Drive N / 9th Street N 1.68
7. 10th Avenue S / 32nd Street S 1.63
8. River Drive N / 1st Avenue N 1.54
9. Central Avenue W / 3rd Street NW 1.51
10. 10th Avenue S / 20th Street S 1.51

Appendix A

Non-Motorized Technical Memo

Technical Memo # 1:

Great Falls Area Long Range Transportation Plan - 2014
Non-Motorized Existing Conditions

Submitted To:

Great Falls TAC

Submitted By:

Alta Planning + Design

Date:

September 13, 2013

alta PLANNING + DESIGN

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1 Demographics

1.1 Area Overview

The Great Falls Area (177 sq mi) includes the City of Great Falls, Montana (23 sq mi), Malmstrom Air Force Base, and other unincorporated areas that also comprise the major population center of Cascade County and the Great Falls, Montana Metropolitan Statistical Area. Most demographic information included in this chapter pertains to the City of Great Falls; data pertaining to other, surrounding communities' demographic information is specified.

The total population of Great Falls was 58,505 (6 percent of Montanans) as of the 2010 decennial census and an estimated 58,950 as of July 2011. The remaining communities in the Great Falls area (Belt, Cascade, Neihart, Black Eagle, Fort Shaw, Malmstrom Air Force Base, Simms, Sun Prairie, Sun River, Ulm, and Vaughn) and other portions of nearby unincorporated Cascade County areas have a combined population of 9,493, bringing the population for the Great Falls area to approximately 67,998 according to the 2010 Census. The population has increased over time and dramatically so during the post-war economic boom, with the only period of population decline being the 1970s and 80s. The cause of this decline could be attributed to the decline in production and the eventual closure of the Black Eagle Industrial Site in 1980. This site and associated industries were a significant job creator for the community.

1.2 Demographics

Race and Ethnicity

90 percent of residents of the City of Great Falls are European American, or White, and 2.2 percent of the population is foreign born[1]. This compares with 89.1 percent and 1.9 percent, respectively, at the statewide level.

Income

The median household income for Great Falls is $42,540, with 15.8 percent of Great Falls residents living below the poverty level. Compared to Montana statewide figures ($45,324 and 9.7 percent, respectively), Great Falls residents, on average, make slightly less annually and have more people living in poverty[2].

Military

In the City of Great Falls, there are 7,292 veterans (or 12.4 percent of the total population), with about 2,300, or 4 percent, of the total working population in the City currently employed in the Armed Forces. There are, in addition to this figure, 3,472 total residents on Malmstrom Air Force Base that are not

[1] *American Community Survey (ACS), 2007-2011, 5-Year Estimates.*

[2] *Ibid.*

included in the municipal Census or ACS data (but are included in the population figure cited above for the Great Falls area and surrounding communities). Of those who live on the base, 2,048 are Armed Forces Personnel. In summary, there are an estimated 4,400 Armed Forces personnel in the Great Falls Area, nearly half of which live on base.

The population of Malmstrom AFB consists mostly of families with young children. The two population ranges that include the highest number of people are "20-24 years old" and "Under 5 years old"[3].

Age & Education

The median age of the Great Falls area is 39 years old, with 19.9 percent of the total population under the age of 16 (too young to drive) and 8.4 percent over 75 years old (and typically less likely to or cannot drive). This means that roughly 30 percent of Great Falls area residents cannot drive or are less likely to drive. Increasing opportunities for and improving non-motorized infrastructure in the Great Falls area will not only benefit those who choose not to drive, but also those who cannot.

90 percent of residents over 25 years old in the Great Falls area have a high school degree or higher (including some college, an associate or bachelor degree, and/or a graduate or professional degree). This figure is 91.5 percent for the entire state of Montana.

Commute and Trip Choice

The vehicle or type of transportation that people choose for their trips, either commuting to and from work, doing errands, or other trips, is available via the American Community Survey (ACS) and the National Household Travel Survey (NHTS). The former includes commute mode share data while the latter includes mode share choices for all trips, regardless of purpose.

[3] *American Community Survey (ACS), 2007-2011, 5-Year Estimates.*

Commuting (ACS)

Bicycling

Five year ACS averages show that approximately 0.8 percent of commuters choose to travel to and from work by bicycle in Great Falls, this is an increase from 0.5 percent when measured during the 2000 Census. When compared to the rest of the United States, this figure is higher than the average, 0.5 percent, but is less than Montana's average mode share for bicycling to work, which is 1.3 percent. In comparison to other major cities in Montana, Great Falls has fewer bike-to-work commuters than Missoula, Bozeman, Kalispell, and Helena, but outperforms Billings and Butte. See Figure 1.

Walking

About 2.7 percent of commuters in Great Falls walk to and from work. This is lower than the national (2.8 percent) and state (5.1 percent) averages, and a decrease from the 2000 Census when 3.1 percent of commuters walked. Of the six other major cities used in the previous comparison, Great Falls has the lowest walking mode share. See Figure 1.

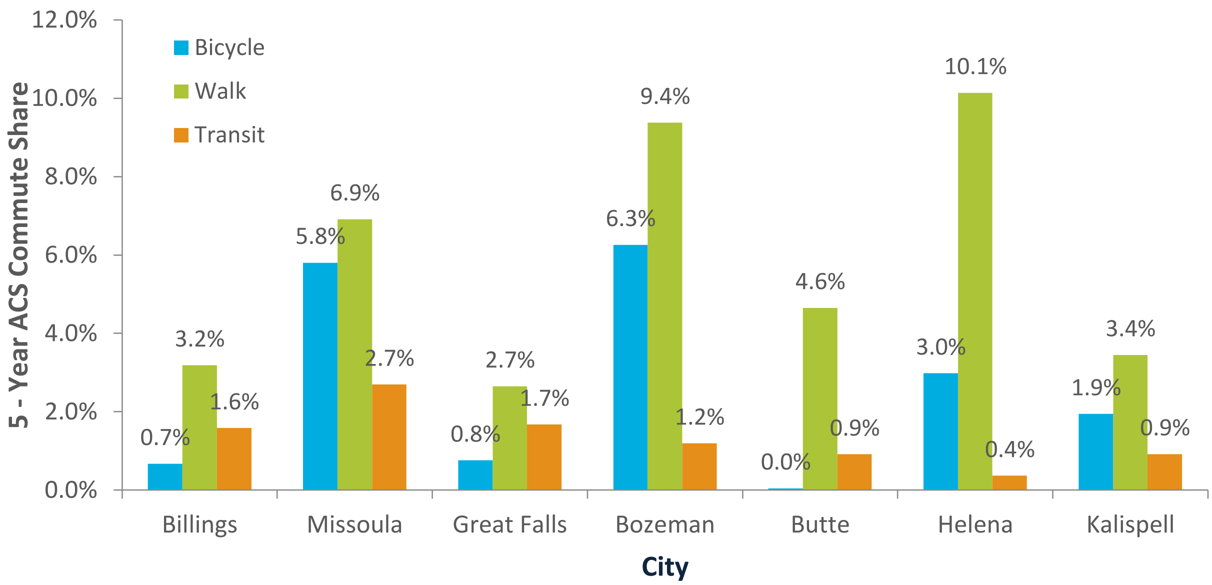

Figure 1: 5 Year ACS Commute Share of Seven Largest Montana Cities

All Trips (NHTS)

Trip mode share from the National Household Travel Survey is data that has been normalized using national averages from NHTS that provide non-motorized averages for percentage of all trips, not just commute trips. See Figure 2 for graph.

Bicycling

Bicycle mode share for all trips in Great Falls is estimated at 1.4 percent, which is higher than the national average (1.0 percent) but lower than the statewide average for Montana (2.5 percent). In comparison to other Montana cities, Great Falls' total bicycle mode share is higher than Billings and Butte, but lower than the other four larger cities highlighted.

Walking

An estimated 5.5 percent of all trips in Great Falls are walking trips, which is much higher than the ACS data outlining walking to and from work (2.7 percent), but it still remains lower than all six Montana cities in the graph and also lower than the national (6.1 percent) and Montana (10.6 percent) averages.

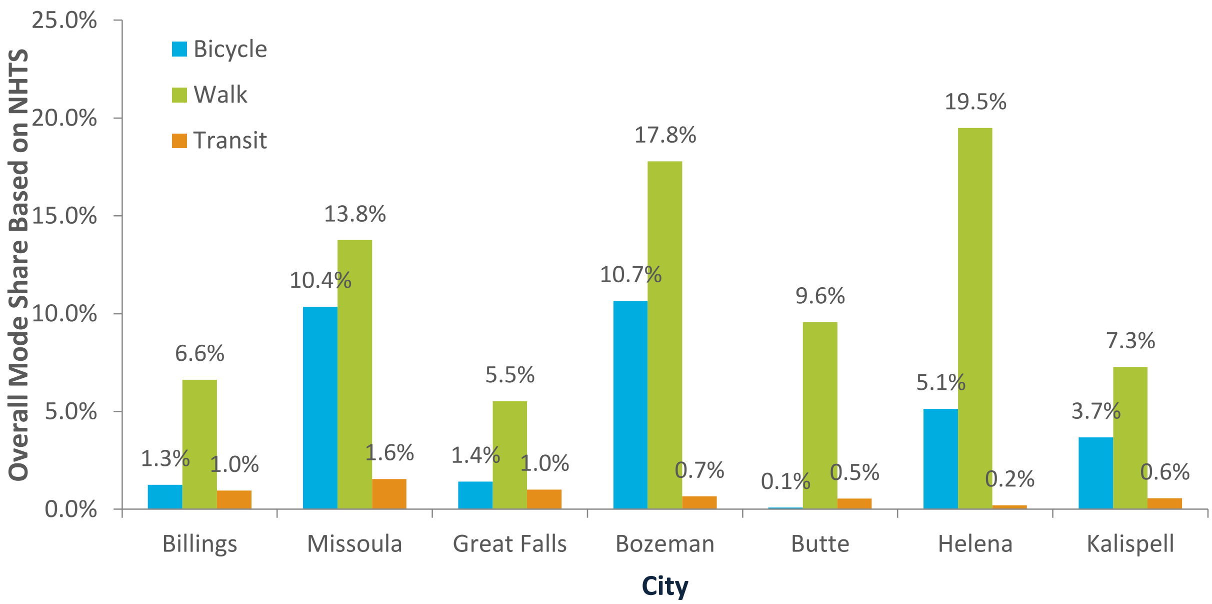

Figure 2: Overall Mode Share Based on ACS and NHTS of Seven Largest Montana Cities

2 Existing Plans, Codes, and Policies

2.1 Plans and Surveys

City of Great Falls Downtown Access, Circulation, and Streetscape Plan (April 2013)

A design document intended to supplement recommendations, vision, and plans made in the Great Falls Downtown Master Plan (2011).

This plan provides several options for recommended bicycle and pedestrian improvements on 1^{st} Ave S, 2^{nd} Ave S, 5^{th} St, and 6^{th} St – all currently one way streets. Improvements such as better sidewalks, street trees, bike lanes, shared lane markings, and two-way cycle tracks are included. The final recommendation for bicycle facilities on all four of the streets (which are currently one-way couplets) will have lane configurations consisting of two one-way travel lanes, parallel parking on both sides, and a one-way buffered bike lane (three foot buffer on the travel lane side and two foot buffer on the parking lane side) in the remaining space of the 50 ft of each street. The extents are below:

- 1^{st} Ave S: 10^{th} St S to Park Drive
- 2^{nd} Ave S: Park Drive to 6^{th} St S
- 5^{th} St: 2^{nd} Ave N to 6^{th} Ave S
- 6^{th} St: 5^{th} Ave S to 2^{nd} Ave N

Great Falls Area 2009 Transportation Plan

The last comprehensive update was adopted in 2003 with a minor update in 2009. The Great Falls Metropolitan Area must, at a minimum, update the Transportation Plan and perform a conformity determination no less frequently than every four years (ref. 40 CFR 93.104(b)(3)).

The vision of the plan and the community is that "our community should grow in compact patterns that facilitate pedestrian, bicycle, and transit travel. Walking should be a practical, safe, and enjoyable means of travel throughout all neighborhoods and shopping areas. Bicycling should become a more viable transportation choice for all residents and visitors in Great Falls" (p. 1-3).

The plan suggests that policies should be enacted in order to require 1) infill development where the land use pattern should be self-contained and promote compact, pedestrian-oriented development, and, 2) protecting and enhancing the area's air quality by reducing vehicle miles traveled and trips generated by using transit and non-motorized transportation modes (bicycling and walking) (p.1-7).

According to this document, when reviewing and updating the Bikeway Facilities Plan, planners/consultants should address the following issues:

- Balance the plan with a variety of facilities to meet the needs of cyclists with different skill levels.
- Link parks, schools, and other activity centers.
- Link the River's Edge Trail to the area-wide bike route system wherever possible.

- Study the expansion of the existing trail system to connect to Wadsworth Park along the Sun River and flood control levees.
- Explore opportunities for unpaved multi-use trails for mountain bikes and hikers.
- Develop policies and procedures for obtaining easements or rights-of-way for non- motorized transportation corridors throughout the community.
- Coordinate the Bikeway Facilities Plan with recommendations in the *Park and Recreation Master Plan (1995)*. In some areas, the seven new trails recommended in the Master Plan duplicate routes in the proposed Bikeway Facilities Plan (p. 1-11)

In Chapter 1, pilot traffic-calming projects including bulbouts, a City-County Bicycle and Pedestrian Advisory Committee, increased trail and path construction, and review of design standards for roadways are suggested (p. 1-10 – 1-14).

Chapter 2 addresses bicycle and pedestrian traffic on the River's Edge Trail, in the Central Business District, as well as ADA wheelchair access ramps, and sidewalk locations on major streets. Maps providing where there exist sidewalk gaps, ADA wheelchair access ramps, lighted corridors, and existing trail system are also included in this chapter. The figures and maps in this chapter should be used as a starting point for prioritizing corridors for upgrades. Each individual block face and intersection should be separately evaluated for sufficiency of pedestrian and bicycle facilities, according to the Plan. ADA facilities in outlying areas are lacking, as well as sidewalks and other non-motorized transportation mode facilities.

The maps included in Chapter 5, which are completely dedicated to pedestrian and bicycle planning, differ significantly from the Existing/Proposed Trails Network map (Figure 2-18) included in Chapter 2 (Existing Conditions). Maps in Chapter 5 are somewhat confusing in that they lump all existing facilities regardless of type together in one line type and show proposed bike lanes, bike routes, and some trails as by individual facility type. Additionally new recommendations as proposed in the 2009 plan are all one color regardless of the recommended facility type. Committed and proposed bikeway network and system improvements are outlined and include extent, cost, and proposed location. The total cost for the bikeway network and system projects is estimated by this plan at $3,462,900.

Chapter 7 includes further discussion of and suggestion for traffic calming in order to benefit pedestrians, especially around schools (p. 7-29). In Chapter 12, suggested street alignments, traffic calming, and ROW requirements are outlined. Most of the suggested cross sections include at least one option depicting facilities for pedestrians and bicyclist. These facilities typically include improved sidewalks and vegetated buffers, bike lanes, and shared use paths. Chapter 14 includes possible funding sources for bicycle and pedestrian projects, such as CMAQ and MACI (which have been used previously), and TIF.

Downtown Great Falls 2013 Safety Plan

This plan makes relatively no mention of bicycling or walking. Chapter 2: Safety Plan Framework references the Downtown Master Plan in identifying one safety related goal/strategy, which is, to "improve pedestrian connectivity and safety Downtown and develop public/private partnerships to ensure Downtown is safe for all users" (p. 5).Chapter 6: Downtown Public Safety Resource & Referral List makes a quick mention of the link to report non-emergency crimes, which include bike thefts (http://www.greatfallsmt.net/police/report-crime-online).

City of Great Falls 2011 Downtown Master Plan

"The Downtown Master Plan provides a strategically focused, goal driven "blueprint" for the future growth and development of Downtown. The plan includes 82 strategies that each serve to make Downtown Great Falls a more desirable place to live, conduct business, recreate and visit."

This plan identifies several objectives that apply to bicycling and walking, both individually and when the two modes overlap. The following objectives and chapter sections apply to bicycling and walking and include visual and some semi-technical elements to consider in the redesign of streets and surrounding areas and corridors in order to increase viability and safety of bicycling and walking. In Chapter 3, under Goal 1: Connected Downtown:

- Objective 1 (improve pedestrian connectivity and safety)
- Objective 2 (develop a comprehensive Downtown bicycle network to connect into a city-wide system)
- Objective 4 (improve connectivity to the Missouri River, River's Edge Trail, and Gibson Park for bicycles and pedestrians)
- Exhibit 1: A Closer Look at Complete Streets
- Exhibit J: A Closer Look at One-way Conversion
- Objective 6: Optimize Downtown parking for all stakeholders (bicycle parking)

Figure 8: Implementation Table (Chapter 3) describes the intention of capital improvement projects and how basic upgrades of public infrastructure are great gateways to accomplishing projects related to bicycling and walking. Chapter 3's Strategy 1: Connected, defines the objectives included above by individual, implementable projects including funding sources, project timeline range, and what type of project it is (capital improvement, program, regulation, etc.).

An online survey was included in the creation of this plan and nearly 450 respondents contributed to better understand demographics and preferences downtown (p. 69-72).

- 52 percent of respondents use downtown daily
- 56 percent come for the shopping, 52 percent work downtown, 42 percent enjoy dining in downtown, and 37 percent use other services provided by downtown businesses
- 94 percent use a car to get to downtown, 4 percent walk, 2 percent ride a bicycle, and none took the bus
- 47 percent of respondents believe that downtown is safe; 56 percent agree that it is clean
- Very few people, however believe that downtown is a desirable place to raise a family (only 10 percent)
- A cleaner and safer environment, with better landscaping and more green space, would be appealing to some (23 percent) respondents.
- Parking issues (9 percent) were identified by some respondents as detriments to downtown living

Conclusions from the One-way Street Conversion Survey

This report is an important document to consider in light of bicycle and pedestrian planning because it shows public sentiment regarding traffic lane realignment and significant changes to existing infrastructure. The Great Falls Business Improvement District (BID) asked the City to consider a proposal to convert two downtown, one-way couplets back to two-way streets. The couplets and segments in question are 5th and 6th Streets between 8th Avenue North and 10th Avenue South, and 1st and 2nd Avenues South between Park Drive and 15th Street.

The project sought public comment and, overall, most respondents were in favor of keeping the streets one-way, in couplets, and improving them with trees and improved storefronts. The majority of customers and home and business owners on ALL streets highlighted in this survey analysis and conclusion said that one-way streets helped, instead of hindered, customers getting to businesses downtown. They also said that smooth traffic flow was more important than slower traffic. 53 percent said they would not support any changes to the streets identified in the survey.

One respondent who owns properties on 5th St and 6th St S, where 3 lanes merge to 2 lanes, had a different opinion. He/she reports fast automobile traffic and almost no one stopping for foot traffic, even school children unloading from the bus, even though there is a pedestrian crossing on the corner.

This report is significant as it depicts observed public resistance (from at least some of the population) to traffic lane realignment and significant changes to existing infrastructure.

2.2 Code

City of Great Falls Municipal Code

The municipal code includes legality of certain actions and includes definitions of and ordinances and laws pertaining to bicycling and walking in Great Falls.

The code sets several definitions including defining a bicycle as a type of vehicle (10.3.010 – Definitions), and that bicyclists as operators of vehicles shall obey the instruction of any official traffic-control device" (10.21.020 – Obedience required).

The code further states that it is illegal to bicycle on the sidewalk within the CBD east of the west side of Park Drive. Bicycles operated by the Police Department are exempt from the CBD sidewalk law. Additionally, any person bicycling on the sidewalk in the rest of the City, where it is legal, must yield the ROW to any pedestrian and give audible signals before passing them (10.72.010). In 12.32.020, this code is contradicted because it states that it is illegal for horses, mules, animals, buggy, wagon, bicycle or other vehicle to be ridden or driven on any sidewalk in the City.

Property owners are responsible for the maintenance of sidewalks in front of and adjoining their property. They are responsible also for reconstruction of buckled or dangerous sidewalks caused by natural deterioration (12.28.130).

Developers may propose and the City may require traffic calming to provide safety and encourage walking as transportation and will be determined on a case-by-case basis (17.32.130).

All new streets must meet the City's growth policy, as outlined in the 2009 Great Falls Area Transportation Plan. Sidewalks must also be provided on both sides of public and private streets. In residential areas, a boulevard area (vegetated, usually) shall be included and must be at least six feet wide. Sidewalks must also be ADA compliant (17.32.080).

There is no bicycle parking requirement in Great Falls. However, when bicycle parking is provided, it may substitute for a vehicular parking space up to a maximum of 5 percent of the required number of parking space, or 10 spaces, whichever is less (17.36.3.010). Exhibit 36-6 in the Municipal Code gives recommended number of bicycle parking spaces at different types of buildings. The code does get stricter on where the bicycle parking spaces are located. They cannot be more than 100 feet from the entrance and should be as close as or closer than the nearest automobile parking space. Parking must be distributed to serve all buildings or entrances when there are more than one, must have adequate lighting, must hold the frame and not just the wheel, must be able to be used with a U-lock, must accommodate a variety of bicycle types, must be securely fastened to the ground, and must be accessible without moving another bicycle.

Cascade County Zoning Regulations (2012):

A recreational trail is defined by Cascade County as a "linear path which may be dedicated to a single use or multiple uses". The zoning regulations definitions section then states that hiking trails, bike trails, cross-country ski trails, and horse trails are all examples of a recreation trail. The document does not, however, list bicycles as a recreation vehicle, reserving this definition for camping trailers, motor homes, and the like. Pedestrian walkways are listed as cross-routes that should affect the planning of landscaping plans.

Cascade County Subdivision Regulations (2007):

In the section on "Blocks", the regulations document states that "rights-of-way for adequate and safe pedestrian access, at least 10 feet wide, must be provided where deemed essential to provide circulation to schools, playgrounds, shopping, transportation, and other community facilities". In Section VI-H, subsection b titled "Improvements", it states that subdivision street improvements including "pavement, curbs, gutters, sidewalks, and drainage must be constructed in accordance with the specifications prescribed" in the document using materials approved by the Cascade County Commissioners. Specifications are provided after in the form of sample designs and materials lists and procedures. Furthermore, any proposed road plan and profile must include the type and location of sidewalks and curbs. There is no mention of or reference to bicycling, bicycle infrastructure, or bicyclists as users in the whole of the document.

Table 1: Great Falls Municipal Code 17.36.3.010 - Bicycle parking

Land use	Number of recommended spaces
Multi-family housing	1 space per 2 apartments
Primary or secondary school	10 percent of the number of students, plus 3 percent of the number of employees
College or university	6 percent of the number of students, plus 3 percent of the number of employees
Dorms, fraternities, sororities	1 spaces per 3 students
Shopping mall	5 percent of the number of vehicle parking spaces
Office	5 percent of the number of vehicle parking spaces
Governmental	10 percent of the number of vehicle parking spaces
Movie theater	5 percent of the number of vehicle parking spaces
Restaurant	5 percent of the number of vehicle parking spaces
Manufacturing/industrial	3 percent of the number of vehicle parking spaces
Other	5 percent to 10 percent of the number of vehicle parking spaces

From field observations in Great Falls it appears that few businesses have provided bicycle parking.

2.3 Policies

Great Falls Growth Policy – Transportation Element

The current Growth Policy (GP) for Great Falls has not been fully updated since 1999, receiving minor updates in 2003 and 2005. On December 20, 2011, Great Falls City Commission passed Resolution 9951 directing the Planning Advisory Board to begin the process of formally updating the City's GP. The GP is an official public document that is intended to guide future social, physical, environmental, and economic growth and development of the City. The updated GP will be adopted and used by the City of Great Falls to guide policies and decisions regarding future growth and development. The transportation element, specifically bicycling and walking, of the GP will be considered here.

The Pedestrian and Bicycle Circulation element of the GP assumes that most people in Great Falls will continue to use motor vehicles as their main mode of transportation (p. 18). The benefits of bicycling are not only physical for the user, but if "enough people can be diverted from driving to bicycling or walking for some of their daily trips, motor vehicle traffic can potentially be reduced or expensive street improvements may be avoided or delayed." Residents also expressed a desire for more pedestrian and bicycling facilities in the area in 1999, which reflects their interest in having more choices in how to travel around the community. The expansion of the River's Edge Trail system is cited as another indicator that Great Falls residents desire more infrastructure, especially separated facilities.

Shared roadways (including shared lane markings) are "adequate on low-volume collectors or local streets where motor vehicles can safely pass bicyclists" (p. 20). Other standard roadway treatments like bike lanes, paved shoulders, and multi-use paths are also proposed.

Vision #4 in the "Transportation Vision" is to "facilitate pedestrian, bicycle, and transit travel. Walking should be a practical, safe, and enjoyable means of travel throughout all neighborhoods and shopping areas. Bicycling should become a more viable transportation choice for all residents and visits in Great Falls." Vision #6 is to "have streets, trails, and walkways that are planned, built, landscaped, and maintained as safe and attractive public spaces linking a balanced system of open lands, natural areas, recreation facilities, schools, and parks with trails and urban streetscapes" (p. 25-26). Goal #2 is to "make…non-motorized modes of transportation viable alternatives to the private automobile for travel in and around the community" (p. 26).

Policies or parts of policies in the GP that apply to bicycling and walking include:

- The land use pattern should promote pedestrian-oriented development, address transportation system needs, and enhance opportunities for walking and bicycling, while increasing connectivity and smooth flow of all transportation modes throughout the community
- New development on the urban fringes or in rural areas should give primary consideration to non-motorized circulation and to transit service
- Pedestrian bicycle access to natural features, historic and cultural resources, parks, schools, and other focal points should be improved. The emerging identities of new neighborhoods should include multiple transportation choices
- Air quality can be improved by using non-motorized transportation modes
- New streets should be in compliance with the Great Falls Area Transportation Plan
- Private enterprise should also be encouraged and supported to provide non-motorized transportation choices. On-street bicycle lanes or off-street pedestrian/bicycle paths should connect all neighborhoods
- The movement of traffic to, from, and within downtown should be a prime consideration in planning, designing, and building all roads as well as pedestrian and bicycle infrastructure.
- Pedestrian and bicycle facilities should be linked when planning transportation system improvements and when reviewing land development proposals. New public and private developments should accommodate the bicycle system by providing access to schools, parks, jobs, shopping centers, and transit facilities and should provide users with facilities for safe and direct crossings of Principal and Minor Arterials. Developers should be required to install paths that connect to the bikeway system recommended in the Bikeway Facilities Plan. In some cases, it may be appropriate to relax a requirement, such as for a sidewalk on one side of a residential street in favor of a comparable bicycle path in the development (p.26-30).

Further, strategies and actions regarding new standards and regulations that encourage pedestrian and bicycle-friendly development, traffic calming, bikeway facilities plan updates, a City-County BPAC, provide sufficient resources to construct trails and bikeways in Parks and Rec & the Bikeway Facilities Plans, access to Smelter Hill by bicycle and foot are all encouraged and framed at the end of the Policy. Most policies, goals, strategies, and plans within the Growth Policy relate in one way or another to non-motorized transportation choices. The universal incorporation of these modes in the GP is encouraging, but action is required to make the vision of the City and its residents a reality.

2.4 Programs

Great Falls Transportation Improvement Program FFY 2011-15

This document includes review of projects related to walking and bicycling that have been completed since 2006 and which are planned for implementation during the Federal Fiscal Years (FFY) of 2011 to 2015.

Table 2: Great Falls Area Transportation Improvement Program FFY 2011-15

Category	Project	FFY	Description	Funding Agency	Total cost	Status	Rank
Pedestrian only	Sidewalks - GTF	2006	Sidewalks on 3rd St NW/Smelter/NW Bypass	State/Federal	$910,000	Complete	n/a
Pedestrian only	City-wide sidewalks	2009	Sidewalks, various locations	State/Federal/ Local	$4,310,100	Complete	n/a
Bicycling and pedestrian	38th St/8th Ave N/6th St SW	2009	Trail/Bike/Ped Improvements	State/Federal/ Local	$634,700	Complete	n/a
Bicycling and pedestrian	Bay Drive Bike/Ped Path	2010	Bike/Ped path	Federal/Local	$936,000	Complete	n/a
				Total cost of bicycling and walking projects since 2006:	$5,220,100		

Category	Project	FFY	Description	Funding Agency	Total cost	Status	Rank
Pedestrian only	ADA/Curb Ramps Program I (**MDT**-1st AVE N-35th to 38th-$201,550; **MDT**-2nd Ave N 37th to 15th-$408,760; 9th St N-River Drive-$306,200) (**City**-25th St N, 26th St S, 8th Ave N, 38th St N, 6th St S & Park Drive)	2015	Install ramps at various locations	CMAQ	$2,047,389	Planned	1st
Bicycling and pedestrian	Sun River Trail Connection	2015	Bike/Ped facility adjoining Country Club Blvd (from Warden Bridge to Bike/Ped Facility at 6th St SW)	CMAQ	$2,061,080	Planned	3rd
Pedestrian only	Great Falls Sidewalk Infill Project	n/a	Sidewalks	CMAQ	$833,571	Planned	4th
Pedestrian only	2001 Sidewalk Program	2011	Construction, additional	MACI, FHWA/CMAQ	$114,076	Planned (2008)	n/a
Pedestrian only	Sidewalks-GTF 1st Ave N & 2nd Ave N	2011	Construction	Other Highway Funds	$1,360,000	Planned (2008)	n/a
Bicycling and pedestrian	2003 Bike/Ped Facility Improvements	2012	RW/IC/Construction-Release	MACI, FHWA/CMAQ	$91,809	Planned (2008)	n/a
Pedestrian only	Sidewalks-Fox Farms Park Garden	2012	Construction-Release	MACI, FHWA/CMAQ	$32,856	Planned (2008)	n/a
Pedestrian and disability	ADA/Curb Ramps Program	2013	PE	MACI, FHWA/CMAQ	$221,546	Planned (2008)	n/a
Pedestrian and disability	ADA/Curb Ramps Program (Local)	2014	RW/IC/Construction	MACI, FHWA/CMAQ	$1,824,141	Planned (2008)	n/a
Pedestrian only	Sidewalk Infill Project	2014	PE	MACI, FHWA/CMAQ	$168,000	Planned (2008)	n/a

Total cost of planned bicycling and walking projects: $8,754,468

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3 Bicycling

3.1 Types of Bikeways

Consistent with bikeway classifications throughout the nation, these Bikeway Design Guidelines identify the following bikeway classes by degree of separation from motor vehicle traffic.

Paved Shoulder Bikeway

This type of bicycle facility may be helpful for Cascade County. The AASHTO *Guide for the Development of Bicycle Facilities* includes this bikeway type especially for application in rural communities in which "adding of improving paved shoulders often can be the best way to accommodate bicyclists". The paved shoulder also has geometric benefits for motorists, as well, which are described below under 'Bike Lanes'.

Shoulder Bikeway

Shared Roadways

Bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility is used to connect other bikeways (usually bike lanes), or designate preferred routes through high-demand corridors.

Shared Roadway

Bicycle Boulevards

Shared roadways may also be designated by pavement markings, signage, and other treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.

Bicycle Boulevard

Bike Lanes

This type of separated bikeways uses signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists.

Bike Lane

Cycle Tracks

Bikeways that combine the user experience of a separate path with the on-street infrastructure of conventional bike lanes.

Cycle Track

Shared Use Paths

Bikeways in rights of way separate from roads, and are for the use of bicyclists, pedestrians, and other non-motorized users such as skateboarders and rollerbladers.

Shared Use Path

Why Separated On-Street Facilities

A national study comparing streets with bike lanes to those without found that 15 percent of bicyclists on streets without bike lanes rode on the sidewalks, versus 3 percent on the streets with bike lanes. In addition, on streets with bike lanes, 81 percent of bicyclists obeyed stop signs, versus 55 percent on streets without[4].

One's chance of injury drops by about 50 percent when riding on a major city street with a bike lane and no parked cars (as opposed to a major city street without bike lanes and with parking)[5].

Separated facilities also provide a buffer for pedestrians by creating more space between sidewalks and moving motor vehicle travel lanes. They also provided a breakdown lane for motorists and a clear recovery zone (for errant vehicles that leave the traveled way to recover into their own lane).

When Bozeman, Montana, installed a greater network of bike lanes, bicycle commuting mode share went from 4.7 percent of commute trips to 6.3 percent of commute trips between 2000 and 2010. Missoula's

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[4] *"CDD." City of Cambridge, Massachusetts. Web. 5 Aug. 2013. <http://www.cambridgema.gov/cdd/transportation/design/bicycling/bicyclelanes.aspx>.*

[5] *Badger, Emily. "Dedicated Bike Lanes Can Cut Cycling Injuries in Half." The Atlantic Cities. Web. 5 Aug. 2013. <http://m.theatlanticcities.com/commute/2012/10/dedicated-bike-lanes-can-cut-cycling-injuries-half/3654/>.*

bicycle commuting mode share also increased to 5.8 percent for similar reasons. Bozeman measured an instantaneous increase in bicycling and walking along West Babcock Street in 2007 of 256 percent when bike lanes and sidewalks were installed.

3.2 Facilities and Programs

The Great Falls area is fortunate to boast an approximately 47 mile off-street bicycling and walking system along the banks of the Missouri River. The city's first bike lane was installed in Summer 2013. Two signed east-west bike routes exist north of downtown. This relative lack of designated on-street bicycle infrastructure is a veritable blank slate and represents a significant opportunity to plan and implement a network of bicycle facilities in the Great Falls area.

River's Edge Trail

Background

According to the River's Edge Trail (RET) website, this 47+ mile trail system "is the result of 20 years of cooperative partnership efforts by the City of Great Falls, Cascade County, Montana Department of Fish, Wildlife & Parks, Montana Department of Transportation, electric utility PPL Montana, a volunteer trail advocacy group Recreational Trails, Inc., and a supportive community. As a result of this work, the River's Edge Trail has grown into a treasured community asset. Since 1990, the trail has grown to more than 47 miles.

River's Edge Trail northwest of Downtown Great Falls

The RET system is composed of:

- 20.34 miles of paved paths and trails,
- 1.42 miles of a mix of paved and unpaved or natural trails, and,
- 25.32 miles of unpaved or natural trails (primarily used for singletrack mountain bike riding and walking/hiking).

The history of the River's Edge Trail began with a conceptual plan for a riverside recreational trail in Great Falls (as developed by the City-County Planning Board staff in 1989). Dubbed the *Riverfront Recreational Corridor*, the trail was to extend 7 miles from the Broadwater Bay area downstream to Rainbow Falls. The trail, re-named the *River's Edge Trail* following a Name-the-Trail contest in the Great Falls Tribune, captured the interest and support of the community. A volunteer group that advocated local bike trails, also in 1989, as part of the Vision 2000 community planning process, began working with the City to develop the first segments of the trail. That group was formalized as a non-profit 501 c3 corporation named *Recreational Trails, Inc. (RTI)*.

Over the last 20 years RTI has continued to work with the City, County, FWP, PPL Montana and many other partners, agencies, groups and individuals to extend and improve the 47+ mile trail. Much of the trail has been constructed on abandoned railroad and road rights-of-way and structures. Miles of new trail connecting these segments have been constructed, as have many new tunnels, underpasses, bridges and trailheads. Volunteers have undertaken an on-going intensive cleanup of riverfront lands that had been littered with debris over the past decades, and have spent thousands of hours on weed control, tree planting, maintenance, and enhancement projects.[6]"

Popularity and Use

In March 2013, the Great Falls Tribune reported that the River's Edge Trail is the envy of other communities, local and otherwise, with five waterfalls and breathtaking views[7]. In the first public open house and in many meetings with stakeholders for this plan, which were held on June 19, 2013, the attractiveness of the trail was a big talking point. Many see it as a central spine of the active transportation system and something that additional infrastructure should tie into, wherever possible.

Signage

New signage on the River's Edge Trail, including wayfinding directions and distance to popular destinations and trail featured, was installed in summer 2013. Signage existing prior to this improvement featured standard paper maps of the trail system behind weatherproof glass (see photo). Trailhead markers with the River's Edge Trail logo and restrictions are also near many entrances/exits on the trail.

River's Edge Trail signage

57th Street N/2nd Avenue N Bike Lanes

The 57th Street N/2nd Avenue N bike lanes were installed in June and July 2013 between the 2nd Ave N gate of Malmstrom Air Force Base on the east, west to the intersection of 57th St N and 2nd Ave N, and then north and northwest till 38th St N & the River's Edge Trail extension. There is no parking along 57th St N for the entirety of the section with bike lanes. Bike lanes are against the curb. There are also minimal driveways, which may equate to fewer motorists crossing the path of bicyclists than on other residential streets or those with commercial density. The bike lanes were installed to connect the Air Force base population to the River's Edge Trail and to the community at large, among other benefits. Although 'Bike Lane' signs (R3-17, MUTCD) are optional, the City has requested that MDT install them along the route.

57th St N/2nd Ave N bike lanes, installed Summer 2013

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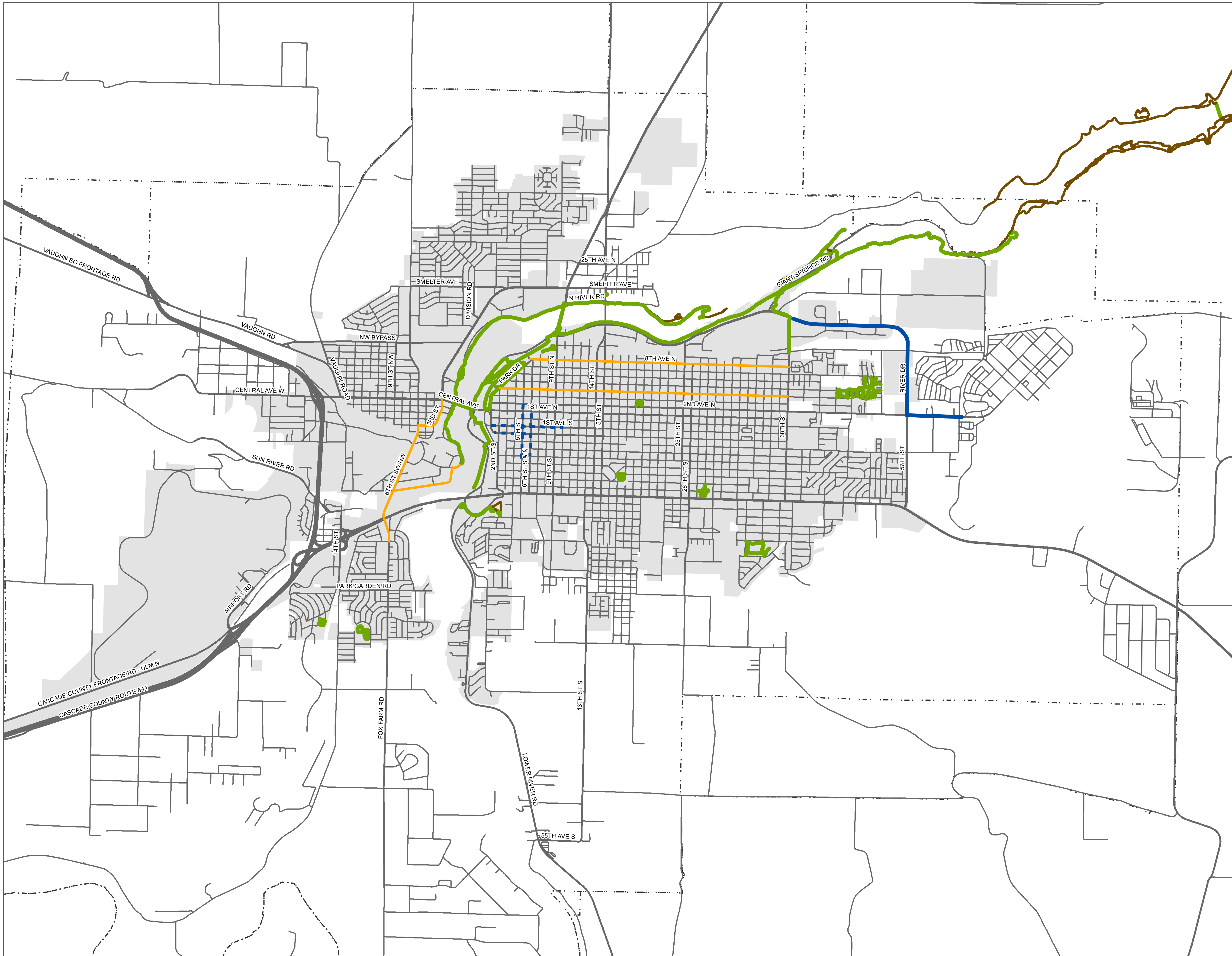
6 *"History of the Trail." The River's Edge Trail. Web. 5 Aug. 2013. <http://thetrail.org/history.html>.*

7 *"Meandering trail is envy of other towns." Great Falls Tribune 24 Mar. 2013. Web. 5 Aug. 2013.*



Existing Bicycle Network

Great Falls Area Long Range Transportation Plan 2014

Legend

- Existing Bike Lane
- Proposed Bike Lane
- Bike Routes
- Multi-use and Park Paths
- Unpaved Path
- Local Road
- Secondary Arterial
- Primary Arterial
- State Route
- Urban Route
- Non-Interstate Highway
- Highway or Freeway Ramp
- Interstate Highway
- Great Falls City Boundary
- Study Area

alta PLANNING + DESIGN

0 0.25 0.5 1 Miles

Data obtained from City of Great Falls
Map created September 10, 2013

4th Avenue North Bike Route

The bike route on 4th Ave N is the newest of Great Falls' two signed shared roadways. It is an east-west route north of Downtown between River Dr on the west and 38th St N on the east.

This is a quiet neighborhood street (25 mph speed limit), close to homes and parks. Many of the intersections on 4th Ave N are uncontrolled (no stop signs or signals) and bicyclists must be vigilant at each intersection and check for cross traffic from perpendicular streets. There is also a problematic link with Gibson Park and the River's Edge Trail on the western terminus of the bike route. Crossing River Dr after the bike route ends require navigating another uncontrolled intersection of 4th Ave N and a much busier road. MDT was initially hesitant to this improvement because of the lack of receiving infrastructure on the opposite side of the road (e.g. sidewalks, paths, etc.). The signs along 4th Ave N indicating that it is a bike route are standard D11-1 signs (MUTCD).

Bicyclist riding on the 4th Ave N bike route

Children and supervisors crossing Park Dr (from 4th Ave N) without crosswalks or sidewalks (on the receiving end)

8th Avenue North Bike Route

8th Ave N is a two-way, two lane "urban route" or collector road. It is 45 ft wide with two 15 ft travel lanes and two 7.5 ft parking lanes. It slopes downhill toward the west and uphill toward the east. Similar to 4th Ave N, it provides connectivity between Park Drive on the west and 38th St N on the east. This road is busier than 4th Ave N, with between 3,000 and 5,000 vehicles each day (depending on the section of the street) but still a 25 mph speed limit (and 20 mph for trucks) and has the same bikeway classification. There is not great connectivity to the River's Edge Trail or to parks on its western terminus. It is one of the most northern continuous east-west streets on the south side of the Missouri River. The signs along 8th Ave N indicating that it is a bike route are standard D11-1 signs (MUTCD).

3.3 Bicycle Parking

The existing policies and programs regarding bicycle parking for the City of Great Falls and for Cascade County state that there is not a requirement to provide bicycle parking. The installation of bike racks is currently completely up to the developer or the business owner. There is, however, a credit for vehicle parking spaces if bike parking spaces are also provided (17.36.3.010). The location of proposed bicycle parking spaces is reviewed by City staff and the Design Review Board when development plans are submitted to the City.

Bicycle parking at the Great Falls Public Library

In Downtown, permission was granted to the Business Improvement District (BID), and its chair Joan Redeen, to place bike racks on sidewalks in the public right of way (ROW). As new bicycle parking has been installed on downtown streets, it has been accepted and utilized by the community. There are, however, no long-term maintenance agreements between the City and the BID or the individual business owners regarding the future upkeep of the existing and any additional racks.

If bike racks are installed independently and on private property, the City does not have any responsibility to maintain them. Their only role is to encourage it and support future growth of bicycle parking.

Although there are many racks at public places like the Great Falls Public Library and in some locations in the BID, there is not a City or area-wide ordinance, initiative, or program to ensure that bicyclists have a place to park their bicycles when arriving at destinations. Without the assurance or predictability of bicycle parking, bicycling use may not be reaching its potential.

3.4 Maintenance

River's Edge Trail

Maintenance of the River's Edge Trail is shared between the Great Falls Parks and Recreation Department, Recreational Trails, Inc., and contracted maintenance crews, with funding for maintenance provided by the former two. Great Falls' Parks and Recreation Department mows the two feet on either side of the trail (because of the trail's nature as a linear park facility), clears snow, cleans and empties toilets and trash cans, and arranges with Cascade County for weed abatement and spraying.

Budget

All other maintenance, including repaving and crack sealing, is completed with a $5,000 budget provided by the City and private funds from RTI, which contracts with private maintenance companies to complete repairs and maintenance. The funding provided is inadequate for annual trail needs and represents the capacity to repave less than 100 feet annually for the existing trail system. RTI would like to contribute monetarily to the City of Great Falls so that they can maintain the trail better and in its entirety.

A local engineering firm, TD&H, is currently developing a comprehensive maintenance plan for the River's Edge Trail with initial and maintenance costs for current trail and future expansion. The plan seeks to help the trail function well and retain its popularity and utility. It is expected to be completed in Fall 2013.

Examining trail maintenance budgets from other cities and counties in the United States will provide some insight into how to best utilize a limited budget and what costs are in areas with similar climate conditions and trail infrastructure. Although there are many variables in maintenance and construction costs (crossings, concrete vs. asphalt vs. natural surfaces, climate, use, etc.), experience from other places may yield ideas and innovation in Great Falls.

Milwaukee County, Wisconsin

Milwaukee County maintains about 130 miles of paved and natural surface trails. The County spends $2,525 per mile to maintain existing asphalt paths and between $24.13 to $154.13 per mile for snow plowing, depending on the trail and surface type, width, and amount of snowfall. Trimming back vegetation and removing storm-damaged material for approximately 16 weeks out of the year costs $150,000. Landscaping on new trails and replacing landscaping on existing trails totals $110,000 while drainage installation, asphalt and washout repair for two weeks of the year costs $20,000.

Wisconsin Department of Natural Resources

On paths and trails within the WDNP's jurisdiction, approximately $2,000 per mile is spent on all maintenance costs combined according to their internal Trail Cost Model.

Iowa Department of Transportation.

IDOT builds and maintains trails and paths of a variety of surface types. Total annual maintenance costs are estimated at approximately $1,500 per mile.

Rails to Trails Conservancy

According to the Conservancy's Rail Trail Maintenance & Operation Manual, a minimum of $1,200 per mile for privately owned trails and approximately $2,077 per mile for government-maintained trails is spent on maintenance. This is applicable to Great Falls and the River's Edge Trail because parts of the RET are on former rail right of way[8].

Michigan Trails and Greenways Alliance

In 2007, the Michigan Trails and Greenways Alliance produced a document entitled "Statewide Greenways Maintenance Inventory and Case Studies", which outlines different maintenance costs on different trail type throughout the state[9].

On unpaved, low-maintenance natural trails with few if any trailheads, MTGA found that costs were much lower than for hard surface trails that run through cities, under roads, and with many trailheads and accesses. On the former type, MTGA estimated maintenance costs at around $221 to $500 per mile. Some snowmobile clubs, where they exist, near the natural surface trails split the costs of maintenance equipment 60/40 with the county and then buy the equipment in earnest over 5 years. They also provide most of the maintenance labor.

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[8] *"Maintenance." American Trails – National Resource for Trails and Greenways. Web. 5 Aug. 2013. <http://www.americantrails.org/resources/ManageMaintain/MilwMaintcost.html>,*

[9] *"Statewide Greenways Maintenance Inventory and Case Studies." Michigan Trails and Greenways Alliance. Web. 5 Aug. 2013. <http://www.michigantrails.org/blog/wp-content/uploads/statewide-trail-maintenance-survey-final.pdf>.*

Mid-level trails that require more maintenance than the aforementioned type cost between $984 and $1,453 per mile. These trails include paved, boardwalk, or other hardscaped trail surfaces.

High maintenance trails, which include hardscaped trails that run near of through cities and densely populated areas that also see high usage (178,000 users per year for the Pere Marquette Trail and 80,000 to 90,000 on the Kal-Haven Trail) have an estimated cost of $2,275 to $3,500 per mile. These costs cover weekly trash removal and toilet maintenance, tree removal, pruning, picnic table cleaning, graffiti removal, and pesticide spraying and invasive species removal.

Street Sweeping

Currently, there is no preferential treatment for streets with designated (separated or otherwise) bikeways. In the case of 8th Ave N (bike route), however, it is on a preferential schedule due to its nature as a snow route and a collector street.

Spring, Summer, and Fall

In the fair weather seasons in Great Falls, sweeping is done from west to east in the older City core (grid system), and then continues into the surrounding areas (e.g. south of 10th Ave S, and in the Riverview and Valley View neighborhoods). The Downtown core is on an enhanced schedule that includes 4 am sweeping so as to take advantage of the lack of motorized traffic and on-street parking (in commercial areas). Sweeping may also be performed as needed after heavy summer storms to clean up impacted areas (fallen branches, leaves, and other debris).

Winter

The City of Great Falls also sweeps in the winter in order to clear debris from the streets. It is done during breaks in the snowfall and preference is give (as mentioned before) to snow routes and arterials and collectors.

Montana Department of Transportation (MDT)

MDT sweeps all of the routes over which they have jurisdiction as needed. With the introduction of salt brine as a preventative measure, their sweeping has been cut down considerably. Although most sweeping is for spot improvements, maintenance crews do pay more attention to high usage routes such as 10th Ave S, 14th/15th St, and other major roadways.

On-street Snow Removal

The Great Falls area receives approximately 62 in of snow per year, receiving the most snow in March. The River's Edge Trail gets plowed before most streets because it is maintained by the Parks and Recreation Department, which is responsible for fewer routes than the Public Work Department, which maintains most roads.

3.5 Law Enforcement

As a matter of priority and utilizing manpower effectively, the Great Falls Police Department does not emphasize enforcement of bicycling laws as much as others. Because of a lack of available officers on duty, these infractions are usually overlooked.

3.6 Crashes

Bicyclists are typically at fault in the majority of crashes nationwide. This is often due to erratic and unsafe riding behavior including riding on the wrong side of the road, riding on sidewalks, and disobeying traffic control devices. Dedicated bicycling infrastructure such as bike lanes has been shown to improve behavior. This trend cannot be verified for Great Falls because there is not an "At Fault" option on Police reports when a crash occurs (at least not in the data provided).

For the period of January 1, 2008 through December 2010, there have been a total of 48 crashes involving bicycles in the City of Great Falls. Three of the 48 were between bicyclists and pedestrians; the remaining 45 were motor vehicle-bicycle crashes. Three of these 45 were alcohol-related; none of the three bicyclist-pedestrian crashes were alcohol-related. 37 of the 48 crashes (77 percent) occurred at intersections, driveways, roadway access points, or other junctions. Only two of the 48 crashes occurred during inclement weather, two occurred at dusk, and five happened at night. There have been no fatal crashes involving a bicyclist recorded in the Great Falls area since the beginning of 2008.

When crash data is visualized, most have occurred on or near major arterials, state, and U.S. routes such as 10th Ave S, 9th St, Central Ave, and 6th St SW.

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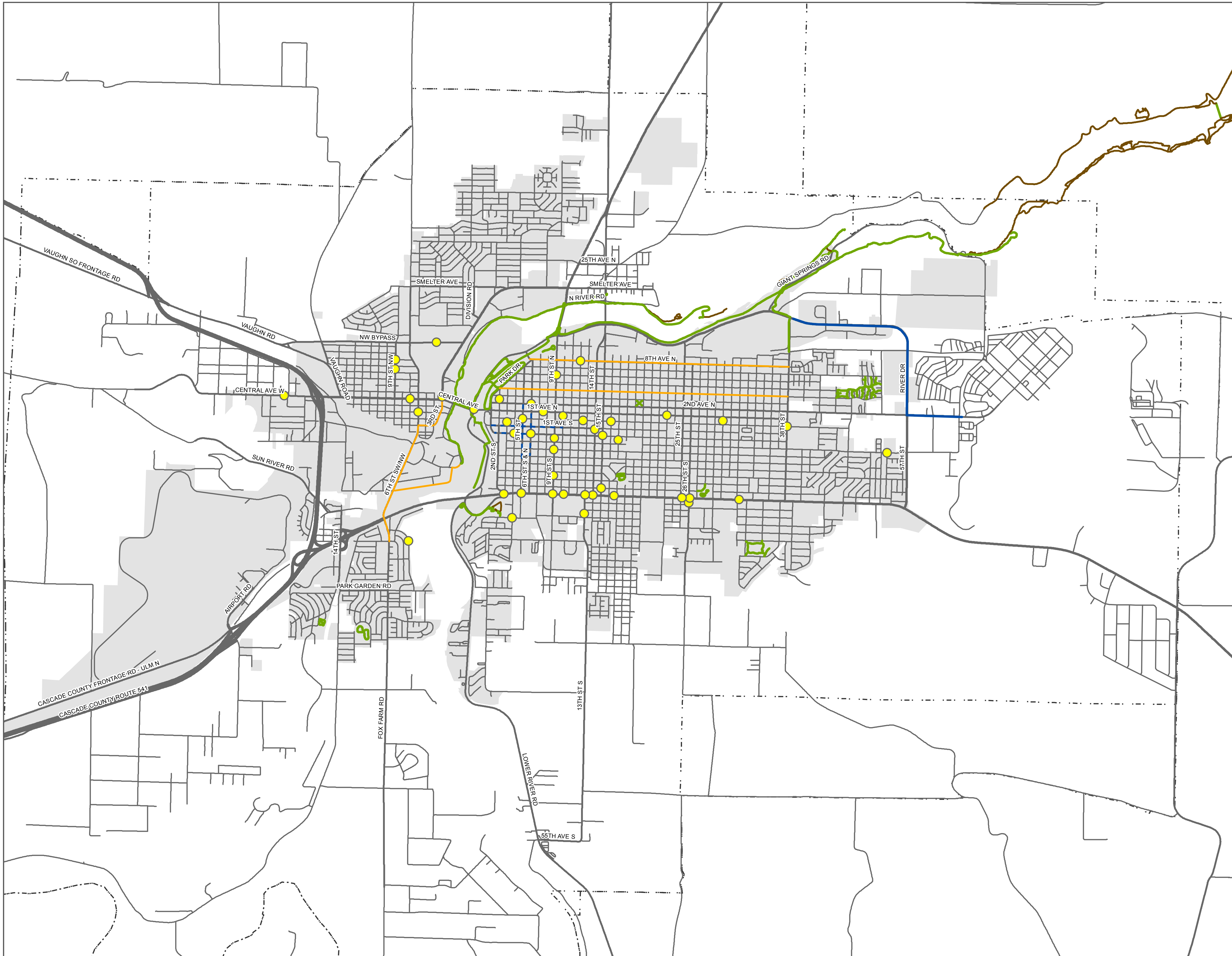

Bicycle Crashes

Great Falls Area Long Range Transportation Plan 2014

Legend

- Non-fatal Crash
- Existing Bike Lane
- Proposed Bike Lane
- Bike Routes
- Multi-use and Park Paths
- Unpaved Path
- Local Road
- Secondary Arterial
- Primary Arterial
- State Route
- Urban Route
- Non-Interstate Highway
- Highway or Freeway Ramp
- Interstate Highway
- Great Falls City Boundary
- Study Area

Dates: Jan 2008 to Dec 2010 (last crash)

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0 0.25 0.5 1 Miles

Data obtained from City of Great Falls
Map created September 10, 2013

4 Walking

As stated previously, about 2.7 percent of commute trips to and from work in Great Falls are done on foot, and about 5.5 percent of all trips, regardless of type, are walking trips. Both of these figures are below state and national averages for commute trips and all trips, respectively. Great Falls' older core neighborhoods and grid street system with small blocks lend themselves to walking and non-motorized transportation.

4.1 Facilities and Programs

Pedestrians use sidewalks, trails, alleys, and bridges in and around Great Falls. Other than maintenance of sidewalks and other pedestrian facilities (either proprietary or shared with other users, like the River's Edge Trail), the City of Great Falls and Cascade County do not currently have any programs dedicated to encouraging walking.

Walking and jogging are very popular on the River's Edge Trail

The downtown core streets like 1st and 2nd Ave S have had multiple pedestrian improvements recently. Bulbouts (or curb extensions) and new street trees and plants have provided simplified and safer street crossings and a more inviting environment, respectively. Bulbouts also have the ability to calm or slow down traffic. This is important in a core commercial areas where walking is more prevalent (even by people who travel by car to get there).

Several non-governmental groups exist in Great Falls that are dedicated to encouraging more active and fit residents, including Recreational Trails, Inc. (discussed previously) and Get Fit Great Falls (GFGF), a group that desires to have a healthier and more active community that is also more economically vibrant and physically active. Get Fit Great Falls is made up of representatives from 20 community organizations and agencies and although it is not officially a non-profit organization, it has been successful in its initial initiatives to encourage more walking and bicycling to Great Falls Voyagers baseball games, overall walkability of the City, and improving the relationship between pedestrians and other roadway users. Bicyclists and pedestrians sharing sidewalks can be dangerous according to GFGF and an improvement on the current situation is another goal of the organization. Focusing also on wheelchair accessibility and safety concerns for disabled users, GFGF has sought to work with the City to close sidewalk gaps and improve ADA access. Gaps in the pedestrian network and an analysis of needs will be provided later.

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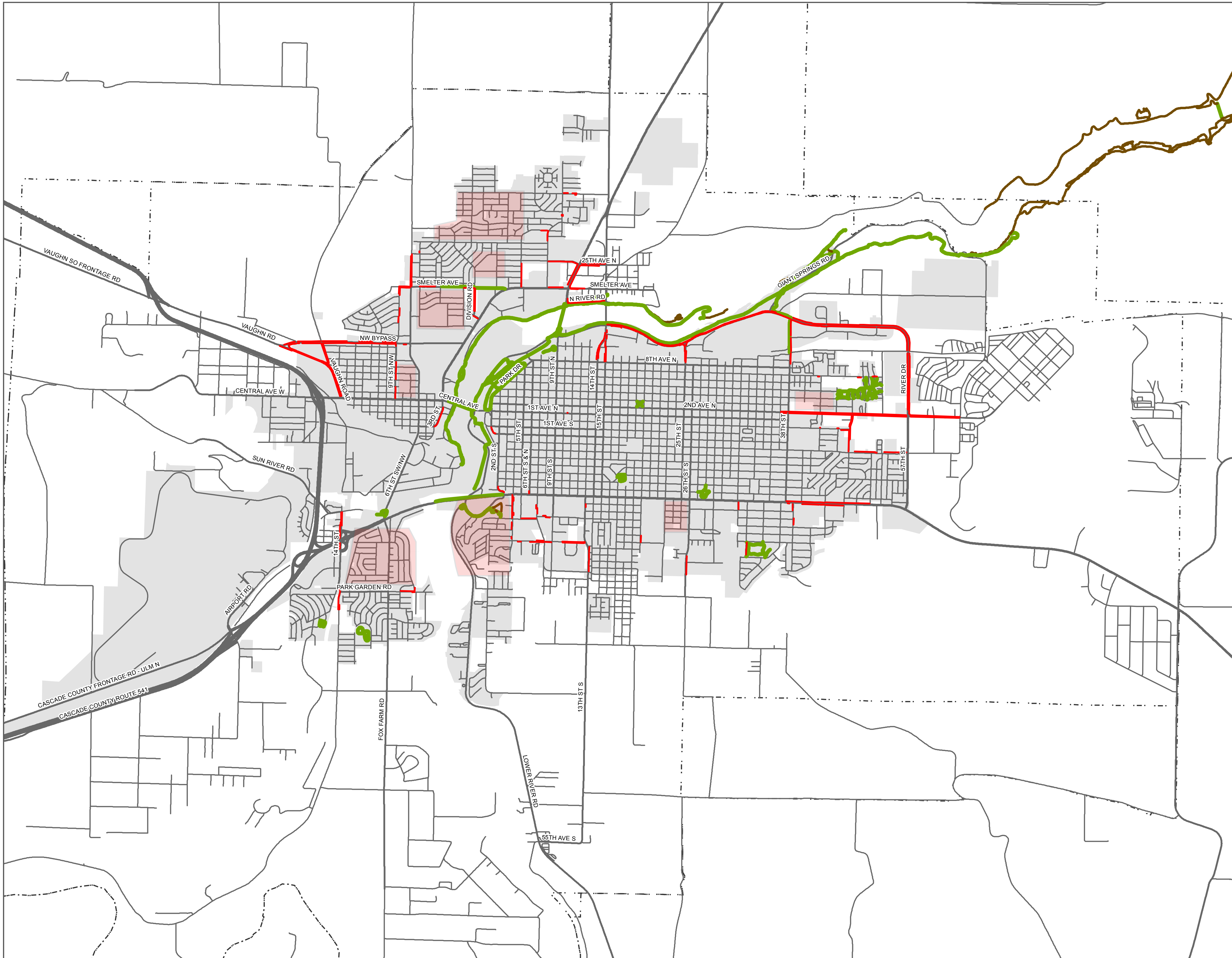
Existing Pedestrian Conditions

Great Falls Area Long Range Transportation Plan 2014



Legend

- Sidewalk Gaps
- Multi-use and Park Paths
- Unpaved Path
- Local
- Secondary Arterial
- Primary Arterial
- State Route
- Urban Route
- Non-Interstate Highway
- Highway or Freeway Ramp
- Interstate Highway
- Great Falls City Boundary
- Study Area
- Areas with poor sidewalk connectivity

Note: Sidewalk gaps are shown only on the major roadway network (collectors, artierials, state and U.S. routes, and interstate highways). Areas with poor sidewalk connectivity are highlighted.

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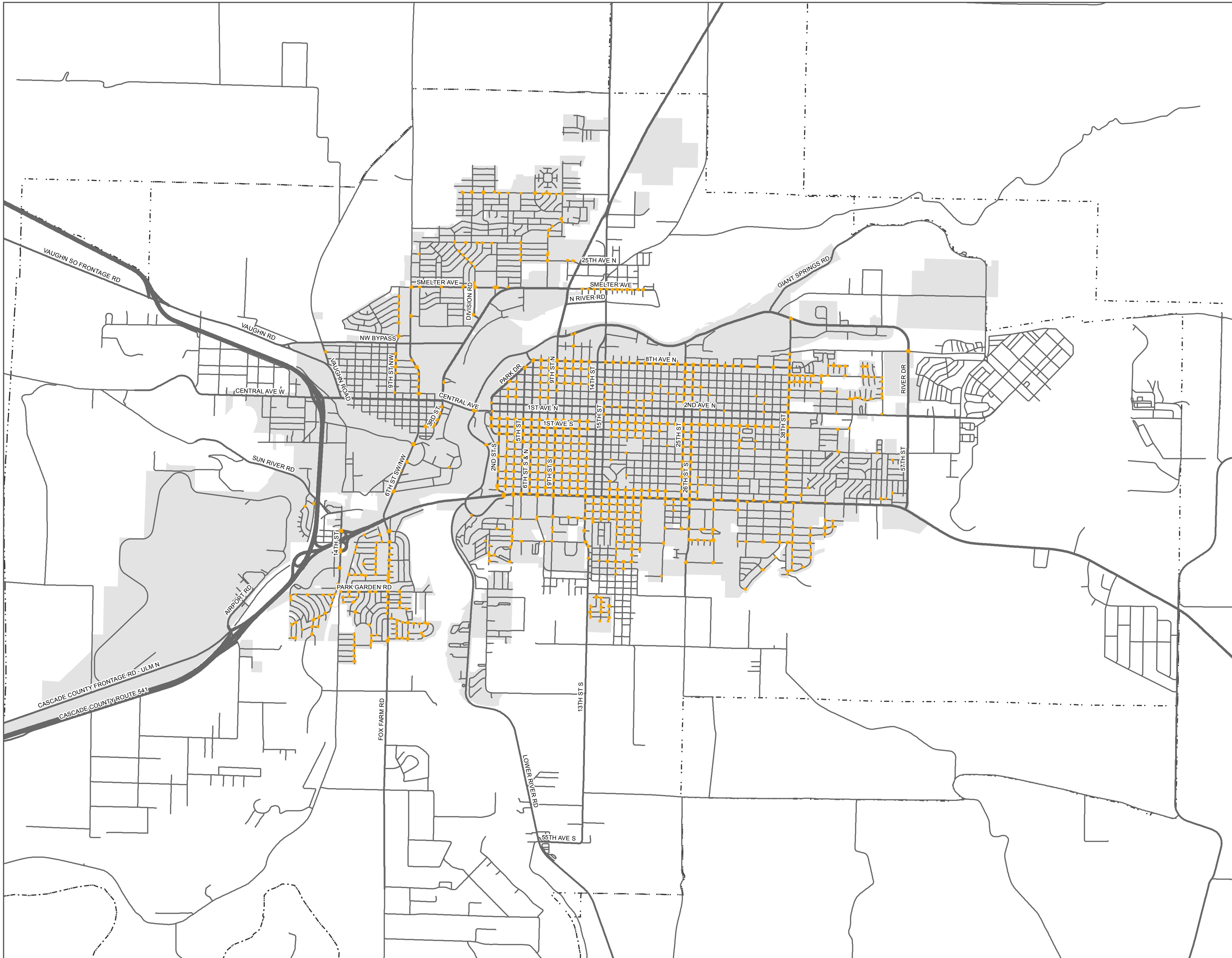
0 0.25 0.5 1 Miles

Data obtained from City of Great Falls
Map created September 10, 2013



Existing ADA Sidewalk Ramps

Great Falls Area Long Range Transportation Plan 2014

Legend

- ADA Ramps
- Local
- Secondary Arterial
- Primary Arterial
- State Route
- Urban Route
- Non-Interstate Highway
- Highway or Freeway Ramp
- Interstate Highway
- Great Falls City Boundary
- Study Area

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N

0 0.25 0.5 1 Miles

Data obtained from City of Great Falls
Map created September 10, 2013

4.2 Sidewalk Maintenance

Within the Great Falls city limits, there are no programs for sidewalk maintenance or replacement. Many Montana communities also have sidewalk networks that are fragmented, disconnected, and poorly maintained. This is due, in large part, to minimal sidewalk infrastructure required as part of 1970s and 1980s era development.

The presence of sidewalks along streets and in neighborhoods can have a dramatic impact on physical activity levels of residents and the transportation options available to the community. According to the National Complete Streets Coalition, 43 percent of people with safe places to walk within 10 minutes of home meet recommended activity levels, whereas only 27 percent of people without safe places to walk meet these activity levels. Furthermore, residents were found to be 65 percent more likely to walk in a neighborhood with sidewalks[10].

One well-documented Montana example echoes the National Complete Streets Coalition's findings. The City of Bozeman performed a video monitoring program of West Babcock Street before and after a reconstruction. Following the addition of sidewalks, the study noted an immediate 273 percent increase in pedestrian activity[11].

Often the biggest hurdle for communities is coming up with ways to fund sidewalk infill projects. Typically, available funding for sidewalk construction and maintenance in operational budgets is scarce. In many communities this is because sidewalk construction and maintenance is the legal responsibility of the adjacent property owner (in the case of existing development) or the developer (in the case of new development). Local ordinance and subdivision regulations typically govern sidewalk installation and maintenance responsibilities.

Per Montana state law, sidewalk maintenance including tree root heaves, crumbling, etc., is the responsibility of the adjoining property owner(s) and is only enforced by the City or the jurisdictional authority. In the case of sidewalks inside of Great Falls city limits, this authority would be the City. Otherwise, it would be Cascade County. At the City level, at least, this process is complaint-driven and is thus reactive, and not proactive. After receiving a hazardous sidewalks complaint, a member of the City's Engineering Department staff performs a site inspection to determine if it is, in fact, a condemnable defect. If that is the case, a letter is then issued to the property owner notifying them of the defect and that they will be allowed 30 days for repairs. In 90 percent of cases, according to the City of Great Falls, the owner complies and the defect is remedied. The remaining 10 percent require a condemnation process that continues with the City hiring a contractor to do the repairs and the owner being charged for any labor and materials needed. If the owner does not pay for the repairs after they have been completed, then a lien is place on the property.

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[10] *"Health | Smart Growth America." National Complete Streets Coalition | Smart Growth America. Web. 6 Aug. 2013. <http://www.completestreets.org/complete-streets-fundamentals/factsheets/health/>.*

[11] *"2005-2006 West Babcock Street Pedestrian and Bicyclist Monitoring Project Final Report." Bozeman Planning and Community Development. Web. 7 Aug. 2013. <http://www.bozeman.net/Smarty/files/73/732447ea-e1cf-4764-ad7f-8cf0b960e8e9.pdf>.*

In some cases where the defect is very minor, like small rises (usually less than one inch) in sidewalks sections that turn into “toe stubbers”, especially in Downtown, grinding the concrete level has been done. Grinding, however, is limited to very minor offsets and to strong or newer concrete because old or deteriorated concrete tends to shatter.

In rare cases, the City or MDT has paid for sidewalk replacement or repair in full when it was part of a larger project, like the addition of ADA ramps, asphalt milling, and overlay projects on 1st and 2nd Ave N.

For the Montana Department of Transportation (MDT), their involvement in the issue depends on the extent of the repair required by the offset or deterioration. Their rule of thumb is that if is more than six linear feet of repair, then they will consider it more than “maintenance” and will fix it with public funds. Even with this program, businesses have also fixed larger repairs on their own.

4.3 Crashes

There have been 88 total pedestrian-related crashes recorded between January 1, 2008 and December 2012 in the City of Great Falls. Seven of them were alcohol-related, with two of the seven proving fatal. 48 of the 88 total were at intersections, driveways, roadway access points, or were otherwise intersection-related. Only three of the 88 occurred during inclement weather, three were during dusk, and 28 at night (either on a lighted or unlit street).

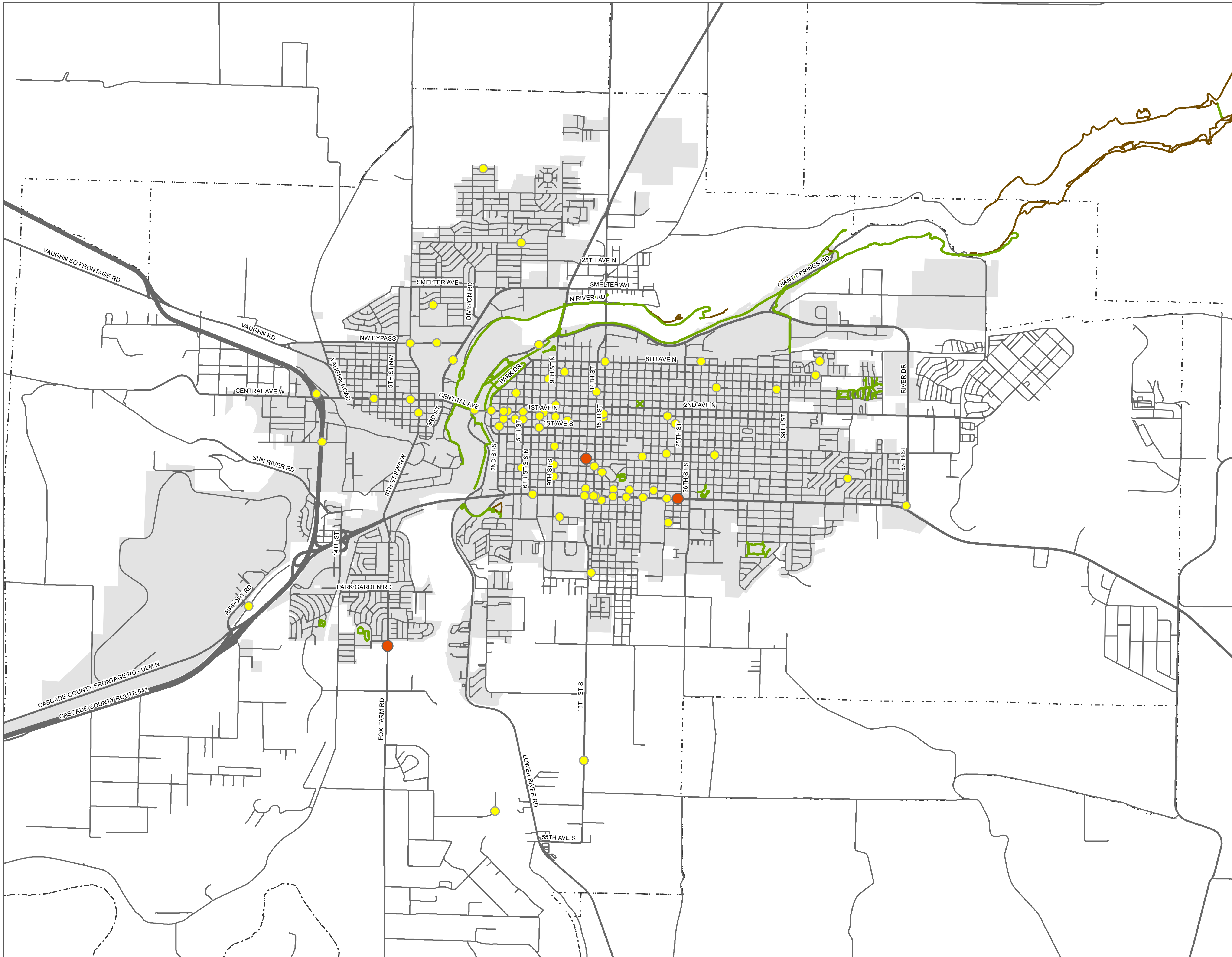
Like bicycle-related crashes, there is a concentration of pedestrian crashes on or near major arterial roadways, state and U.S. routes (e.g. 10th Ave S between 13th St S and 26th St S; 9th St South; 15th St; and in Downtown between 1st Ave N and 1st Ave S).

Fatal Crashes

All three total fatal crashes since the beginning of 2008 occurred between midnight and 8:00 am. In these crashes, at least one pedestrian was killed while none of the motorists were killed. Alcohol played a factor in two of the three crashes.

Pedestrian Crashes

Great Falls Area Long Range Transportation Plan 2014



Legend

- Fatal Pedestrian Crash
- Non-fatal Pedestrian Crash
- Multi-use and Park Paths
- Unpaved Path
- Local
- Secondary Arterial
- Primary Arterial
- State Route
- Urban Route
- Non-Interstate Highway
- Highway or Freeway Ramp
- Interstate Highway
- Great Falls City Boundary
- Study Area

Dates: Jan 2008 to Dec 2012 (last crash)

0 0.25 0.5 1 Miles

Data obtained from City of Great Falls
Map created September 10, 2013

5 Connectivity to Transit

Trips by transit (in Great Falls' case, by bus) often begin and end on foot or bicycle or both. When connectivity to transit is poor, ridership and ease of use of the system is also negatively affected. By improving sidewalks at and near bus stops, constructing bus shelters for waiting patrons, and planning routes near popular bicycling and walking routes, citizen connectivity to transit can improve.

Currently, the Great Falls Transit District (GFTD) bus route network is mostly a flag-down system, but there are plans and programs now in place to include fixed stops and the amenities that go along with them. A completely fixed stop system has been discussed internally at GFTD, but a plan for implementation has not been created yet. The advantages of a fixed stop system, especially for bicyclists and pedestrians, would be, among others, improved predictability of route time tables and scheduling, both for the user and the Transit District.

Overall ridership in the last year has increased and always goes up during the school year.

Bicycling

Nearly all GFTD buses now have bike racks mounted on the front of the bus that allow users to use buses to connect longer legs of a trip, in case of an emergency or breakdown, or to avoid inclement weather or difficult topography. GFTD has not, however, tracked or counted their use to determine demand on certain routes, or where bicyclists board and alight most.

Walking

The GFTD is currently focused heavily on addressing connectivity to newly implemented fixed stops via sidewalks and applicable improvements.

The City's Planning Department expressed interest in seeing GFTD provide a priority analysis on Safe Routes to Schools and sidewalks and their relationship with transit accessibility. According to the City and GFTD, there are transit users with limited mobility who use paratransit and other transit services because there are not sidewalks where they want to go or that access traditional bus stops and not necessarily because they require a paratransit ride.

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6 Needs Analysis

6.1 System Deficiencies

Overview

Even though the River's Edge Trail provides a high-quality backbone to the community's transportation system, the active transportation network of bikeways and pedestrian facilities is still lacking significantly, especially connections between that network (proposed and existing) and the River's Edge Trail. Access from Downtown to the trail (and vice versa) is limited. Several other features in Great Falls, like the Missouri River 10th Ave S bridge, were designed and constructed without consideration for active transportation modes. Existing sidewalk gaps and the attitude and perception of motorists towards other modes also pose significant barriers to walking and bicycling being perceived and utilized as legitimate forms of transportation.

Sidewalk Gaps

Most of the established areas of Great Falls have a very cohesive and continuous sidewalk network. On the outskirts and in new or fringe developments, however, such connectivity is lacking. Much of the latter areas were subdivided and built before being incorporating into the City (if at all), and most of the sidewalk gaps occur here. Developers and builders in unincorporated areas were not required to build sidewalks and they weren't included in the design of these neighborhoods.

There are currently 37.62 miles of sidewalk gaps out of the 196 miles of potential sidewalk mileage within the City limits. This means that slightly less than 20 percent of the potential total mileage for sidewalks (assuming they would be installed on every non-Interstate system street within the City limits) is still missing.

According to the public survey regarding walking in Great Falls, 44 percent of those surveyed believe that the sidewalk network near their home is complete, while 33 percent said that it was mostly complete. Only 8 percent of those surveyed live in an area where sidewalks are spotty at best and 15 percent live where there are no sidewalks at all. Additionally, 71 percent of respondents rated the present quality of pedestrian infrastructure in Great Falls as "Fair".

There are some locations in Great Falls where sidewalks end

Some streets don't have any sidewalks

ADA Ramps

An ADA ramp is an inclined ramp that allows access for those in wheelchairs, with other disabilities (including the elderly), and those pushing carts or strollers to transition gradually and safely between the sidewalk and the street, similar to the way a driveway curb cut allows a car to access a driveway and the roadway.

The City of Great Falls has made a significant effort is creating curb ramps or ADA ramps in recent years.

The Great Falls Transit District ADA (Americans with Disabilities Act) advisory committee is currently without effective guidance or leadership, but its role has traditionally been to advise the Board of Trustees or Directors on issues regarding wheelchair access and accommodating and providing services for those with disabilities who use the transit system. In the past, their priority was a curb cut, or ADA ramp, program. Once that began to pick up speed and more ADA ramps were installed on sidewalks, interested members of that committee dwindled and stopped coming to meetings.

6.2 Public Meetings

Consultants from Robert Peccia & Associates and Alta Planning + Design met with stakeholders of the project and with the public in June 2013. The overall sentiment throughout each of the meetings was positive and encouraging. Representatives from governments, non-profits, trails groups, bicycling advocacy groups, and health and recreational organizations were supportive of walking and bicycling as a way to contribute to the local economy, provide mobility and safe transportation choices for Great Falls area residents, and build upon and create a world class trail system.

Stakeholder Meetings

Consultants met with the following groups during the stakeholder meetings: Get Fit Great Falls, Great Falls Transit District, Great Falls Public Work Department, Montana Department of Transportation, River's Edge Trail (Recreational Trails, Inc.), and the City's Trails Working Group.

Citizens and community groups that met with consultants have specific projects and broad or general goals that they would like to see implemented over coming years. Government representatives would like to implement the same and desire a plan that not only suggests visionary improvements to bicycling and walking in the area but also provides a plan for implementation so that the area is not left with disjointed bikeways as experiments, sidewalks without connectivity to key destinations, or facilities that are less safe than they should be. With such a plan, all parties agree that there will be a vision to follow and with which all parties can move forward.

Public Open House #1

At the first public open house for the Great Falls Area Long Range Transportation Plan there were more than 30 in attendance not including City and State government representatives and the project consultants. Attendees were members of the public, representatives from non-profit organizations, avid bicyclists, potential and interested bicyclists and pedestrians, and some with ideas on how to best implement the plan.

After a presentation about the "why" behind the plan, attendees participating in two mapping stations: one dedicated to all roadways and traffic improvements, and one specifically for walking and bicycling. The comments received at these mapping stations (including the maps themselves) reflect the attendees' desired improvements for the City.

6.3 Survey Summary

Bicycling

A public survey was created as part of the active transportation section of this plan in order to collect information about the preferences and key identifiers of different types of people interested in bicycling in the Great Falls area. Of the 298 total respondents to the "Bicycling Survey", 152 of them (52 percent) were women, while 142 (48 percent) were men.

The survey was not statistically valid (because of the reach and response) and was distributed and promoted primarily by stakeholder groups in the transportation planning process and advertised in the newspaper.

Age

28 percent (the largest group of respondents by age) were between 50 and 59 years old. In total, there were only two respondents under 20 years old.

Education

The most common response when asked about the highest level of education acquired was "Bachelor Degree" with 41 percent of respondents having achieved this level. The next most common response was "Graduate Degree".

Income

There was a fairly even split between income levels among those surveyed, with about 20-25 percent in each level, except for the $0-$24,999 range, which only had 5 percent of the total respondents. The other levels were: $25,000-$49,999; $50,000-$74,999; $75,000-$99,999; and $100,000 and above.

Types of Bicyclists

It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. Bicyclist skill level greatly influences expected speeds and behavior, both in separated bikeways and on shared roadways. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people. The bicycle planning and engineering professions currently use several systems to classify the population, which can assist in understanding the characteristics and infrastructure preferences of different bicyclists. The most conventional framework classifies the "design cyclist" as *'Experienced and Confident' or 'Casual and Less Confident'*.[12] A more detailed understanding of the US population

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[12] *Guide for the Development of Bicycle Facilities, 4th Edition. (2012). AASHTO.*

as a whole was developed by planners in Portland, OR[13] and supported by data collected nationally since 2005. This classification provides the following alternative categories to address varying attitudes towards bicycling in the US:

Strong and Fearless (approximately 1 percent of population)

Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles - over separate bikeways such as shared use paths.

Enthused and Confident (5-10 percent of population)

This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.

Interested but Concerned (approximately 60 percent of population)

This user type comprises the bulk of the population and represents bicyclists who typically only ride on low traffic streets or shared use paths under favorable weather conditions. These people perceive significant barriers to increased cycling, specifically traffic and other safety issues. These people may become "Enthused & Confident" with encouragement, education and experience.

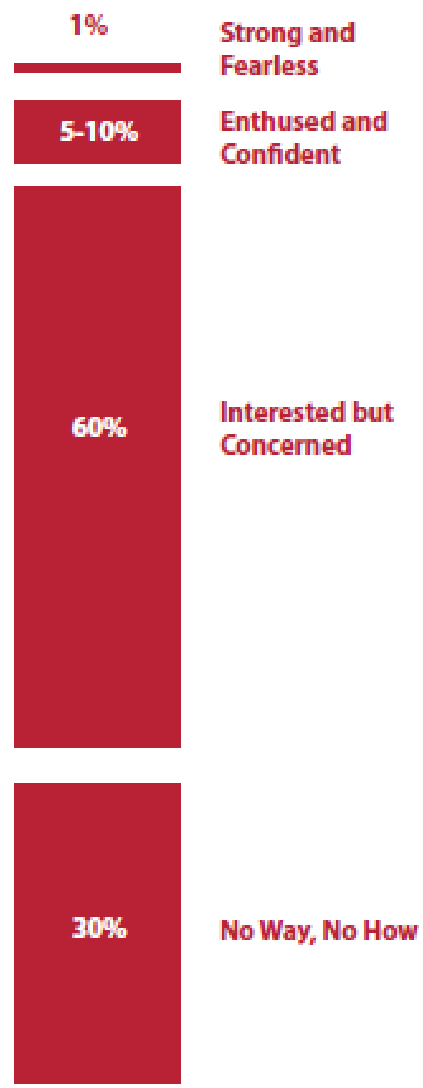


Figure 3: Typical Distribution of Bicyclist Types

No Way, No How (approximately 30 percent of population)

Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

[13] *Four Types of Cyclists. (2009). Roget Geller, City of Portland Bureau of Transportation. http://www.portlandonline.com/transportation/index.cfm?&a=237507*

When considering responses from all 298 respondents, they all self-identified as the following types of bicyclists or potential bicyclists:

- Strong and Fearless: 19 percent
- Enthused and Confident: 39 percent
- Interested but Concerned: 34 percent
- No way No how: 8 percent

The 8 percent (or 25 people) who chose the last category not only identified themselves as those who do not and will not ride a bicycle but they also, for the most part, also opposed bicycle infrastructure of any kind and often stated that bicyclists should pay for bike lanes themselves via licensing fees or that federal or state money should be used instead of local money. Only four of the 25 said that local money should be used in concert with state and federal funds.

44 percent of the 152 female respondents answered that they were bicyclists or potential bicyclists that were "Interested but Concerned", whereas only 23 percent of the 142 male respondents considered themselves part of this type of bicyclist. The most common type of self-identified male bicyclist was the "Enthused and Confident" type (38.5 percent of the 142).

"Strong and Fearless" male bicyclists came a close second at 31 percent of the 142 respondents. Interestingly, only 7 percent of females surveyed identified themselves in this category.

Preferred Facilities

Survey takers were given the chance to select which facilities and types of bikeways they preferred or wished to have in their community (on a scale of 1-5, with one being least desirable and five being the most, depending on how much they liked it and how desirable it was). Most of the bikeways types received an average score of 3.5, but shared use paths received a 4.3, which is indicative of the fact that Great Falls residents are familiar with this type of facility (River's Edge Trail) and may not be familiar with other types.

Destinations

When asked what their normal destinations are in Great Falls, respondents showed that trails, open space, and community spaces are among the most visited and cherished. The top 5 destinations among respondents were:

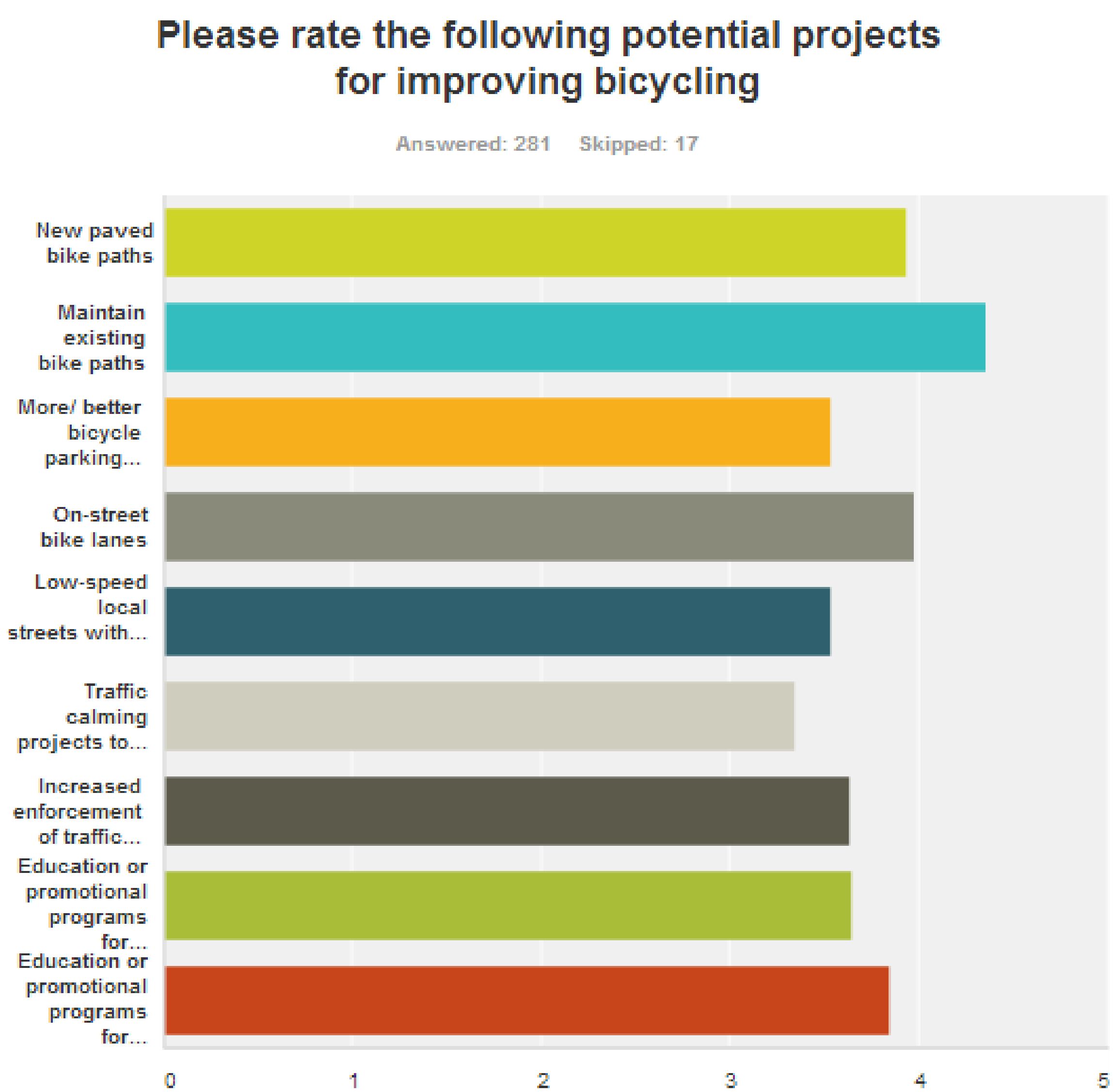
- River's Edge Trail
- Downtown Great Falls
- Gibson Park
- Giant Springs Interpretive Center
- Riverfront parks

Funding

An overwhelming majority of those surveyed believe that local funds should be prioritized and complement existing State or Federal funds in order to provide bicycle facilities. 66 percent of them said that they would be willing to pay more taxes, pay more in street assessments, or by local bond to implement a bicycle network more quickly.

Improving Bicycling

When asked what methods they would prefer in order to improve bicycling in Great Falls, the only choice that received a higher score than 4 (on a scale of 1 to 5), was "Maintain existing bike paths" with all other options receiving an average score of 3.6, the lowest being 3.34 ("Traffic calming to slow cars"). This does not mean that survey respondents don't want bicycling improvements and different methods to accomplish a cohesive system, but it does mean that improving maintenance of existing facilities, especially paths and trails, is the number one priority for them right now.



Walking

A public survey dealing with walking and the preferences of pedestrians in the Great Falls area ran concurrently with the Bicycling Survey discussed previously. A total of 192 responses from Great Falls area residents were gathered. Of these 192 people surveyed, 116 (61%) of them were women, while 75 (39%) were men.

Age, Education, and Income

The age, education, and income characteristics for this survey were nearly identical to the Bicycling Survey.

Walking Habits

In addition to demographic information, respondents were also asked about their walking habits. About half (49 percent) of respondents walk a few times per week, the next most common response was "5+ times per week" with only a cumulative 10 percent of respondents saying that they walk a few times per month or never.

Most respondents walk primarily for exercise and the next reasons are, in this order: spending time outdoors, transportation to a destination, social visits, and walking to school.

An overwhelming amount of people surveys responded that they currently enjoy walking on the River's Edge Trail, with the next most popular responses being "riverfront parks", "Downtown Great Falls", and "grocery stores".

Proximity to Destinations

Nearly 50 percent of respondents say that it only takes one to five minutes to walk to a park or playground, 30 percent have a 6-10 minute walk to a small grocery store, and 35 percent have an 11-20 minute walk to a supermarket. There was an even split of about 18 percent of respondents who lived 21-30 minutes walking from a supermarket, fast food restaurant, pharmacy, or trail or greenway. Only 10 percent of respondents lived within a one to five minute walk from a trail or greenway.

Sidewalk Network

44 percent of the 192 respondents believe that the sidewalk network near their home is complete. Additional analysis of this section of the Walking Survey is provided in earlier in section 6 of this memorandum.

Preference

70 percent of respondents said that they would walk more often if there were more sidewalks, greenway trails, and safe roadway crossings (in that order) according to the preference survey question.

Automobile speed & traffic, lack of sidewalks & trails, and a lack of pedestrian crossings at intersections were the top 3 reasons why people surveyed choose not to walk. Connectivity was also a big draw for respondents who said that they would like to see more pedestrian connectivity between neighborhood, shopping centers, park, and other destinations more than any other improvement. Marked crosswalks and sidewalks rounded out the top three.

Interestingly, 10th Ave S and Fox Farm Rd seemed to pop up more than others in open-ended questions that asked for additional thoughts on locations or corridors that could be improved for pedestrians. Respondents cited these as routes and barriers that were difficult to use and were unattractive as a pedestrian.

GREAT FALLS AREA
Long Range Transportation Plan - 2018 Update

Appendix B

Existing Intersection Operations

Intersection Level Of Service Report
Intersection 1: 57th St S and 2nd Ave N

Control Type:	Signalized	Delay (sec / veh):	21.0
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.270

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	250.00	100.00	100.00	230.00	100.00	250.00	200.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	38	179	152	24	115	23	49	197	42	92	83	16
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	38	179	152	24	115	23	49	197	42	92	83	16
Peak Hour Factor	0.8930	0.8930	0.8930	0.8930	0.8930	0.8930	0.8930	0.8930	0.8930	0.8930	0.8930	0.8930
Other Adjustment Factor	0.9640	0.9640	0.9640	0.9640	0.9640	0.9640	0.9180	0.9180	0.9180	0.9640	0.9640	0.9640
Total 15-Minute Volume [veh/h]	10	48	41	6	31	6	13	51	11	25	22	4
Total Analysis Volume [veh/h]	41	193	164	26	124	25	50	203	43	99	90	17
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	2	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups			2									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	15	15	5	15	0	5	15	0	5	15	0
Maximum Green [s]	20	45	45	20	45	0	20	45	0	20	45	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	35	35	10	34	0	12	27	0	18	33	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	No	No	No	No	No		No	No		No	No	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	L	C	C
C, Cycle Length [s]	90	90	90	90	90	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	54	46	46	54	46	46	26	15	15	26	18	18
g / C, Green / Cycle	0.60	0.52	0.52	0.60	0.51	0.51	0.29	0.17	0.17	0.29	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.04	0.12	0.12	0.02	0.05	0.05	0.04	0.08	0.08	0.08	0.03	0.04
s, saturation flow rate [veh/h]	1157	1550	1318	1112	1550	1463	1238	1550	1459	1180	1550	1467
c, Capacity [veh/h]	772	798	678	699	784	740	443	259	244	383	303	287
d1, Uniform Delay [s]	7.55	12.13	12.13	7.68	11.59	11.61	23.48	34.03	34.12	24.54	30.26	30.30
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.13	0.72	0.84	0.02	0.24	0.27	0.11	1.39	1.56	0.35	0.28	0.31
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.05	0.24	0.24	0.04	0.10	0.10	0.11	0.48	0.50	0.26	0.18	0.18
d, Delay for Lane Group [s/veh]	7.68	12.85	12.98	7.70	11.83	11.88	23.59	35.42	35.68	24.89	30.54	30.61
Lane Group LOS	A	B	B	A	B	B	C	D	D	C	C	C
Critical Lane Group	No	Yes	No	Yes	No	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	0.33	2.20	1.89	0.19	0.80	0.79	0.78	2.54	2.48	1.62	0.99	0.97
50th-Percentile Queue Length [ft/ln]	8.26	54.88	47.23	4.85	20.03	19.77	19.59	63.57	61.95	40.40	24.77	24.31
95th-Percentile Queue Length [veh/ln]	0.59	3.95	3.40	0.35	1.44	1.42	1.41	4.58	4.46	2.91	1.78	1.75
95th-Percentile Queue Length [ft/ln]	14.87	98.79	85.01	8.73	36.05	35.58	35.25	114.43	111.52	72.71	44.58	43.77

Movement, Approach, & Intersection Results

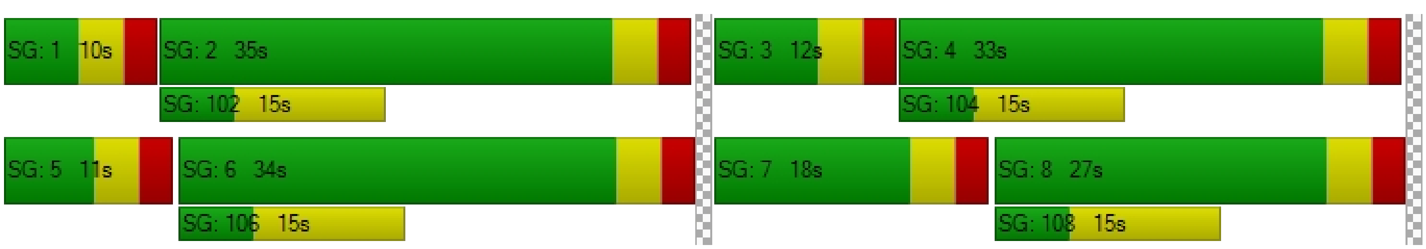
d_M, Delay for Movement [s/veh]	7.68	12.85	12.98	7.70	11.85	11.88	23.59	35.52	35.68	24.89	30.57	30.61
Movement LOS	A	B	B	A	B	B	C	D	D	C	C	C
d_A, Approach Delay [s/veh]	12.37			11.24			33.53			27.84		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	20.98											
Intersection LOS	C											
Intersection V/C	0.270											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.562	2.254	2.420	2.438
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	667	644	489	622
d_b, Bicycle Delay [s]	20.00	20.67	25.69	21.36
I_b,int, Bicycle LOS Score for Intersection	2.216	1.704	1.804	1.730
Bicycle LOS	B	A	A	A

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 1: 57th St S and 2nd Ave N

Control Type:	Signalized	Delay (sec / veh):	21.7
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.321

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	250.00	100.00	100.00	230.00	100.00	250.00	200.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	54	158	115	19	226	69	24	82	52	224	274	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	54	158	115	19	226	69	24	82	52	224	274	57
Peak Hour Factor	0.8730	0.8730	0.8730	0.8730	0.8730	0.8730	0.8730	0.8730	0.8730	0.8730	0.8730	0.8730
Other Adjustment Factor	0.9640	0.9640	0.9640	0.9640	0.9640	0.9640	0.9180	0.9180	0.9180	0.9640	0.9640	0.9640
Total 15-Minute Volume [veh/h]	15	44	32	5	62	19	6	22	14	62	76	16
Total Analysis Volume [veh/h]	60	174	127	21	250	76	25	86	55	247	303	63
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	2	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups			2									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	15	15	5	15	0	5	15	0	5	15	0
Maximum Green [s]	20	45	45	20	45	0	20	45	0	20	45	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	10	21	21	10	21	0	11	21	0	38	48	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	No	No	No	No	No		No	No		No	No	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	L	C	C
C, Cycle Length [s]	90	90	90	90	90	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	47	39	39	47	38	38	34	15	15	34	26	26
g / C, Green / Cycle	0.52	0.44	0.44	0.52	0.42	0.42	0.37	0.16	0.16	0.37	0.29	0.29
(v / s)_i Volume / Saturation Flow Rate	0.06	0.11	0.10	0.02	0.11	0.11	0.02	0.05	0.05	0.19	0.12	0.12
s, saturation flow rate [veh/h]	1027	1550	1318	1132	1550	1430	1005	1550	1359	1301	1550	1459
c, Capacity [veh/h]	570	678	576	615	646	596	400	253	221	552	451	424
d1, Uniform Delay [s]	11.29	16.10	15.82	10.97	17.20	17.27	18.47	33.15	33.30	21.40	25.83	25.86
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.37	0.92	0.88	0.02	0.97	1.10	0.06	0.61	0.79	0.57	0.62	0.66
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.11	0.26	0.22	0.03	0.26	0.27	0.06	0.29	0.31	0.45	0.42	0.42
d, Delay for Lane Group [s/veh]	11.66	17.02	16.70	10.99	18.17	18.37	18.54	33.77	34.10	21.97	26.44	26.52
Lane Group LOS	B	B	B	B	B	B	B	C	C	C	C	C
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	0.63	2.36	1.71	0.20	2.36	2.27	0.33	1.41	1.36	3.89	3.26	3.10
50th-Percentile Queue Length [ft/ln]	15.87	59.10	42.82	5.00	59.03	56.86	8.34	35.22	34.08	97.33	81.41	77.46
95th-Percentile Queue Length [veh/ln]	1.14	4.26	3.08	0.36	4.25	4.09	0.60	2.54	2.45	7.01	5.86	5.58
95th-Percentile Queue Length [ft/ln]	28.57	106.38	77.07	9.00	106.25	102.34	15.01	63.39	61.34	175.20	146.54	139.43

Movement, Approach, & Intersection Results

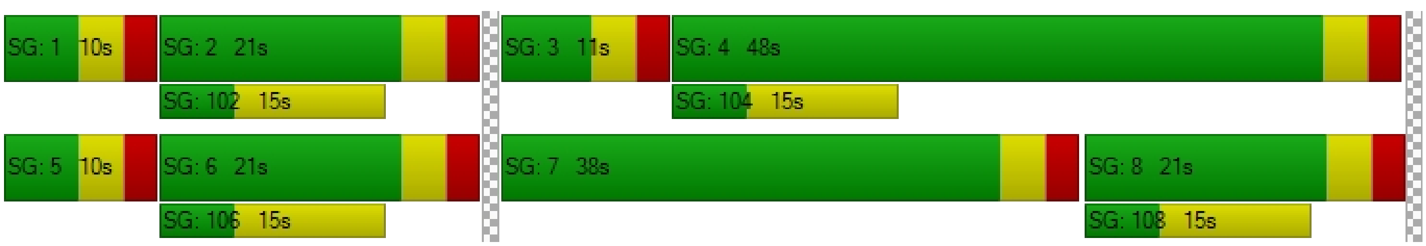
d_M, Delay for Movement [s/veh]	11.66	17.02	16.70	10.99	18.24	18.37	18.54	33.82	34.10	21.97	26.47	26.52
Movement LOS	B	B	B	B	B	B	B	C	C	C	C	C
d_A, Approach Delay [s/veh]	16.02			17.83			31.61			24.66		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	21.74											
Intersection LOS	C											
Intersection V/C	0.321											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.616	2.292	2.457	2.480
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	356	356	356	956
d_b, Bicycle Delay [s]	30.42	30.42	30.42	12.27
I_b,int, Bicycle LOS Score for Intersection	2.155	1.846	1.697	2.065
Bicycle LOS	B	A	A	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report

Intersection 2: 10th Ave S and 20th St S

Control Type:	Signalized	Delay (sec / veh):	14.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.464

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	275.00	100.00	100.00	275.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	57	40	48	51	64	31	12	1226	153	31	1159	38
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.60	7.50	4.20	2.00	1.60	3.20	0.00	4.70	2.70	3.20	2.60	2.60
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	57	40	48	51	64	31	12	1226	153	31	1159	38
Peak Hour Factor	0.8320	0.8320	0.8320	0.8320	0.8320	0.8320	0.8320	0.8320	0.8320	0.8320	0.8320	0.8320
Other Adjustment Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550	0.8660	0.8660	0.8660	0.8660	0.8660	0.8660
Total 15-Minute Volume [veh/h]	15	10	12	13	16	8	3	319	40	8	302	10
Total Analysis Volume [veh/h]	59	41	49	52	66	32	12	1276	159	32	1206	40
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	10	0	0	10	0	0	15	0	0	15	0
Maximum Green [s]	0	30	0	0	30	0	0	60	0	0	60	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	36	0	0	36	0	0	94	0	0	94	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	C
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	2.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	31	31	31	89	89	89	89	89	89
g / C, Green / Cycle	0.24	0.24	0.24	0.68	0.68	0.68	0.68	0.68	0.68
(v / s)_i Volume / Saturation Flow Rate	0.05	0.07	0.13	0.03	0.33	0.33	0.10	0.28	0.28
s, saturation flow rate [veh/h]	1152	1352	1141	408	2887	1432	332	2937	1517
c, Capacity [veh/h]	154	322	309	278	1977	980	225	2011	1039
d1, Uniform Delay [s]	43.51	40.38	45.21	13.76	9.68	9.68	17.11	8.98	8.98
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	7.04	2.15	5.36	0.29	0.86	1.72	1.32	0.62	1.19
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.38	0.28	0.48	0.04	0.49	0.49	0.14	0.41	0.41
d, Delay for Lane Group [s/veh]	50.54	42.53	50.57	14.05	10.54	11.40	18.42	9.59	10.17
Lane Group LOS	D	D	D	B	B	B	B	A	B
Critical Lane Group	No	No	Yes	No	No	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.98	2.57	4.84	0.19	6.34	6.53	0.60	5.02	5.36
50th-Percentile Queue Length [ft/ln]	49.45	64.15	121.05	4.73	158.58	163.17	15.10	125.55	133.91
95th-Percentile Queue Length [veh/ln]	3.56	4.62	8.45	0.34	10.47	10.72	1.09	8.70	9.15
95th-Percentile Queue Length [ft/ln]	89.01	115.46	211.26	8.51	261.84	267.92	27.18	217.43	228.81

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	50.54	42.53	42.53	50.57	50.57	50.57	14.05	10.75	11.40	18.42	9.78	10.17
Movement LOS	D	D	D	D	D	D	B	B	B	B	A	B
d_A, Approach Delay [s/veh]	45.71			50.57			10.85			10.01		
Approach LOS	D			D			B			B		
d_I, Intersection Delay [s/veh]	14.18											
Intersection LOS	B											
Intersection V/C	0.464											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	56.31	56.31	56.31	56.31
I_p,int, Pedestrian LOS Score for Intersection	2.137	1.869	3.079	3.057
Crosswalk LOS	B	A	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	477	477	1369	1369
d_b, Bicycle Delay [s]	37.70	37.70	6.47	6.47
I_b,int, Bicycle LOS Score for Intersection	1.805	1.807	2.355	2.263
Bicycle LOS	A	A	B	B

Sequence

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

Generated with PTV VISTRO

Version 5.00-05 Existing PM

Intersection Level Of Service Report
Intersection 2: 10th Ave S and 20th St S

Control Type:	Signalized	Delay (sec / veh):	21.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.535

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	275.00	100.00	100.00	275.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	227	62	90	52	65	42	17	1449	114	36	1764	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.40	0.00	1.10	0.00	0.00	2.40	0.00	1.90	0.00	0.00	1.90	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	227	62	90	52	65	42	17	1449	114	36	1764	27
Peak Hour Factor	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510	0.9510
Other Adjustment Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550	0.8660	0.8660	0.8660	0.8660	0.8660	0.8660
Total 15-Minute Volume [veh/h]	51	14	20	12	15	9	4	330	26	8	402	6
Total Analysis Volume [veh/h]	204	56	81	47	58	38	15	1319	104	33	1606	25
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	115
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	10	0	0	10	0	0	15	0	0	15	0
Maximum Green [s]	0	30	0	0	30	0	0	60	0	0	60	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	46	0	0	46	0	0	69	0	0	69	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	C
C, Cycle Length [s]	115	115	115	115	115	115	115	115	115
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	2.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	41	41	41	64	64	64	64	64	64
g / C, Green / Cycle	0.36	0.36	0.36	0.56	0.56	0.56	0.56	0.56	0.56
(v / s)_i Volume / Saturation Flow Rate	0.17	0.10	0.12	0.05	0.32	0.32	0.10	0.36	0.36
s, saturation flow rate [veh/h]	1184	1426	1172	282	2954	1494	344	2954	1539
c, Capacity [veh/h]	313	508	459	143	1644	831	176	1644	857
d1, Uniform Delay [s]	35.56	26.34	28.52	30.93	16.63	16.63	28.50	17.75	17.75
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	10.16	1.30	1.76	1.46	1.47	2.88	2.33	2.03	3.85
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.65	0.27	0.31	0.10	0.57	0.57	0.19	0.65	0.65
d, Delay for Lane Group [s/veh]	45.72	27.64	30.28	32.39	18.10	19.51	30.84	19.78	21.60
Lane Group LOS	D	C	C	C	B	B	C	B	C
Critical Lane Group	Yes	No	No	No	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	5.94	2.86	3.29	0.37	8.17	8.60	0.79	9.96	10.81
50th-Percentile Queue Length [ft/ln]	148.39	71.55	82.19	9.34	204.36	214.90	19.74	248.95	270.35
95th-Percentile Queue Length [veh/ln]	9.93	5.15	5.92	0.67	12.86	13.40	1.42	15.13	16.21
95th-Percentile Queue Length [ft/ln]	248.28	128.79	147.95	16.82	321.59	335.11	35.53	378.33	405.17

Movement, Approach, & Intersection Results

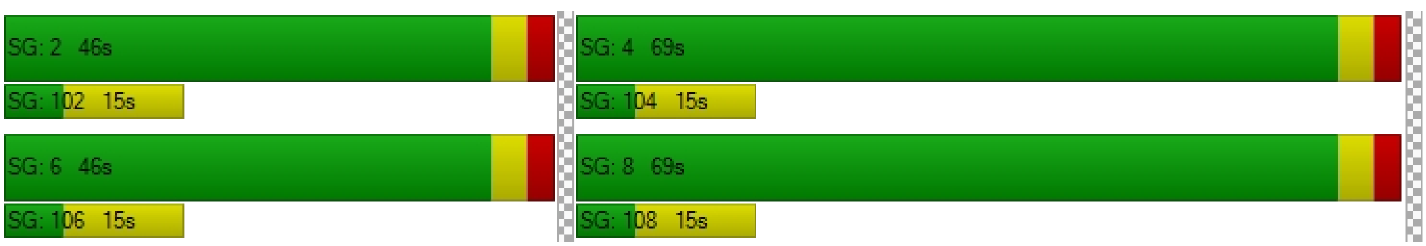
d_M, Delay for Movement [s/veh]	45.72	27.64	27.64	30.28	30.28	30.28	32.39	18.50	19.51	30.84	20.39	21.60
Movement LOS	D	C	C	C	C	C	C	B	B	C	C	C
d_A, Approach Delay [s/veh]	38.46			30.28			18.72			20.61		
Approach LOS	D			C			B			C		
d_I, Intersection Delay [s/veh]	21.93											
Intersection LOS	C											
Intersection V/C	0.535											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	48.85	48.85	48.85	48.85
I_p,int, Pedestrian LOS Score for Intersection	2.175	1.866	3.355	3.107
Crosswalk LOS	B	A	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	713	713	1113	1113
d_b, Bicycle Delay [s]	23.81	23.81	11.31	11.31
I_b,int, Bicycle LOS Score for Intersection	2.122	1.796	2.351	2.475
Bicycle LOS	B	A	B	B

Sequence

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



Intersection Level Of Service Report
Intersection 3: 10th Ave S and 6th St SW/Fox Farm Rd

Control Type:	Signalized	Delay (sec / veh):	37.6
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.894

Intersection Setup

Name												
Approach	Northbound			Southbound			Northeastbound			Southwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	1	0	1	2	0	1
Pocket Length [ft]	150.00	100.00	100.00	500.00	100.00	300.00	300.00	100.00	300.00	525.00	100.00	500.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	159	98	136	47	191	421	133	395	130	157	740	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.40	3.06	5.88	4.26	1.05	0.48	1.50	4.30	2.31	3.82	5.14	6.25
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	159	98	136	47	191	421	133	395	130	157	740	48
Peak Hour Factor	0.8630	0.8630	0.8630	0.8630	0.8630	0.8630	0.8630	0.8630	0.8630	0.8630	0.8630	0.8630
Other Adjustment Factor	0.8670	0.8670	0.8670	0.8750	0.8750	0.8750	0.8890	0.8890	0.8890	0.8750	0.8750	0.8750
Total 15-Minute Volume [veh/h]	40	25	34	12	48	107	34	102	33	40	188	12
Total Analysis Volume [veh/h]	160	98	137	48	194	427	137	407	134	159	750	49
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap
Signal group	5	2	2	1	6	6	3	8	8	7	4	4
Auxiliary Signal Groups			2			6			8			4
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	15	15	5	15	15	5	15	15	5	15	15
Maximum Green [s]	15	60	60	20	60	60	20	60	60	20	60	60
Amber [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All red [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Split [s]	10	20	20	12	22	22	17	20	20	58	61	61
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	5	0	5	5	0	5	5
Pedestrian Clearance [s]	0	10	10	0	10	10	0	10	10	0	10	10
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Recall	Yes	No	No	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	51	39	39	51	41	41	12	35	35	8	32	32
g / C, Green / Cycle	0.47	0.36	0.36	0.47	0.38	0.38	0.11	0.32	0.32	0.08	0.29	0.29
(v / s)_i Volume / Saturation Flow Rate	0.20	0.07	0.11	0.04	0.07	0.32	0.09	0.14	0.10	0.06	0.26	0.04
s, saturation flow rate [veh/h]	818	1399	1277	1146	2974	1334	1482	2897	1314	2825	2877	1273
c, Capacity [veh/h]	491	500	456	532	1117	501	160	926	420	218	832	368
d1, Uniform Delay [s]	21.41	24.44	25.46	20.32	22.96	31.56	48.29	29.64	28.37	49.69	37.64	28.94
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	1.76	0.88	1.68	0.07	0.34	16.56	12.21	0.33	0.43	4.61	3.93	0.16
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.33	0.20	0.30	0.09	0.17	0.85	0.86	0.44	0.32	0.73	0.90	0.13
d, Delay for Lane Group [s/veh]	23.17	25.32	27.14	20.40	23.29	48.13	60.50	29.97	28.80	54.29	41.57	29.10
Lane Group LOS	C	C	C	C	C	D	E	C	C	D	D	C
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	2.85	1.89	2.78	0.78	1.73	12.47	4.23	4.29	2.72	2.27	10.02	0.98
50th-Percentile Queue Length [ft/ln]	71.15	47.14	69.56	19.61	43.30	311.77	105.64	107.15	68.12	56.85	250.54	24.45
95th-Percentile Queue Length [veh/ln]	5.12	3.39	5.01	1.41	3.12	18.26	7.60	7.68	4.90	4.09	15.21	1.76
95th-Percentile Queue Length [ft/ln]	128.07	84.86	125.21	35.30	77.93	456.56	189.91	192.03	122.62	102.33	380.33	44.00

Movement, Approach, & Intersection Results

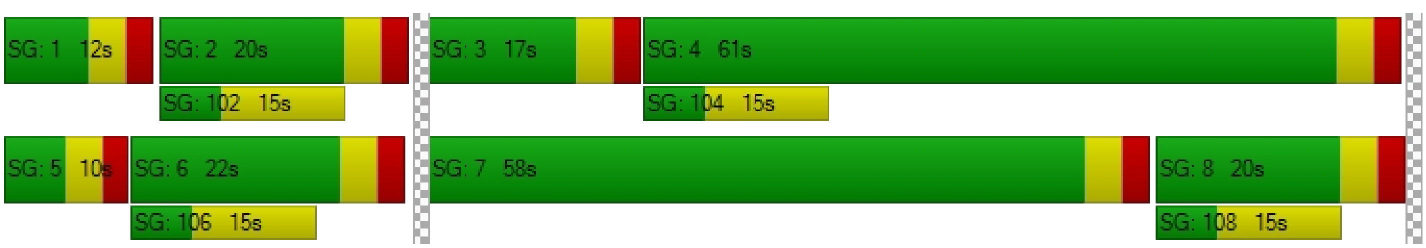
d_M, Delay for Movement [s/veh]	23.17	25.32	27.14	20.40	23.29	48.13	60.50	29.97	28.80	54.29	41.57	29.10
Movement LOS	C	C	C	C	C	D	E	C	C	D	D	C
d_A, Approach Delay [s/veh]		25.08			38.94			35.91			43.04	
Approach LOS		C			D			D			D	
d_I, Intersection Delay [s/veh]	37.61											
Intersection LOS	D											
Intersection V/C	0.894											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
I_p,int, Pedestrian LOS Score for Intersection	2.483	2.619	3.019	2.934
Crosswalk LOS	B	B	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	273	309	273	1018
d_b, Bicycle Delay [s]	41.02	39.31	41.02	13.25
I_b,int, Bicycle LOS Score for Intersection	1.885	2.112	2.119	2.350
Bicycle LOS	A	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3: 10th Ave S and 6th St SW/Fox Farm Rd

Control Type:	Signalized	Delay (sec / veh):	49.7
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.984

Intersection Setup

Name												
Approach	Northbound			Southbound			Northeastbound			Southwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	1	0	1	2	0	1
Pocket Length [ft]	150.00	100.00	100.00	500.00	100.00	300.00	300.00	100.00	300.00	525.00	100.00	500.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	177	307	348	75	175	246	508	959	232	222	679	92
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.56	1.30	1.15	4.00	0.57	0.00	0.20	2.61	2.16	1.35	3.53	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	177	307	348	75	175	246	508	959	232	222	679	92
Peak Hour Factor	0.9620	0.9620	0.9620	0.9620	0.9620	0.9620	0.9620	0.9620	0.9620	0.9620	0.9620	0.9620
Other Adjustment Factor	0.8670	0.8670	0.8670	0.8750	0.8750	0.8750	0.8890	0.8890	0.8890	0.8750	0.8750	0.8750
Total 15-Minute Volume [veh/h]	40	69	78	17	40	56	117	222	54	50	154	21
Total Analysis Volume [veh/h]	160	277	314	68	159	224	469	886	214	202	618	84
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	135
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap
Signal group	5	2	2	1	6	6	3	8	8	7	4	4
Auxiliary Signal Groups			2			6			8			4
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	15	15	5	15	15	5	15	15	5	15	15
Maximum Green [s]	15	60	60	20	60	60	20	60	60	20	60	60
Amber [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All red [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Split [s]	10	37	37	11	38	38	67	63	63	24	20	20
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	5	0	5	5	0	5	5
Pedestrian Clearance [s]	0	10	10	0	10	10	0	10	10	0	10	10
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Recall	Yes	No	No	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	135	135	135	135	135	135	135	135	135	135	135	135
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	45	34	34	45	35	35	44	63	63	12	31	31
g / C, Green / Cycle	0.33	0.25	0.25	0.33	0.26	0.26	0.33	0.47	0.47	0.09	0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.22	0.18	0.24	0.07	0.05	0.17	0.31	0.30	0.16	0.07	0.21	0.06
s, saturation flow rate [veh/h]	827	1419	1327	976	2985	1339	1498	2937	1316	2882	2915	1339
c, Capacity [veh/h]	366	356	333	216	771	346	492	1382	619	248	664	305
d1, Uniform Delay [s]	40.40	46.34	49.63	37.54	39.22	44.60	44.27	27.10	22.60	60.64	51.10	42.96
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.23	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.57	12.28	36.84	0.82	0.61	9.05	17.96	0.50	0.33	6.41	6.54	0.48
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.49	0.73	0.94	0.31	0.21	0.65	0.95	0.64	0.35	0.81	0.93	0.28
d, Delay for Lane Group [s/veh]	44.97	58.62	86.47	38.37	39.83	53.65	62.24	27.61	22.93	67.05	57.64	43.44
Lane Group LOS	D	E	F	D	D	D	E	C	C	E	E	D
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	3.61	9.20	13.77	1.75	2.16	7.57	17.67	10.87	4.40	3.63	10.83	2.38
50th-Percentile Queue Length [ft/ln]	90.33	229.99	344.34	43.79	53.94	189.36	441.74	271.68	109.90	90.75	270.86	59.49
95th-Percentile Queue Length [veh/ln]	6.50	14.17	19.86	3.15	3.88	12.09	24.56	16.27	7.83	6.53	16.23	4.28
95th-Percentile Queue Length [ft/ln]	162.60	354.35	496.50	78.82	97.10	302.20	614.08	406.83	195.87	163.35	405.82	107.08

Movement, Approach, & Intersection Results

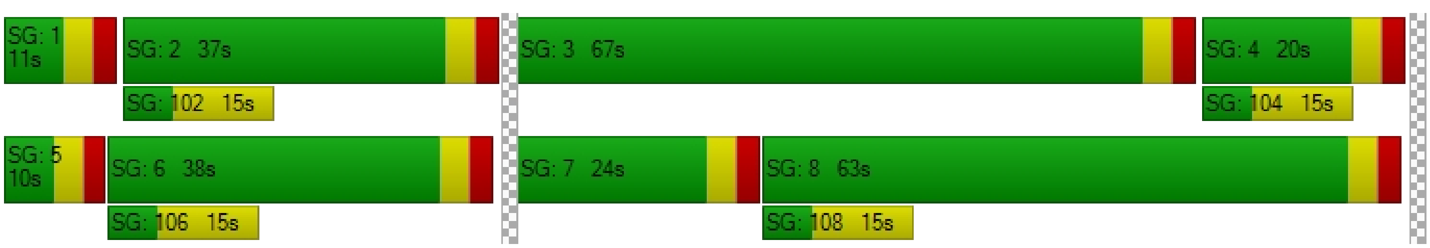
d_M, Delay for Movement [s/veh]	44.97	57.74	86.47	38.37	39.83	53.65	62.24	27.61	22.93	67.05	57.64	43.44
Movement LOS	D	E	F	D	D	D	E	C	C	E	E	D
d_A, Approach Delay [s/veh]		67.03			46.47			37.32			58.42	
Approach LOS		E			D			D			E	
d_I, Intersection Delay [s/veh]	49.71											
Intersection LOS	D											
Intersection V/C	0.984											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	58.80	58.80	58.80	58.80
I_p,int, Pedestrian LOS Score for Intersection	2.579	2.682	3.145	2.999
Crosswalk LOS	B	B	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	474	489	859	222
d_b, Bicycle Delay [s]	39.29	38.53	21.96	53.33
I_b,int, Bicycle LOS Score for Intersection	2.179	1.932	2.854	2.305
Bicycle LOS	B	A	C	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
#11: Vaughn Rd and I-15 SB

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.260

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	219	1	0	27	12	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.60	0.00	2.00	11.10	8.30	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	219	1	0	27	12	0
Peak Hour Factor	0.8830	0.2500	1.0000	0.8440	0.7500	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	62	1	0	8	4	0
Total Analysis Volume [veh/h]	248	4	0	32	16	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.26	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.11	9.71	0.00	0.00	0.00	0.00
Movement LOS	B	A		A	A	
95th-Percentile Queue Length [veh]	1.06	1.06	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	26.50	26.50	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.10		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	8.49					
Intersection LOS	B					

Intersection Level Of Service Report
#11: Vaughn Rd and I-15 SB

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.177

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	143	1	0	53	50	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	7.00	0.00	2.00	7.60	4.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	143	1	0	53	50	0
Peak Hour Factor	0.9410	0.2500	1.0000	0.7790	0.8930	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	38	1	0	17	14	0
Total Analysis Volume [veh/h]	152	4	0	68	56	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.18	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.11	9.46	0.00	0.00	0.00	0.00
Movement LOS	B	A		A	A	
95th-Percentile Queue Length [veh]	0.66	0.66	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	16.44	16.44	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.09		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	5.62					
Intersection LOS	B					

Intersection Level Of Service Report
#12: Vaughn Rd and I-15 NB

Control Type:	Two-way stop	Delay (sec / veh):	7.3
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name						
Approach	Eastbound		Westbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	0	237	19	76	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	5.30	14.50	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	237	19	76	0	0
Peak Hour Factor	1.0000	0.8590	0.5940	0.8260	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	69	8	23	0	0
Total Analysis Volume [veh/h]	0	276	32	92	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.26	0.00	0.00	0.00	0.00	0.00
Movement LOS	A	A	A	A		
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
#12: Vaughn Rd and I-15 NB

Control Type:	Two-way stop	Delay (sec / veh):	7.3
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name						
Approach	Eastbound		Westbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	0	165	55	334	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	6.10	1.80	4.80	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	165	55	334	0	0
Peak Hour Factor	1.0000	0.7500	0.8090	0.9180	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	55	17	91	0	0
Total Analysis Volume [veh/h]	0	220	68	364	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.33	0.00	0.00	0.00	0.00	0.00
Movement LOS	A	A	A	A		
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
#8: Central Ave and I15 SB

Control Type:	Two-way stop	Delay (sec / veh):	28.0
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.499

Intersection Setup

Name												
Approach	Southbound			Eastbound			Westbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	130	0	6	0	191	39	123	88	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.30	0.00	0.00	2.00	3.10	0.00	6.50	11.30	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	130	0	6	0	191	39	123	88	0	0	0	0
Peak Hour Factor	0.8550	1.0000	0.7500	1.0000	0.6920	0.7500	0.7690	0.8150	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	38	0	2	0	69	13	40	27	0	0	0	0
Total Analysis Volume [veh/h]	152	0	8	0	276	52	160	108	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.50	0.00	0.01	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	28.03	27.54	8.82	0.00	0.00	0.00	8.27	0.00	0.00	0.00	0.00	0.00
Movement LOS	D	D	A		A	A	A	A				
95th-Percentile Queue Length [veh]	2.63	2.63	0.03	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	65.65	65.65	0.64	0.00	0.00	0.00	10.86	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	27.07			0.00			4.94			0.00		
Approach LOS	D			A			A			A		
d_I, Intersection Delay [s/veh]	7.48											
Intersection LOS	D											

Intersection Level Of Service Report

#8: Central Ave and I15 SB

Control Type:	Two-way stop	Delay (sec / veh):	42.0
Analysis Method:	HCM2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.432

Intersection Setup

Name												
Approach	Southbound			Eastbound			Westbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	66	0	6	0	166	30	230	299	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	6.00	0.00	0.00	2.00	0.60	0.00	6.50	1.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	0	6	0	166	30	230	299	0	0	0	0
Peak Hour Factor	0.9170	1.0000	0.7500	1.0000	0.8470	0.8330	0.8980	0.8690	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	0	2	0	49	9	64	86	0	0	0	0
Total Analysis Volume [veh/h]	72	0	8	0	196	36	256	344	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.43	0.00	0.01	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	42.03	39.90	10.18	0.00	0.00	0.00	8.29	0.00	0.00	0.00	0.00	0.00
Movement LOS	E	E	B		A	A	A	A				
95th-Percentile Queue Length [veh]	1.96	1.96	0.03	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	48.88	48.88	0.86	0.00	0.00	0.00	17.46	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	38.84			0.00			3.54			0.00		
Approach LOS	E			A			A			A		
d_I, Intersection Delay [s/veh]	5.73											
Intersection LOS	E											

Intersection Level Of Service Report
#9: Central Ave and I-15 NB

Control Type:	Two-way stop	Delay (sec / veh):	19.9
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.080

Intersection Setup

Name												
Approach	Northbound			Eastbound			Westbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	15	0	177	6	305	0	0	202	44	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	10.80	16.70	2.00	2.00	2.00	11.40	13.60	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	0	177	6	305	0	0	202	44	0	0	0
Peak Hour Factor	0.5360	1.0000	0.8510	0.7500	0.7190	1.0000	1.0000	0.8420	0.7330	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	0	52	2	106	0	0	60	15	0	0	0
Total Analysis Volume [veh/h]	28	0	208	8	424	0	0	240	60	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.34	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	19.87	19.21	15.45	7.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Movement LOS	C	C	C	A	A			A	A			
95th-Percentile Queue Length [veh]	2.07	2.07	2.07	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	51.73	51.73	51.73	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	15.98			0.15			0.00			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	3.96											
Intersection LOS	C											

Intersection Level Of Service Report
#9: Central Ave and I-15 NB

Control Type:	Two-way stop	Delay (sec / veh):	29.1
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.303

Intersection Setup

Name												
Approach	Northbound			Eastbound			Westbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	57	0	170	5	249	0	0	471	113	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	1.80	0.00	7.00	0.00	2.00	2.00	2.00	4.60	0.90	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	57	0	170	5	249	0	0	471	113	0	0	0
Peak Hour Factor	0.7130	1.0000	0.7590	0.4170	0.8650	1.0000	1.0000	0.9350	0.8310	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	0	56	3	72	0	0	126	34	0	0	0
Total Analysis Volume [veh/h]	80	0	224	12	288	0	0	504	136	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.30	0.00	0.30	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	29.07	27.04	20.30	8.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Movement LOS	D	D	C	A	A			A	A			
95th-Percentile Queue Length [veh]	3.98	3.98	3.98	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	99.39	99.39	99.39	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	22.61			0.34			0.00			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	5.61											
Intersection LOS	D											

Intersection Level Of Service Report
#10: Central Ave and Vaughn Rd

Control Type:	Two-way stop	Delay (sec / veh):	27.1
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.377

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	77	60	71	410	184	65
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	9.10	6.70	7.00	5.10	11.40	6.20
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	77	60	71	410	184	65
Peak Hour Factor	0.7700	0.7890	0.8450	0.8010	0.8520	0.7740
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	19	21	128	54	21
Total Analysis Volume [veh/h]	100	76	84	512	216	84
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.38	0.10	0.07	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	27.07	18.19	8.13	0.00	0.00	0.00
Movement LOS	D	C	A	A	A	A
95th-Percentile Queue Length [veh]	2.47	2.47	0.22	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	61.70	61.70	5.47	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	23.23		1.15		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	4.45					
Intersection LOS	D					

Intersection Level Of Service Report
#10: Central Ave and Vaughn Rd

Control Type:	Two-way stop	Delay (sec / veh):	65.0
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.576

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	68	121	66	361	462	76
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.90	1.60	1.50	4.00	3.40	2.60
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	68	121	66	361	462	76
Peak Hour Factor	0.6540	0.9450	0.7500	0.7910	0.8680	0.7310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	32	22	114	133	26
Total Analysis Volume [veh/h]	104	128	88	456	532	104
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.58	0.25	0.09	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	65.02	52.12	9.18	0.00	0.00	0.00
Movement LOS	F	F	A	A	A	A
95th-Percentile Queue Length [veh]	6.75	6.75	0.31	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	168.80	168.80	7.64	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	57.91		1.48		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	10.09					
Intersection LOS	F					

Intersection Level Of Service Report
#6: 14th St SW and I-315 WB

Control Type:	Signalized	Delay (sec / veh):	23.0
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.254

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	11	17	90	26	136	0	0	7	15	162	16	38
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	9.10	0.00	4.40	7.70	1.50	0.00	0.00	0.00	0.00	2.50	0.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	17	90	26	136	0	0	7	15	162	16	38
Peak Hour Factor	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	5	28	8	42	0	0	2	5	50	5	12
Total Analysis Volume [veh/h]	14	21	112	32	169	0	0	9	19	201	20	47
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	1	2	0	1	0	0	3	0	0	2	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	5	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	35	40	0	35	0	0	25	0	0	40	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	25	19	0	25	0	0	16	0	0	19	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	9	7	0	9	0	0	0	0	0	7	0
Pedestrian Clearance [s]	0	11	7	0	11	0	0	0	0	0	7	0
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		no	no		no			no			no	
Maximum Recall		no	no		no			no			no	
Pedestrian Recall		no	no		no			no			no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	R	L	C	C	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	11	11	27	11	11	2	11	11
g / C, Green / Cycle	0.19	0.19	0.45	0.19	0.19	0.03	0.18	0.18
(v / s)_i Volume / Saturation Flow Rate	0.01	0.01	0.08	0.03	0.10	0.02	0.14	0.03
s, saturation flow rate [veh/h]	1019	1710	1392	1181	1685	1527	1636	1454
c, Capacity [veh/h]	178	321	624	283	316	48	290	257
d1, Uniform Delay [s]	27.05	20.04	9.94	22.89	22.00	28.67	23.49	20.99
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.19	0.08	0.14	0.17	1.40	10.79	4.15	0.34
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.08	0.07	0.18	0.11	0.53	0.58	0.76	0.18
d, Delay for Lane Group [s/veh]	27.24	20.13	10.07	23.06	23.41	39.47	27.64	21.33
Lane Group LOS	C	C	B	C	C	D	C	C
Critical Lane Group	no	no	no	no	yes	yes	yes	no
50th-Percentile Queue Length [veh]	0.19	0.23	0.79	0.39	2.12	0.52	3.10	0.55
50th-Percentile Queue Length [ft]	4.78	5.84	19.74	9.76	53.01	13.05	77.54	13.75
95th-Percentile Queue Length [veh]	0.34	0.42	1.42	0.70	3.82	0.94	5.58	0.99
95th-Percentile Queue Length [ft]	8.60	10.51	35.54	17.57	95.41	23.49	139.58	24.76

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.24	20.13	10.07	23.06	23.41	23.41	39.47	39.47	39.47	27.64	27.64	21.33
Movement LOS	C	C	B	C	C	C	D	D	D	C	C	C
d_A, Approach Delay [s/veh]	13.14			23.35			39.47			26.53		
Approach LOS	B			C			D			C		
d_I, Intersection Delay [s/veh]	23.05											
Intersection LOS	C											
Intersection V/C	0.254											

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
#6: 14th St SW and I-315 WB

Control Type:	Signalized	Delay (sec / veh):	19.4
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.536

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	5	76	146	22	131	2	3	5	19	638	12	142
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	40.00	6.60	0.70	0.00	2.30	0.00	0.00	0.00	15.80	1.80	8.30	4.20
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	76	146	22	131	2	3	5	19	638	12	142
Peak Hour Factor	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	19	37	6	33	1	1	1	5	161	3	36
Total Analysis Volume [veh/h]	5	77	148	22	133	2	3	5	19	646	12	144
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	1	2	0	1	0	0	3	0	0	2	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	5	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	35	40	0	35	0	0	25	0	0	40	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	25	19	0	25	0	0	16	0	0	19	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	9	7	0	9	0	0	0	0	0	7	0
Pedestrian Clearance [s]	0	11	7	0	11	0	0	0	0	0	7	0
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		no	no		no			no			no	
Maximum Recall		no	no		no			no			no	
Pedestrian Recall		no	no		no			no			no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	R	L	C	C	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	10	10	44	10	10	2	29	29
g / C, Green / Cycle	0.17	0.17	0.73	0.17	0.17	0.03	0.48	0.48
(v / s)_i Volume / Saturation Flow Rate	0.01	0.05	0.10	0.02	0.08	0.02	0.44	0.10
s, saturation flow rate [veh/h]	819	1604	1443	1209	1667	1514	1505	1395
c, Capacity [veh/h]	164	265	1050	223	275	46	721	668
d1, Uniform Delay [s]	27.03	21.97	2.49	25.56	22.75	28.72	14.48	9.09
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.19	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.07	0.60	0.06	0.19	1.35	11.38	8.39	0.16
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.03	0.29	0.14	0.10	0.49	0.59	0.91	0.22
d, Delay for Lane Group [s/veh]	27.10	22.57	2.55	25.75	24.11	40.09	22.87	9.25
Lane Group LOS	C	C	A	C	C	D	C	A
Critical Lane Group	no	no	no	no	yes	yes	yes	no
50th-Percentile Queue Length [veh]	0.07	0.94	0.29	0.29	1.72	0.51	8.46	0.96
50th-Percentile Queue Length [ft]	1.71	23.40	7.27	7.21	43.07	12.75	211.56	24.03
95th-Percentile Queue Length [veh]	0.12	1.68	0.52	0.52	3.10	0.92	13.23	1.73
95th-Percentile Queue Length [ft]	3.07	42.12	13.09	12.99	77.53	22.96	330.84	43.26

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.10	22.57	2.55	25.75	24.11	24.11	40.09	40.09	40.09	22.87	22.87	9.25
Movement LOS	C	C	A	C	C	C	D	D	D	C	C	A
d_A, Approach Delay [s/veh]	9.78			24.34			40.09			20.42		
Approach LOS	A			C			D			C		
d_I, Intersection Delay [s/veh]	19.35											
Intersection LOS	B											
Intersection V/C	0.536											

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
#5: 14th St SW and I-315 EB

Control Type:	Signalized	Delay (sec / veh):	14.4
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.175

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	7	66	286	142	91	60	44	69	3	20	30	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.30	1.50	1.70	3.50	4.40	5.00	0.00	4.30	0.00	10.00	3.30	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	66	286	142	91	60	44	69	3	20	30	5
Peak Hour Factor	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	20	86	43	27	18	13	21	1	6	9	2
Total Analysis Volume [veh/h]	8	80	345	171	110	72	53	83	4	24	36	6
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	2	3	0	6	7	7	4	0	3	8	0
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	15	0	5	15	15	5	0	15	15	0
Maximum Green [s]	0	50	20	0	50	20	20	60	0	20	60	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	22	18	0	22	18	18	20	0	18	20	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	5	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0	0	10	0	10	10	0
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	1.0	0.0	3.0	1.0	1.0	3.0	0.0	1.0	3.0	0.0
Minimum Recall		no	no		no	no	no	no		no	no	
Maximum Recall		no	no		no	no	no	no		no	no	
Pedestrian Recall		no	no		no	no	no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	3.00	5.00	5.00	3.00	5.00	5.00	5.00	4.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	0.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	15	15	34	15	15	33	28	12	12	28	10	10
g / C, Green / Cycle	0.24	0.24	0.57	0.24	0.24	0.54	0.47	0.20	0.20	0.47	0.17	0.17
(v / s)_i Volume / Saturation Flow Rate	0.01	0.04	0.22	0.13	0.06	0.05	0.03	0.05	0.00	0.02	0.02	0.00
s, saturation flow rate [veh/h]	1140	1872	1588	1294	1820	1538	1631	1822	1615	1432	1839	1615
c, Capacity [veh/h]	299	452	912	342	439	836	920	360	319	797	307	270
d1, Uniform Delay [s]	21.49	18.04	6.95	23.72	18.38	6.55	8.80	20.24	19.36	8.71	21.23	20.89
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.04	0.19	0.26	1.13	0.30	0.04	0.03	0.32	0.02	0.02	0.17	0.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

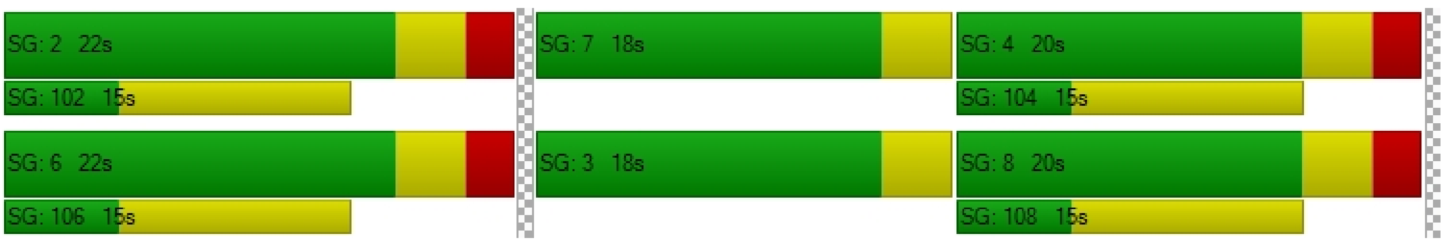
X, volume / capacity	0.03	0.18	0.38	0.50	0.25	0.09	0.06	0.23	0.01	0.03	0.12	0.02
d, Delay for Lane Group [s/veh]	21.52	18.22	7.21	24.85	18.67	6.60	8.83	20.56	19.38	8.72	21.39	20.92
Lane Group LOS	C	B	A	C	B	A	A	C	B	A	C	C
Critical Lane Group	no	no	yes	no	no	no	no	no	no	no	yes	no
50th-Percentile Queue Length [veh]	0.09	0.84	1.92	2.26	1.18	0.37	0.33	0.94	0.04	0.15	0.42	0.07
50th-Percentile Queue Length [ft]	2.32	20.94	47.91	56.41	29.43	9.15	8.37	23.62	1.09	3.74	10.46	1.72
95th-Percentile Queue Length [veh]	0.17	1.51	3.45	4.06	2.12	0.66	0.60	1.70	0.08	0.27	0.75	0.12
95th-Percentile Queue Length [ft]	4.18	37.70	86.24	101.54	52.97	16.46	15.06	42.51	1.95	6.74	18.82	3.09

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	21.52	18.22	7.21	24.85	18.67	6.60	8.83	20.56	19.38	8.72	21.39	20.92
Movement LOS	C	B	A	C	B	A	A	C	B	A	C	C
d_A, Approach Delay [s/veh]	9.51			19.20			16.09			16.74		
Approach LOS	A			B			B			B		
d_I, Intersection Delay [s/veh]	14.37											
Intersection LOS	B											
Intersection V/C	0.175											

Sequence

Ring 1	2	7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	3	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
#5: 14th St SW and I-315 EB

Control Type:	Signalized	Delay (sec / veh):	13.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.368

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	┐│┌			┐│┌			┐│┌			┐│┌		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	13	82	260	95	396	262	107	168	10	102	50	31
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.40	1.20	4.30	1.30	0.40	0.90	0.00	0.00	1.00	0.00	12.90
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	82	260	95	396	262	107	168	10	102	50	31
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	22	69	25	106	70	29	45	3	27	13	8
Total Analysis Volume [veh/h]	14	87	277	101	422	279	114	179	11	109	53	33
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	2	3	0	6	7	7	4	0	3	8	0
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	15	0	5	15	15	5	0	15	15	0
Maximum Green [s]	0	50	20	0	50	20	20	45	0	20	45	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	22	18	0	22	18	18	20	0	18	20	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	5	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0	0	10	0	10	10	0
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	1.0	0.0	3.0	1.0	1.0	3.0	0.0	1.0	3.0	0.0
Minimum Recall		no	no		no	no	no	no		no	no	
Maximum Recall		no	no		no	no	no	no		no	no	
Pedestrian Recall		no	no		no	no	no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	3.00	5.00	5.00	3.00	3.00	5.00	5.00	4.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	0.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	18	18	38	18	18	38	32	14	14	32	14	14
g / C, Green / Cycle	0.31	0.31	0.64	0.31	0.31	0.64	0.54	0.24	0.24	0.54	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.01	0.05	0.17	0.08	0.22	0.17	0.07	0.09	0.01	0.07	0.03	0.02
s, saturation flow rate [veh/h]	980	1855	1596	1276	1876	1609	1573	1900	1615	1497	1900	1430
c, Capacity [veh/h]	181	566	1018	416	572	1027	1004	459	390	897	459	345
d1, Uniform Delay [s]	26.77	15.19	4.75	19.22	18.69	4.75	6.76	19.06	17.38	6.92	17.75	17.67
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.18	0.12	0.14	0.30	1.88	0.14	0.05	0.54	0.03	0.06	0.11	0.12
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

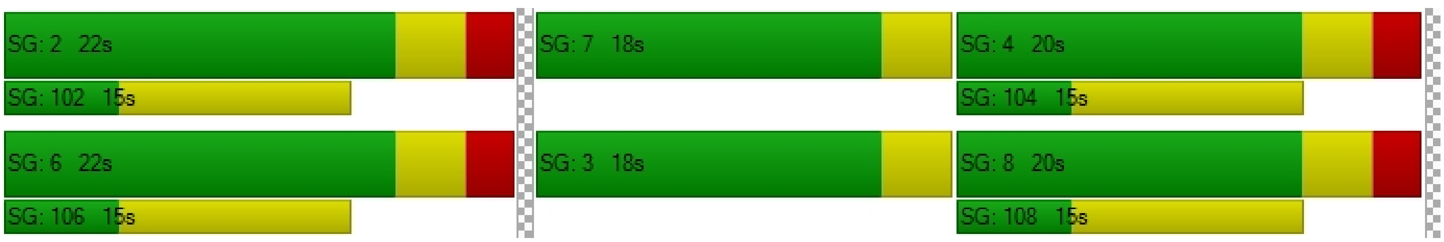
X, volume / capacity	0.08	0.15	0.27	0.24	0.74	0.27	0.11	0.39	0.03	0.12	0.12	0.10
d, Delay for Lane Group [s/veh]	26.95	15.32	4.89	19.52	20.56	4.89	6.81	19.60	17.41	6.98	17.86	17.79
Lane Group LOS	C	B	A	B	C	A	A	B	B	A	B	B
Critical Lane Group	no	no	no	no	yes	yes	no	yes	no	no	no	no
50th-Percentile Queue Length [veh]	0.19	0.81	1.09	1.12	5.03	1.10	0.59	2.00	0.11	0.57	0.55	0.34
50th-Percentile Queue Length [ft]	4.75	20.31	27.29	28.03	125.69	27.47	14.87	49.98	2.78	14.22	13.67	8.53
95th-Percentile Queue Length [veh]	0.34	1.46	1.96	2.02	8.70	1.98	1.07	3.60	0.20	1.02	0.98	0.61
95th-Percentile Queue Length [ft]	8.55	36.56	49.12	50.46	217.62	49.44	26.77	89.97	5.01	25.60	24.60	15.36

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	26.95	15.32	4.89	19.52	20.56	4.89	6.81	19.60	17.41	6.98	17.86	17.79
Movement LOS	C	B	A	B	C	A	A	B	B	A	B	B
d_A, Approach Delay [s/veh]	8.11			14.98			14.72			11.77		
Approach LOS	A			B			B			B		
d_I, Intersection Delay [s/veh]	13.01											
Intersection LOS	B											
Intersection V/C	0.368											

Sequence

Ring 1	2	7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	3	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
#4: I-15 SB Off and Airport RD Frontage

Control Type:	Two-way stop	Delay (sec / veh):	12.7
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.272

Intersection Setup

Name												
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	5	0	44	159	54	96	8	12	0	0	40	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	11.30	10.10	7.40	3.10	12.50	8.30	2.00	2.00	2.50	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	0	44	159	54	96	8	12	0	0	40	4
Peak Hour Factor	0.4170	1.0000	0.5240	0.8110	0.9000	0.7060	0.4000	0.7500	1.0000	1.0000	0.7690	0.5000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	21	49	15	34	5	4	0	0	13	2
Total Analysis Volume [veh/h]	12	0	84	196	60	136	20	16	0	0	52	8
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.09	0.27	0.08	0.13	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.78	0.00	9.10	12.67	12.44	8.90	7.47	0.00	0.00	0.00	0.00	0.00
Movement LOS	B		A	B	B	A	A	A			A	A
95th-Percentile Queue Length [veh]	0.34	0.00	0.34	1.59	1.59	0.44	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	8.59	0.00	8.59	39.68	39.68	11.00	1.87	1.87	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.31			11.33			4.15			0.00		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	9.39											
Intersection LOS	B											

Intersection Level Of Service Report
#4: I-15 SB Off and Airport RD Frontage

Control Type:	Two-way stop	Delay (sec / veh):	35.3
Analysis Method:	HCM2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.660

Intersection Setup

Name												
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	55	217	26	47	8	15	0	0	286	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	1.80	18.90	11.50	2.10	37.50	6.70	2.00	2.00	1.00	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	55	217	26	47	8	15	0	0	286	1
Peak Hour Factor	1.0000	1.0000	0.7240	0.8350	0.7220	0.6910	0.6670	0.7500	1.0000	1.0000	0.6810	0.2500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	19	65	9	17	3	5	0	0	105	1
Total Analysis Volume [veh/h]	0	0	76	260	36	68	12	20	0	0	420	4
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.12	0.66	0.08	0.06	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.08	0.00	11.47	35.33	33.80	8.64	8.76	0.00	0.00	0.00	0.00	0.00
Movement LOS	B		B	E	D	A	A	A			A	A
95th-Percentile Queue Length [veh]	0.41	0.00	0.41	5.82	5.82	0.21	0.10	0.10	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	10.19	0.00	10.19	145.42	145.42	5.15	2.56	2.56	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	11.47			30.19			3.29			0.00		
Approach LOS	B			D			A			A		
d_I, Intersection Delay [s/veh]	13.35											
Intersection LOS	E											

Intersection Level Of Service Report
#3: I-15 SB On and Airport RD

Control Type:	Two-way stop	Delay (sec / veh):	8.6
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.046

Intersection Setup

Name						
Approach	Northeastbound		Northwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	32	23	251	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	43.80	21.70	14.00	16.70
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	32	23	251	6
Peak Hour Factor	1.0000	1.0000	0.6670	0.6390	0.8720	0.3750
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	12	9	72	4
Total Analysis Volume [veh/h]	0	0	48	36	288	16
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	8.58	0.00	0.00	0.00
Movement LOS			A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.26	0.26	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	6.49	6.49	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		4.90		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.06					
Intersection LOS	A					

Intersection Level Of Service Report

#3: I-15 SB On and Airport RD

Control Type:	Two-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.063

Intersection Setup

Name						
Approach	Northeastbound		Northwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	25	21	542	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	64.00	19.10	7.30	0.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	25	21	542	14
Peak Hour Factor	1.0000	1.0000	0.6250	0.7500	0.7450	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	10	7	182	5
Total Analysis Volume [veh/h]	0	0	40	28	728	20
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.06	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	11.03	0.00	0.00	0.00
Movement LOS			B	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.36	0.36	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	8.91	8.91	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		6.49		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.54					
Intersection LOS	B					

Intersection Level Of Service Report

#2: I-15 NB and Airport Rd

Control Type:	Two-way stop	Delay (sec / veh):	16.9
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name												
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	4	0	13	0	0	0	0	49	222	79	173	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	46.20	2.00	2.00	2.00	2.00	38.80	26.60	12.70	10.90	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	0	13	0	0	0	0	49	222	79	173	0
Peak Hour Factor	0.5000	1.0000	0.8130	1.0000	1.0000	1.0000	1.0000	0.7210	0.8670	0.7050	0.9010	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	4	0	0	0	0	17	64	28	48	0
Total Analysis Volume [veh/h]	8	0	16	0	0	0	0	68	256	112	192	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
d_M, Delay for Movement [s/veh]	14.89	16.91	10.09	0.00	0.00	0.00	0.00	0.00	0.00	8.38	0.00	0.00
Movement LOS	B	C	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.13	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	1.03	1.03	0.00
95th-Percentile Queue Length [ft]	3.34	3.34	3.34	0.00	0.00	0.00	0.00	0.00	0.00	25.85	25.85	0.00
d_A, Approach Delay [s/veh]	11.69			0.00			0.00			3.09		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	1.87											
Intersection LOS	C											

Intersection Level Of Service Report

#2: I-15 NB and Airport Rd

Control Type:	Two-way stop	Delay (sec / veh):	55.4
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.053

Intersection Setup

Name												
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	2	2	31	0	0	0	0	47	197	307	236	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	47.40	2.00	2.00	2.00	2.00	40.40	20.80	0.70	17.40	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	2	31	0	0	0	0	47	197	307	236	0
Peak Hour Factor	0.5000	0.5000	0.7750	1.0000	1.0000	1.0000	1.0000	0.6910	0.8210	0.6910	0.8680	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	10	0	0	0	0	17	60	111	68	0
Total Analysis Volume [veh/h]	4	4	40	0	0	0	0	68	240	444	272	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00
d_M, Delay for Movement [s/veh]	48.66	55.37	12.63	0.00	0.00	0.00	0.00	0.00	0.00	9.40	0.00	0.00
Movement LOS	E	F	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.56	0.56	0.56	0.00	0.00	0.00	0.00	0.00	0.00	3.74	3.74	0.00
95th-Percentile Queue Length [ft]	13.96	13.96	13.96	0.00	0.00	0.00	0.00	0.00	0.00	93.56	93.56	0.00
d_A, Approach Delay [s/veh]	19.19			0.00			0.00			5.83		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	4.75											
Intersection LOS	F											

Intersection Level Of Service Report
#1: Tri Hill and Frontage Airport Rd

Control Type:	Two-way stop	Delay (sec / veh):	13.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.202

Intersection Setup

Name						
Approach	Northeastbound		Northwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	83	19	9	189	97	88
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	21.70	31.10	22.20	28.60	25.70	5.70
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	83	19	9	189	97	88
Peak Hour Factor	0.7410	0.4750	0.5630	0.8750	0.9330	0.7590
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	10	4	54	26	29
Total Analysis Volume [veh/h]	112	40	16	216	104	116
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.20	0.05	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.48	11.42	7.94	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.99	0.99	0.04	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	24.73	24.73	0.98	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.93		0.55		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	3.47					
Intersection LOS	B					

Intersection Level Of Service Report
#1: Tri Hill and Frontage Airport Rd

Control Type:	Two-way stop	Delay (sec / veh):	14.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.256

Intersection Setup

Name						
Approach	Northeastbound		Northwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	75	7	9	160	207	70
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.70	0.00	22.20	33.80	18.90	15.80
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	75	7	9	160	207	70
Peak Hour Factor	0.5680	0.4380	0.7500	0.8000	0.8480	0.8330
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	4	3	50	61	21
Total Analysis Volume [veh/h]	132	16	12	200	244	84
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.26	0.02	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.52	12.30	8.23	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh]	1.12	1.12	0.03	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	28.04	28.04	0.81	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	14.28		0.47		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	3.22					
Intersection LOS	B					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	324	79	11	132	201	66	223	43	362	179	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1900	1900	1776	1900
Adj Flow Rate, veh/h	18	405	99	14	165	251	82	279	54	452	224	19
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	0	2	0
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	343	537	457	210	531	826	244	408	78	419	400	34
Arrive On Green	0.02	0.30	0.30	0.01	0.30	0.30	0.14	0.14	0.14	0.25	0.25	0.25
Sat Flow, veh/h	1691	1776	1509	1691	1776	1509	1691	2828	540	1691	1615	137
Grp Volume(v), veh/h	18	405	99	14	165	251	82	165	168	452	0	243
Grp Sat Flow(s),veh/h/ln	1691	1776	1509	1691	1776	1509	1691	1687	1680	1691	0	1752
Q Serve(g_s), s	0.5	14.1	3.4	0.4	4.9	6.2	3.0	6.4	6.5	17.0	0.0	8.3
Cycle Q Clear(g_c), s	0.5	14.1	3.4	0.4	4.9	6.2	3.0	6.4	6.5	17.0	0.0	8.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.32	1.00		0.08
Lane Grp Cap(c), veh/h	343	537	457	210	531	826	244	243	242	419	0	434
V/C Ratio(X)	0.05	0.75	0.22	0.07	0.31	0.30	0.34	0.68	0.69	1.08	0.00	0.56
Avail Cap(c_a), veh/h	426	945	804	298	945	1178	419	418	417	419	0	434
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.4	21.6	17.8	17.8	18.6	8.4	26.4	27.8	27.9	25.8	0.0	22.5
Incr Delay (d2), s/veh	0.1	2.2	0.2	0.1	0.3	0.2	0.8	3.3	3.6	66.4	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	7.2	1.4	0.2	2.4	4.0	1.4	3.2	3.3	15.5	0.0	4.2
LnGrp Delay(d),s/veh	16.4	23.8	18.1	17.9	18.9	8.6	27.2	31.1	31.5	92.1	0.0	24.1
LnGrp LOS	B	C	B	B	B	A	C	C	C	F		C
Approach Vol, veh/h		522			430			415			695	
Approach Delay, s/veh		22.4			12.9			30.5			68.4	
Approach LOS		C			B			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		14.9	5.9	25.7		22.0	6.2	25.5
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		17.0	4.5	36.5		17.0	4.5	36.5
Max Q Clear Time (g_c+I1), s		8.5	2.4	16.1		19.0	2.5	8.2
Green Ext Time (p_c), s		1.4	0.0	4.6		0.0	0.0	5.0

Intersection Summary	
HCM 2010 Ctrl Delay	37.5
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	19	326	92	39	313	403	149	435	53	338	206	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1845	1845	1845	1845	1845	1900	1900	1845	1900
Adj Flow Rate, veh/h	21	362	102	43	348	448	166	483	59	376	229	28
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	0	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	221	532	452	255	555	824	337	603	73	394	362	44
Arrive On Green	0.02	0.29	0.29	0.03	0.30	0.30	0.19	0.19	0.19	0.22	0.22	0.22
Sat Flow, veh/h	1757	1845	1568	1757	1845	1568	1757	3147	383	1757	1613	197
Grp Volume(v), veh/h	21	362	102	43	348	448	166	268	274	376	0	257
Grp Sat Flow(s),veh/h/ln	1757	1845	1568	1757	1845	1568	1757	1752	1777	1757	0	1810
Q Serve(g_s), s	0.6	13.2	3.8	1.3	12.3	14.4	6.4	11.1	11.2	16.0	0.0	9.7
Cycle Q Clear(g_c), s	0.6	13.2	3.8	1.3	12.3	14.4	6.4	11.1	11.2	16.0	0.0	9.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22	1.00		0.11
Lane Grp Cap(c), veh/h	221	532	452	255	555	824	337	336	341	394	0	406
V/C Ratio(X)	0.09	0.68	0.23	0.17	0.63	0.54	0.49	0.80	0.80	0.95	0.00	0.63
Avail Cap(c_a), veh/h	292	889	756	304	889	1108	394	393	399	394	0	406
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.3	23.9	20.5	19.2	22.8	11.9	27.3	29.2	29.2	29.0	0.0	26.5
Incr Delay (d2), s/veh	0.2	1.5	0.3	0.3	1.2	0.6	1.1	9.6	9.9	33.4	0.0	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	6.9	1.6	0.6	6.5	9.2	3.2	6.3	6.4	11.4	0.0	5.2
LnGrp Delay(d),s/veh	19.5	25.4	20.8	19.5	24.0	12.5	28.4	38.8	39.1	62.4	0.0	29.7
LnGrp LOS	B	C	C	B	C	B	C	D	D	E		C
Approach Vol, veh/h		485			839			708			633	
Approach Delay, s/veh		24.2			17.6			36.5			49.1	
Approach LOS		C			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.5	7.4	26.8		22.0	6.4	27.8
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		17.0	4.5	36.5		17.0	4.5	36.5
Max Q Clear Time (g_c+I1), s		13.2	3.3	15.2		18.0	2.6	16.4
Green Ext Time (p_c), s		1.4	0.0	6.5		0.0	0.0	6.4

Intersection Summary	
HCM 2010 Ctrl Delay	31.3
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	477	254	26	364	84	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	250	150	-	0	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	568	302	31	433	100	42

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	568	0	1063	568
Stage 1	-	-	-	-	568	-
Stage 2	-	-	-	-	495	-
Critical Hdwy	-	-	4.17	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.263	-	3.563	3.363
Pot Cap-1 Maneuver	-	-	980	-	242	513
Stage 1	-	-	-	-	557	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	980	-	234	513
Mov Cap-2 Maneuver	-	-	-	-	234	-
Stage 1	-	-	-	-	557	-
Stage 2	-	-	-	-	583	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	25.9
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	234	513	-	-	980	-
HCM Lane V/C Ratio	0.427	0.081	-	-	0.032	-
HCM Control Delay (s)	31.4	12.6	-	-	8.8	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	2	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	6.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	494	256	54	622	100	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	250	150	-	0	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	568	294	62	715	115	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	568	0	1407	568
Stage 1	-	-	-	-	568	-
Stage 2	-	-	-	-	839	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	989	-	151	517
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	419	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	989	-	142	517
Mov Cap-2 Maneuver	-	-	-	-	142	-
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	393	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	75.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	142	517	-	-	989	-
HCM Lane V/C Ratio	0.809	0.062	-	-	0.063	-
HCM Control Delay (s)	92.7	12.4	-	-	8.9	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	5.1	0.2	-	-	0.2	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	391	135	8	200	0	184	1	26	0	0	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1759	1900	1759	1759	1900	1759	1759	1900	1900	1759	1900
Adj Flow Rate, veh/h	2	483	167	10	247	0	227	1	32	0	0	0
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	8	8	8	8	8	8	8	8	8	8	8	8
Cap, veh/h	671	647	224	361	911	0	539	9	292	0	352	0
Arrive On Green	0.52	0.52	0.52	0.52	0.52	0.00	0.20	0.20	0.20	0.00	0.00	0.00
Sat Flow, veh/h	1066	1251	432	735	1759	0	1675	46	1457	0	1759	0
Grp Volume(v), veh/h	2	0	650	10	247	0	227	0	33	0	0	0
Grp Sat Flow(s),veh/h/ln	1066	0	1683	735	1759	0	1675	0	1502	0	1759	0
Q Serve(g_s), s	0.0	0.0	10.8	0.4	2.8	0.0	4.4	0.0	0.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.8	0.0	10.8	11.1	2.8	0.0	4.4	0.0	0.6	0.0	0.0	0.0
Prop In Lane	1.00		0.26	1.00		0.00	1.00		0.97	0.00		0.00
Lane Grp Cap(c), veh/h	671	0	871	361	911	0	539	0	301	0	352	0
V/C Ratio(X)	0.00	0.00	0.75	0.03	0.27	0.00	0.42	0.00	0.11	0.00	0.00	0.00
Avail Cap(c_a), veh/h	1021	0	1425	603	1490	0	1149	0	848	0	993	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	5.6	0.0	6.7	11.1	4.8	0.0	13.1	0.0	11.6	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.3	0.0	0.2	0.0	0.5	0.0	0.2	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	5.2	0.1	1.3	0.0	2.1	0.0	0.3	0.0	0.0	0.0
LnGrp Delay(d),s/veh	5.6	0.0	8.0	11.1	5.0	0.0	13.6	0.0	11.7	0.0	0.0	0.0
LnGrp LOS	A		A	B	A		B		B			
Approach Vol, veh/h		652			257			260			0	
Approach Delay, s/veh		8.0			5.2			13.4			0.0	
Approach LOS		A			A			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		12.1		23.3		12.1		23.3
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s		20.0		30.0		20.0		30.0
Max Q Clear Time (g_c+I1), s		6.4		12.8		0.0		13.1
Green Ext Time (p_c), s		0.7		5.3		0.0		5.2

Intersection Summary	
HCM 2010 Ctrl Delay	8.6
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	273	227	51	480	1	167	0	21	2	1	2
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1792	1900	1792	1792	1900	1792	1792	1900	1900	1792	1900
Adj Flow Rate, veh/h	0	317	264	59	558	1	194	0	24	2	1	2
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	202	467	389	406	923	2	478	0	309	220	110	126
Arrive On Green	0.00	0.52	0.52	0.52	0.52	0.52	0.20	0.00	0.20	0.20	0.20	0.20
Sat Flow, veh/h	815	905	754	799	1789	3	1355	0	1524	385	544	620
Grp Volume(v), veh/h	0	0	581	59	0	559	194	0	24	5	0	0
Grp Sat Flow(s),veh/h/ln	815	0	1659	799	0	1792	1355	0	1524	1549	0	0
Q Serve(g_s), s	0.0	0.0	9.3	2.1	0.0	7.8	4.6	0.0	0.5	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	9.3	11.4	0.0	7.8	4.7	0.0	0.5	0.1	0.0	0.0
Prop In Lane	1.00		0.45	1.00		0.00	1.00		1.00	0.40		0.40
Lane Grp Cap(c), veh/h	202	0	856	406	0	925	478	0	309	456	0	0
V/C Ratio(X)	0.00	0.00	0.68	0.15	0.00	0.60	0.41	0.00	0.08	0.01	0.00	0.00
Avail Cap(c_a), veh/h	309	0	1073	511	0	1159	851	0	728	864	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	6.4	10.6	0.0	6.1	13.2	0.0	11.5	11.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.2	0.2	0.0	0.6	0.6	0.0	0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	4.5	0.5	0.0	3.9	1.8	0.0	0.2	0.0	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	7.6	10.8	0.0	6.7	13.7	0.0	11.6	11.3	0.0	0.0
LnGrp LOS			A	B		A	B		B	B		
Approach Vol, veh/h		581			618			218			5	
Approach Delay, s/veh		7.6			7.1			13.5			11.3	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		12.2		23.4		12.2		23.4
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s		17.0		23.0		17.0		23.0
Max Q Clear Time (g_c+I1), s		6.7		11.3		2.1		13.4
Green Ext Time (p_c), s		0.5		5.7		0.6		5.0

Intersection Summary	
HCM 2010 Ctrl Delay	8.3
HCM 2010 LOS	A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/17/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*36th Ave. NE / Bootlegger Tr.*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *36th Avenue NE* North/South Street: *Bootlegger Trail*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*236*	*111*	*0*	*0*	*58*	*18*
Peak-Hour Factor, PHF	*0.88*	*0.84*	*0.25*	*0.25*	*0.85*	*0.75*
Hourly Flow Rate, HFR (veh/h)	*268*	*132*	*0*	*0*	*68*	*24*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*33*	*0*	*92*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.64*	*0.25*	*0.92*	*0.25*	*0.25*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*51*	*0*	*99*	*0*	*0*	*0*
Percent Heavy Vehicles	*3*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*268*	*0*		*0*			*150*	
C (m) (veh/h)	*1515*	*1466*					*530*	
v/c	*0.18*	*0.00*					*0.28*	
95% queue length	*0.64*	*0.00*					*1.16*	
Control Delay (s/veh)	*7.9*	*7.5*					*14.5*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*14.5*		
Approach LOS	--	--				*B*		

 *HCS+*TM Version 5.6 Generated: 6/18/2013 10:14 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/17/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*36th Ave. NE / Bootlegger Tr.*
Jurisdiction	*Great Falls*
Analysis Year	

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *36th Avenue NE* North/South Street: *Bootlegger Trail*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	41	32	0	0	151	12
Peak-Hour Factor, PHF	0.64	0.80	0.25	0.25	0.79	0.60
Hourly Flow Rate, HFR (veh/h)	64	39	0	0	191	19
Percent Heavy Vehicles	5	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	13	0	290	0	0	0
Peak-Hour Factor, PHF	0.81	0.25	0.76	0.25	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	16	0	381	0	0	0
Percent Heavy Vehicles	0	0	3	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	64	0		0			397	
C (m) (veh/h)	1343	1584					822	
v/c	0.05	0.00					0.48	
95% queue length	0.15	0.00					2.67	
Control Delay (s/veh)	7.8	7.3					13.4	
LOS	A	A					B	
Approach Delay (s/veh)	--	--				13.4		
Approach LOS	--	--				B		

 HCS+™ Version 5.6 Generated: 6/18/2013 10:14 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Bootlegger Tr. / U.S. 87*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Bootlegger Trail*	North/South Street: *U.S. 87*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*106*	*118*	*5*	*0*	*113*	*8*
Peak-Hour Factor, PHF	*0.76*	*0.92*	*0.42*	*0.25*	*0.71*	*0.67*
Hourly Flow Rate, HFR (veh/h)	*139*	*128*	*11*	*0*	*159*	*11*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*0*	*2*	*0*
Configuration	*L*	*T*	*TR*	*LT*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*	*0*	*435*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.63*	*0.25*	*0.73*	*0.25*	*0.25*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*15*	*0*	*595*	*0*	*0*	*0*
Percent Heavy Vehicles	*10*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*LT*		*LTR*			*LTR*	
v (veh/h)	*139*	*0*		*0*			*610*	
C (m) (veh/h)	*1420*	*1457*					*946*	
v/c	*0.10*	*0.00*					*0.64*	
95% queue length	*0.32*	*0.00*					*4.88*	
Control Delay (s/veh)	*7.8*	*7.5*					*15.4*	
LOS	*A*	*A*					*C*	
Approach Delay (s/veh)	--	--				*15.4*		
Approach LOS	--	--				*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Bootlegger Tr. / U.S. 87*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Bootlegger Trail*	North/South Street: *U.S. 87*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	391	174	0	0	177	11
Peak-Hour Factor, PHF	0.80	0.91	0.25	0.25	0.81	
Hourly Flow Rate, HFR (veh/h)	488	191	0	0	218	11
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T	TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	0	216	6	0	1
Peak-Hour Factor, PHF	0.63	0.25	0.83	0.75	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	7	0	260	8	0	4
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	488	0		12			267	
C (m) (veh/h)	1351	1395		96			750	
v/c	0.36	0.00		0.13			0.36	
95% queue length	1.67	0.00		0.41			1.62	
Control Delay (s/veh)	9.2	7.6		47.8			12.4	
LOS	A	A		E			B	
Approach Delay (s/veh)	--	--	47.8			12.4		
Approach LOS	--	--	E			B		

 HCS+™ Version 5.6 Generated: 8/15/2013 3:02 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/19/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Old Havre Hwy / 15th St. N*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Old Havre Highway* North/South Street: *15th Street North*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*8*	*135*	*7*	*0*	*379*	*181*
Peak-Hour Factor, PHF	*0.40*	*0.89*	*0.58*	*0.25*	*0.77*	*0.72*
Hourly Flow Rate, HFR (veh/h)	*19*	*151*	*12*	*0*	*492*	*251*
Percent Heavy Vehicles	*13*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*89*	*5*	*8*	*3*	*2*	*1*
Peak-Hour Factor, PHF	*0.86*	*0.63*	*0.50*	*0.38*	*0.25*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*103*	*7*	*16*	*7*	*8*	*4*
Percent Heavy Vehicles	*20*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*19*	*0*		*19*			*126*	
C (m) (veh/h)	*994*	*1428*		*467*			*360*	
v/c	*0.02*	*0.00*		*0.04*			*0.35*	
95% queue length	*0.06*	*0.00*		*0.13*			*1.53*	
Control Delay (s/veh)	*8.7*	*7.5*		*13.0*			*20.3*	
LOS	*A*	*A*		*B*			*C*	
Approach Delay (s/veh)	--	--	*13.0*			*20.3*		
Approach LOS	--	--	*B*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/19/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Old Havre Hwy / 15th St. N*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Old Havre Highway*	North/South Street: *15th Street North*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*9*	*323*	*8*	*1*	*181*	*161*
Peak-Hour Factor, PHF	*0.56*	*0.89*	*0.67*	*0.25*	*0.87*	*0.84*
Hourly Flow Rate, HFR (veh/h)	*16*	*362*	*11*	*4*	*208*	*191*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*188*	*4*	*10*	*4*	*5*	*0*
Peak-Hour Factor, PHF	*0.94*	*0.50*	*0.42*	*0.50*	*0.63*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*200*	*8*	*23*	*8*	*7*	*0*
Percent Heavy Vehicles	*8*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*16*	*4*		*15*			*231*	
C (m) (veh/h)	*1375*	*1197*		*414*			*502*	
v/c	*0.01*	*0.00*		*0.04*			*0.46*	
95% queue length	*0.04*	*0.01*		*0.11*			*2.39*	
Control Delay (s/veh)	*7.6*	*8.0*		*14.0*			*18.1*	
LOS	*A*	*A*		*B*			*C*	
Approach Delay (s/veh)	--	--	*14.0*			*18.1*		
Approach LOS	--	--	*B*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*25th Ave. NE / 8th St. NE*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *25th Avenue NE* | North/South Street: *8th Street NE*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	167	57	153	270	8
Peak-Hour Factor, PHF	0.63	0.62	0.59	0.74	0.73	0.68
Hourly Flow Rate, HFR (veh/h)	7	269	96	206	369	11
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	6	48	9	17	19	62
Peak-Hour Factor, PHF	0.50	0.92	0.56	0.53	0.53	0.71
Hourly Flow Rate, HFR (veh/h)	12	52	16	32	35	87
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	7	206		154			80	
C (m) (veh/h)	1182	1197		234			162	
v/c	0.01	0.17		0.66			0.49	
95% queue length	0.02	0.62		4.10			2.38	
Control Delay (s/veh)	8.1	8.6		45.8			47.2	
LOS	A	A		E			E	
Approach Delay (s/veh)	--	--	45.8			47.2		
Approach LOS	--	--	E			E		

 *HCS+*TM Version 5.6 Generated: 6/28/2013 9:36 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*25th Ave. NE / 8th St. NE*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *25th Avenue NE* | North/South Street: *8th Street NE*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	14	190	28	59	119	3
Peak-Hour Factor, PHF	0.50	0.78	0.88	0.87	0.83	0.38
Hourly Flow Rate, HFR (veh/h)	28	243	31	67	143	7
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	2	24	17	36	67	175
Peak-Hour Factor, PHF	0.25	0.75	0.53	0.75	0.84	0.84
Hourly Flow Rate, HFR (veh/h)	8	32	32	48	79	208
Percent Heavy Vehicles	0	0	0	0	1	1
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

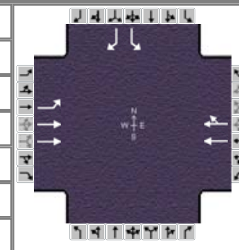
Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	28	67		335			72	
C (m) (veh/h)	1444	1301		546			448	
v/c	0.02	0.05		0.61			0.16	
95% queue length	0.06	0.16		4.12			0.57	
Control Delay (s/veh)	7.5	7.9		21.5			14.6	
LOS	A	A		C			B	
Approach Delay (s/veh)	--	--	21.5			14.6		
Approach LOS	--	--	C			B		

 HCS+TM Version 5.6 Generated: 6/28/2013 9:44 AM

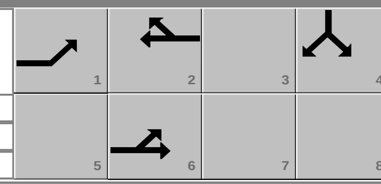
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.83
Intersection	Smelter Ave. / 6th St. NE	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	19_SmelterAve_6thStNE_AM.xus				
Project Description	Great Falls Area LRTP				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	32	744			659	24				144		117

Signal Information										
Cycle, s	100.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	5.4	64.0	16.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.9	3.9	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.9	1.1	1.1	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	10.0	79.0		69.0				21.0
Change Period, *(Y+R$_c$)*, s	4.6	5.0		5.0				5.0
Max Allow Headway *(MAH)*, s	3.1	0.0		0.0				3.2
Queue Clearance Time *(g$_s$)*, s	2.7							12.1
Green Extension Time *(g$_e$)*, s	0.0	0.0		0.0				0.3
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.57

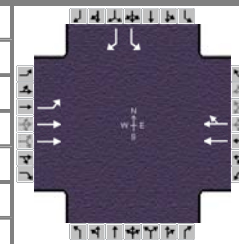
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				7		14
Adjusted Flow Rate (*v*), veh/h	39	896			414	409				173		141
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1556			1635	1611				1619		1441
Queue Service Time (*g$_s$*), s	0.7	10.5			12.2	12.2				10.1		9.1
Cycle Queue Clearance Time (*g$_c$*), s	0.7	10.5			12.2	12.2				10.1		9.1
Capacity (*c*), veh/h	509	2303			1046	1031				259		231
Volume-to-Capacity Ratio *(X)*	0.076	0.389			0.396	0.396				0.670		0.612
Available Capacity (*c$_a$*), veh/h	509	2303			1046	1031				259		231
Back of Queue (*Q*), veh/ln (50th percentile)	0.2	2.6			4.0	4.0				4.3		3.3
Overflow Queue (*Q$_3$*), veh/ln	0.0	0.0			0.0	0.0				0.0		0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00			0.00	0.00				0.00		0.00
Uniform Delay (*d$_1$*), s/veh	5.3	4.7			8.7	8.7				39.5		39.1
Incremental Delay (*d$_2$*), s/veh	0.0	0.5			1.1	1.1				5.3		3.4
Initial Queue Delay (*d$_3$*), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (*d*), s/veh	5.3	5.2			9.8	9.8				44.9		42.5
Level of Service (LOS)	A	A			A	A				D		D

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	5.2	A	9.8	A	0.0		43.8	D
Intersection Delay, s/veh / LOS	12.9				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.6	A	2.2	B	2.7	B	2.9	C
Bicycle LOS Score / LOS	1.3	A	1.2	A				F

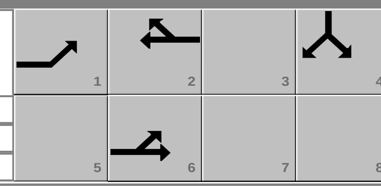
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.97
Intersection	Smelter Ave. / 6th St. NE	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	19_SmelterAve_6thStNE_PM.xus				
Project Description	Great Falls Area LRTP				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	62	840			1057	59				83		84

Signal Information										
Cycle, s	110.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	5.4	75.0	15.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.9	3.9	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.9	1.1	1.1	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	10.0	90.0		80.0				20.0
Change Period, $(Y+R_c)$, s	4.6	5.0		5.0				5.0
Max Allow Headway (MAH), s	3.1	0.0		0.0				3.2
Queue Clearance Time (g_s), s	3.1							8.1
Green Extension Time (g_e), s	0.0	0.0		0.0				0.2
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.02

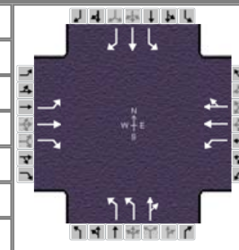
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				7		14
Adjusted Flow Rate (v), veh/h	64	866			581	569				86		87
Adjusted Saturation Flow Rate (s), veh/h/ln	1619	1602			1667	1631				1619		1441
Queue Service Time (g_s), s	1.1	9.3			18.7	18.8				5.3		6.1
Cycle Queue Clearance Time (g_c), s	1.1	9.3			18.7	18.8				5.3		6.1
Capacity (c), veh/h	399	2476			1136	1112				221		196
Volume-to-Capacity Ratio (X)	0.160	0.350			0.512	0.512				0.388		0.441
Available Capacity (c_a), veh/h	399	2476			1136	1112				221		196
Back of Queue (Q), veh/ln (50th percentile)	0.3	2.3			6.2	6.1				2.1		2.2
Overflow Queue (Q_3), veh/ln	0.0	0.0			0.0	0.0				0.0		0.0
Queue Storage Ratio (RQ) (50th percentile)	0.00	0.00			0.00	0.00				0.00		0.00
Uniform Delay (d_1), s/veh	5.9	3.9			8.6	8.6				43.3		43.6
Incremental Delay (d_2), s/veh	0.1	0.4			1.6	1.7				0.4		0.6
Initial Queue Delay (d_3), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay (d), s/veh	5.9	4.3			10.2	10.2				43.7		44.2
Level of Service (LOS)	A	A			B	B				D		D
Approach Delay, s/veh / LOS	4.4		A	10.2		B	0.0			44.0		D
Intersection Delay, s/veh / LOS	10.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.6	A	2.2	B	2.7	B	2.9	C
Bicycle LOS Score / LOS	1.3	A	1.4	A				F

 HCS 2010™ Streets Version 6.41 Generated: 8/15/2013 1:13:29 PM

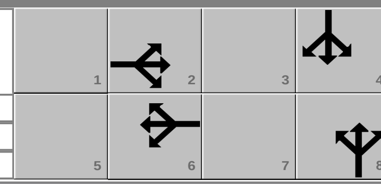
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.82
Intersection	Smelter Ave. / 10th St. NE	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	20_SmelterAve_10thStNE_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	117	112	647	34	156	19	432	81	19	9	145	112

Signal Information										
Cycle, s	110.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	58.3	14.4	19.8	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	3.0	1.9	2.2	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		5.0		6.0		10.0		9.0
Phase Duration, s		65.0		65.0		25.0		20.0
Change Period, *(Y+R$_c$)*, s		6.7		6.7		5.2		5.6
Max Allow Headway *(MAH)*, s		0.0		0.0		4.1		4.1
Queue Clearance Time *(g$_s$)*, s						20.6		13.3
Green Extension Time *(g$_e$)*, s		0.0		0.0		0.0		0.1
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

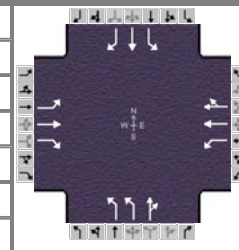
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	143	137	789	41	108	106	527	122		11	177	137
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1079	1650	1396	614	1650	1588	1541	1628		1619	1667	1295
Queue Service Time (*g$_s$*), s	8.4	4.7	58.3	4.1	3.6	3.7	18.6	7.3		0.7	11.3	11.3
Cycle Queue Clearance Time (*g$_c$*), s	12.1	4.7	58.3	8.7	3.6	3.7	18.6	7.3		0.7	11.3	11.3
Capacity (*c*), veh/h	601	875	740	365	875	842	555	293		212	218	170
Volume-to-Capacity Ratio *(X)*	0.237	0.156	1.067	0.114	0.123	0.126	0.949	0.416		0.052	0.810	0.806
Available Capacity (*c$_a$*), veh/h	601	875	740	365	875	842	555	293		212	218	170
Back of Queue (*Q*), veh/ln (50th percentile)	2.1	1.7	28.1	0.6	1.3	1.3	8.9	2.9		0.3	5.8	4.7
Overflow Queue (*Q$_3$*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (*d$_1$*), s/veh	16.1	13.2	25.9	15.5	13.0	13.0	44.6	40.0		41.8	46.5	46.4
Incremental Delay (*d$_2$*), s/veh	0.9	0.4	52.4	0.6	0.3	0.3	26.1	0.9		0.1	20.1	24.0
Initial Queue Delay (*d$_3$*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	17.0	13.6	78.2	16.1	13.3	13.3	70.7	40.9		41.9	66.5	70.5
Level of Service (LOS)	B	B	F	B	B	B	E	D		D	E	E
Approach Delay, s/veh / LOS	61.8	E		13.8	B		65.1	E		67.4	E	
Intersection Delay, s/veh / LOS	58.2						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.6	B	2.5	B	2.9	C
Bicycle LOS Score / LOS	2.3	B	0.7	A	1.6	A	1.0	A

HCS 2010 Signalized Intersection Results Summary

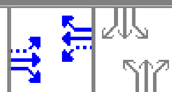
General Information			
Agency	Robert Peccia & Associates		
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013
Jurisdiction	Great Falls	Time Period	PM Peak Hour
Intersection	Smelter Ave. / 10th St. NE	Analysis Year	2013 - Existing
File Name	20_SmelterAve_10thStNE_PM.xus		
Project Description	Great Falls Area LRTP - 2014		

Intersection Information	
Duration, h	0.25
Area Type	Other
PHF	0.95
Analysis Period	1> 7:00

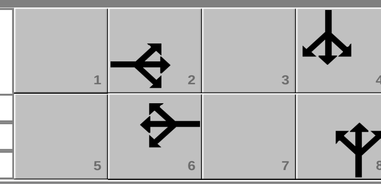


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	127	163	683	45	306	19	713	144	50	13	114	173

Signal Information			
Cycle, s	95.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	46.3	10.4	20.8	0.0	0.0	0.0
Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Red	3.0	1.9	2.2	0.0	0.0	0.0



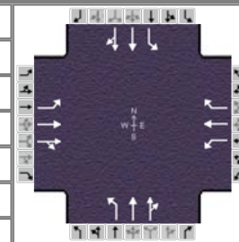
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		5.0		6.0		10.0		9.0
Phase Duration, s		53.0		53.0		26.0		16.0
Change Period, ($Y+R_c$), s		6.7		6.7		5.2		5.6
Max Allow Headway (MAH), s		0.0		0.0		4.1		4.2
Queue Clearance Time (g_s), s						22.8		12.4
Green Extension Time (g_e), s		0.0		0.0		0.0		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	134	172	719	47	172	170	751	204		14	120	182
Adjusted Saturation Flow Rate (s), veh/h/ln	1034	1683	1397	634	1700	1665	1572	1625		1619	1667	1326
Queue Service Time (g_s), s	8.1	5.5	46.3	4.4	5.5	5.5	20.8	10.7		0.7	6.6	10.4
Cycle Queue Clearance Time (g_c), s	13.6	5.5	46.3	9.9	5.5	5.5	20.8	10.7		0.7	6.6	10.4
Capacity (c), veh/h	519	820	681	348	829	811	688	356		177	182	145
Volume-to-Capacity Ratio (X)	0.257	0.209	1.056	0.136	0.208	0.210	1.090	0.574		0.077	0.658	1.255
Available Capacity (c_a), veh/h	519	820	681	348	829	811	688	356		177	182	145
Back of Queue (Q), veh/ln (50th percentile)	2.0	2.1	23.0	0.7	2.1	2.1	13.5	4.3		0.3	3.0	9.7
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio (RQ) (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	17.8	13.9	24.4	16.7	13.9	13.9	37.1	33.1		38.0	40.6	42.3
Incremental Delay (d_2), s/veh	1.2	0.6	50.3	0.8	0.6	0.6	61.5	2.2		0.2	8.3	158.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh	19.0	14.5	74.6	17.5	14.5	14.5	98.6	35.4		38.2	48.9	201.1
Level of Service (LOS)	B	B	F	B	B	B	F	D		D	D	F
Approach Delay, s/veh / LOS	57.3	E		14.8	B		85.1	F		136.2	F	
Intersection Delay, s/veh / LOS	70.3						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.6	B	2.5	B	2.8	C
Bicycle LOS Score / LOS	2.2	B	0.8	A	2.1	B	1.0	A

HCS 2010 Signalized Intersection Results Summary

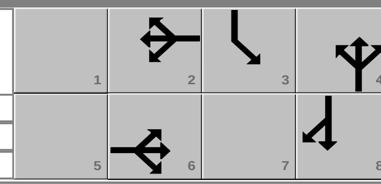
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/12/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	River Rd. / 9th St. N	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	RiverRd_9thStN_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	49	197	10	5	78	169	8	179	18	273	277	122

Signal Information			
Cycle, s	105.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	37.1	30.4	20.4	0.0	0.0	0.0
Yellow	3.6	3.2	3.2	0.0	0.0	0.0
Red	2.3	2.4	2.4	0.0	0.0	0.0



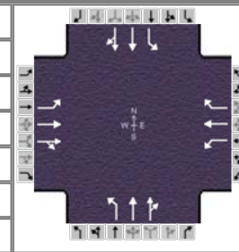
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4	3	8
Case Number		6.0		5.0		6.3	2.0	4.0
Phase Duration, s		43.0		43.0		26.0	36.0	62.0
Change Period, *($Y+R_c$)*, s		5.9		5.9		5.6	5.6	5.6
Max Allow Headway *(MAH)*, s		0.0		0.0		2.1	2.6	2.1
Queue Clearance Time *(g_s)*, s						7.8	18.7	9.7
Green Extension Time *(g_e)*, s		0.0		0.0		0.4	0.3	0.4
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	53	113	112	5	85	184	9	108	106	297	225	208
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1128	1700	1671	1173	1700	1441	964	1700	1646	1619	1700	1521
Queue Service Time (g_s), s	3.5	4.8	4.9	0.3	3.6	9.9	0.8	5.7	5.8	16.7	7.4	7.7
Cycle Queue Clearance Time (g_c), s	7.1	4.8	4.9	5.2	3.6	9.9	0.8	5.7	5.8	16.7	7.4	7.7
Capacity (*c*), veh/h	429	601	590	429	601	509	256	330	320	469	913	817
Volume-to-Capacity Ratio *(X)*	0.124	0.188	0.190	0.013	0.141	0.361	0.034	0.326	0.333	0.633	0.247	0.255
Available Capacity (c_a), veh/h	429	601	590	429	601	509	256	330	320	469	913	817
Back of Queue (*Q*), veh/ln (50th percentile)	1.0	2.0	2.0	0.1	1.5	3.6	0.2	2.4	2.3	6.7	2.7	2.5
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	25.5	23.5	23.5	25.3	23.1	25.2	34.4	36.4	36.4	32.4	13.0	13.0
Incremental Delay (d_2), s/veh	0.6	0.7	0.7	0.1	0.5	2.0	0.0	0.2	0.2	2.1	0.1	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	26.1	24.2	24.2	25.4	23.6	27.1	34.4	36.6	36.7	34.6	13.0	13.1
Level of Service (LOS)	C	C	C	C	C	C	C	D	D	C	B	B
Approach Delay, s/veh / LOS	24.6	C		26.0	C		36.5	D		21.8	C	
Intersection Delay, s/veh / LOS	25.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.8	C	2.4	B
Bicycle LOS Score / LOS	0.7	A	0.9	A	0.7	A	1.1	A

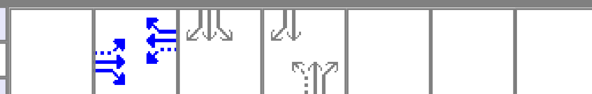
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/12/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	River Rd. / 9th St. N	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	RiverRd_9thStN_PM.xus				
Project Description	Great Falls Area LRTP - 2014				

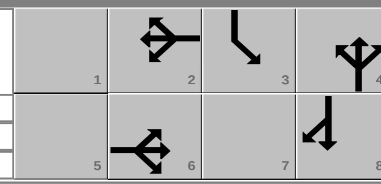


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	102	137	8	37	231	278	14	437	29	282	381	118

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	34.1	25.4	23.4	0.0	0.0	0.0
Yellow	3.6	3.2	3.2	0.0	0.0	0.0
Red	2.3	2.4	2.4	0.0	0.0	0.0



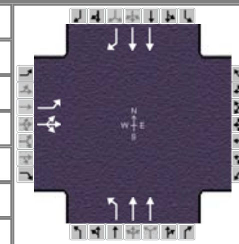
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4	3	8
Case Number		6.0		5.0		6.3	2.0	4.0
Phase Duration, s		40.0		40.0		29.0	31.0	60.0
Change Period, *(Y+R$_c$)*, s		5.9		5.9		5.6	5.6	5.6
Max Allow Headway *(MAH)*, s		0.0		0.0		2.1	2.6	2.1
Queue Clearance Time *(g_s)*, s						16.0	20.1	11.2
Green Extension Time *(g_e)*, s		0.0		0.0		0.6	0.2	0.7
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.04	0.07	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	111	79	79	40	251	302	15	255	251	307	280	262
Adjusted Saturation Flow Rate (*s*), veh/h/ln	869	1518	1488	1124	1604	1385	877	1667	1629	1572	1700	1562
Queue Service Time (g_s), s	11.4	3.6	3.7	2.6	12.2	18.4	1.4	13.9	14.0	18.1	9.0	9.2
Cycle Queue Clearance Time (g_c), s	23.7	3.6	3.7	6.3	12.2	18.4	1.4	13.9	14.0	18.1	9.0	9.2
Capacity (*c*), veh/h	262	518	507	414	547	472	277	390	381	399	925	850
Volume-to-Capacity Ratio *(X)*	0.423	0.153	0.155	0.097	0.459	0.640	0.055	0.655	0.658	0.768	0.303	0.308
Available Capacity (c_a), veh/h	262	518	507	414	547	472	277	390	381	399	925	850
Back of Queue (*Q*), veh/ln (50th percentile)	2.7	1.4	1.4	0.7	4.9	6.7	0.3	5.8	5.7	7.6	3.2	3.0
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	35.0	22.9	22.9	25.1	25.7	27.8	29.9	34.6	34.7	34.6	12.5	12.5
Incremental Delay (d_2), s/veh	4.9	0.6	0.6	0.5	2.8	6.5	0.0	3.1	3.3	7.9	0.1	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	39.9	23.5	23.6	25.6	28.5	34.3	29.9	37.8	38.0	42.5	12.5	12.6
Level of Service (LOS)	D	C	C	C	C	C	C	D	D	D	B	B
Approach Delay, s/veh / LOS	30.3	C		31.2	C		37.7	D		23.4	C	
Intersection Delay, s/veh / LOS	29.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.8	C	2.4	B
Bicycle LOS Score / LOS	0.7	A	1.5	A	0.9	A	1.2	A

HCS 2010 Signalized Intersection Results Summary

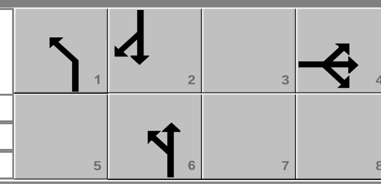
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/12/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.87
Intersection	NW Bypass / 3rd St. NW	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	NWBypass_3rdStNW_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	156	0	59				84	222			230	210

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.1	60.2	23.0	0.0	0.0	0.0
Yellow	3.9	3.9	3.6	0.0	0.0	0.0
Red	2.0	2.9	2.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			1	6		2
Case Number		10.0			1.0	4.0		7.3
Phase Duration, s		29.0			14.0	81.0		67.0
Change Period, *(Y+R$_c$)*, s		6.0			5.9	6.8		6.8
Max Allow Headway *(MAH)*, s		4.7			4.1	0.0		0.0
Queue Clearance Time *(g$_s$)*, s		12.8			4.5			
Green Extension Time *(g$_e$)*, s		0.8			0.1	0.0		0.0
Phase Call Probability		1.00			1.00			
Max Out Probability		0.06			1.00			

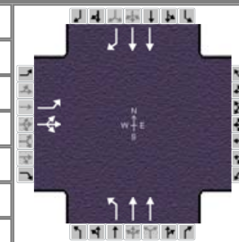
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14				1	6			2	12
Adjusted Flow Rate (*v*), veh/h	179	179					97	255			264	241
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1619					1619	1618			1618	1441
Queue Service Time (*g$_s$*), s	10.8	10.8					2.5	3.1			4.4	10.0
Cycle Queue Clearance Time (*g$_c$*), s	10.8	10.8					2.5	3.1			4.4	10.0
Capacity (*c*), veh/h	339	339					645	2183			1771	788
Volume-to-Capacity Ratio *(X)*	0.530	0.530					0.150	0.117			0.149	0.306
Available Capacity (*c$_a$*), veh/h	339	339					645	2183			1771	788
Back of Queue (*Q*), veh/ln (50th percentile)	4.4	4.4					0.8	1.0			1.6	3.3
Overflow Queue (*Q$_3$*), veh/ln	0.0	0.0					0.0	0.0			0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00					0.00	0.00			0.00	0.00
Uniform Delay (*d$_1$*), s/veh	38.7	38.7					7.8	6.3			12.3	13.5
Incremental Delay (*d$_2$*), s/veh	1.8	1.8					0.1	0.1			0.2	1.0
Initial Queue Delay (*d$_3$*), s/veh	0.0	0.0					0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	40.5	40.5					7.9	6.4			12.5	14.5
Level of Service (LOS)	D	D					A	A			B	B
Approach Delay, s/veh / LOS	39.4		D	0.0			6.8		A	13.5		B
Intersection Delay, s/veh / LOS	17.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	1.9	A	2.3	B
Bicycle LOS Score / LOS	0.9	A			0.8	A	0.9	A

 HCS 2010™ Streets Version 6.41 Generated: 8/15/2013 7:27:40 PM

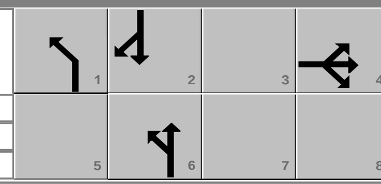
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/12/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	NW Bypass / 3rd St. NW	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	NWBypass_3rdStNW_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	362	0	145				222	572			486	507

Signal Information											
Cycle, s	115.0	Reference Phase	2	Green	10.1	53.2	32.2	0.0	0.0	0.0
Offset, s	0	Reference Point	End	Yellow	3.9	3.9	3.9	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Red	2.0	2.9	2.9	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On							

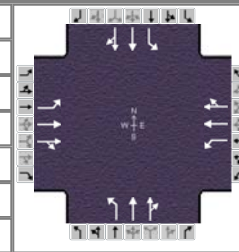


Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			1	6		2
Case Number		10.0			1.0	4.0		7.3
Phase Duration, s		39.0			16.0	76.0		60.0
Change Period, *(Y+R*$_c$*)*, s		6.8			5.9	6.8		6.8
Max Allow Headway *(MAH)*, s		4.7			4.1	0.0		0.0
Queue Clearance Time *(g*$_s$*)*, s		29.6			10.7			
Green Extension Time *(g*$_e$*)*, s		0.7			0.0	0.0		0.0
Phase Call Probability		1.00			1.00			
Max Out Probability		1.00			1.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14				1	6			2	12
Adjusted Flow Rate (*v*), veh/h	393	393					241	622			528	551
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1572	1572					1619	1587			1571	1412
Queue Service Time (*g*$_s$), s	27.6	27.6					8.7	11.2			12.5	39.5
Cycle Queue Clearance Time (*g*$_c$), s	27.6	27.6					8.7	11.2			12.5	39.5
Capacity (*c*), veh/h	440	440					393	1910			1454	653
Volume-to-Capacity Ratio *(X)*	0.894	0.894					0.614	0.326			0.363	0.843
Available Capacity (*c*$_a$), veh/h	440	440					393	1910			1454	653
Back of Queue (*Q*), veh/ln (50th percentile)	12.9	12.9					3.3	3.8			4.6	15.0
Overflow Queue (*Q*$_3$), veh/ln	0.0	0.0					0.0	0.0			0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00					0.00	0.00			0.00	0.00
Uniform Delay (*d*$_1$), s/veh	39.8	39.8					14.3	11.3			20.0	27.2
Incremental Delay (*d*$_2$), s/veh	20.4	20.4					2.8	0.5			0.7	12.6
Initial Queue Delay (*d*$_3$), s/veh	0.0	0.0					0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	60.1	60.1					17.1	11.8			20.7	39.8
Level of Service (LOS)	E	E					B	B			C	D
Approach Delay, s/veh / LOS	52.7	D		0.0			13.3	B		30.4	C	
Intersection Delay, s/veh / LOS	29.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	1.9	A	2.3	B
Bicycle LOS Score / LOS	1.4	A			1.2	A	1.4	A

HCS 2010 Signalized Intersection Results Summary

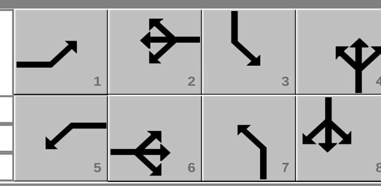


General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 12, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	Central Ave. NW / 6th St. N	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	CentralAveNW_6thStNW_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	32	530	63	113	229	40	63	270	68	87	172	19

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.0	40.5	4.0	1.0	19.5	0.0
Yellow	3.0	3.2	3.0	0.0	3.2	0.0
Red	2.0	2.3	2.0	0.0	2.3	0.0



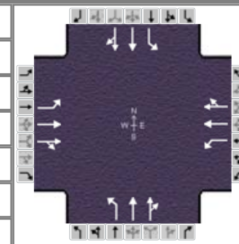
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	9.0	46.0	9.0	46.0	9.0	25.0	10.0	26.0
Change Period, *(Y+R_c)*, s	5.0	5.5	5.0	5.5	5.0	5.5	5.0	5.5
Max Allow Headway *(MAH)*, s	3.6	0.0	3.6	0.0	3.6	3.6	3.6	3.6
Queue Clearance Time *(g_s)*, s	3.0		5.9		5.0	11.1	6.0	6.8
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.3
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.12	1.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	35	328	317	123	148	144	68	188	179	95	105	103
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1572	1635	1573	1557	1491	1414	1587	1683	1562	1619	1650	1592
Queue Service Time (*g_s*), s	1.0	12.4	12.5	3.9	5.5	5.6	3.0	8.9	9.1	4.0	4.7	4.8
Cycle Queue Clearance Time (*g_c*), s	1.0	12.4	12.5	3.9	5.5	5.6	3.0	8.9	9.1	4.0	4.7	4.8
Capacity (*c*), veh/h	565	736	708	388	671	637	354	365	338	288	376	363
Volume-to-Capacity Ratio *(X)*	0.062	0.446	0.448	0.317	0.221	0.227	0.193	0.515	0.530	0.328	0.278	0.284
Available Capacity (*c_a*), veh/h	565	736	708	388	671	637	354	365	338	288	376	363
Back of Queue (*Q*), veh/ln (50th percentile)	0.3	4.8	4.6	1.3	1.9	1.9	1.1	3.6	3.5	1.5	1.8	1.8
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (*d_1*), s/veh	11.9	17.0	17.0	13.5	15.1	15.2	25.8	31.1	31.2	25.2	28.6	28.7
Incremental Delay (*d_2*), s/veh	0.0	2.0	2.0	0.3	0.8	0.8	0.2	1.0	1.3	0.5	0.3	0.3
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	12.0	19.0	19.1	13.9	15.9	16.0	26.0	32.1	32.5	25.7	28.9	29.0
Level of Service (LOS)	B	B	B	B	B	B	C	C	C	C	C	C
Approach Delay, s/veh / LOS	18.7	B		15.3	B		31.3	C		27.9	C	
Intersection Delay, s/veh / LOS	22.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.0	A	0.8	A	0.8	A	0.7	A

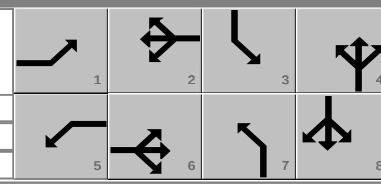
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 12, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	Central Ave. NW / 6th St. N	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	CentralAveNW_6thStNW_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	31	386	78	332	542	123	71	259	72	112	296	24

Signal Information										
Cycle, s	110.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	4.0	2.0	51.5	4.0	22.5	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.0	3.0	3.2	3.0	3.2	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.3	2.0	2.3	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	9.0	57.0	16.0	64.0	9.0	28.0	9.0	28.0
Change Period, *($Y+R_c$)*, s	5.0	5.5	5.0	5.5	5.0	5.5	5.0	5.5
Max Allow Headway *(MAH)*, s	3.6	0.0	3.6	0.0	3.6	3.6	3.6	3.6
Queue Clearance Time *(g_s)*, s	3.2		13.0		6.0	13.1	6.0	12.3
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	1.5	0.0	1.5
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.11	1.00	0.08

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate *(v)*, veh/h	34	258	246	361	373	350	77	184	176	122	175	172
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1527	1650	1553	1587	1650	1543	1603	1683	1556	1603	1683	1633
Queue Service Time *(g_s)*, s	1.2	10.8	11.0	11.0	15.0	15.1	4.0	10.8	11.1	4.0	10.2	10.3
Cycle Queue Clearance Time *(g_c)*, s	1.2	10.8	11.0	11.0	15.0	15.1	4.0	10.8	11.1	4.0	10.2	10.3
Capacity *(c)*, veh/h	397	773	727	552	878	821	239	344	318	230	344	334
Volume-to-Capacity Ratio *(X)*	0.085	0.334	0.339	0.654	0.425	0.427	0.323	0.535	0.552	0.529	0.510	0.516
Available Capacity *(c_a)*, veh/h	397	773	727	552	878	821	239	344	318	230	344	334
Back of Queue *(Q)*, veh/ln (50th percentile)	0.4	4.3	4.1	3.9	5.8	5.4	1.7	4.5	4.3	1.5	4.2	4.2
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay *(d_1)*, s/veh	14.1	18.4	18.5	12.1	15.6	15.6	34.3	39.1	39.2	39.2	38.9	38.9
Incremental Delay *(d_2)*, s/veh	0.1	1.2	1.3	2.5	1.5	1.6	0.6	1.3	1.7	1.8	1.0	1.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	14.2	19.6	19.8	14.7	17.1	17.2	34.8	40.4	40.9	41.0	39.8	40.0
Level of Service (LOS)	B	B	B	B	B	B	C	D	D	D	D	D
Approach Delay, s/veh / LOS	19.3		B	16.3		B	39.6		D	40.2		D
Intersection Delay, s/veh / LOS	25.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.8	C	2.8	C
Bicycle LOS Score / LOS	0.9	A	1.4	A	0.8	A	0.9	A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/2/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*6th St. SW / 4th Ave. SW*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *4th Avenue SW* | North/South Street: *6th Street SW*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	227	292	2	316	2
Peak-Hour Factor, PHF	0.38	0.86	0.73	0.50	0.83	0.50
Hourly Flow Rate, HFR (veh/h)	7	263	399	4	380	4
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	7	41	1	4
Peak-Hour Factor, PHF	0.25	0.25	0.88	0.60	0.25	0.33
Hourly Flow Rate, HFR (veh/h)	4	4	7	68	4	12
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	7	4		84			15	
C (m) (veh/h)	1186	936		358			419	
v/c	0.01	0.00		0.23			0.04	
95% queue length	0.02	0.01		0.90			0.11	
Control Delay (s/veh)	8.1	8.9		18.1			13.9	
LOS	A	A		C			B	
Approach Delay (s/veh)	--	--	18.1			13.9		
Approach LOS	--	--	C			B		

 HCS+™ Version 5.6 Generated: 7/2/2013 9:42 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/2/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*6th St. SW / 4th Ave. SW*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *4th Avenue SW* North/South Street: *6th Street SW*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*443*	*137*	*4*	*726*	*9*
Peak-Hour Factor, PHF	*0.83*	*0.89*	*0.75*	*0.50*	*0.89*	*0.56*
Hourly Flow Rate, HFR (veh/h)	*12*	*497*	*182*	*8*	*815*	*16*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*1*	*2*	*0*
Configuration	*L*	*T*	*TR*	*L*	*T*	*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*1*	*2*	*14*	*70*	*1*	*4*
Peak-Hour Factor, PHF	*0.25*	*0.50*	*0.70*	*0.76*	*0.25*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*4*	*4*	*20*	*92*	*4*	*8*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*12*	*8*		*104*			*28*	
C (m) (veh/h)	*808*	*923*		*182*			*303*	
v/c	*0.01*	*0.01*		*0.57*			*0.09*	
95% queue length	*0.05*	*0.03*		*3.05*			*0.30*	
Control Delay (s/veh)	*9.5*	*8.9*		*48.3*			*18.1*	
LOS	*A*	*A*		*E*			*C*	
Approach Delay (s/veh)	--	--	*48.3*			*18.1*		
Approach LOS	--	--	*E*			*C*		

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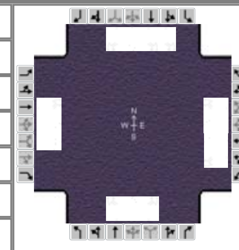
HCS 2010 Signalized Intersection Results Summary

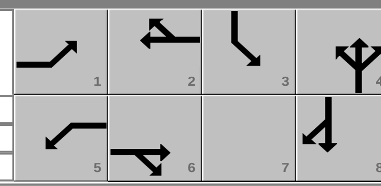
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 29, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.77
Intersection	Central Ave. W / 3rd St. NV	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	16_CentralAveW_3rdStNW_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	84	649	1	41	362	201	2	129	156	400	24	76

Signal Information			
Cycle, s	82.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	3.3	11.3	9.2	16.6	14.9	0.0
Yellow	3.0	3.2	3.0	3.9	3.6	0.0
Red	2.0	2.3	2.0	1.6	2.4	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4	3	8
Case Number	2.0	4.0	2.0	3.0		5.3	2.0	3.0
Phase Duration, s	14.2	31.1	8.3	25.2		20.9	22.1	43.0
Change Period, *(Y+R$_c$)*, s	5.5	5.5	5.0	5.5		6.0	5.5	6.0
Max Allow Headway *(MAH)*, s	4.1	4.1	3.2	4.2		4.3	4.2	4.3
Queue Clearance Time *(g$_s$)*, s	7.7	22.0	4.7	16.3		13.1	15.2	6.0
Green Extension Time *(g$_e$)*, s	0.0	3.5	0.0	3.4		0.3	1.4	1.7
Phase Call Probability	0.92	1.00	0.70	1.00		1.00	1.00	1.00
Max Out Probability	1.00	0.00	1.00	0.00		1.00	0.35	0.02

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	109	422	422	53	470	261	3	168	203	519	31	99
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1513	1619	1618	1619	1513	1410	1266	1667	1436	1557	1700	1225
Queue Service Time (*g$_s$*), s	5.7	20.0	20.0	2.7	11.5	14.3	0.1	7.5	11.1	13.2	0.8	4.0
Cycle Queue Clearance Time (*g$_c$*), s	5.7	20.0	20.0	2.7	11.5	14.3	0.1	7.5	11.1	13.2	0.8	4.0
Capacity (*c*), veh/h	161	503	503	65	722	337	316	301	259	626	763	549
Volume-to-Capacity Ratio *(X)*	0.678	0.839	0.839	0.815	0.651	0.776	0.008	0.556	0.781	0.829	0.041	0.180
Available Capacity (*c$_a$*), veh/h	161	1375	1374	138	1835	855	318	303	261	831	763	549
Back of Queue (*Q*), veh/ln (50th percentile)	2.6	7.9	7.9	1.2	4.1	2.9	0.0	3.1	4.7	5.3	0.3	1.1
Overflow Queue (*Q$_3$*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (*d$_1$*), s/veh	35.5	26.5	26.5	39.2	28.3	11.6	27.7	30.8	32.2	31.6	12.8	13.6
Incremental Delay (*d$_2$*), s/veh	10.9	3.8	3.8	8.8	1.0	3.8	0.0	2.2	14.0	5.4	0.0	0.2
Initial Queue Delay (*d$_3$*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	46.4	30.3	30.3	48.1	29.3	15.5	27.7	33.0	46.2	36.9	12.8	13.8
Level of Service (LOS)	D	C	C	D	C	B	C	C	D	D	B	B
Approach Delay, s/veh / LOS	32.1	C		26.0	C		40.1	D		32.3	C	
Intersection Delay, s/veh / LOS	31.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.6	B	3.0	C	2.8	C
Bicycle LOS Score / LOS	1.3	A	1.1	A	1.1	A	1.6	A

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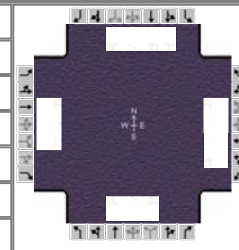
HCS 2010 Signalized Intersection Results Summary

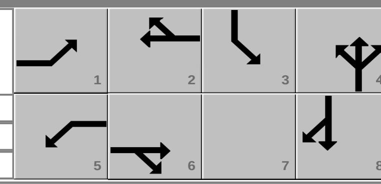
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 29, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	Central Ave. W / 3rd St. NV	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	16_CentralAveW_3rdStNW_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	138	506	3	82	876	571	4	107	65	408	54	157

Signal Information			
Cycle, s	136.3	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	9.3	51.5	16.0	21.6	11.0	0.0
Yellow	3.0	3.2	3.0	3.9	3.6	0.0
Red	2.0	2.3	2.0	1.6	2.4	0.0



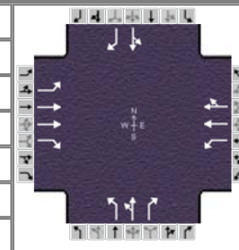
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4	3	8
Case Number	2.0	4.0	2.0	3.0		5.3	2.0	3.0
Phase Duration, s	21.0	78.0	14.3	71.3		17.0	27.1	44.1
Change Period, *($Y+R_c$)*, s	5.5	5.5	5.0	5.5		6.0	5.5	6.0
Max Allow Headway *(MAH)*, s	4.1	4.1	3.2	4.2		4.4	4.2	4.4
Queue Clearance Time (g_s), s	14.9	15.0	9.5	55.5		11.2	20.9	15.7
Green Extension Time (g_e), s	0.5	2.6	0.0	10.1		0.0	0.6	1.6
Phase Call Probability	1.00	1.00	0.97	1.00		1.00	1.00	1.00
Max Out Probability	0.00	0.00	0.17	0.00		1.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	150	277	276	89	952	621	4	116	71	443	59	171
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1557	1635	1631	1603	1602	1441	763	1700	1419	1572	1700	1396
Queue Service Time (g_s), s	12.9	13.0	13.0	7.5	29.9	53.5	0.7	9.2	6.6	18.9	3.5	13.7
Cycle Queue Clearance Time (g_c), s	12.9	13.0	13.0	7.5	29.9	53.5	0.7	9.2	6.6	18.9	3.5	13.7
Capacity (*c*), veh/h	177	870	868	109	1548	696	114	137	114	498	475	390
Volume-to-Capacity Ratio *(X)*	0.849	0.318	0.318	0.818	0.615	0.892	0.038	0.850	0.618	0.891	0.124	0.438
Available Capacity (c_a), veh/h	467	870	868	164	3589	1613	114	137	114	552	475	390
Back of Queue (*Q*), veh/ln (50th percentile)	5.6	5.0	5.0	3.4	11.4	12.4	0.1	5.4	2.7	8.6	1.5	4.8
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	59.4	18.0	18.0	62.8	26.0	15.1	58.1	62.0	60.8	56.3	36.8	40.4
Incremental Delay (d_2), s/veh	10.7	0.2	0.2	10.4	0.4	4.3	0.1	36.8	9.7	15.5	0.1	0.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	70.1	18.2	18.2	73.3	26.4	19.4	58.2	98.8	70.5	71.8	36.9	41.2
Level of Service (LOS)	E	B	B	E	C	B	E	F	E	E	D	D
Approach Delay, s/veh / LOS	29.3	C		26.3	C		87.4	F		61.0	E	
Intersection Delay, s/veh / LOS	37.8						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.6	B	3.0	C	2.8	C
Bicycle LOS Score / LOS	1.1	A	1.9	A	0.8	A	1.6	A

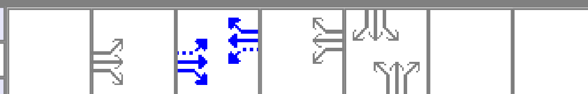
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.79
Intersection	River Dr. / 1st Ave. N	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	18_RiverDr_1stAveN_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

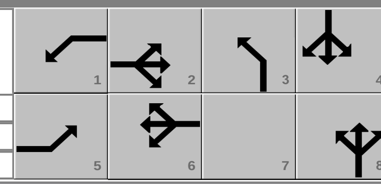


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	159	737	260	35	431	24	157	69	45	11	63	99

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.5	57.0	4.5	14.0	21.0	0.0
Yellow	3.0	3.2	3.0	3.2	3.2	0.0
Red	2.5	2.8	2.5	2.8	2.8	0.0



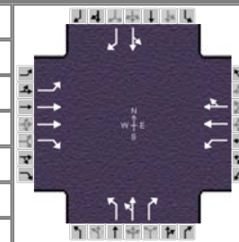
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.2	3.0	1.3	4.0		9.0		11.0
Phase Duration, s	10.0	73.0	10.0	73.0		27.0		20.0
Change Period, *($Y+R_c$)*, s	5.5	6.0	6.0	6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	3.2	0.0	3.2	0.0		4.2		4.3
Queue Clearance Time *(g_s)*, s	6.5		2.0			17.4		13.3
Green Extension Time *(g_e)*, s	0.0	0.0	0.4	0.0		0.4		0.1
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	201	933	329	44	291	285	199	87	57		94	125
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1618	1373	1619	1683	1647	1603	1683	1389		1638	1414
Queue Service Time (*g_s*), s	4.5	25.5	19.9	0.0	13.1	13.2	15.4	6.0	4.7		7.0	11.3
Cycle Queue Clearance Time (*g_c*), s	4.5	25.5	19.9	0.0	13.1	13.2	15.4	6.0	4.7		7.0	11.3
Capacity (*c*), veh/h	398	1668	708	241	867	849	259	272	224		176	152
Volume-to-Capacity Ratio *(X)*	0.506	0.559	0.465	0.184	0.335	0.336	0.767	0.321	0.254		0.531	0.823
Available Capacity (*c_a*), veh/h	398	1668	708	241	867	849	259	272	224		176	152
Back of Queue (*Q*), veh/ln (50th percentile)	3.0	9.9	4.8	1.0	5.4	5.3	7.1	2.6	1.7		3.1	5.3
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Uniform Delay (*d_1*), s/veh	26.7	21.4	11.2	32.0	18.5	18.5	52.2	48.2	47.7		54.9	56.8
Incremental Delay (*d_2*), s/veh	0.4	1.4	2.2	0.1	1.0	1.1	13.0	0.7	0.6		3.0	29.1
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Control Delay *(d)*, s/veh	27.1	22.8	13.4	32.1	19.5	19.5	65.1	48.9	48.2		57.9	85.9
Level of Service (LOS)	C	C	B	C	B	B	E	D	D		E	F
Approach Delay, s/veh / LOS	21.3		C	20.4		C	58.2		E	73.9		E
Intersection Delay, s/veh / LOS	30.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.7	A	1.0	A	1.1	A	0.8	A

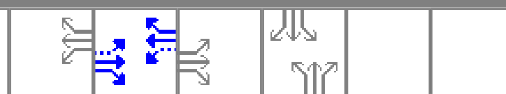
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.90
Intersection	River Dr. / 1st Ave. N	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	18_RiverDr_1stAveN_PM.xus				
Project Description	Great Falls Area LRTP - 2014				

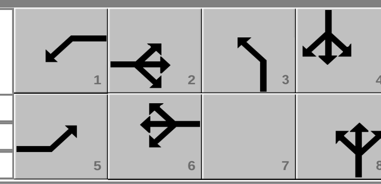


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	136	663	322	64	1009	19	541	90	95	27	94	317

Signal Information			
Cycle, s	160.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.5	49.0	5.5	27.0	45.0	0.0
Yellow	3.0	3.2	3.0	3.2	3.2	0.0
Red	2.5	2.8	2.5	2.8	2.8	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.3	3.0	1.2	4.0		9.0		11.0
Phase Duration, s	11.0	66.0	10.0	65.0		51.0		33.0
Change Period, *($Y+R_c$)*, s	6.0	6.0	5.5	6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	3.2	0.0	3.2	0.0		4.2		4.4
Queue Clearance Time *(g_s)*, s	7.0		6.5			47.0		29.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	151	737	358	71	573	569	601	100	106		134	352
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1618	1396	1619	1700	1687	1619	1683	1426		1665	1415
Queue Service Time (*g_s*), s	5.0	29.5	34.5	4.5	51.4	51.4	45.0	7.3	9.2		11.7	27.0
Cycle Queue Clearance Time (*g_c*), s	5.0	29.5	34.5	4.5	51.4	51.4	45.0	7.3	9.2		11.7	27.0
Capacity (*c*), veh/h	113	1214	523	154	627	622	455	473	401		281	239
Volume-to-Capacity Ratio *(X)*	1.336	0.607	0.684	0.460	0.914	0.915	1.320	0.211	0.263		0.479	1.476
Available Capacity (*c_a*), veh/h	113	1214	523	154	627	622	455	473	401		281	239
Back of Queue (*Q*), veh/ln (50th percentile)	10.9	12.2	13.0	2.0	25.3	25.1	38.5	3.1	3.3		5.1	20.8
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Uniform Delay (*d_1*), s/veh	75.7	40.5	42.0	40.8	48.1	48.1	57.5	43.9	44.6		60.1	21.7
Incremental Delay (*d_2*), s/veh	199.2	2.3	7.1	0.8	20.1	20.3	158.8	0.2	0.3		1.3	235.3
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Control Delay *(d)*, s/veh	274.9	42.7	49.1	41.6	68.2	68.4	216.3	44.2	45.0		61.4	257.0
Level of Service (LOS)	F	D	D	D	E	E	F	D	D		E	F
Approach Delay, s/veh / LOS	72.7		E	66.7		E	172.6		F	202.9		F
Intersection Delay, s/veh / LOS	109.1						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.5	A	1.5	A	1.8	A	1.3	A

 HCS 2010™ Streets Version 6.41 Generated: 8/22/2013 4:53:17 PM

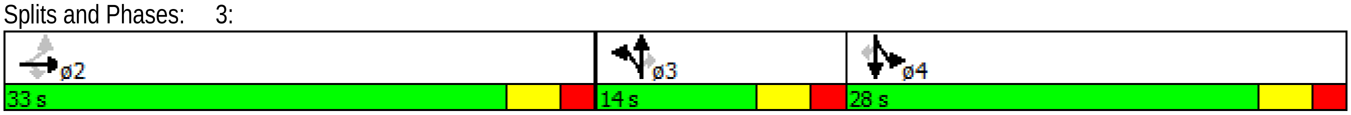
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	564	214	0	0	0	116	22	19	16	68	364
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.996					0.950	0.967		0.950		
Satd. Flow (prot)	0	3154	1417	0	0	0	1504	1531	1417	1583	1667	1417
Flt Permitted		0.996					0.950	0.967		0.950		
Satd. Flow (perm)	0	3154	1417	0	0	0	1504	1531	1417	1583	1667	1417
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			285						102			485
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1038			1127			1081			976	
Travel Time (s)		23.6			25.6			24.6			22.2	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	61	752	285	0	0	0	155	29	25	21	91	485
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	0	813	285	0	0	0	91	93	25	21	91	485
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1				1	2	1	1	2	1
Detector Template	Left	Thru	Right				Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20				20	100	20	20	100	20
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0				0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20				20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94						94			94	
Detector 2 Size(ft)		6						6			6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm				Split	NA	Perm	Split	NA	Perm
Protected Phases		2					3	3		4	4	
Permitted Phases	2		2						3			4
Detector Phase	2	2	2				3	3	3	4	4	4
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0				7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	21.0	21.0	21.0				12.0	12.0	12.0	12.0	12.0	12.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	33.0	33.0	33.0				14.0	14.0	14.0	28.0	28.0	28.0
Total Split (%)	44.0%	44.0%	44.0%				18.7%	18.7%	18.7%	37.3%	37.3%	37.3%
Maximum Green (s)	28.0	28.0	28.0				9.0	9.0	9.0	23.0	23.0	23.0
Yellow Time (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0				2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0				5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max				None	None	None	None	None	None
Walk Time (s)	5.0	5.0	5.0				5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0				11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	2	2	2				3	3	3	0	0	0
Act Effct Green (s)		29.1	29.1				9.5	9.5	9.5	11.4	11.4	11.4
Actuated g/C Ratio		0.47	0.47				0.15	0.15	0.15	0.18	0.18	0.18
v/c Ratio		0.55	0.35				0.40	0.40	0.08	0.07	0.30	0.74
Control Delay		16.7	3.8				31.8	31.8	0.5	22.4	25.7	10.3
Queue Delay		0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		16.7	3.8				31.8	31.8	0.5	22.4	25.7	10.3
LOS		B	A				C	C	A	C	C	B
Approach Delay		13.4						28.0			13.1	
Approach LOS		B						C			B	
90th %ile Green (s)	28.0	28.0	28.0				16.0	16.0	16.0	23.0	23.0	23.0
90th %ile Term Code	MaxR	MaxR	MaxR				Ped	Ped	Ped	Max	Max	Max
70th %ile Green (s)	28.0	28.0	28.0				9.0	9.0	9.0	12.6	12.6	12.6
70th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Gap	Gap	Gap
50th %ile Green (s)	28.0	28.0	28.0				9.0	9.0	9.0	9.6	9.6	9.6
50th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Gap	Gap	Gap
30th %ile Green (s)	28.0	28.0	28.0				7.5	7.5	7.5	7.3	7.3	7.3
30th %ile Term Code	MaxR	MaxR	MaxR				Gap	Gap	Gap	Gap	Gap	Gap
10th %ile Green (s)	28.0	28.0	28.0				0.0	0.0	0.0	7.0	7.0	7.0
10th %ile Term Code	MaxR	MaxR	MaxR				Skip	Skip	Skip	Min	Min	Min
Stops (vph)		422	23				58	59	0	14	53	47
Fuel Used(gal)		9	2				1	1	0	0	1	4
CO Emissions (g/hr)		653	142				93	96	11	19	81	265
NOx Emissions (g/hr)		127	28				18	19	2	4	16	52
VOC Emissions (g/hr)		151	33				22	22	3	4	19	61
Dilemma Vehicles (#)		0	0				0	0	0	0	0	0
Queue Length 50th (ft)		110	0				32	33	0	7	31	0
Queue Length 95th (ft)		202	23				70	72	0	20	59	23
Internal Link Dist (ft)		958			1047			1001			896	
Turn Bay Length (ft)												
Base Capacity (vph)		1473	813				251	256	322	607	639	842
Starvation Cap Reductn		0	0				0	0	0	0	0	0
Spillback Cap Reductn		0	0				0	0	0	0	0	0
Storage Cap Reductn		0	0				0	0	0	0	0	0
Reduced v/c Ratio		0.55	0.35				0.36	0.36	0.08	0.03	0.14	0.58

Intersection Summary

Area Type: Other	
Cycle Length: 75	
Actuated Cycle Length: 62.2	
Natural Cycle: 45	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 14.9	Intersection LOS: B
Intersection Capacity Utilization 43.1%	ICU Level of Service A
Analysis Period (min) 15	
90th %ile Actuated Cycle: 82	
70th %ile Actuated Cycle: 64.6	
50th %ile Actuated Cycle: 61.6	
30th %ile Actuated Cycle: 57.8	
10th %ile Actuated Cycle: 45	

Splits and Phases: 3:



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	617	174	0	0	0	432	20	51	9	43	526
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.996					0.950	0.956		0.950		
Satd. Flow (prot)	0	3154	1417	0	0	0	1504	1514	1417	1583	1667	1417
Flt Permitted		0.996					0.950	0.956		0.950		
Satd. Flow (perm)	0	3154	1417	0	0	0	1504	1514	1417	1583	1667	1417
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			183						102			554
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1038			1127			1081			976	
Travel Time (s)		23.6			25.6			24.6			22.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	63	649	183	0	0	0	455	21	54	9	45	554
Shared Lane Traffic (%)							48%					
Lane Group Flow (vph)	0	712	183	0	0	0	237	239	54	9	45	554
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1				1	2	1	1	2	1
Detector Template	Left	Thru	Right				Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20				20	100	20	20	100	20
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0				0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20				20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94						94			94	
Detector 2 Size(ft)		6						6			6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm				Split	NA	Perm	Split	NA	Perm
Protected Phases		2					3	3		4	4	
Permitted Phases	2		2						3			4
Detector Phase	2	2	2				3	3	3	4	4	4
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0				7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	21.0	21.0	21.0				12.0	12.0	12.0	12.0	12.0	12.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	28.0	28.0	28.0				22.0	22.0	22.0	25.0	25.0	25.0
Total Split (%)	37.3%	37.3%	37.3%				29.3%	29.3%	29.3%	33.3%	33.3%	33.3%
Maximum Green (s)	23.0	23.0	23.0				17.0	17.0	17.0	20.0	20.0	20.0
Yellow Time (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0				2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0				5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max				None	None	None	None	None	None
Walk Time (s)	5.0	5.0	5.0				5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0				11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	7	7	7				2	2	2	2	2	2
Act Effct Green (s)		23.3	23.3				14.2	14.2	14.2	10.8	10.8	10.8
Actuated g/C Ratio		0.37	0.37				0.22	0.22	0.22	0.17	0.17	0.17
v/c Ratio		0.62	0.29				0.71	0.71	0.14	0.03	0.16	0.79
Control Delay		20.9	4.7				36.6	36.6	2.1	21.8	23.7	11.7
Queue Delay		0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		20.9	4.7				36.6	36.6	2.1	21.8	23.7	11.7
LOS		C	A				D	D	A	C	C	B
Approach Delay		17.6						33.1			12.8	
Approach LOS		B						C			B	
90th %ile Green (s)	23.0	23.0	23.0				17.0	17.0	17.0	20.0	20.0	20.0
90th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Max	Max	Max
70th %ile Green (s)	23.0	23.0	23.0				17.0	17.0	17.0	13.8	13.8	13.8
70th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Gap	Gap	Gap
50th %ile Green (s)	23.0	23.0	23.0				16.0	16.0	16.0	8.0	8.0	8.0
50th %ile Term Code	MaxR	MaxR	MaxR				Gap	Gap	Gap	Gap	Gap	Gap
30th %ile Green (s)	23.0	23.0	23.0				12.5	12.5	12.5	7.1	7.1	7.1
30th %ile Term Code	MaxR	MaxR	MaxR				Gap	Gap	Gap	Gap	Gap	Gap
10th %ile Green (s)	23.0	23.0	23.0				9.3	9.3	9.3	7.0	7.0	7.0
10th %ile Term Code	MaxR	MaxR	MaxR				Gap	Gap	Gap	Min	Min	Min
Stops (vph)		529	24				189	191	3	9	36	71
Fuel Used(gal)		11	2				5	5	0	0	1	6
CO Emissions (g/hr)		788	119				323	326	33	11	51	395
NOx Emissions (g/hr)		153	23				63	63	6	2	10	77
VOC Emissions (g/hr)		183	28				75	75	8	3	12	92
Dilemma Vehicles (#)		0	0				0	0	0	0	0	0
Queue Length 50th (ft)		111	0				82	83	0	3	15	0
Queue Length 95th (ft)		216	42				#208	#210	8	14	40	85
Internal Link Dist (ft)		958			1047			1001			896	
Turn Bay Length (ft)												
Base Capacity (vph)		1157	635				407	410	458	505	531	829
Starvation Cap Reductn		0	0				0	0	0	0	0	0
Spillback Cap Reductn		0	0				0	0	0	0	0	0
Storage Cap Reductn		0	0				0	0	0	0	0	0
Reduced v/c Ratio		0.62	0.29				0.58	0.58	0.12	0.02	0.08	0.67

Intersection Summary

Area Type: Other	
Cycle Length: 75	
Actuated Cycle Length: 63.5	
Natural Cycle: 50	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 20.2	Intersection LOS: C
Intersection Capacity Utilization 58.7%	ICU Level of Service B
Analysis Period (min) 15	
90th %ile Actuated Cycle: 75	
70th %ile Actuated Cycle: 68.8	
50th %ile Actuated Cycle: 62	
30th %ile Actuated Cycle: 57.6	
10th %ile Actuated Cycle: 54.3	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3:

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	372	18	62	0	0	87
Sign Control	Free		Stop			Stop
Grade	0%		0%			0%
Peak Hour Factor	0.76	0.90	0.71	0.92	0.92	0.75
Hourly flow rate (vph)	489	20	87	0	0	116
Pedestrians	9					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		999	9	1042	989
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		999	9	1042	989
tC, single (s)	4.1		6.5	6.2	7.1	6.5
tC, 2 stage (s)						
tF (s)	2.2		4.0	3.3	3.5	4.0
p0 queue free %	70		49	100	100	33
cM capacity (veh/h)	1623		170	1065	97	172

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	326	183	87	116
Volume Left	326	163	0	0
Volume Right	0	20	0	0
cSH	1623	1623	170	172
Volume to Capacity	0.30	0.30	0.51	0.67
Queue Length 95th (ft)	32	32	64	99
Control Delay (s)	8.2	7.6	46.6	60.7
Lane LOS	A	A	E	F
Approach Delay (s)	7.9		46.6	60.7
Approach LOS			E	F

Intersection Summary			
Average Delay	21.3		
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	558	25	79	0	0	100
Sign Control	Free		Stop			Stop
Grade	0%		0%			0%
Peak Hour Factor	0.89	0.62	0.82	0.92	0.92	0.83
Hourly flow rate (vph)	627	40	96	0	0	120
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		1294	2	1324	1274
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		1294	2	1324	1274
tC, single (s)	4.1		6.5	6.2	7.1	6.5
tC, 2 stage (s)						
tF (s)	2.2		4.0	3.3	3.5	4.0
p0 queue free %	61		3	100	100	0
cM capacity (veh/h)	1623		100	1080	12	103

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	418	249	96	120
Volume Left	418	209	0	0
Volume Right	0	40	0	0
cSH	1623	1623	100	103
Volume to Capacity	0.39	0.39	0.97	1.17
Queue Length 95th (ft)	47	47	145	198
Control Delay (s)	8.6	7.8	159.0	221.3
Lane LOS	A	A	F	F
Approach Delay (s)	8.3		159.0	221.3
Approach LOS			F	F

Intersection Summary			
Average Delay	53.7		
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*River Dr. S / 3rd Ave. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *3rd Avenue South* North/South Street: *River Drive South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		183	47	115	267	
Peak-Hour Factor, PHF	1.00	0.70	0.73	0.70	0.87	1.00
Hourly Flow Rate, HFR (veh/h)	0	261	64	164	306	0
Percent Heavy Vehicles	0	--	--	1	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				11		104
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.69	1.00	0.79
Hourly Flow Rate, HFR (veh/h)	0	0	0	15	0	131
Percent Heavy Vehicles	0	0	0	18	0	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		164		146				
C (m) (veh/h)		1240		611				
v/c		0.13		0.24				
95% queue length		0.46		0.93				
Control Delay (s/veh)		8.3		12.7				
LOS		A		B				
Approach Delay (s/veh)	--	--	12.7					
Approach LOS	--	--	B					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*River Dr. S / 3rd Ave. S*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*7/1/2013*	Analysis Year	*2013 - Existing*
Analysis Time Period	*PM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*	
East/West Street: *3rd Avenue South*	North/South Street: *River Drive South*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*161*	*33*	*79*	*331*	
Peak-Hour Factor, PHF	*1.00*	*0.76*	*0.69*	*0.86*	*0.92*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*211*	*47*	*91*	*359*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*61*		*281*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.59*	*1.00*	*0.59*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*103*	*0*	*476*
Percent Heavy Vehicles	*0*	*0*	*0*	*2*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*91*		*579*				
C (m) (veh/h)		*1293*		*630*				
v/c		*0.07*		*0.92*				
95% queue length		*0.23*		*11.89*				
Control Delay (s/veh)		*8.0*		*44.4*				
LOS		*A*		*E*				
Approach Delay (s/veh)	--	--	*44.4*					
Approach LOS	--	--	*E*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*2nd St. S / 3rd Ave. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *3rd Avenue South* — North/South Street: *2nd Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	153	157			81	25
Peak-Hour Factor, PHF	0.71	0.77	1.00	1.00	0.81	0.69
Hourly Flow Rate, HFR (veh/h)	215	203	0	0	99	36
Percent Heavy Vehicles	2	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	30		98			
Peak-Hour Factor, PHF	0.83	1.00	0.77	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	36	0	127	0	0	0
Percent Heavy Vehicles	0	0	4	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	215						163	
C (m) (veh/h)	1449						658	
v/c	0.15						0.25	
95% queue length	0.52						0.97	
Control Delay (s/veh)	7.9						12.3	
LOS	A						B	
Approach Delay (s/veh)	--	--				12.3		
Approach LOS	--	--				B		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*2nd St. S / 3rd Ave. S*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*7/1/2013*	Analysis Year	*2013 - Existing*
Analysis Time Period	*PM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *3rd Avenue South*	North/South Street: *2nd Street South*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	286	170			219	45
Peak-Hour Factor, PHF	0.78	0.71	1.00	1.00	0.91	0.66
Hourly Flow Rate, HFR (veh/h)	366	239	0	0	240	68
Percent Heavy Vehicles	1	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	39		114			
Peak-Hour Factor, PHF	0.89	1.00	0.77	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	43	0	148	0	0	0
Percent Heavy Vehicles	3	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration		LR				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	366						191	
C (m) (veh/h)	1254						371	
v/c	0.29						0.51	
95% queue length	1.22						2.83	
Control Delay (s/veh)	9.0						24.6	
LOS	A						C	
Approach Delay (s/veh)	--	--				24.6		
Approach LOS	--	--				C		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Fox Farm Rd. / 18th Ave. SW*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *18th Avenue SW*	North/South Street: *Fox Farm Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*602*	*1*	*4*	*165*	*52*
Peak-Hour Factor, PHF	*0.31*	*0.71*	*0.25*	*0.50*	*0.88*	*0.65*
Hourly Flow Rate, HFR (veh/h)	*16*	*847*	*4*	*8*	*187*	*80*
Percent Heavy Vehicles	*0*	*--*	*--*	*0*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration	*LTR*			*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*195*	*4*	*12*	*2*	*2*	*13*
Peak-Hour Factor, PHF	*0.81*	*0.50*	*0.75*	*0.50*	*0.50*	*0.54*
Hourly Flow Rate, HFR (veh/h)	*240*	*8*	*16*	*4*	*4*	*24*
Percent Heavy Vehicles	*1*	*0*	*8*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*L*		*LTR*			*LTR*	
v (veh/h)	*16*	*8*		*32*			*264*	
C (m) (veh/h)	*1304*	*796*		*288*			*169*	
v/c	*0.01*	*0.01*		*0.11*			*1.56*	
95% queue length	*0.04*	*0.03*		*0.37*			*17.52*	
Control Delay (s/veh)	*7.8*	*9.6*		*19.1*			*328.8*	
LOS	*A*	*A*		*C*			*F*	
Approach Delay (s/veh)	--	--		*19.1*			*328.8*	
Approach LOS	--	--		*C*			*F*	

 *HCS+*TM Version 5.6 Generated: 6/18/2013 10:55 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Fox Farm Rd. / 18th Ave. SW*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *18th Avenue SW* — North/South Street: *Fox Farm Road*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	310	0	13	612	167
Peak-Hour Factor, PHF	0.75	0.83	0.25	0.54	0.92	0.84
Hourly Flow Rate, HFR (veh/h)	4	373	0	24	665	198
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	76	3	6	0	0	3
Peak-Hour Factor, PHF	0.79	0.38	0.50	0.25	0.25	0.38
Hourly Flow Rate, HFR (veh/h)	96	7	12	0	0	7
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	4	24		7			115	
C (m) (veh/h)	788	1193		673			171	
v/c	0.01	0.02		0.01			0.67	
95% queue length	0.02	0.06		0.03			3.94	
Control Delay (s/veh)	9.6	8.1		10.4			61.0	
LOS	A	A		B			F	
Approach Delay (s/veh)	--	--	10.4			61.0		
Approach LOS	--	--	B			F		

 HCS+TM Version 5.6 Generated: 6/18/2013 11:09 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Fox Farm Rd. / Park Garden Rd.*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Park Garden Road* North/South Street: *Fox Farm Road*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	13	415	1	11	104	30
Peak-Hour Factor, PHF	0.81	0.79	0.25	0.31	0.59	0.75
Hourly Flow Rate, HFR (veh/h)	16	525	4	35	176	40
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	102	3	5	1	8	36
Peak-Hour Factor, PHF	0.75	0.75	0.63	0.25	0.40	0.53
Hourly Flow Rate, HFR (veh/h)	136	4	7	4	19	67
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	35		90			147	
C (m) (veh/h)	1343	1047		441			222	
v/c	0.01	0.03		0.20			0.66	
95% queue length	0.04	0.10		0.76			4.09	
Control Delay (s/veh)	7.7	8.6		15.2			48.2	
LOS	A	A		C			E	
Approach Delay (s/veh)	--	--	15.2			48.2		
Approach LOS	--	--	C			E		

 HCS+™ Version 5.6 Generated: 6/18/2013 11:27 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Fox Farm Rd. / Park Garden Rd.*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Park Garden Road* North/South Street: *Fox Farm Road*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	18	195	5	46	391	130
Peak-Hour Factor, PHF	0.75	0.73	0.31	0.72	0.84	0.77
Hourly Flow Rate, HFR (veh/h)	24	267	16	63	465	168
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	69	6	25	6	8	27
Peak-Hour Factor, PHF	0.75	0.50	0.69	0.50	0.40	0.68
Hourly Flow Rate, HFR (veh/h)	92	12	36	12	19	39
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

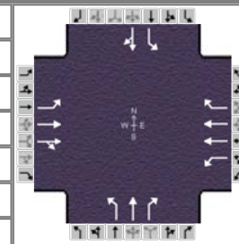
Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	24	63		70			140	
C (m) (veh/h)	958	1287		321			213	
v/c	0.03	0.05		0.22			0.66	
95% queue length	0.08	0.15		0.82			4.00	
Control Delay (s/veh)	8.9	7.9		19.3			49.4	
LOS	A	A		C			E	
Approach Delay (s/veh)	--	--	19.3			49.4		
Approach LOS	--	--	C			E		

 HCS+™ Version 5.6 Generated: 6/18/2013 11:36 AM

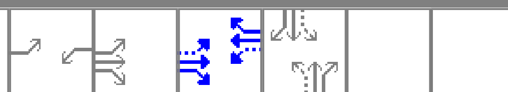
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 1, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	10th Ave. S / 2nd St.	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_2ndSt_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

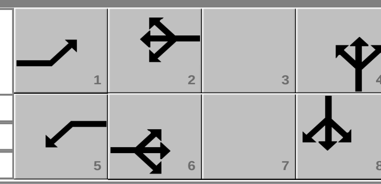


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	92	1090	0	22	502	197	38	3	180	59	3	29

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.7	4.7	73.0	22.5	0.0	0.0
Yellow	3.6	3.0	3.6	4.0	0.0	0.0
Red	1.7	3.3	2.4	2.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	4.0	1.1	3.0		5.0		6.0
Phase Duration, s	22.0	90.0	11.0	79.0		29.0		29.0
Change Period, *(Y+R$_c$)*, s	6.3	6.0	5.3	6.0		6.5		6.5
Max Allow Headway *(MAH)*, s	4.1	0.0	1.1	0.0		4.4		4.4
Queue Clearance Time *(g$_s$)*, s	3.9		2.8			19.3		8.3
Green Extension Time *(g$_e$)*, s	0.2	0.0	0.0	0.0		0.4		1.1
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		0.00			1.00		0.01

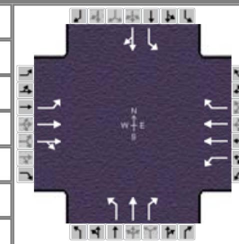
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	100	1185	0	24	546	214	41	3	196	64	35	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1603	1650	0	1619	1571	1441	1316	1700	1412	1202	1462	
Queue Service Time (*g$_s$*), s	1.9	25.8	0.0	0.8	12.0	10.0	3.6	0.2	17.3	6.1	2.6	
Cycle Queue Clearance Time (*g$_c$*), s	1.9	25.8	0.0	0.8	12.0	10.0	6.2	0.2	17.3	6.3	2.6	
Capacity (*c*), veh/h	582	2133		342	1765	809	257	294	244	262	253	
Volume-to-Capacity Ratio *(X)*	0.172	0.555	0.000	0.070	0.309	0.265	0.161	0.011	0.800	0.245	0.137	
Available Capacity (*c$_a$*), veh/h	582	2133		342	1765	809	257	294	244	262	253	
Back of Queue (*Q*), veh/ln (50th percentile)	0.5	9.2		0.3	4.3	3.4	1.2	0.1	7.2	1.9	1.0	
Overflow Queue (*Q$_3$*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (*d$_1$*), s/veh	6.1	12.7		11.2	15.1	14.7	48.2	44.5	51.6	47.1	45.5	
Incremental Delay (*d$_2$*), s/veh	0.1	1.0	0.0	0.0	0.5	0.8	0.3	0.0	17.0	0.5	0.2	
Initial Queue Delay (*d$_3$*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	6.2	13.7		11.2	15.6	15.5	48.4	44.5	68.6	47.6	45.8	
Level of Service (LOS)	A	B		B	B	B	D	D	E	D	D	
Approach Delay, s/veh / LOS	13.2	B		15.4	B		64.8	E		47.0	D	
Intersection Delay, s/veh / LOS	20.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	1.5	A	1.1	A	0.9	A	0.7	A

 HCS 2010™ Streets Version 6.41 Generated: 8/15/2013 4:22:48 PM

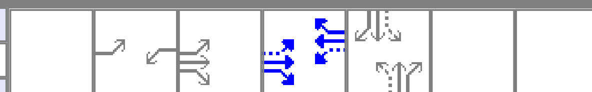
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 1, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	10th Ave. S / 2nd St.	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_2ndSt_PM.xus				
Project Description	Great Falls Area LRTP - 2014				

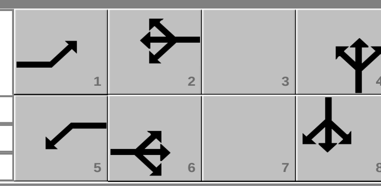


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	48	974	0	54	1555	277	56	3	190	156	15	208

Signal Information			
Cycle, s	115.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.7	2.7	62.0	20.5	0.0	0.0
Yellow	3.6	3.0	3.6	4.0	0.0	0.0
Red	1.7	3.3	2.4	2.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	4.0	1.1	3.0		5.0		6.0
Phase Duration, s	20.0	77.0	11.0	68.0		27.0		27.0
Change Period, *($Y+R_c$)*, s	6.3	6.0	5.3	6.0		6.5		6.5
Max Allow Headway *(MAH)*, s	4.1	0.0	1.1	0.0		4.5		4.5
Queue Clearance Time *(g_s)*, s	2.9		3.8			22.5		20.9
Green Extension Time *(g_e)*, s	0.1	0.0	0.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		0.09			1.00		1.00

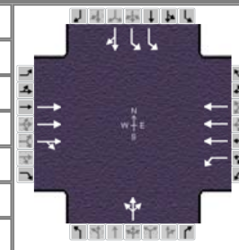
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	52	1059	0	59	1690	301	61	3	207	170	242	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1619	1667	0	1587	1602	1441	1122	1700	1422	1179	1456	
Queue Service Time (g_s), s	0.9	20.5	0.0	1.8	59.1	14.0	1.6	0.2	16.1	15.9	18.9	
Cycle Queue Clearance Time (g_c), s	0.9	20.5	0.0	1.8	59.1	14.0	20.5	0.2	16.1	16.1	18.9	
Capacity (*c*), veh/h	261	2058		374	1728	777	78	303	253	271	259	
Volume-to-Capacity Ratio *(X)*	0.200	0.514	0.000	0.157	0.978	0.388	0.776	0.011	0.815	0.626	0.934	
Available Capacity (c_a), veh/h	261	2058		374	1728	777	78	303	253	271	259	
Back of Queue (*Q*), veh/ln (50th percentile)	0.9	7.3		0.6	24.8	4.7	2.6	0.1	6.9	4.9	9.5	
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	26.6	12.3		10.7	25.8	15.4	57.3	38.9	45.4	45.5	46.6	
Incremental Delay (d_2), s/veh	0.4	0.9	0.0	0.1	17.1	1.5	37.6	0.0	18.2	4.5	38.4	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	27.0	13.3		10.8	42.9	16.9	94.9	38.9	63.6	50.0	85.0	
Level of Service (LOS)	C	B		B	D	B	F	D	E	D	F	
Approach Delay, s/veh / LOS	13.9	B		38.2	D		70.4	E		70.6	E	
Intersection Delay, s/veh / LOS	36.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	1.4	A	2.2	B	0.9	A	1.2	A

 HCS 2010™ Streets Version 6.41 Generated: 8/15/2013 4:24:19 PM

HCS 2010 Signalized Intersection Results Summary

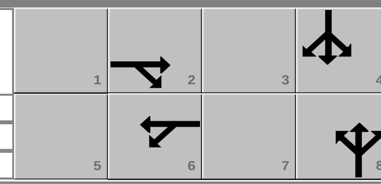
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 7, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.88
Intersection	10th Ave. S / 5th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_5thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1345	17	14	909		42	0	19	104	32	50

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	82.0	11.0	9.0	0.0	0.0	0.0
Yellow	3.6	3.1	3.0	0.0	0.0	0.0
Red	2.4	2.9	3.0	0.0	0.0	0.0

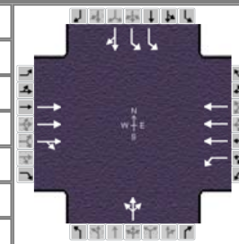


Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		6.0		12.0		10.0
Phase Duration, s		88.0		88.0		15.0		17.0
Change Period, *(Y+Rc)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.2		4.2
Queue Clearance Time *(gs)*, s						7.2		9.5
Green Extension Time *(ge)*, s		0.0		0.0		0.0		0.1
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h		1034	514	16	1033			69		118	93	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln		1650	1639	339	1484			1557		1456	1451	
Queue Service Time *(gs)*, s		17.3	17.3	2.7	11.5			5.2		4.6	7.5	
Cycle Queue Clearance Time *(gc)*, s		17.3	17.3	20.1	11.5			5.2		4.6	7.5	
Capacity *(c)*, veh/h		2256	1120	243	3043			117		267	133	
Volume-to-Capacity Ratio *(X)*		0.458	0.458	0.065	0.339			0.594		0.443	0.701	
Available Capacity *(ca)*, veh/h		2256	1120	243	3043			117		267	133	
Back of Queue *(Q)*, veh/ln (50th percentile)		5.8	6.0	0.2	3.4			2.3		1.7	3.3	
Overflow Queue *(Q3)*, veh/ln		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	
Uniform Delay *(d1)*, s/veh		8.8	8.8	13.4	7.8			53.7		51.6	52.9	
Incremental Delay *(d2)*, s/veh		0.7	1.4	0.5	0.3			7.8		1.2	15.1	
Initial Queue Delay *(d3)*, s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Control Delay *(d)*, s/veh		9.4	10.1	13.9	8.1			61.6		52.8	68.0	
Level of Service (LOS)		A	B	B	A			E		D	E	
Approach Delay, s/veh / LOS	9.7	A		8.2	A		61.6	E		59.5	E	
Intersection Delay, s/veh / LOS	14.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.3	C	3.2	C
Bicycle LOS Score / LOS	1.3	A	1.1	A	0.6	A	0.8	A

HCS 2010 Signalized Intersection Results Summary

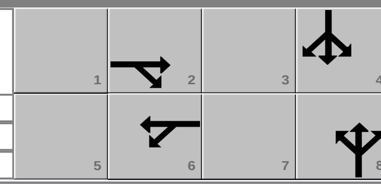


General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 7, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.90
Intersection	10th Ave. S / 5th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_5thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1370	24	31	1653		144	0	46	224	44	118

Signal Information				
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	68.0	16.0	18.0	0.0	0.0	0.0
Yellow	3.6	3.1	3.0	0.0	0.0	0.0
Red	2.4	2.9	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		6.0		12.0		10.0
Phase Duration, s		74.0		74.0		24.0		22.0
Change Period, *(Y+Rc)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.2		4.2
Queue Clearance Time *(gs)*, s						17.9		16.5
Green Extension Time *(ge)*, s		0.0		0.0		0.0		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

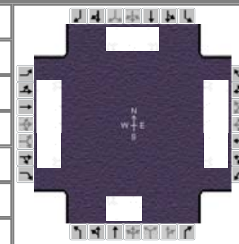
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		1036	513	34	1837			211		249	180	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1683	1668	339	1513			1567		1541	1473	
Queue Service Time (*gs*), s		23.1	23.1	8.5	35.3			15.9		9.1	14.5	
Cycle Queue Clearance Time (*gc*), s		23.1	23.1	31.6	35.3			15.9		9.1	14.5	
Capacity (*c*), veh/h		1908	945	187	2573			235		411	196	
Volume-to-Capacity Ratio *(X)*		0.543	0.543	0.184	0.714			0.898		0.606	0.916	
Available Capacity (*ca*), veh/h		1908	945	187	2573			235		411	196	
Back of Queue (*Q*), veh/ln (50th percentile)		8.8	9.0	0.8	12.1			8.3		3.6	7.5	
Overflow Queue (*Q3*), veh/ln		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	
Uniform Delay (*d1*), s/veh		16.3	16.3	26.2	18.9			50.1		49.0	51.3	
Incremental Delay (*d2*), s/veh		1.1	2.2	2.2	1.7			33.0		2.5	41.4	
Initial Queue Delay (*d3*), s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Control Delay (*d*), s/veh		17.4	18.5	28.3	20.6			83.1		51.6	92.8	
Level of Service (LOS)		B	B	C	C			F		D	F	
Approach Delay, s/veh / LOS	17.8		B	20.8		C	83.1		F	68.9		E
Intersection Delay, s/veh / LOS	28.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.3	C	3.2	C
Bicycle LOS Score / LOS	1.3	A	1.5	A	0.8	A	1.2	A

 HCS 2010™ Streets Version 6.41 Generated: 8/15/2013 4:34:16 PM

HCS 2010 Signalized Intersection Results Summary

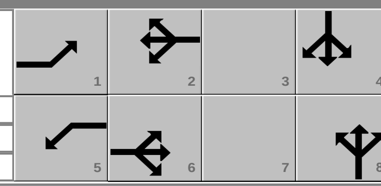
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/1/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.80
Intersection	10th Ave. S / 9th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_9thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	111	1239	43	21	953	140	54	26	16	119	36	83

Signal Information			
Cycle, s	105.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.7	3.7	64.0	11.0	0.0	0.0
Yellow	3.7	3.7	3.7	3.0	0.0	0.0
Red	1.6	1.6	2.3	1.0	0.0	0.0



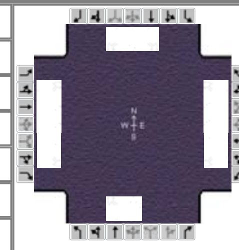
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		8		4
Case Number	1.1	3.0	1.1	3.0		6.0		5.0
Phase Duration, s	20.0	79.0	11.0	70.0		15.0		15.0
Change Period, *(Y+Rc)*, s	5.3	6.0	5.3	6.0		4.0		4.0
Max Allow Headway *(MAH)*, s	1.1	0.0	1.1	0.0		1.2		1.2
Queue Clearance Time *(gs)*, s	3.4		2.6			10.0		13.0
Green Extension Time *(ge)*, s	0.0	0.0	0.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		0.00			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	139	1549	54	26	1191	175	68	53		149	45	104
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1619	1544	1441	1619	1544	1441	1258	1591		1373	1700	1441
Queue Service Time (*gs*), s	1.4	16.1	1.2	0.6	14.2	5.7	5.5	3.2		7.8	2.6	7.3
Cycle Queue Clearance Time (*gc*), s	1.4	16.1	1.2	0.6	14.2	5.7	8.0	3.2		11.0	2.6	7.3
Capacity (*c*), veh/h	487	3220	1002	331	2823	878	170	167		170	178	151
Volume-to-Capacity Ratio *(X)*	0.285	0.481	0.054	0.079	0.422	0.199	0.398	0.315		0.873	0.253	0.687
Available Capacity (*ca*), veh/h	487	3220	1002	331	2823	878	170	167		170	178	151
Back of Queue (*Q*), veh/ln (50th percentile)	0.8	4.6	0.4	0.2	4.5	1.8	1.7	1.3		5.5	1.1	3.0
Overflow Queue (*Q3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (*d1*), s/veh	5.8	7.3	5.1	6.3	10.8	9.1	46.9	43.5		49.8	43.2	45.3
Incremental Delay (*d2*), s/veh	0.1	0.5	0.1	0.0	0.5	0.5	0.6	0.4		34.5	0.3	10.4
Initial Queue Delay (*d3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	5.9	7.8	5.2	6.3	11.2	9.6	47.5	43.9		84.4	43.5	55.7
Level of Service (LOS)	A	A	A	A	B	A	D	D		F	D	E
Approach Delay, s/veh / LOS	7.6		A	10.9		B	45.9		D	68.2		E
Intersection Delay, s/veh / LOS	15.3						B					

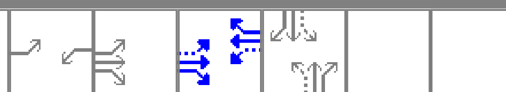
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.4	B	3.4	C	3.4	C
Bicycle LOS Score / LOS	1.4	A	1.3	A	0.7	A	1.0	A

HCS 2010 Signalized Intersection Results Summary

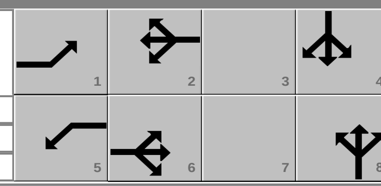
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/1/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.95
Intersection	10th Ave. S / 9th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_9thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	138	1348	115	53	1457	179	160	70	51	281	77	175



Signal Information										
Cycle, s	95.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	5.7	2.7	42.0	24.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.7	3.7	3.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.6	1.6	2.3	1.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		8		4
Case Number	1.1	3.0	1.1	3.0		6.0		5.0
Phase Duration, s	19.0	56.0	11.0	48.0		28.0		28.0
Change Period, *(Y+R$_c$)*, s	5.3	6.0	5.3	6.0		4.0		4.0
Max Allow Headway *(MAH)*, s	1.1	0.0	1.1	0.0		1.4		1.4
Queue Clearance Time *(g_s)*, s	4.9		3.7			18.7		26.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0		0.1		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		0.06			0.01		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	145	1419	121	56	1534	188	168	127		296	81	184
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1603	1513	1426	1619	1513	1441	1121	1580		1283	1700	1426
Queue Service Time (*g_s*), s	2.9	20.5	4.2	1.7	27.0	8.0	13.2	6.2		17.8	3.6	10.5
Cycle Queue Clearance Time (*g_c*), s	2.9	20.5	4.2	1.7	27.0	8.0	16.7	6.2		24.0	3.6	10.5
Capacity (*c*), veh/h	352	2389	751	279	2007	637	317	399		316	429	360
Volume-to-Capacity Ratio *(X)*	0.413	0.594	0.161	0.200	0.764	0.296	0.531	0.319		0.936	0.189	0.511
Available Capacity (*c_a*), veh/h	352	2389	751	279	2007	637	317	399		316	429	360
Back of Queue (*Q*), veh/ln (50th percentile)	1.7	6.7	1.3	0.6	9.5	2.7	3.6	2.3		9.9	1.4	3.6
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (*d_1*), s/veh	16.9	15.5	11.6	13.2	22.3	17.0	34.4	28.9		40.3	27.9	30.5
Incremental Delay (*d_2*), s/veh	0.3	1.1	0.5	0.1	2.8	1.2	0.9	0.2		33.9	0.1	0.5
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	17.2	16.6	12.1	13.3	25.2	18.2	35.3	29.0		74.2	27.9	31.0
Level of Service (LOS)	B	B	B	B	C	B	D	C		E	C	C
Approach Delay, s/veh / LOS	16.3	B		24.0	C		32.6	C		53.3	D	
Intersection Delay, s/veh / LOS	25.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	3.4	C	3.4	C
Bicycle LOS Score / LOS	1.4	A	1.5	A	1.0	A	1.4	A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*13th Ave. S / 9th St.S*
Jurisdiction	*Great Falls*
Analysis Year	*Existing - 2013*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *13th Avenue South* | North/South Street: *9th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*112*	*18*	*28*	*167*	*41*
Peak-Hour Factor, PHF	*0.63*	*0.70*	*0.64*	*0.54*	*0.67*	*0.60*
Hourly Flow Rate, HFR (veh/h)	*7*	*160*	*28*	*51*	*249*	*68*
Percent Heavy Vehicles	*0*	--	--	*4*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*8*	*34*	*6*	*15*	*31*	*18*
Peak-Hour Factor, PHF	*0.67*	*0.71*	*0.75*	*0.54*	*0.71*	*0.56*
Hourly Flow Rate, HFR (veh/h)	*11*	*47*	*8*	*27*	*43*	*32*
Percent Heavy Vehicles	*0*	*3*	*17*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*7*	*51*		*102*			*66*	
C (m) (veh/h)	*1255*	*1370*		*457*			*409*	
v/c	*0.01*	*0.04*		*0.22*			*0.16*	
95% queue length	*0.02*	*0.12*		*0.85*			*0.57*	
Control Delay (s/veh)	*7.9*	*7.7*		*15.1*			*15.5*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*15.1*			*15.5*		
Approach LOS	--	--	*C*			*C*		

 HCS+™ Version 5.6 Generated: 7/1/2013 3:14 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*13th Ave. S / 9th St.S*
Jurisdiction	*Great Falls*
Analysis Year	*Existing - 2013*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *13th Avenue South* | North/South Street: *9th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*13*	*181*	*35*	*64*	*115*	*82*
Peak-Hour Factor, PHF	*0.81*	*0.91*	*0.80*	*0.62*	*0.87*	*0.82*
Hourly Flow Rate, HFR (veh/h)	*16*	*198*	*43*	*103*	*132*	*100*
Percent Heavy Vehicles	*0*	*--*	*--*	*2*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*27*	*69*	*10*	*14*	*87*	*42*
Peak-Hour Factor, PHF	*0.68*	*0.82*	*0.50*	*0.58*	*0.78*	*0.70*
Hourly Flow Rate, HFR (veh/h)	*39*	*84*	*20*	*24*	*111*	*60*
Percent Heavy Vehicles	*4*	*0*	*0*	*0*	*1*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

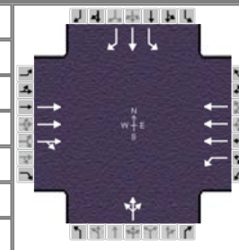
Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*16*	*103*		*195*			*143*	
C (m) (veh/h)	*1348*	*1319*		*389*			*317*	
v/c	*0.01*	*0.08*		*0.50*			*0.45*	
95% queue length	*0.04*	*0.25*		*2.71*			*2.24*	
Control Delay (s/veh)	*7.7*	*8.0*		*23.2*			*25.4*	
LOS	*A*	*A*		*C*			*D*	
Approach Delay (s/veh)	--	--	*23.2*			*25.4*		
Approach LOS	--	--	*C*			*D*		

 *HCS+*TM Version 5.6 Generated: 7/1/2013 3:27 PM

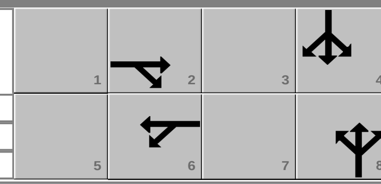
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/8/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.82
Intersection	10th Ave. S / 14th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_14thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1066	26	20	1098		7	0	8	139	86	157

Signal Information										
Cycle, s	100.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	58.0	18.0	6.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.1	3.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.4	2.9	3.0	0.0	0.0	0.0



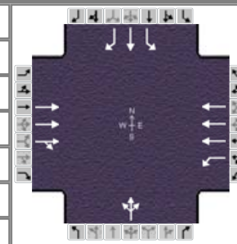
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		6.0		12.0		9.0
Phase Duration, s		64.0		64.0		12.0		24.0
Change Period, *(Y+R$_c$)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		3.3		3.2
Queue Clearance Time *(g$_s$)*, s						3.1		15.2
Green Extension Time *(g$_e$)*, s		0.0		0.0		0.0		0.3
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		892	440	24	1339			18		170	105	191
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1650	1629	418	1499			1514		1619	1683	1385
Queue Service Time (*g$_s$*), s		15.5	15.5	3.6	17.8			1.1		9.6	5.4	13.2
Cycle Queue Clearance Time (*g$_c$*), s		15.5	15.5	19.1	17.8			1.1		9.6	5.4	13.2
Capacity (*c*), veh/h		1915	945	249	2608			91		291	303	249
Volume-to-Capacity Ratio *(X)*		0.466	0.466	0.098	0.514			0.201		0.582	0.346	0.768
Available Capacity (*c$_a$*), veh/h		1915	945	249	2608			91		291	303	249
Back of Queue (*Q*), veh/ln (50th percentile)		5.4	5.6	0.4	5.6			0.4		3.9	2.2	5.2
Overflow Queue (*Q$_3$*), veh/ln		0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	0.00
Uniform Delay (*d$_1$*), s/veh		12.1	12.1	17.6	12.6			44.7		37.6	35.9	39.0
Incremental Delay (*d$_2$*), s/veh		0.8	1.6	0.8	0.7			0.4		2.0	0.3	12.2
Initial Queue Delay (*d$_3$*), s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		12.9	13.7	18.4	13.3			45.1		39.5	36.1	51.3
Level of Service (LOS)		B	B	B	B			D		D	D	D
Approach Delay, s/veh / LOS	13.2		B	13.4		B	45.1		D	43.6		D
Intersection Delay, s/veh / LOS	17.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.3	C	3.2	C
Bicycle LOS Score / LOS	1.2	A	1.2	A	0.5	A	1.3	A

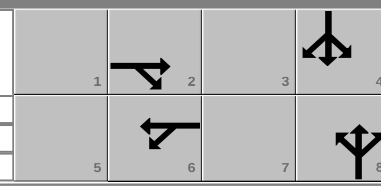
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/8/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.95
Intersection	10th Ave. S / 14th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_14thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1576	37	25	1490		30	0	31	233	142	199

Signal Information										
Cycle, s	90.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	49.0	17.0	6.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.1	3.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.4	2.9	3.0	0.0	0.0	0.0



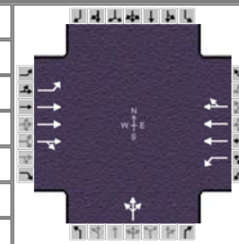
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		6.0		12.0		9.0
Phase Duration, s		55.0		55.0		12.0		23.0
Change Period, *(Y+R$_c$)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.3		4.2
Queue Clearance Time (*g$_s$*), s						5.7		15.0
Green Extension Time (*g$_e$*), s		0.0		0.0		0.0		0.5
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		1137	561	26	1568			64		245	149	209
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1683	1662	294	1499			1523		1619	1650	1390
Queue Service Time (*g$_s$*), s		20.9	20.9	6.1	22.0			3.7		13.0	7.3	13.0
Cycle Queue Clearance Time (*g$_c$*), s		20.9	20.9	27.0	22.0			3.7		13.0	7.3	13.0
Capacity (*c*), veh/h		1833	905	172	2448			102		306	312	263
Volume-to-Capacity Ratio *(X)*		0.620	0.620	0.153	0.641			0.632		0.802	0.479	0.798
Available Capacity (*c$_a$*), veh/h		1833	905	172	2448			102		306	312	263
Back of Queue (*Q*), veh/ln (50th percentile)		7.5	7.8	0.5	6.9			1.7		6.2	2.9	5.4
Overflow Queue (*Q$_3$*), veh/ln		0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	0.00
Uniform Delay (*d$_1$*), s/veh		14.1	14.1	23.4	14.3			40.9		34.9	32.6	34.9
Incremental Delay (*d$_2$*), s/veh		1.6	3.2	1.9	1.3			12.0		14.2	1.1	15.8
Initial Queue Delay (*d$_3$*), s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		15.7	17.3	25.3	15.6			53.0		49.1	33.7	50.6
Level of Service (LOS)		B	B	C	B			D		D	C	D
Approach Delay, s/veh / LOS	16.2		B	15.8		B	53.0		D	45.8		D
Intersection Delay, s/veh / LOS	21.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.3	C	3.2	C
Bicycle LOS Score / LOS	1.4	A	1.4	A	0.6	A	1.5	A

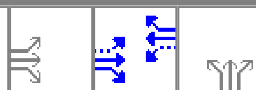
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 8, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.85
Intersection	10th Ave. S / 15th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_15thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

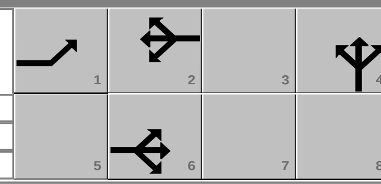


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	119	1139	9	4	1087	143	20	64	11			

Signal Information			
Cycle, s	115.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.9	82.8	10.5	0.0	0.0	0.0
Yellow	3.6	3.6	3.0	0.0	0.0	0.0
Red	1.2	2.4	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2		4		
Case Number	1.0	4.0		6.3		12.0		
Phase Duration, s	9.7	98.5		88.8		16.5		
Change Period, ($Y+R_c$), s	4.8	6.0		6.0		6.0		
Max Allow Headway (MAH), s	4.1	0.0		0.0		3.1		
Queue Clearance Time (g_s), s	4.5					9.8		
Green Extension Time (g_e), s	0.4	0.0		0.0		0.1		
Phase Call Probability	0.99					0.97		
Max Out Probability	0.00					0.02		

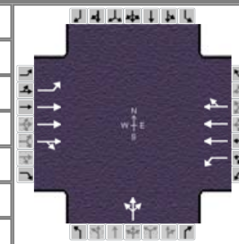
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14			
Adjusted Flow Rate (v), veh/h	140	902	449	5	985	462		112				
Adjusted Saturation Flow Rate (s), veh/h/ln	1572	1650	1644	410	1683	1578		1615				
Queue Service Time (g_s), s	2.5	8.5	8.5	0.4	13.3	13.3		7.8				
Cycle Queue Clearance Time (g_c), s	2.5	8.5	8.5	0.4	13.3	13.3		7.8				
Capacity (c), veh/h	349	2656	1322	358	2423	1136		147				
Volume-to-Capacity Ratio (X)	0.401	0.340	0.340	0.013	0.407	0.407		0.759				
Available Capacity (c_a), veh/h	565	2656	1322	358	2423	1136		225				
Back of Queue (Q), veh/ln (50th percentile)	0.7	2.1	2.2	0.0	4.2	4.2		3.2				
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0				
Queue Storage Ratio (RQ) (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00				
Uniform Delay (d_1), s/veh	4.7	3.0	3.0	4.6	6.4	6.4		51.0				
Incremental Delay (d_2), s/veh	0.7	0.3	0.7	0.1	0.5	1.1		3.0				
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0				
Control Delay (d), s/veh	5.5	3.4	3.7	4.6	6.9	7.5		54.0				
Level of Service (LOS)	A	A	A	A	A	A		D				

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	3.7	A	7.1	A	54.0	D	0.0	
Intersection Delay, s/veh / LOS	7.1				A			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	1.9	A	3.3	C	3.3	C
Bicycle LOS Score / LOS	1.3	A	1.3	A	0.7	A		

HCS 2010 Signalized Intersection Results Summary

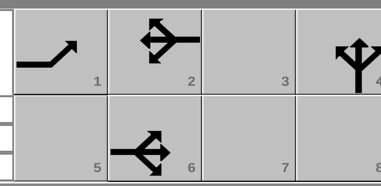
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 8, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.97
Intersection	10th Ave. S / 15th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_15thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	227	1644	40	20	1477	253	41	144	12			

Signal Information			
Cycle, s	115.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.1	73.5	16.6	0.0	0.0	0.0
Yellow	3.6	3.6	3.0	0.0	0.0	0.0
Red	1.2	2.4	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2		4		
Case Number	1.0	4.0		6.3		12.0		
Phase Duration, s	12.9	92.4		79.5		22.6		
Change Period, *(Y+R_c)*, s	4.8	6.0		6.0		6.0		
Max Allow Headway *(MAH)*, s	4.1	0.0		0.0		3.1		
Queue Clearance Time (g_s), s	7.4					15.7		
Green Extension Time (g_e), s	0.7	0.0		0.0		0.3		
Phase Call Probability	1.00					1.00		
Max Out Probability	0.00					0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14			
Adjusted Flow Rate (v), veh/h	234	1162	574	21	1219	564		203				
Adjusted Saturation Flow Rate (s), veh/h/ln	1603	1683	1662	283	1700	1567		1664				
Queue Service Time (g_s), s	5.4	15.1	15.1	3.4	23.2	23.3		13.7				
Cycle Queue Clearance Time (g_c), s	5.4	15.1	15.1	5.6	23.2	23.3		13.7				
Capacity (c), veh/h	292	2529	1249	238	2173	1001		240				
Volume-to-Capacity Ratio (X)	0.801	0.459	0.460	0.087	0.561	0.563		0.846				
Available Capacity (c_a), veh/h	550	2529	1249	238	2173	1001		420				
Back of Queue (Q), veh/ln (50th percentile)	4.6	4.5	4.6	0.2	8.3	8.1		5.8				
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0				
Queue Storage Ratio (RQ) (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00				
Uniform Delay (d_1), s/veh	17.3	5.4	5.4	8.9	11.7	11.7		48.0				
Incremental Delay (d_2), s/veh	5.1	0.6	1.2	0.7	1.1	2.3		3.2				
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0				
Control Delay (d), s/veh	22.4	6.0	6.7	9.7	12.7	14.0		51.1				
Level of Service (LOS)	C	A	A	A	B	B		D				

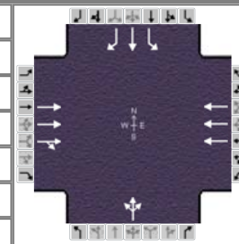
Approach Delay, s/veh / LOS	8.2	A	13.1	B	51.1	D	0.0	
Intersection Delay, s/veh / LOS	12.6				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	1.9	A	3.3	C	3.3	C
Bicycle LOS Score / LOS	1.6	A	1.5	A	0.8	A		

 HCS 2010™ Streets Version 6.41 Generated: 8/15/2013 5:58:41 PM

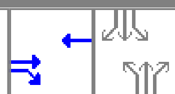
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/1/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	10th Ave. S / 25th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_25thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

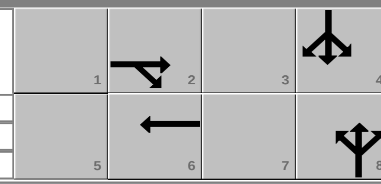


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1033	16		1028		12	0	12	226	112	161

Signal Information			
Cycle, s	80.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	38.0	16.0	8.0	0.0	0.0	0.0
Yellow	3.7	3.2	3.2	0.0	0.0	0.0
Red	2.3	2.8	2.8	0.0	0.0	0.0



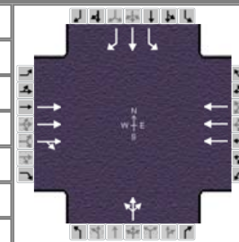
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		12.0		9.0
Phase Duration, s		44.0		44.0		14.0		22.0
Change Period, *(Y+R$_c$)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.3		4.2
Queue Clearance Time *(g$_s$)*, s						3.3		13.4
Green Extension Time *(g$_e$)*, s		0.0		0.0		0.0		0.6
Phase Call Probability						1.00		1.00
Max Out Probability						0.51		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		762	378		1117			26		246	122	175
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1700	1686		1544			1525		1619	1700	1441
Queue Service Time (*g$_s$*), s		12.1	12.1		13.4			1.3		11.4	4.9	8.8
Cycle Queue Clearance Time (*g$_c$*), s		12.1	12.1		13.4			1.3		11.4	4.9	8.8
Capacity (*c*), veh/h		1615	801		2200			152		324	340	288
Volume-to-Capacity Ratio *(X)*		0.472	0.472		0.508			0.171		0.759	0.358	0.607
Available Capacity (*c$_a$*), veh/h		1615	801		2200			152		324	340	288
Back of Queue (*Q*), veh/ln (50th percentile)		4.4	4.6		4.4			0.5		5.1	2.0	3.2
Overflow Queue (*Q$_3$*), veh/ln		0.0	0.0		0.0			0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00		0.00			0.00		0.00	0.00	0.00
Uniform Delay (*d$_1$*), s/veh		14.2	14.2		14.5			33.0		30.2	27.6	29.1
Incremental Delay (*d$_2$*), s/veh		1.0	2.0		0.8			0.5		9.9	0.6	3.6
Initial Queue Delay (*d$_3$*), s/veh		0.0	0.0		0.0			0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		15.2	16.2		15.4			33.5		40.1	28.2	32.8
Level of Service (LOS)		B	B		B			C		D	C	C
Approach Delay, s/veh / LOS	15.5	B		15.4	B		33.5	C		35.1	D	
Intersection Delay, s/veh / LOS	19.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.2	C	3.2	C
Bicycle LOS Score / LOS	1.1	A	1.1	A	0.5	A	1.4	A

HCS 2010 Signalized Intersection Results Summary

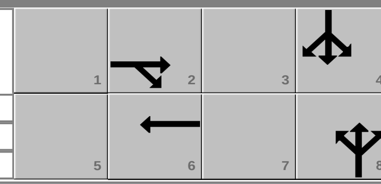
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/1/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	10th Ave. S / 25th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_25thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1514	27		1378		42	0	14	181	118	191

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	41.0	23.0	8.0	0.0	0.0	0.0
Yellow	3.7	3.2	3.2	0.0	0.0	0.0
Red	2.3	2.8	2.8	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		12.0		9.0
Phase Duration, s		47.0		47.0		14.0		29.0
Change Period, *(Y+R$_c$)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.2		4.2
Queue Clearance Time *(g$_s$)*, s						5.3		13.3
Green Extension Time *(g$_e$)*, s		0.0		0.0		0.0		1.5
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		0.14

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6		3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h		1120	555		1498			61		197	128	208
Adjusted Saturation Flow Rate *(s)*, veh/h/ln		1700	1684		1544			1570		1619	1700	1441
Queue Service Time *(g$_s$)*, s		24.1	24.1		23.4			3.3		9.3	5.5	11.3
Cycle Queue Clearance Time *(g$_c$)*, s		24.1	24.1		23.4			3.3		9.3	5.5	11.3
Capacity *(c)*, veh/h		1549	767		2110			140		414	434	368
Volume-to-Capacity Ratio *(X)*		0.723	0.723		0.710			0.436		0.475	0.295	0.564
Available Capacity *(c$_a$)*, veh/h		1549	767		2110			140		414	434	368
Back of Queue *(Q)*, veh/ln (50th percentile)		9.4	9.9		8.1			1.3		3.6	2.2	4.0
Overflow Queue *(Q$_3$)*, veh/ln		0.0	0.0		0.0			0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00		0.00			0.00		0.00	0.00	0.00
Uniform Delay *(d$_1$)*, s/veh		19.9	19.9		19.7			38.9		28.4	27.0	29.1
Incremental Delay *(d$_2$)*, s/veh		3.0	5.9		2.1			2.1		0.8	0.4	2.0
Initial Queue Delay *(d$_3$)*, s/veh		0.0	0.0		0.0			0.0		0.0	0.0	0.0
Control Delay *(d)*, s/veh		22.9	25.8		21.8			41.0		29.2	27.3	31.1
Level of Service (LOS)		C	C		C			D		C	C	C
Approach Delay, s/veh / LOS	23.8	C		21.8	C		41.0	D		29.5	C	
Intersection Delay, s/veh / LOS	24.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.2	C	3.2	C
Bicycle LOS Score / LOS	1.4	A	1.3	A	0.6	A	1.4	A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*11th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *11th Avenue South*	North/South Street: *26th Street South*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*191*	*38*	*123*	*291*	*0*
Peak-Hour Factor, PHF	*0.25*	*0.87*	*0.68*	*0.79*	*0.69*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*4*	*219*	*55*	*155*	*421*	*0*
Percent Heavy Vehicles	*0*	--	--		--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*1*	*1*
Configuration	*LT*		*TR*	*LT*		*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*2*	*1*	*0*	*27*	*1*	*88*
Peak-Hour Factor, PHF	*0.25*	*0.25*	*0.25*	*0.68*	*0.25*	*0.88*
Hourly Flow Rate, HFR (veh/h)	*8*	*4*	*0*	*39*	*4*	*100*
Percent Heavy Vehicles	*17*	*25*	*0*	*1*	*9*	*1*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration		*LTR*		*LT*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LT*	*LT*		*R*		*LTR*	
v (veh/h)	*4*	*155*	*43*		*100*		*12*	
C (m) (veh/h)	*1149*	*1286*	*175*		*914*		*174*	
v/c	*0.00*	*0.12*	*0.25*		*0.11*		*0.07*	
95% queue length	*0.01*	*0.41*	*0.93*		*0.37*		*0.22*	
Control Delay (s/veh)	*8.1*	*8.2*	*32.1*		*9.4*		*27.2*	
LOS	*A*	*A*	*D*		*A*		*D*	
Approach Delay (s/veh)	--	--	*16.3*			*27.2*		
Approach LOS	--	--	*C*			*D*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*11th Ave. S / 26th St. S*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*6/27/2013*	Analysis Year	*2013 - Existing*
Analysis Time Period	*PM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *11th Avenue South* | North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	2	393	49	120	161	4
Peak-Hour Factor, PHF	0.50	0.86	0.53	0.94	0.92	0.50
Hourly Flow Rate, HFR (veh/h)	4	456	92	127	174	8
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	1	1
Configuration	LT		TR	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	0	1	1	42	2	294
Peak-Hour Factor, PHF	0.25	0.25	0.25	0.75	0.50	0.81
Hourly Flow Rate, HFR (veh/h)	0	4	4	56	4	362
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration		LTR		LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R		LTR	
v (veh/h)	4	127	60		362		8	
C (m) (veh/h)	1405	1032	193		770		345	
v/c	0.00	0.12	0.31		0.47		0.02	
95% queue length	0.01	0.42	1.26		2.54		0.07	
Control Delay (s/veh)	7.6	9.0	31.9		13.8		15.7	
LOS	A	A	D		B		C	
Approach Delay (s/veh)	--	--	16.3			15.7		
Approach LOS	--	--	C			C		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*13th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *13th Avenue South* | North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	12	190	5	29	287	26
Peak-Hour Factor, PHF	0.60	0.74	0.63	0.66	0.84	0.43
Hourly Flow Rate, HFR (veh/h)	19	256	7	43	341	60
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	2	0
Configuration	LT		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	2	10	1	1	4
Peak-Hour Factor, PHF	0.63	0.25	0.36	0.25	0.25	0.50
Hourly Flow Rate, HFR (veh/h)	7	8	27	4	4	8
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT		LTR			LTR	
v (veh/h)	19	43		16			42	
C (m) (veh/h)	1159	1309		486			531	
v/c	0.02	0.03		0.03			0.08	
95% queue length	0.05	0.10		0.10			0.26	
Control Delay (s/veh)	8.2	7.8		12.7			12.4	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	12.7			12.4		
Approach LOS	--	--	B			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*13th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *13th Avenue South*	North/South Street: *26th Street South*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*8*	*401*	*6*	*33*	*169*	*22*
Peak-Hour Factor, PHF	*0.50*	*0.78*	*0.75*	*0.55*	*0.94*	*0.69*
Hourly Flow Rate, HFR (veh/h)	*16*	*514*	*8*	*59*	*179*	*31*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration	*LT*		*TR*	*LT*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*26*	*1*	*10*	*1*	*1*	*6*
Peak-Hour Factor, PHF	*0.72*	*0.25*	*0.83*	*0.25*	*0.25*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*36*	*4*	*12*	*4*	*4*	*12*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LT*		*LTR*			*LTR*	
v (veh/h)	*16*	*59*		*20*			*52*	
C (m) (veh/h)	*1359*	*1055*		*433*			*371*	
v/c	*0.01*	*0.06*		*0.05*			*0.14*	
95% queue length	*0.04*	*0.18*		*0.14*			*0.48*	
Control Delay (s/veh)	*7.7*	*8.6*		*13.7*			*16.3*	
LOS	*A*	*A*		*B*			*C*	
Approach Delay (s/veh)	--	--	*13.7*			*16.3*		
Approach LOS	--	--	*B*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*15th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *15th Avenue South* North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	10	155	18	71	196	19
Peak-Hour Factor, PHF	0.42	0.84	0.50	0.71	0.78	0.68
Hourly Flow Rate, HFR (veh/h)	23	184	36	100	251	27
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	2	0
Configuration	LT		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	6	23	29	4	23	30
Peak-Hour Factor, PHF	0.75	0.52	0.66	0.50	0.48	0.75
Hourly Flow Rate, HFR (veh/h)	8	44	43	8	47	40
Percent Heavy Vehicles	0	0	3	0	0	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT		LTR			LTR	
v (veh/h)	23	100		95			95	
C (m) (veh/h)	1268	1357		432			431	
v/c	0.02	0.07		0.22			0.22	
95% queue length	0.06	0.24		0.83			0.83	
Control Delay (s/veh)	7.9	7.9		15.7			15.7	
LOS	A	A		C			C	
Approach Delay (s/veh)	--	--	15.7			15.7		
Approach LOS	--	--	C			C		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*15th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *15th Avenue South* North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	24	277	17	23	123	12
Peak-Hour Factor, PHF	0.50	0.82	0.60	0.64	0.83	0.75
Hourly Flow Rate, HFR (veh/h)	48	337	28	35	148	16
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	2	0
Configuration	LT		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	22	24	29	29	35	98
Peak-Hour Factor, PHF	0.79	0.50	0.81	0.73	0.73	0.70
Hourly Flow Rate, HFR (veh/h)	27	48	35	39	47	140
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT		LTR			LTR	
v (veh/h)	48	35		226			110	
C (m) (veh/h)	1417	1170		531			421	
v/c	0.03	0.03		0.43			0.26	
95% queue length	0.11	0.09		2.11			1.03	
Control Delay (s/veh)	7.6	8.2		16.7			16.5	
LOS	A	A		C			C	
Approach Delay (s/veh)	--	--	16.7			16.5		
Approach LOS	--	--	C			C		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*10th Ave. S / 29th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *10th Avenue South* North/South Street: *29th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	11	637	140	97	954	6
Peak-Hour Factor, PHF	0.55	0.85	0.61	0.71	0.79	0.50
Hourly Flow Rate, HFR (veh/h)	19	749	229	136	1207	12
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	1	24	3	3	17
Peak-Hour Factor, PHF	0.63	0.25	0.67	0.75	0.38	0.71
Hourly Flow Rate, HFR (veh/h)	7	4	35	4	7	23
Percent Heavy Vehicles	0	0	1	0	0	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	19	136		46			34	
C (m) (veh/h)	567	701		106			70	
v/c	0.03	0.19		0.43			0.49	
95% queue length	0.10	0.71		1.85			1.97	
Control Delay (s/veh)	11.6	11.4		62.8			97.7	
LOS	B	B		F			F	
Approach Delay (s/veh)	--	--	62.8			97.7		
Approach LOS	--	--	F			F		

 HCS+™ Version 5.6 Generated: 8/15/2013 1:54 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*10th Ave. S / 29th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *10th Avenue South* North/South Street: *29th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	54	1307	39	25	1183	15
Peak-Hour Factor, PHF	0.68	0.98	0.75	0.63	0.95	0.75
Hourly Flow Rate, HFR (veh/h)	79	1333	52	39	1245	20
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

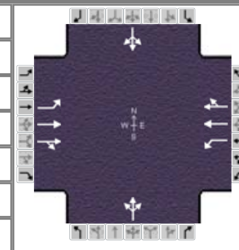
Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	0	77	0	0	20
Peak-Hour Factor, PHF	0.42	0.25	0.88	0.25	0.25	0.71
Hourly Flow Rate, HFR (veh/h)	11	0	87	0	0	28
Percent Heavy Vehicles	0	0	1	0	0	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	79	39		98			28	
C (m) (veh/h)	545	490		131			476	
v/c	0.14	0.08		0.75			0.06	
95% queue length	0.50	0.26		4.34			0.19	
Control Delay (s/veh)	12.7	13.0		87.4			13.0	
LOS	B	B		F			B	
Approach Delay (s/veh)	--	--	87.4			13.0		
Approach LOS	--	--	F			B		

HCS 2010 Signalized Intersection Results Summary

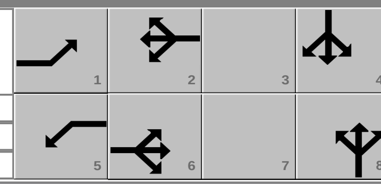
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	7/30/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.83
Intersection	10th Ave. S / 32nd St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10_10thAveS_32ndStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	18	573	32	23	790	3	125	19	17	28	34	74

Signal Information				
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.0	1.0	50.0	17.0	0.0	0.0
Yellow	3.6	0.0	3.6	3.0	0.0	0.0
Red	1.4	0.0	2.4	3.0	0.0	0.0



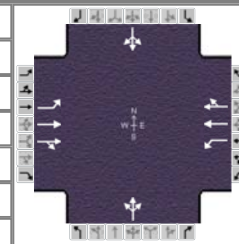
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	11.0	57.0	10.0	56.0		23.0		23.0
Change Period, *($Y+R_c$)*, s	5.0	6.0	5.0	6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	2.6	0.0	2.6	0.0		2.8		2.8
Queue Clearance Time *(g_s)*, s	2.4		2.6			19.0		11.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0		0.0		0.3
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.11		1.00			1.00		0.06

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	22	368	361	28	478	477		194			164	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1650	1619	1619	1650	1648		986			1520	
Queue Service Time (*g_s*), s	0.4	11.2	11.2	0.6	16.3	16.3		8.0			0.0	
Cycle Queue Clearance Time (*g_c*), s	0.4	11.2	11.2	0.6	16.3	16.3		17.0			9.0	
Capacity (*c*), veh/h	411	935	918	496	917	916		257			335	
Volume-to-Capacity Ratio *(X)*	0.053	0.393	0.394	0.056	0.521	0.521		0.754			0.489	
Available Capacity (*c_a*), veh/h	411	935	918	496	917	916		257			335	
Back of Queue (*Q*), veh/ln (50th percentile)	0.1	4.0	3.9	0.2	5.9	5.9		4.9			3.2	
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00			0.00	
Uniform Delay (*d_1*), s/veh	7.9	10.9	10.9	7.5	12.5	12.5		38.1			33.3	
Incremental Delay (*d_2*), s/veh	0.0	1.2	1.3	0.0	2.1	2.1		10.7			0.4	
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay (*d*), s/veh	7.9	12.1	12.1	7.5	14.6	14.6		48.7			33.7	
Level of Service (LOS)	A	B	B	A	B	B		D			C	
Approach Delay, s/veh / LOS	12.0		B	14.4		B	48.7		D	33.7		C
Intersection Delay, s/veh / LOS	18.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.1	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	0.8	A	0.8	A

HCS 2010 Signalized Intersection Results Summary

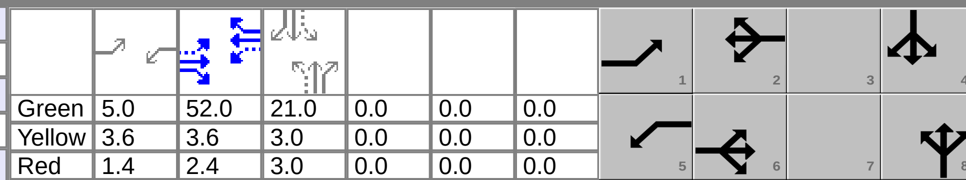
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	7/30/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.83
Intersection	10th Ave. S / 32nd St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10_10thAveS_32ndStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	79	1174	24	51	993	9	103	63	64	51	50	65

Signal Information			
Cycle, s	95.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.0	52.0	21.0	0.0	0.0	0.0
Yellow	3.6	3.6	3.0	0.0	0.0	0.0
Red	1.4	2.4	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	10.0	58.0	10.0	58.0		27.0		27.0
Change Period, *(Y+R$_c$)*, s	5.0	6.0	5.0	6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time *(g$_s$)*, s	4.4		3.5			23.0		14.8
Green Extension Time *(g$_e$)*, s	0.0	0.0	0.0	0.0		0.0		1.1
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		0.49

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	95	724	719	61	605	603		277			200	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1683	1669	1619	1650	1645		1150			1309	
Queue Service Time *(g$_s$)*, s	2.4	32.5	32.6	1.5	24.9	24.9		8.2			0.0	
Cycle Queue Clearance Time *(g$_c$)*, s	2.4	32.5	32.6	1.5	24.9	24.9		21.0			12.8	
Capacity *(c)*, veh/h	295	921	914	238	903	901		309			339	
Volume-to-Capacity Ratio *(X)*	0.322	0.786	0.787	0.258	0.669	0.669		0.897			0.590	
Available Capacity *(c$_a$)*, veh/h	295	921	914	238	903	901		309			339	
Back of Queue *(Q)*, veh/ln (50th percentile)	0.8	12.9	12.9	0.5	9.4	9.4		8.7			4.3	
Overflow Queue *(Q$_3$)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00			0.00	
Uniform Delay *(d$_1$)*, s/veh	12.2	17.1	17.1	14.6	15.4	15.4		38.5			33.5	
Incremental Delay *(d$_2$)*, s/veh	0.6	6.7	6.8	0.6	3.9	3.9		26.8			2.7	
Initial Queue Delay *(d$_3$)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay *(d)*, s/veh	12.8	23.8	23.9	15.1	19.3	19.3		65.3			36.2	
Level of Service (LOS)	B	C	C	B	B	B		E			D	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	23.2	C	19.1	B	65.3	E	36.2	D
Intersection Delay, s/veh / LOS	25.9				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.1	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.8	A	1.5	A	0.9	A	0.8	A

 HCS 2010™ Streets Version 6.41 Generated: 8/14/2013 3:05:17 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/2/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*32nd St. S / 11th Ave. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *11th Avenue South* | North/South Street: *32nd Street South*

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	16	38	2	2	145	109
Peak-Hour Factor, PHF	0.67	0.79	0.25	0.25	0.59	0.68
Hourly Flow Rate, HFR (veh/h)	23	48	8	8	245	160
Percent Heavy Vehicles	0	--	--	50	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	9	0	5	4	51
Peak-Hour Factor, PHF	0.33	0.75	0.25	0.63	0.50	0.71
Hourly Flow Rate, HFR (veh/h)	12	12	0	7	8	71
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	23	8		24			86	
C (m) (veh/h)	1157	1287		437			660	
v/c	0.02	0.01		0.05			0.13	
95% queue length	0.06	0.02		0.17			0.45	
Control Delay (s/veh)	8.2	7.8		13.7			11.3	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	13.7			11.3		
Approach LOS	--	--	B			B		

 HCS+™ Version 5.6 Generated: 7/2/2013 10:03 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/2/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*32nd St. S / 11th Ave. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *11th Avenue South* | North/South Street: *32nd Street South*

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*74*	*146*	*10*	*2*	*87*	*90*
Peak-Hour Factor, PHF	*0.84*	*0.78*	*0.63*	*0.50*	*0.73*	*0.83*
Hourly Flow Rate, HFR (veh/h)	*88*	*187*	*15*	*4*	*119*	*108*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*4*	*12*	*1*	*16*	*12*	*51*
Peak-Hour Factor, PHF	*0.50*	*0.60*	*0.25*	*0.80*	*0.75*	*0.80*
Hourly Flow Rate, HFR (veh/h)	*8*	*19*	*4*	*19*	*16*	*63*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

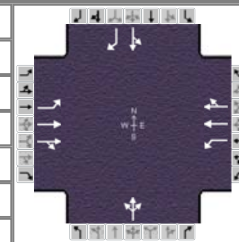
Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*88*	*4*		*31*			*98*	
C (m) (veh/h)	*1345*	*1378*		*399*			*608*	
v/c	*0.07*	*0.00*		*0.08*			*0.16*	
95% queue length	*0.21*	*0.01*		*0.25*			*0.57*	
Control Delay (s/veh)	*7.9*	*7.6*		*14.8*			*12.1*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay (s/veh)	--	--	*14.8*			*12.1*		
Approach LOS	--	--	*B*			*B*		

 HCS+™ Version 5.6 Generated: 7/2/2013 10:10 AM

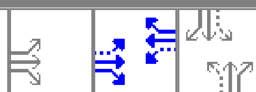
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 8, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.85
Intersection	10th Ave. S / 38th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_38thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

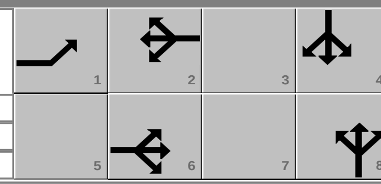


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	136	465	0	3	676	32	1	2	1	81	2	196

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.0	46.0	22.0	0.0	0.0	0.0
Yellow	3.6	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.7	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2		8		4
Case Number	1.0	4.0		6.3		8.0		7.0
Phase Duration, s	10.0	62.0		52.0		28.0		28.0
Change Period, *(Y+R$_c$)*, s	5.0	6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	4.1	0.0		0.0		4.3		4.3
Queue Clearance Time *(g_s)*, s	6.2					2.2		15.6
Green Extension Time *(g_e)*, s	0.0	0.0		0.0		1.2		0.7
Phase Call Probability	1.00					1.00		1.00
Max Out Probability	1.00					0.00		0.36

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	160	547	0	4	420	413		5			98	231
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1557	1650	0	874	1635	1608		1507			1441	1382
Queue Service Time (g_s), s	4.2	6.8	0.0	0.2	15.2	15.2		0.0			4.7	13.6
Cycle Queue Clearance Time (g_c), s	4.2	6.8	0.0	0.2	15.2	15.2		0.2			4.9	13.6
Capacity (*c*), veh/h	387	2054		526	835	822		418			431	338
Volume-to-Capacity Ratio *(X)*	0.414	0.266	0.000	0.007	0.502	0.503		0.011			0.226	0.683
Available Capacity (c_a), veh/h	387	2054		526	835	822		418			431	338
Back of Queue (*Q*), veh/ln (50th percentile)	1.3	2.2		0.0	5.6	5.6		0.1			1.7	4.9
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00			0.00	0.00
Uniform Delay (d_1), s/veh	10.7	7.7		10.8	14.5	14.5		25.8			27.5	30.8
Incremental Delay (d_2), s/veh	0.7	0.3	0.0	0.0	2.2	2.2		0.0			0.3	5.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Control Delay (*d*), s/veh	11.4	8.0		10.8	16.6	16.7		25.8			27.8	36.4
Level of Service (LOS)	B	A		B	B	B		C			C	D

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	8.8	A	16.6	B	25.8	C	33.8	C
Intersection Delay, s/veh / LOS	16.7				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.1	A	1.2	A	0.5	A	1.0	A

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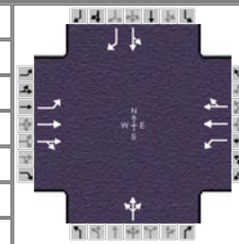
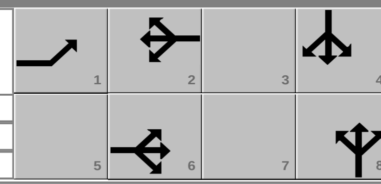
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 8, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.91
Intersection	10th Ave. S / 38th St. S	Analysis Year	2013 - Existing	Analysis Period	1> 7:00
File Name	10thAveS_38thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	250	839	1	5	935	81	4	2	3	112	5	180

Signal Information										
Cycle, s	85.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	12.0	42.0	14.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	4.3	3.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.4	1.7	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2		8		4
Case Number	1.0	4.0		6.3		8.0		7.0
Phase Duration, s	17.0	65.0		48.0		20.0		20.0
Change Period, *($Y+R_c$)*, s	5.0	6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	3.1	0.0		0.0		4.3		4.3
Queue Clearance Time *(g_s)*, s	7.9					14.6		14.9
Green Extension Time *(g_e)*, s	0.2	0.0		0.0		0.0		0.0
Phase Call Probability	1.00					1.00		1.00
Max Out Probability	0.45					1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	275	462	461	5	566	550		10			129	198
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1667	1666	615	1650	1603		423			886	1426
Queue Service Time (*g_s*), s	5.9	10.0	10.0	0.4	22.4	22.5		0.1			0.7	11.4
Cycle Queue Clearance Time (*g_c*), s	5.9	10.0	10.0	0.4	22.4	22.5		12.6			12.9	11.4
Capacity (*c*), veh/h	431	1157	1156	389	816	792		131			229	235
Volume-to-Capacity Ratio *(X)*	0.637	0.399	0.399	0.014	0.694	0.695		0.076			0.562	0.842
Available Capacity (*c_a*), veh/h	431	1157	1156	389	816	792		131			229	235
Back of Queue (*Q*), veh/ln (50th percentile)	2.5	2.9	2.9	0.1	8.7	8.5		0.2			2.7	5.3
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00			0.00	0.00
Uniform Delay (*d_1*), s/veh	13.2	5.5	5.5	11.0	16.6	16.6		30.4			35.2	34.4
Incremental Delay (*d_2*), s/veh	2.4	1.0	1.0	0.1	4.8	5.0		0.2			3.1	23.2
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Control Delay (*d*), s/veh	15.6	6.5	6.5	11.0	21.4	21.5		30.7			38.3	57.6
Level of Service (LOS)	B	A	A	B	C	C		C			D	E
Approach Delay, s/veh / LOS	8.6	A		21.4	C		30.7	C		50.0	D	
Intersection Delay, s/veh / LOS	19.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.5	A	1.4	A	0.5	A	1.0	A

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	Trisha Bodlovic
Agency/Co.	Robert Peccia & Associates
Date Performed	6/17/2013
Analysis Time Period	AM Peak Hour

Site Information

Intersection	38th St. / Central Ave.
Jurisdiction	Great Falls
Analysis Year	

Project ID *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Central Avenue*

North/South Street: *38th Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	8	147	46	39	101	69
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	48	193	47	45	203	21
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.73		0.68		0.89		0.81	
Flow Rate (veh/h)	274		306		321		330	
% Heavy Vehicles	0		0		1		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.24		0.27		0.29		0.29	
hd, final value (s)	6.90		6.78		6.79		6.80	
x, final value	0.53		0.58		0.61		0.62	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	4.9		4.8		4.8		4.8	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	460		478		484		487	
Delay (s/veh)	17.29		18.61		19.68		20.40	
LOS	C		C		C		C	
Approach: Delay (s/veh)	17.29		18.61		19.68		20.40	
LOS	C		C		C		C	
Intersection Delay (s/veh)	19.08							
Intersection LOS	C							

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ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*38th St. / Central Ave.*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*6/17/2013*	Analysis Year	
Analysis Time Period	*PM Peak Hour*		

Project ID *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Central Avenue* | North/South Street: *38th Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	18	77	7	28	50	27
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	39	300	22	21	319	30
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.84		0.81		0.84		0.88	
Flow Rate (veh/h)	120		128		429		419	
% Heavy Vehicles	1		0		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.11		0.11		0.38		0.37	
hd, final value (s)	6.51		6.37		5.38		5.38	
x, final value	0.22		0.23		0.64		0.63	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	4.5		4.4		3.4		3.4	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	370		378		647		646	
Delay (s/veh)	11.30		11.23		17.50		16.94	
LOS	B		B		C		C	
Approach: Delay (s/veh)	11.30		11.23		17.50		16.94	
LOS	B		B		C		C	
Intersection Delay (s/veh)	15.87							
Intersection LOS	C							

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GREAT FALLS AREA
Long Range Transportation Plan - 2018 Update

Appendix C

Projected Intersection Operations

Intersection Level Of Service Report
Intersection 1: 57th St S and 2nd Ave N

Control Type:	Signalized	Delay (sec / veh):	21.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.312

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	250.00	100.00	100.00	230.00	100.00	250.00	200.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	38	179	152	24	115	23	49	197	42	92	83	16
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	45	213	181	29	137	27	58	234	50	109	99	19
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	0.9640	0.9640	0.9640	0.9640	0.9640	0.9640	0.9180	0.9180	0.9180	0.9640	0.9640	0.9640
Total 15-Minute Volume [veh/h]	12	56	47	8	36	7	14	58	12	29	26	5
Total Analysis Volume [veh/h]	47	223	190	30	144	28	58	233	50	114	104	20
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	2	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups			2									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	15	15	5	15	0	5	15	0	5	15	0
Maximum Green [s]	20	45	45	20	45	0	20	45	0	20	45	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	12	33	33	10	31	0	15	27	0	20	32	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	No	No	No	No	No		No	No		No	No	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	L	C	C
C, Cycle Length [s]	90	90	90	90	90	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	53	45	45	53	45	45	27	15	15	27	18	18
g / C, Green / Cycle	0.59	0.50	0.50	0.59	0.49	0.49	0.30	0.17	0.17	0.30	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.04	0.14	0.14	0.03	0.06	0.06	0.05	0.09	0.10	0.10	0.04	0.04
s, saturation flow rate [veh/h]	1139	1550	1318	1089	1550	1465	1226	1550	1458	1168	1550	1466
c, Capacity [veh/h]	745	779	662	661	765	723	446	259	244	381	313	296
d1, Uniform Delay [s]	7.96	13.05	13.05	8.17	12.27	12.30	22.99	34.48	34.57	24.25	29.93	29.97
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.16	0.92	1.09	0.03	0.30	0.33	0.13	1.85	2.09	0.44	0.31	0.34
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.06	0.29	0.29	0.05	0.11	0.12	0.13	0.56	0.57	0.30	0.20	0.21
d, Delay for Lane Group [s/veh]	8.12	13.97	14.15	8.20	12.57	12.63	23.12	36.33	36.66	24.68	30.24	30.31
Lane Group LOS	A	B	B	A	B	B	C	D	D	C	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	0.39	2.69	2.32	0.23	0.96	0.95	0.90	2.99	2.90	1.85	1.15	1.12
50th-Percentile Queue Length [ft/ln]	9.83	67.17	58.00	5.80	24.10	23.74	22.49	74.68	72.53	46.34	28.63	28.02
95th-Percentile Queue Length [veh/ln]	0.71	4.84	4.18	0.42	1.74	1.71	1.62	5.38	5.22	3.34	2.06	2.02
95th-Percentile Queue Length [ft/ln]	17.70	120.90	104.41	10.44	43.38	42.73	40.48	134.42	130.55	83.41	51.54	50.44

Movement, Approach, & Intersection Results

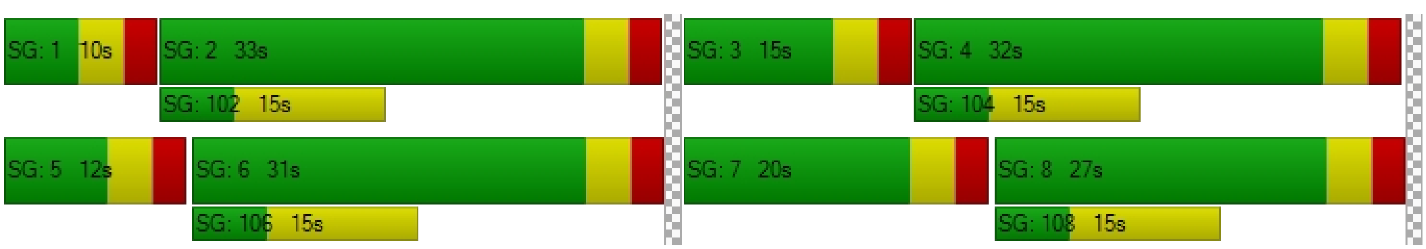
d_M, Delay for Movement [s/veh]	8.12	13.97	14.15	8.20	12.59	12.63	23.12	36.46	36.66	24.68	30.27	30.31
Movement LOS	A	B	B	A	B	B	C	D	D	C	C	C
d_A, Approach Delay [s/veh]	13.45			11.95			34.22			27.60		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	21.62											
Intersection LOS	C											
Intersection V/C	0.312											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.573	2.274	2.437	2.459
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	622	578	489	600
d_b, Bicycle Delay [s]	21.36	22.76	25.69	22.05
I_b,int, Bicycle LOS Score for Intersection	2.319	1.726	1.841	1.756
Bicycle LOS	B	A	A	A

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Version 5.00-05 Future PM

Intersection Level Of Service Report
Intersection 1: 57th St S and 2nd Ave N

Control Type:	Signalized	Delay (sec / veh):	22.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.363

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	1	0	0	1	0	0
Pocket Length [ft]	250.00	100.00	100.00	230.00	100.00	250.00	200.00	100.00	100.00	400.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	54	158	115	19	226	69	24	82	52	224	274	57
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	64	188	137	23	269	82	29	98	62	267	326	68
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	0.9640	0.9640	0.9640	0.9640	0.9640	0.9640	0.9180	0.9180	0.9180	0.9640	0.9640	0.9640
Total 15-Minute Volume [veh/h]	17	49	36	6	70	21	7	24	15	70	85	18
Total Analysis Volume [veh/h]	67	197	144	24	282	86	29	98	62	280	342	71
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	2	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups			2									
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	15	15	5	15	0	5	15	0	5	15	0
Maximum Green [s]	20	45	45	20	45	0	20	45	0	20	45	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	10	21	21	10	21	0	11	23	0	36	48	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0
Minimum Recall	No	No	No	No	No		No	No		No	No	
Maximum Recall	No	No	No	No	No		No	No		No	No	
Pedestrian Recall	No	No	No	No	No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	L	C	C
C, Cycle Length [s]	90	90	90	90	90	90	90	90	90	90	90	90
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	45	38	38	45	36	36	35	15	15	35	28	28
g / C, Green / Cycle	0.50	0.42	0.42	0.50	0.40	0.40	0.39	0.16	0.16	0.39	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.07	0.13	0.11	0.02	0.12	0.13	0.03	0.05	0.06	0.22	0.14	0.14
s, saturation flow rate [veh/h]	1002	1550	1318	1116	1550	1429	972	1550	1360	1299	1550	1459
c, Capacity [veh/h]	529	644	548	572	614	566	399	255	224	569	476	448
d1, Uniform Delay [s]	12.34	17.64	17.29	11.96	18.75	18.83	17.56	33.24	33.40	20.72	25.12	25.14
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.49	1.22	1.17	0.03	1.30	1.47	0.08	0.72	0.93	0.66	0.66	0.70
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.13	0.31	0.26	0.04	0.31	0.32	0.07	0.32	0.35	0.49	0.45	0.45
d, Delay for Lane Group [s/veh]	12.83	18.87	18.46	11.99	20.05	20.29	17.64	33.95	34.33	21.38	25.78	25.84
Lane Group LOS	B	B	B	B	C	C	B	C	C	C	C	C
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	Yes	No	No
50th-Percentile Queue Length [veh/ln]	0.75	2.86	2.07	0.24	2.85	2.73	0.37	1.61	1.55	4.37	3.65	3.46
50th-Percentile Queue Length [ft/ln]	18.81	71.58	51.79	6.03	71.23	68.31	9.35	40.28	38.80	109.34	91.17	86.43
95th-Percentile Queue Length [veh/ln]	1.35	5.15	3.73	0.43	5.13	4.92	0.67	2.90	2.79	7.80	6.56	6.22
95th-Percentile Queue Length [ft/ln]	33.85	128.85	93.23	10.85	128.21	122.95	16.83	72.50	69.84	195.09	164.10	155.58

Movement, Approach, & Intersection Results

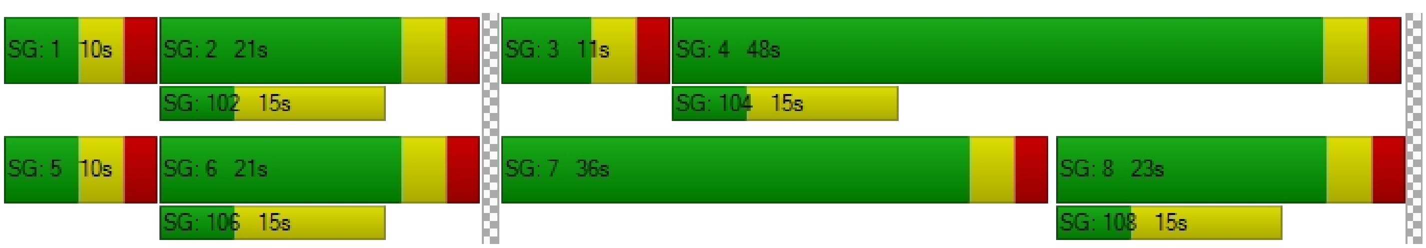
d_M, Delay for Movement [s/veh]	12.83	18.87	18.46	11.99	20.13	20.29	17.64	34.02	34.33	21.38	25.80	25.84
Movement LOS	B	B	B	B	C	C	B	C	C	C	C	C
d_A, Approach Delay [s/veh]	17.73			19.67			31.60			24.02		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	22.33											
Intersection LOS	C											
Intersection V/C	0.363											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	36.45	36.45	36.45	36.45
I_p,int, Pedestrian LOS Score for Intersection	2.632	2.314	2.475	2.503
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	356	356	400	956
d_b, Bicycle Delay [s]	30.42	30.42	28.80	12.27
I_b,int, Bicycle LOS Score for Intersection	2.233	1.883	1.716	2.131
Bicycle LOS	B	A	A	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: 10th Ave S and 20th St S

Control Type:	Signalized	Delay (sec / veh):	13.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.439

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	275.00	100.00	100.00	275.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	57	40	48	51	64	31	12	1226	153	31	1159	38
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.60	7.50	4.20	2.00	1.60	3.20	0.00	4.70	2.70	3.20	2.60	2.60
Growth Rate	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	60	42	50	54	67	33	13	1287	161	33	1217	40
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550	0.8660	0.8660	0.8660	0.8660	0.8660	0.8660
Total 15-Minute Volume [veh/h]	14	10	12	13	16	8	3	303	38	8	286	9
Total Analysis Volume [veh/h]	56	39	46	50	62	31	12	1211	152	31	1146	38
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	130
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	10	0	0	10	0	0	15	0	0	15	0
Maximum Green [s]	0	30	0	0	30	0	0	60	0	0	60	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	36	0	0	36	0	0	94	0	0	94	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	C
C, Cycle Length [s]	130	130	130	130	130	130	130	130	130
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	2.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	31	31	31	89	89	89	89	89	89
g / C, Green / Cycle	0.24	0.24	0.24	0.68	0.68	0.68	0.68	0.68	0.68
(v / s)_i Volume / Saturation Flow Rate	0.05	0.06	0.12	0.03	0.32	0.32	0.09	0.27	0.27
s, saturation flow rate [veh/h]	1158	1353	1157	433	2887	1432	356	2937	1517
c, Capacity [veh/h]	164	323	313	296	1977	980	242	2011	1039
d1, Uniform Delay [s]	43.02	40.22	44.68	13.24	9.45	9.45	16.15	8.81	8.81
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.54	1.99	4.73	0.26	0.78	1.56	1.09	0.57	1.10
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.34	0.26	0.46	0.04	0.46	0.46	0.13	0.39	0.39
d, Delay for Lane Group [s/veh]	48.56	42.21	49.41	13.50	10.22	11.01	17.24	9.37	9.90
Lane Group LOS	D	D	D	B	B	B	B	A	A
Critical Lane Group	No	No	Yes	No	No	Yes	No	No	No
50th-Percentile Queue Length [veh/ln]	1.83	2.41	4.55	0.18	5.87	6.04	0.56	4.68	4.99
50th-Percentile Queue Length [ft/ln]	45.66	60.26	113.71	4.60	146.85	150.99	13.99	116.97	124.75
95th-Percentile Queue Length [veh/ln]	3.29	4.34	8.05	0.33	9.85	10.07	1.01	8.23	8.65
95th-Percentile Queue Length [ft/ln]	82.19	108.47	201.15	8.27	246.22	251.75	25.17	205.66	216.34

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	48.56	42.21	42.21	49.41	49.41	49.41	13.50	10.42	11.01	17.24	9.54	9.90
Movement LOS	D	D	D	D	D	D	B	B	B	B	A	A
d_A, Approach Delay [s/veh]	44.73			49.41			10.51			9.75		
Approach LOS	D			D			B			A		
d_I, Intersection Delay [s/veh]	13.80											
Intersection LOS	B											
Intersection V/C	0.439											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	56.31	56.31	56.31	56.31
I_p,int, Pedestrian LOS Score for Intersection	2.129	1.864	3.056	3.035
Crosswalk LOS	B	A	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	477	477	1369	1369
d_b, Bicycle Delay [s]	37.70	37.70	6.47	6.47
I_b,int, Bicycle LOS Score for Intersection	1.792	1.796	2.316	2.228
Bicycle LOS	A	A	B	B

Sequence

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

Intersection Level Of Service Report
Intersection 2: 10th Ave S and 20th St S

Control Type:	Signalized	Delay (sec / veh):	27.5
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.582

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	275.00	100.00	100.00	275.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	227	62	90	52	65	42	17	1449	114	36	1764	27
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.40	0.00	1.10	0.00	0.00	2.40	0.00	1.90	0.00	0.00	1.90	0.00
Growth Rate	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	238	65	95	55	68	44	18	1521	120	38	1852	28
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	0.8550	0.8550	0.8550	0.8550	0.8550	0.8550	0.8660	0.8660	0.8660	0.8660	0.8660	0.8660
Total 15-Minute Volume [veh/h]	55	15	22	13	16	10	4	358	28	9	436	7
Total Analysis Volume [veh/h]	221	60	88	51	63	41	17	1432	113	36	1743	26
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	135
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fixed time
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	10	0	0	10	0	0	15	0	0	15	0
Maximum Green [s]	0	30	0	0	30	0	0	60	0	0	60	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	56	0	0	56	0	0	79	0	0	79	0
Vehicle Extension [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	C
C, Cycle Length [s]	135	135	135	135	135	135	135	135	135
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	2.00	0.00	0.00	2.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	51	51	51	74	74	74	74	74	74
g / C, Green / Cycle	0.38	0.38	0.38	0.55	0.55	0.55	0.55	0.55	0.55
(v / s)_i Volume / Saturation Flow Rate	0.19	0.10	0.13	0.07	0.35	0.35	0.12	0.39	0.39
s, saturation flow rate [veh/h]	1176	1425	1153	247	2954	1494	306	2954	1540
c, Capacity [veh/h]	314	538	471	112	1619	819	143	1619	844
d1, Uniform Delay [s]	41.24	29.16	32.63	41.89	21.12	21.12	38.26	22.73	22.73
k, delay calibration	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.46	1.26	1.86	2.83	1.90	3.72	4.18	2.77	5.23
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.70	0.27	0.33	0.15	0.63	0.63	0.25	0.72	0.72
d, Delay for Lane Group [s/veh]	53.70	30.42	34.49	44.72	23.02	24.84	42.44	25.50	27.96
Lane Group LOS	D	C	C	D	C	C	D	C	C
Critical Lane Group	Yes	No	No	No	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	7.66	3.57	4.18	0.56	11.48	12.03	1.13	14.10	15.29
50th-Percentile Queue Length [ft/ln]	191.61	89.15	104.40	13.91	286.98	300.71	28.26	352.57	382.20
95th-Percentile Queue Length [veh/ln]	12.20	6.42	7.52	1.00	17.04	17.72	2.03	20.26	21.70
95th-Percentile Queue Length [ft/ln]	305.12	160.46	187.93	25.03	425.89	442.91	50.86	506.54	542.50

Movement, Approach, & Intersection Results

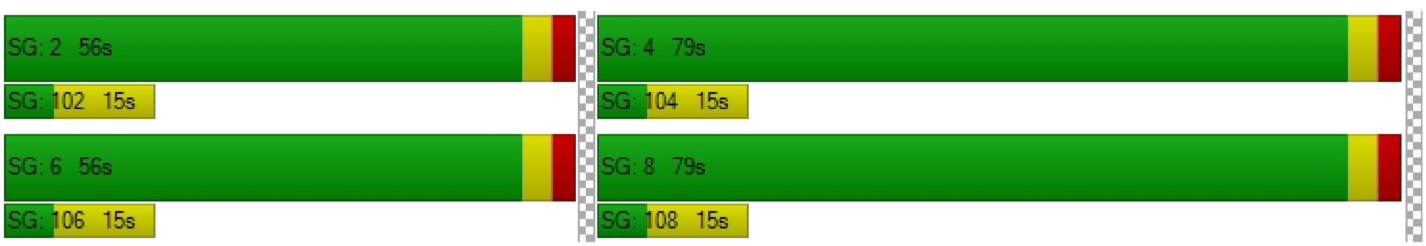
d_M, Delay for Movement [s/veh]	53.70	30.42	30.42	34.49	34.49	34.49	44.72	23.53	24.84	42.44	26.32	27.96
Movement LOS	D	C	C	C	C	C	D	C	C	D	C	C
d_A, Approach Delay [s/veh]	44.36			34.49			23.86			26.66		
Approach LOS	D			C			C			C		
d_I, Intersection Delay [s/veh]	27.53											
Intersection LOS	C											
Intersection V/C	0.582											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	58.80	58.80	58.80	58.80
I_p,int, Pedestrian LOS Score for Intersection	2.201	1.886	3.426	3.157
Crosswalk LOS	B	A	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	756	756	1096	1096
d_b, Bicycle Delay [s]	26.13	26.13	13.78	13.78
I_b,int, Bicycle LOS Score for Intersection	2.168	1.815	2.419	2.552
Bicycle LOS	B	A	B	B

Sequence

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



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Version 5.00-05 Future AM

Intersection Level Of Service Report

Intersection 3: 10th Ave S and 6th St SW/Fox Farm Rd

Control Type:	Signalized	Delay (sec / veh):	45.6
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	7.072

Intersection Setup

Name												
Approach	Northbound			Southbound			Northeastbound			Southwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	1	0	1	2	0	1
Pocket Length [ft]	150.00	100.00	100.00	500.00	100.00	300.00	300.00	100.00	300.00	525.00	100.00	500.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	159	98	136	47	191	421	133	395	130	157	740	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.40	3.06	5.88	4.26	1.05	0.48	1.50	4.30	2.31	3.82	5.14	6.25
Growth Rate	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	186	115	159	55	223	493	156	462	152	184	866	56
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	0.8670	0.8670	0.8670	0.8750	0.8750	0.8750	0.8890	0.8890	0.8890	0.8750	0.8750	0.8750
Total 15-Minute Volume [veh/h]	44	27	37	13	53	117	38	112	37	44	206	13
Total Analysis Volume [veh/h]	175	108	150	52	212	469	151	446	147	175	824	53
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	135
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap
Signal group	5	2	2	1	6	6	3	8	8	7	4	4
Auxiliary Signal Groups			2			6			8			4
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	15	15	5	15	15	5	15	15	5	15	15
Maximum Green [s]	15	60	60	20	60	60	20	60	60	20	60	60
Amber [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All red [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Split [s]	10	53	53	10	53	53	21	20	20	52	51	51
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	5	0	5	5	0	5	5
Pedestrian Clearance [s]	0	10	10	0	10	10	0	10	10	0	10	10
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Recall	Yes	No	No	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	135	135	135	135	135	135	135	135	135	135	135	135
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	63	53	53	63	53	53	16	46	46	11	41	41
g / C, Green / Cycle	0.47	0.39	0.39	0.47	0.39	0.39	0.12	0.34	0.34	0.08	0.31	0.31
(v / s)_i Volume / Saturation Flow Rate	0.22	0.08	0.12	0.05	0.07	0.35	0.10	0.15	0.11	0.06	0.29	0.04
s, saturation flow rate [veh/h]	801	1399	1277	1136	2974	1334	1482	2897	1314	2825	2877	1273
c, Capacity [veh/h]	480	550	502	509	1169	524	171	991	449	225	881	390
d1, Uniform Delay [s]	27.30	26.99	28.22	23.90	26.80	38.40	58.88	34.59	32.95	61.03	45.59	33.95
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.19	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	2.13	0.80	1.52	0.09	0.34	20.38	20.96	0.32	0.42	5.71	5.39	0.16
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.36	0.20	0.30	0.10	0.18	0.89	0.88	0.45	0.33	0.78	0.94	0.14
d, Delay for Lane Group [s/veh]	29.43	27.79	29.74	23.98	27.15	58.77	79.84	34.91	33.37	66.74	50.98	34.11
Lane Group LOS	C	C	C	C	C	E	E	C	C	E	D	C
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	2.33	2.45	3.59	1.05	2.32	17.34	6.09	5.80	3.66	3.13	14.03	1.30
50th-Percentile Queue Length [ft/ln]	58.26	61.19	89.74	26.26	58.07	433.46	152.33	144.89	91.60	78.29	350.83	32.45
95th-Percentile Queue Length [veh/ln]	4.19	4.41	6.46	1.89	4.18	24.17	10.14	9.74	6.60	5.64	20.18	2.34
95th-Percentile Queue Length [ft/ln]	104.87	110.13	161.52	47.28	104.53	604.18	253.54	243.59	164.88	140.93	504.42	58.41

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	29.43	27.79	29.74	23.98	27.15	58.77	79.84	34.91	33.37	66.74	50.98	34.11
Movement LOS	C	C	C	C	C	E	E	C	C	E	D	C
d_A, Approach Delay [s/veh]	29.13			47.16			43.72			52.75		
Approach LOS	C			D			D			D		
d_I, Intersection Delay [s/veh]	45.65											
Intersection LOS	D											
Intersection V/C	7.072											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	58.80	58.80	58.80	58.80
I_p,int, Pedestrian LOS Score for Intersection	2.509	2.643	3.082	2.956
Crosswalk LOS	B	B	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	711	711	222	681
d_b, Bicycle Delay [s]	28.03	28.03	53.33	29.34
I_b,int, Bicycle LOS Score for Intersection	1.917	2.164	2.173	2.428
Bicycle LOS	A	B	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 3: 10th Ave S and 6th St SW/Fox Farm Rd

Control Type:	Signalized	Delay (sec / veh):	80.4
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	469.735

Intersection Setup

Name												
Approach	Northbound			Southbound			Northeastbound			Southwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	1	1	0	1	2	0	1
Pocket Length [ft]	150.00	100.00	100.00	500.00	100.00	300.00	300.00	100.00	300.00	525.00	100.00	500.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	177	307	348	75	175	246	508	959	232	222	679	92
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.56	1.30	1.15	4.00	0.57	0.00	0.20	2.61	2.16	1.35	3.53	0.00
Growth Rate	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	207	359	407	88	205	288	594	1122	271	260	794	108
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	0.8670	0.8670	0.8670	0.8750	0.8750	0.8750	0.8890	0.8890	0.8890	0.8750	0.8750	0.8750
Total 15-Minute Volume [veh/h]	49	85	96	21	49	68	143	271	65	62	189	26
Total Analysis Volume [veh/h]	195	338	384	84	195	274	574	1084	262	247	755	103
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0			0			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	135
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap	Protecte	Permiss	Overlap
Signal group	5	2	2	1	6	6	3	8	8	7	4	4
Auxiliary Signal Groups			2			6			8			4
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	15	15	5	15	15	5	15	15	5	15	15
Maximum Green [s]	15	60	60	20	60	60	20	60	60	20	60	60
Amber [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All red [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Split [s]	10	39	39	11	40	40	50	66	66	19	35	35
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Walk [s]	0	5	5	0	5	5	0	5	5	0	5	5
Pedestrian Clearance [s]	0	10	10	0	10	10	0	10	10	0	10	10
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
I2, Clearance Lost Time [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Recall	Yes	No	No	No	No	No	No	No	No	No	No	No
Maximum Recall	No	No	No	No	No	No	No	No	No	No	No	No
Pedestrian Recall	No	No	No	No	No	No	No	No	No	No	No	No
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	C	C	R	L	C	R	L	C	R	L	C	R
C, Cycle Length [s]	135	135	135	135	135	135	135	135	135	135	135	135
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	0.00	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	45	34	34	45	35	35	45	62	62	13	30	30
g / C, Green / Cycle	0.33	0.25	0.25	0.33	0.26	0.26	0.33	0.46	0.46	0.10	0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.29	0.24	0.29	0.09	0.07	0.20	0.38	0.37	0.20	0.09	0.26	0.08
s, saturation flow rate [veh/h]	692	1419	1327	923	2985	1339	1498	2937	1316	2882	2915	1339
c, Capacity [veh/h]	335	355	332	143	770	345	499	1343	602	287	652	299
d1, Uniform Delay [s]	44.14	49.57	50.59	43.01	39.76	46.73	45.01	31.52	24.83	59.86	52.40	44.07
k, delay calibration	0.50	0.50	0.50	0.13	0.50	0.50	0.50	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	7.57	34.44	98.41	4.73	0.79	16.92	88.73	1.20	0.50	7.49	75.23	0.68
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.59	0.94	1.16	0.59	0.25	0.79	1.15	0.81	0.44	0.86	1.16	0.34
d, Delay for Lane Group [s/veh]	51.71	84.00	149.00	47.74	40.55	63.65	133.74	32.71	25.32	67.35	127.63	44.75
Lane Group LOS	D	F	F	D	D	E	F	C	C	E	F	D
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	4.79	14.39	20.27	2.29	2.68	10.21	28.85	15.25	5.80	4.47	17.84	2.99
50th-Percentile Queue Length [ft/ln]	119.76	359.79	506.63	57.25	67.10	255.22	721.21	381.19	145.11	111.75	445.90	74.65
95th-Percentile Queue Length [veh/ln]	8.38	20.61	29.96	4.12	4.83	15.45	41.18	21.65	9.76	7.94	26.75	5.37
95th-Percentile Queue Length [ft/ln]	209.50	515.33	749.07	103.05	120.79	386.23	1029.51	541.29	243.89	198.43	668.79	134.37

Movement, Approach, & Intersection Results

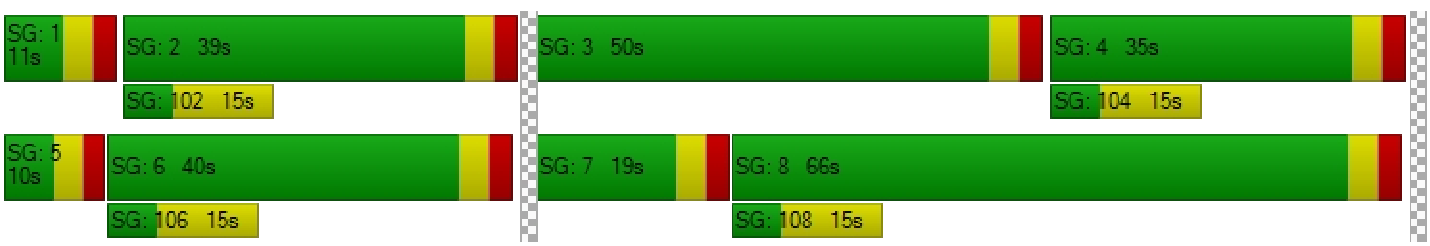
d_M, Delay for Movement [s/veh]	51.71	83.58	149.00	47.74	40.55	63.65	133.74	32.71	25.32	67.35	127.63	44.75
Movement LOS	D	F	F	D	D	E	F	C	C	E	F	D
d_A, Approach Delay [s/veh]		104.20			53.09			61.91			106.43	
Approach LOS		F			D			E			F	
d_I, Intersection Delay [s/veh]						80.40						
Intersection LOS						F						
Intersection V/C						469.735						

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	58.80	58.80	58.80	58.80
I_p,int, Pedestrian LOS Score for Intersection	2.637	2.728	3.268	3.043
Crosswalk LOS	B	B	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	504	519	904	444
d_b, Bicycle Delay [s]	37.78	37.04	20.28	40.83
I_b,int, Bicycle LOS Score for Intersection	2.316	2.016	3.144	2.471
Bicycle LOS	B	B	C	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
#11: Vaughn Rd and I-15 SB

Control Type:	Two-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.361

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	219	1	0	27	12	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	4.60	0.00	2.00	11.10	8.30	2.00
Growth Rate	1.36	1.36	1.00	1.36	1.36	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	298	1	0	37	16	0
Peak Hour Factor	0.8830	0.2500	1.0000	0.8440	0.7500	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	84	1	0	11	5	0
Total Analysis Volume [veh/h]	337	4	0	44	21	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.36	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.04	10.58	0.00	0.00	0.00	0.00
Movement LOS	B	B		A	A	
95th-Percentile Queue Length [veh]	1.68	1.68	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	42.07	42.07	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	11.04		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	9.27					
Intersection LOS	B					

Intersection Level Of Service Report
#11: Vaughn Rd and I-15 SB

Control Type:	Two-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.254

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	143	1	0	53	50	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	7.00	0.00	2.00	7.60	4.00	2.00
Growth Rate	1.36	1.36	1.00	1.36	1.36	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	194	1	0	72	68	0
Peak Hour Factor	0.9410	0.2500	1.0000	0.7790	0.8930	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	1	0	23	19	0
Total Analysis Volume [veh/h]	206	4	0	92	76	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.25	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.97	10.17	0.00	0.00	0.00	0.00
Movement LOS	B	B		A	A	
95th-Percentile Queue Length [veh]	1.03	1.03	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	25.74	25.74	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.96		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	6.09					
Intersection LOS	B					

Intersection Level Of Service Report
#12: Vaughn Rd and I-15 NB

Control Type:	Two-way stop	Delay (sec / veh):	7.3
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name						
Approach	Eastbound		Westbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	0	237	19	76	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	5.00	5.30	14.50	2.00	2.00
Growth Rate	1.37	1.37	1.37	1.37	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	325	26	104	0	0
Peak Hour Factor	1.0000	0.8590	0.5940	0.8260	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	95	11	31	0	0
Total Analysis Volume [veh/h]	0	378	44	126	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.28	0.00	0.00	0.00	0.00	0.00
Movement LOS	A	A	A	A		
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
#12: Vaughn Rd and I-15 NB

Control Type:	Two-way stop	Delay (sec / veh):	7.4
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name						
Approach	Eastbound		Westbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	0	165	55	334	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	6.10	1.80	4.80	2.00	2.00
Growth Rate	1.37	1.37	1.37	1.37	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	226	75	458	0	0
Peak Hour Factor	1.0000	0.7500	0.8090	0.9180	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	75	23	125	0	0
Total Analysis Volume [veh/h]	0	301	93	499	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.38	0.00	0.00	0.00	0.00	0.00
Movement LOS	A	A	A	A		
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.00					
Intersection LOS	A					

Intersection Level Of Service Report
#8: Central Ave and I15 SB

Control Type:	Two-way stop	Delay (sec / veh):	178.9
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.188

Intersection Setup

Name												
Approach	Southbound			Eastbound			Westbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	130	0	6	0	191	39	123	88	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.30	0.00	0.00	2.00	3.10	0.00	6.50	11.30	2.00	2.00	2.00	2.00
Growth Rate	1.41	1.41	1.41	1.00	1.41	1.41	1.41	1.41	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	183	0	8	0	269	55	173	124	0	0	0	0
Peak Hour Factor	0.8550	1.0000	0.7500	1.0000	0.6920	0.7500	0.7690	0.8150	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	54	0	3	0	97	18	56	38	0	0	0	0
Total Analysis Volume [veh/h]	214	0	11	0	389	73	225	152	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.19	0.00	0.01	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	178.88	176.96	9.05	0.00	0.00	0.00	8.91	0.00	0.00	0.00	0.00	0.00
Movement LOS	F	F	A		A	A	A	A				
95th-Percentile Queue Length [veh]	11.32	11.32	0.04	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	282.97	282.97	0.93	0.00	0.00	0.00	18.22	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	170.57			0.00			5.32			0.00		
Approach LOS	F			A			A			A		
d_I, Intersection Delay [s/veh]	37.95											
Intersection LOS	F											

Intersection Level Of Service Report
#8: Central Ave and I15 SB

Control Type:	Two-way stop	Delay (sec / veh):	314.9
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.339

Intersection Setup

Name												
Approach	Southbound			Eastbound			Westbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	66	0	6	0	166	30	230	299	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	6.00	0.00	0.00	2.00	0.60	0.00	6.50	1.00	2.00	2.00	2.00	2.00
Growth Rate	1.41	1.41	1.41	1.00	1.41	1.41	1.41	1.41	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	93	0	8	0	234	42	324	422	0	0	0	0
Peak Hour Factor	0.9170	1.0000	0.7500	1.0000	0.8470	0.8330	0.8980	0.8690	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	0	3	0	69	13	90	121	0	0	0	0
Total Analysis Volume [veh/h]	101	0	11	0	276	50	361	486	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.34	0.00	0.02	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	314.89	307.18	11.27	0.00	0.00	0.00	8.99	0.00	0.00	0.00	0.00	0.00
Movement LOS	F	F	B		A	A	A	A				
95th-Percentile Queue Length [veh]	7.96	7.96	0.06	0.00	0.00	0.00	1.19	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	198.90	198.90	1.44	0.00	0.00	0.00	29.75	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	285.07			0.00			3.83			0.00		
Approach LOS	F			A			A			A		
d_I, Intersection Delay [s/veh]	27.37											
Intersection LOS	F											

Intersection Level Of Service Report
#9: Central Ave and I-15 NB

Control Type:	Two-way stop		Delay (sec / veh):	113.1
Analysis Method:	HCM2010		Level Of Service:	F
Analysis Period:	15 minutes		Volume to Capacity (v/c):	0.274

Intersection Setup

Name												
Approach	Northbound			Eastbound			Westbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	15	0	177	6	305	0	0	202	44	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	10.80	16.70	2.00	2.00	2.00	11.40	13.60	2.00	2.00	2.00
Growth Rate	1.64	1.64	1.64	1.64	1.64	1.00	1.00	1.64	1.64	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	25	0	290	10	500	0	0	331	72	0	0	0
Peak Hour Factor	0.5360	1.0000	0.8510	0.7500	0.7190	1.0000	1.0000	0.8420	0.7330	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	0	85	3	174	0	0	98	25	0	0	0
Total Analysis Volume [veh/h]	47	0	341	13	695	0	0	393	98	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.27	0.00	0.80	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	113.09	109.47	100.54	8.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Movement LOS	F	F	F	A	A			A	A			
95th-Percentile Queue Length [veh]	13.79	13.79	13.79	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	344.63	344.63	344.63	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	102.06			0.15			0.00			0.00		
Approach LOS	F			A			A			A		
d_I, Intersection Delay [s/veh]	25.02											
Intersection LOS	F											

Intersection Level Of Service Report
#9: Central Ave and I-15 NB

Control Type:	Two-way stop	Delay (sec / veh):	445.2
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.211

Intersection Setup

Name												
Approach	Northbound			Eastbound			Westbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	57	0	170	5	249	0	0	471	113	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	1.80	0.00	7.00	0.00	2.00	2.00	2.00	4.60	0.90	2.00	2.00	2.00
Growth Rate	1.64	1.64	1.64	1.64	1.64	1.00	1.00	1.64	1.64	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	93	0	279	8	408	0	0	772	185	0	0	0
Peak Hour Factor	0.7130	1.0000	0.7590	0.4170	0.8650	1.0000	1.0000	0.9350	0.8310	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	33	0	92	5	118	0	0	206	56	0	0	0
Total Analysis Volume [veh/h]	130	0	368	19	472	0	0	826	223	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.21	0.00	0.63	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	445.19	435.47	417.85	9.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Movement LOS	F	F	F	A	A			A	A			
95th-Percentile Queue Length [veh]	33.98	33.98	33.98	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	849.39	849.39	849.39	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	424.99			0.37			0.00			0.00		
Approach LOS	F			A			A			A		
d_I, Intersection Delay [s/veh]	103.94											
Intersection LOS	F											

Intersection Level Of Service Report
#10: Central Ave and Vaughn Rd

Control Type:	Two-way stop	Delay (sec / veh):	406.0
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.518

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	77	60	71	410	184	65
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	9.10	6.70	7.00	5.10	11.40	6.20
Growth Rate	1.63	1.63	1.63	1.63	1.63	1.63
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	126	98	116	668	300	106
Peak Hour Factor	0.7700	0.7890	0.8450	0.8010	0.8520	0.7740
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	41	31	34	208	88	34
Total Analysis Volume [veh/h]	164	124	137	834	352	137
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.52	0.20	0.13	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	405.95	378.42	8.95	0.00	0.00	0.00
Movement LOS	F	F	A	A	A	A
95th-Percentile Queue Length [veh]	20.34	20.34	0.45	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	508.50	508.50	11.23	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	394.10		1.26		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	65.63					
Intersection LOS	F					

Intersection Level Of Service Report
#10: Central Ave and Vaughn Rd

Control Type:	Two-way stop	Delay (sec / veh):	1,422.7
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	3.231

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	68	121	66	361	462	76
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.90	1.60	1.50	4.00	3.40	2.60
Growth Rate	1.63	1.63	1.63	1.63	1.63	1.63
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	111	197	108	588	753	124
Peak Hour Factor	0.6540	0.9450	0.7500	0.7910	0.8680	0.7310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	52	36	186	217	42
Total Analysis Volume [veh/h]	170	208	144	743	868	170
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	3.23	0.66	0.21	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	1422.75	1365.77	11.82	0.00	0.00	0.00
Movement LOS	F	F	B	A	A	A
95th-Percentile Queue Length [veh]	38.77	38.77	0.81	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	969.13	969.13	20.22	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	1391.39		1.92		0.00	
Approach LOS	F		A		A	
d_I, Intersection Delay [s/veh]	229.11					
Intersection LOS	F					

Intersection Level Of Service Report
#6: 14th St SW and I-315 WB

Control Type:	Signalized	Delay (sec / veh):	22.2
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.295

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	11	17	90	26	136	0	0	7	15	162	16	38
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	9.10	0.00	4.40	7.70	1.50	0.00	0.00	0.00	0.00	2.50	0.00	0.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	20	104	30	158	0	0	8	17	188	19	44
Peak Hour Factor	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040	0.8040
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	6	32	9	49	0	0	2	5	58	6	14
Total Analysis Volume [veh/h]	16	25	129	37	197	0	0	10	21	234	24	55
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	1	2	0	1	0	0	3	0	0	2	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	5	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	35	40	0	35	0	0	25	0	0	40	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	25	19	0	25	0	0	16	0	0	19	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	9	7	0	9	0	0	0	0	0	7	0
Pedestrian Clearance [s]	0	11	7	0	11	0	0	0	0	0	7	0
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		no	no		no			no			no	
Maximum Recall		no	no		no			no			no	
Pedestrian Recall		no	no		no			no			no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	R	L	C	C	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	13	13	30	13	13	2	12	12
g / C, Green / Cycle	0.21	0.21	0.49	0.21	0.21	0.03	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.02	0.01	0.09	0.03	0.12	0.02	0.16	0.04
s, saturation flow rate [veh/h]	994	1710	1392	1176	1685	1527	1636	1454
c, Capacity [veh/h]	183	356	686	305	350	52	329	292
d1, Uniform Delay [s]	26.76	19.09	8.52	21.98	21.31	28.58	22.73	19.90
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.20	0.08	0.13	0.18	1.41	10.57	4.12	0.31
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.09	0.07	0.19	0.12	0.56	0.60	0.78	0.19
d, Delay for Lane Group [s/veh]	26.96	19.18	8.65	22.16	22.72	39.15	26.86	20.21
Lane Group LOS	C	B	A	C	C	D	C	C
Critical Lane Group	no	no	no	no	yes	yes	yes	no
50th-Percentile Queue Length [veh]	0.22	0.27	0.82	0.44	2.44	0.57	3.57	0.62
50th-Percentile Queue Length [ft]	5.43	6.74	20.40	11.02	60.90	14.26	89.30	15.53
95th-Percentile Queue Length [veh]	0.39	0.49	1.47	0.79	4.38	1.03	6.43	1.12
95th-Percentile Queue Length [ft]	9.77	12.13	36.71	19.83	109.62	25.67	160.74	27.96

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	26.96	19.18	8.65	22.16	22.72	22.72	39.15	39.15	39.15	26.86	26.86	20.21
Movement LOS	C	B	A	C	C	C	D	D	D	C	C	C
d_A, Approach Delay [s/veh]		11.92			22.63			39.15			25.69	
Approach LOS		B			C			D			C	
d_I, Intersection Delay [s/veh]	22.16											
Intersection LOS	C											
Intersection V/C	0.295											

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
#6: 14th St SW and I-315 WB

Control Type:	Signalized	Delay (sec / veh):	19.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.621

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	5	76	146	22	131	2	3	5	19	638	12	142
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	40.00	6.60	0.70	0.00	2.30	0.00	0.00	0.00	15.80	1.80	8.30	4.20
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	88	169	26	152	2	3	6	22	740	14	165
Peak Hour Factor	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880	0.9880
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	22	43	7	38	1	1	2	6	187	4	42
Total Analysis Volume [veh/h]	6	89	171	26	154	2	3	6	22	749	14	167
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	1	2	0	1	0	0	3	0	0	2	0
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	5	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	35	40	0	35	0	0	25	0	0	40	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	25	19	0	25	0	0	16	0	0	19	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	9	7	0	9	0	0	0	0	0	7	0
Pedestrian Clearance [s]	0	11	7	0	11	0	0	0	0	0	7	0
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	3.0	3.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Minimum Recall		no	no		no			no			no	
Maximum Recall		no	no		no			no			no	
Pedestrian Recall		no	no		no			no			no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	R	L	C	C	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	3.00	3.00	3.00
g_i, Effective Green Time [s]	11	11	49	11	11	2	33	33
g / C, Green / Cycle	0.18	0.18	0.81	0.18	0.18	0.03	0.54	0.54
(v / s)_i Volume / Saturation Flow Rate	0.01	0.06	0.12	0.02	0.09	0.02	0.51	0.12
s, saturation flow rate [veh/h]	804	1604	1443	1196	1668	1513	1505	1395
c, Capacity [veh/h]	167	290	1168	234	301	51	820	760
d1, Uniform Delay [s]	26.79	21.32	1.24	25.10	22.21	28.59	12.61	7.06
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.27	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.09	0.59	0.06	0.21	1.37	11.05	11.60	0.14
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.04	0.31	0.15	0.11	0.52	0.61	0.93	0.22
d, Delay for Lane Group [s/veh]	26.88	21.91	1.30	25.31	23.59	39.64	24.21	7.20
Lane Group LOS	C	C	A	C	C	D	C	A
Critical Lane Group	no	no	no	no	yes	yes	yes	no
50th-Percentile Queue Length [veh]	0.08	1.06	0.08	0.34	1.97	0.58	9.92	0.92
50th-Percentile Queue Length [ft]	2.04	26.57	1.93	8.44	49.22	14.38	247.97	23.06
95th-Percentile Queue Length [veh]	0.15	1.91	0.14	0.61	3.54	1.04	15.08	1.66
95th-Percentile Queue Length [ft]	3.67	47.82	3.47	15.19	88.60	25.89	377.09	41.51

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	26.88	21.91	1.30	25.31	23.59	23.59	39.64	39.64	39.64	24.21	24.21	7.20
Movement LOS	C	C	A	C	C	C	D	D	D	C	C	A
d_A, Approach Delay [s/veh]	8.77			23.83			39.64			21.15		
Approach LOS	A			C			D			C		
d_I, Intersection Delay [s/veh]	19.57											
Intersection LOS	B											
Intersection V/C	0.621											

Sequence

Ring 1	1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
#5: 14th St SW and I-315 EB

Control Type:	Signalized	Delay (sec / veh):	13.3
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.218

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	7	66	286	142	91	60	44	69	3	20	30	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.30	1.50	1.70	3.50	4.40	5.00	0.00	4.30	0.00	10.00	3.30	0.00
Growth Rate	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	82	355	176	113	74	55	86	4	25	37	6
Peak Hour Factor	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300	0.8300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	25	107	53	34	22	17	26	1	8	11	2
Total Analysis Volume [veh/h]	11	99	428	212	136	89	66	104	5	30	45	7
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	2	3	0	6	7	7	4	0	3	8	0
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	15	0	5	15	15	5	0	15	15	0
Maximum Green [s]	0	50	20	0	50	20	20	60	0	20	60	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	22	18	0	22	18	18	20	0	18	20	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	5	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0	0	10	0	10	10	0
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	3.0	1.0	0.0	3.0	1.0	1.0	3.0	0.0	1.0	3.0	0.0
Minimum Recall		no	no		no	no	no	no		no	no	
Maximum Recall		no	no		no	no	no	no		no	no	
Pedestrian Recall		no	no		no	no	no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	3.00	5.00	5.00	3.00	5.00	5.00	5.00	4.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	0.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	17	17	37	17	17	36	29	12	12	29	11	11
g / C, Green / Cycle	0.28	0.28	0.62	0.28	0.28	0.60	0.49	0.21	0.21	0.49	0.19	0.19
(v / s)_i Volume / Saturation Flow Rate	0.01	0.05	0.27	0.17	0.07	0.06	0.04	0.06	0.00	0.02	0.02	0.00
s, saturation flow rate [veh/h]	1114	1872	1588	1272	1820	1538	1616	1822	1615	1422	1839	1615
c, Capacity [veh/h]	334	530	979	387	515	920	948	376	333	816	346	304
d1, Uniform Delay [s]	19.78	16.28	6.04	22.47	16.66	5.14	8.16	20.04	18.95	8.07	20.26	19.85
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.04	0.17	0.31	1.21	0.27	0.05	0.03	0.39	0.02	0.02	0.17	0.03
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

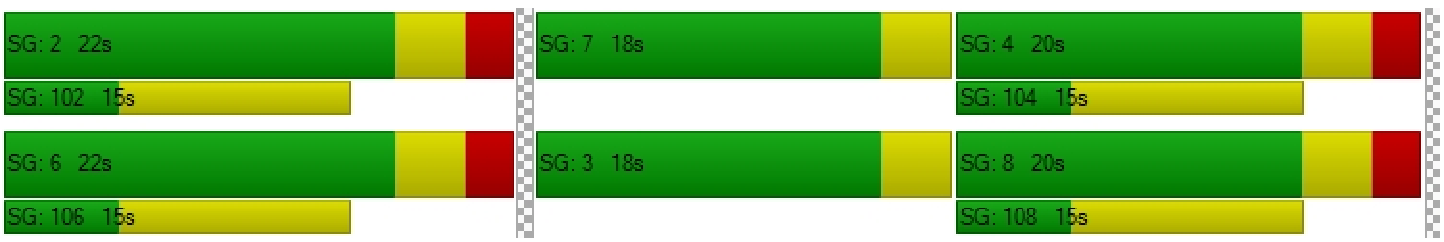
X, volume / capacity	0.03	0.19	0.44	0.55	0.26	0.10	0.07	0.28	0.01	0.04	0.13	0.02
d, Delay for Lane Group [s/veh]	19.82	16.44	6.35	23.68	16.93	5.19	8.20	20.43	18.97	8.08	20.43	19.88
Lane Group LOS	B	B	A	C	B	A	A	C	B	A	C	B
Critical Lane Group	no	no	yes	no	no	no	no	no	no	no	yes	no
50th-Percentile Queue Length [veh]	0.12	0.97	2.14	2.75	1.37	0.37	0.40	1.18	0.05	0.18	0.51	0.08
50th-Percentile Queue Length [ft]	3.03	24.30	53.51	68.66	34.27	9.31	9.90	29.58	1.34	4.43	12.70	1.94
95th-Percentile Queue Length [veh]	0.22	1.75	3.85	4.94	2.47	0.67	0.71	2.13	0.10	0.32	0.91	0.14
95th-Percentile Queue Length [ft]	5.46	43.75	96.31	123.59	61.69	16.75	17.82	53.25	2.41	7.97	22.86	3.49

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	19.82	16.44	6.35	23.68	16.93	5.19	8.20	20.43	18.97	8.08	20.43	19.88
Movement LOS	B	B	A	C	B	A	A	C	B	A	C	B
d_A, Approach Delay [s/veh]	8.48			17.81			15.78			15.87		
Approach LOS	A			B			B			B		
d_I, Intersection Delay [s/veh]	13.32											
Intersection LOS	B											
Intersection V/C	0.218											

Sequence

Ring 1	2	7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	3	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report

#5: 14th St SW and I-315 EB

Control Type:	Signalized	Delay (sec / veh):	12.4
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.457

Intersection Setup

Name												
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	13	82	260	95	396	262	107	168	10	102	50	31
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.40	1.20	4.30	1.30	0.40	0.90	0.00	0.00	1.00	0.00	12.90
Growth Rate	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	102	322	118	491	325	133	208	12	126	62	38
Peak Hour Factor	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	27	86	31	131	87	35	55	3	34	17	10
Total Analysis Volume [veh/h]	17	109	343	126	523	346	142	222	13	134	66	41
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	no
Signal Coordination Group	-
Cycle Length [s]	60
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	2	3	0	6	7	7	4	0	3	8	0
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	15	0	5	15	15	5	0	15	15	0
Maximum Green [s]	0	50	20	0	50	20	20	45	0	20	45	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Split [s]	0	22	18	0	22	18	18	20	0	18	20	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	0	0	5	0	5	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0	0	10	0	10	10	0
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	3.0	1.0	0.0	3.0	1.0	1.0	3.0	0.0	1.0	3.0	0.0
Minimum Recall		no	no		no	no	no	no		no	no	
Maximum Recall		no	no		no	no	no	no		no	no	
Pedestrian Recall		no	no		no	no	no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	L	C	R	L	C	R	L	C	R	L	C	R
L, Total Lost Time per Cycle [s]	5.00	5.00	3.00	5.00	5.00	3.00	3.00	5.00	5.00	4.00	5.00	5.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.00	3.00	0.00	3.00	3.00	0.00	0.00	3.00	3.00	0.00	3.00	3.00
g_i, Effective Green Time [s]	21	21	41	21	21	41	33	15	15	33	15	15
g / C, Green / Cycle	0.35	0.35	0.68	0.35	0.35	0.68	0.55	0.25	0.25	0.55	0.25	0.25
(v / s)_i Volume / Saturation Flow Rate	0.02	0.06	0.21	0.10	0.28	0.22	0.09	0.12	0.01	0.09	0.03	0.03
s, saturation flow rate [veh/h]	893	1855	1596	1251	1876	1609	1564	1900	1615	1472	1900	1430
c, Capacity [veh/h]	183	647	1089	469	654	1097	998	466	396	872	466	351
d1, Uniform Delay [s]	26.40	13.51	3.86	17.33	17.64	3.86	6.75	19.34	17.22	7.01	17.69	17.58
k, delay calibration	0.11	0.11	0.11	0.11	0.11	0.20	0.11	0.11	0.11	0.11	0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.22	0.12	0.16	0.30	2.31	0.30	0.06	0.75	0.03	0.08	0.14	0.15
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

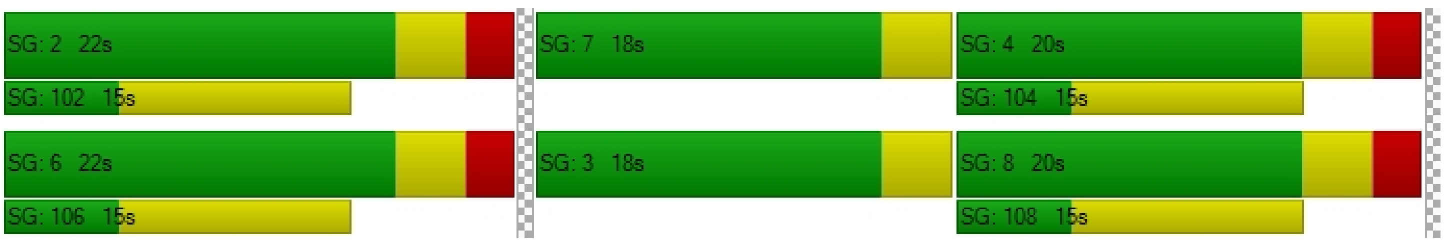
X, volume / capacity	0.09	0.17	0.32	0.27	0.80	0.32	0.14	0.48	0.03	0.15	0.14	0.12
d, Delay for Lane Group [s/veh]	26.62	13.63	4.03	17.63	19.95	4.16	6.82	20.09	17.25	7.09	17.83	17.73
Lane Group LOS	C	B	A	B	B	A	A	C	B	A	B	B
Critical Lane Group	no	no	no	no	yes	yes	no	yes	no	no	no	no
50th-Percentile Queue Length [veh]	0.23	0.94	1.10	1.32	6.19	1.15	0.74	2.53	0.13	0.70	0.68	0.42
50th-Percentile Queue Length [ft]	5.73	23.57	27.43	32.90	154.65	28.69	18.54	63.35	3.27	17.48	17.01	10.58
95th-Percentile Queue Length [veh]	0.41	1.70	1.97	2.37	10.26	2.07	1.33	4.56	0.24	1.26	1.22	0.76
95th-Percentile Queue Length [ft]	10.31	42.42	49.37	59.22	256.62	51.65	33.37	114.02	5.88	31.46	30.62	19.05

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	26.62	13.63	4.03	17.63	19.95	4.16	6.82	20.09	17.25	7.09	17.83	17.73
Movement LOS	C	B	A	B	B	A	A	C	B	A	B	B
d_A, Approach Delay [s/veh]	7.08			14.16			15.00			11.84		
Approach LOS	A			B			B			B		
d_I, Intersection Delay [s/veh]	12.45											
Intersection LOS	B											
Intersection V/C	0.457											

Sequence

Ring 1	2	7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	3	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
#4: I-15 SB Off and Airport RD Frontage

Control Type:	Two-way stop	Delay (sec / veh):	121.8
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.947

Intersection Setup

Name												
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	5	0	44	159	54	96	8	12	0	0	40	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	11.30	10.10	7.40	3.10	12.50	8.30	2.00	2.00	2.50	0.00
Growth Rate	2.22	1.00	2.22	2.22	2.22	2.22	2.22	2.22	1.00	1.00	2.22	2.22
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	0	98	353	120	213	18	27	0	0	89	9
Peak Hour Factor	0.4170	1.0000	0.5240	0.8110	0.9000	0.7060	0.4000	0.7500	1.0000	1.0000	0.7690	0.5000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	0	47	109	33	75	11	9	0	0	29	5
Total Analysis Volume [veh/h]	26	0	187	435	133	302	45	36	0	0	116	18
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.21	0.95	0.22	0.29	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	16.59	0.00	10.80	121.78	119.80	9.92	7.68	0.00	0.00	0.00	0.00	0.00
Movement LOS	C		B	F	F	A	A	A			A	A
95th-Percentile Queue Length [veh]	1.14	0.00	1.14	20.41	20.41	1.22	0.19	0.19	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	28.44	0.00	28.44	510.19	510.19	30.56	4.64	4.64	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	11.50			82.65			4.27			0.00		
Approach LOS	B			F			A			A		
d_I, Intersection Delay [s/veh]	57.55											
Intersection LOS	F											

Intersection Level Of Service Report
#4: I-15 SB Off and Airport RD Frontage

Control Type:	Two-way stop	Delay (sec / veh):	3,138.9
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	7.378

Intersection Setup

Name												
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	55	217	26	47	8	15	0	0	286	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	2.00	1.80	18.90	11.50	2.10	37.50	6.70	2.00	2.00	1.00	0.00
Growth Rate	2.22	1.00	2.22	2.22	2.22	2.22	2.22	2.22	1.00	1.00	2.22	2.22
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	122	482	58	104	18	33	0	0	635	2
Peak Hour Factor	1.0000	1.0000	0.7240	0.8350	0.7220	0.6910	0.6670	0.7500	1.0000	1.0000	0.6810	0.2500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	42	144	20	38	7	11	0	0	233	2
Total Analysis Volume [veh/h]	0	0	169	577	80	151	27	44	0	0	932	8
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.53	7.38	0.38	0.15	0.04	0.00	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	47.75	0.00	27.94	3138.95	3109.90	9.11	11.25	0.00	0.00	0.00	0.00	0.00
Movement LOS	E		D	F	F	A	B	A			A	A
95th-Percentile Queue Length [veh]	2.88	0.00	2.88	74.83	74.83	0.52	0.40	0.40	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	72.12	0.00	72.12	1870.70	1870.70	12.88	9.95	9.95	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	27.94			2551.16			4.28			0.00		
Approach LOS	D			F			A			A		
d_I, Intersection Delay [s/veh]	1039.42											
Intersection LOS	F											

Intersection Level Of Service Report
#3: I-15 SB On and Airport RD

Control Type:	Two-way stop	Delay (sec / veh):	10.4
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.133

Intersection Setup

Name						
Approach	Northeastbound		Northwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	32	23	251	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	43.80	21.70	14.00	16.70
Growth Rate	1.00	1.00	2.12	2.12	2.12	2.12
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	68	49	532	13
Peak Hour Factor	1.0000	1.0000	0.6670	0.6390	0.8720	0.3750
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	25	19	153	9
Total Analysis Volume [veh/h]	0	0	102	77	610	35
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.13	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	10.39	0.00	0.00	0.00
Movement LOS			B	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.90	0.90	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	22.46	22.46	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		5.92		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.29					
Intersection LOS	B					

Intersection Level Of Service Report
#3: I-15 SB On and Airport RD

Control Type:	Two-way stop	Delay (sec / veh):	23.5
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.305

Intersection Setup

Name						
Approach	Northeastbound		Northwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	25	21	542	14
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	64.00	19.10	7.30	0.00
Growth Rate	1.00	1.00	2.12	2.12	2.12	2.12
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	53	45	1149	30
Peak Hour Factor	1.0000	1.0000	0.6250	0.7500	0.7450	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	21	15	386	11
Total Analysis Volume [veh/h]	0	0	85	60	1542	43
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.30	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	23.48	0.00	0.00	0.00
Movement LOS			C	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	2.79	2.79	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	69.68	69.68	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		13.76		0.00	
Approach LOS	A		B		A	
d_I, Intersection Delay [s/veh]	1.15					
Intersection LOS	C					

Intersection Level Of Service Report
#2: I-15 NB and Airport Rd

Control Type:	Two-way stop	Delay (sec / veh):	44.2
Analysis Method:	HCM2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name												
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	4	0	13	0	0	0	0	49	222	79	173	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	46.20	2.00	2.00	2.00	2.00	38.80	26.60	12.70	10.90	2.00
Growth Rate	1.90	1.90	1.90	1.00	1.00	1.00	1.00	1.90	1.90	1.90	1.90	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	0	25	0	0	0	0	93	422	150	329	0
Peak Hour Factor	0.5000	1.0000	0.8130	1.0000	1.0000	1.0000	1.0000	0.7210	0.8670	0.7050	0.9010	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	8	0	0	0	0	32	122	53	91	0
Total Analysis Volume [veh/h]	16	0	31	0	0	0	0	129	487	213	365	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00
d_M, Delay for Movement [s/veh]	34.72	44.22	13.81	0.00	0.00	0.00	0.00	0.00	0.00	10.13	0.00	0.00
Movement LOS	D	E	B					A	A	B	A	
95th-Percentile Queue Length [veh]	0.61	0.61	0.61	0.00	0.00	0.00	0.00	0.00	0.00	4.65	4.65	0.00
95th-Percentile Queue Length [ft]	15.29	15.29	15.29	0.00	0.00	0.00	0.00	0.00	0.00	116.18	116.18	0.00
d_A, Approach Delay [s/veh]	20.93			0.00			0.00			3.73		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	2.53											
Intersection LOS	E											

Intersection Level Of Service Report
#2: I-15 NB and Airport Rd

Control Type:	Two-way stop	Delay (sec / veh):	10,000.0
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.159

Intersection Setup

Name												
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			yes			yes			yes		

Volumes

Name												
Base Volume Input [veh/h]	2	2	31	0	0	0	0	47	197	307	236	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	47.40	2.00	2.00	2.00	2.00	40.40	20.80	0.70	17.40	2.00
Growth Rate	1.90	1.90	1.90	1.00	1.00	1.00	1.00	1.90	1.90	1.90	1.90	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	4	59	0	0	0	0	89	374	583	448	0
Peak Hour Factor	0.5000	0.5000	0.7750	1.0000	1.0000	1.0000	1.0000	0.6910	0.8210	0.6910	0.8680	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	2	19	0	0	0	0	32	114	211	129	0
Total Analysis Volume [veh/h]	8	8	76	0	0	0	0	129	456	844	516	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.01	0.00
d_M, Delay for Movement [s/veh]	10000.0	10000.0	10000.0	0.00	0.00	0.00	0.00	0.00	0.00	24.83	0.00	0.00
Movement LOS	F	F	F					A	A	C	A	
95th-Percentile Queue Length [veh]	13.97	13.97	13.97	0.00	0.00	0.00	0.00	0.00	0.00	54.79	54.79	0.00
95th-Percentile Queue Length [ft]	349.24	349.24	349.24	0.00	0.00	0.00	0.00	0.00	0.00	1369.74	1369.74	0.00
d_A, Approach Delay [s/veh]	10000.00			0.00			0.00			15.41		
Approach LOS	F			A			A			F		
d_I, Intersection Delay [s/veh]	461.93											
Intersection LOS	F											

Intersection Level Of Service Report
#1: Tri Hill and Frontage Airport Rd

Control Type:	Two-way stop	Delay (sec / veh):	27.3
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.514

Intersection Setup

Name						
Approach	Northeastbound		Northwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	83	19	9	189	97	88
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	21.70	31.10	22.20	28.60	25.70	5.70
Growth Rate	1.70	1.70	1.70	1.70	1.70	1.70
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	141	32	15	321	165	150
Peak Hour Factor	0.7410	0.4750	0.5630	0.8750	0.9330	0.7590
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	48	17	7	92	44	49
Total Analysis Volume [veh/h]	190	67	27	367	177	198
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.51	0.10	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	27.25	22.66	8.42	0.00	0.00	0.00
Movement LOS	D	C	A	A	A	A
95th-Percentile Queue Length [veh]	3.94	3.94	0.08	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	98.56	98.56	1.92	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	26.06		0.58		0.00	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	6.75					
Intersection LOS	D					

Intersection Level Of Service Report
#1: Tri Hill and Frontage Airport Rd

Control Type:	Two-way stop	Delay (sec / veh):	43.7
Analysis Method:	HCM2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.713

Intersection Setup

Name						
Approach	Northeastbound		Northwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	yes		yes		yes	

Volumes

Name						
Base Volume Input [veh/h]	75	7	9	160	207	70
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.70	0.00	22.20	33.80	18.90	15.80
Growth Rate	1.70	1.70	1.70	1.70	1.70	1.70
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [ve	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	128	12	15	272	352	119
Peak Hour Factor	0.5680	0.4380	0.7500	0.8000	0.8480	0.8330
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	56	7	5	85	104	36
Total Analysis Volume [veh/h]	225	27	20	340	415	143
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.71	0.05	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	43.71	38.46	9.00	0.00	0.00	0.00
Movement LOS	E	E	A	A	A	A
95th-Percentile Queue Length [veh]	5.93	5.93	0.07	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	148.33	148.33	1.67	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	43.15		0.50		0.00	
Approach LOS	E		A		A	
d_I, Intersection Delay [s/veh]	9.45					
Intersection LOS	E					

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	352	86	12	144	218	72	242	47	393	195	16
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1776	1776	1776	1776	1776	1776	1776	1900	1900	1776	1900
Adj Flow Rate, veh/h	22	517	126	18	211	320	106	355	69	577	286	23
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	7	7	7	7	7	7	7	7	7	7	7
Cap, veh/h	311	599	509	152	594	928	262	437	84	474	454	37
Arrive On Green	0.02	0.34	0.34	0.02	0.33	0.33	0.15	0.15	0.15	0.28	0.28	0.28
Sat Flow, veh/h	1691	1776	1509	1691	1776	1509	1691	2824	543	1691	1622	130
Grp Volume(v), veh/h	22	517	126	18	211	320	106	211	213	577	0	309
Grp Sat Flow(s),veh/h/ln	1691	1776	1509	1691	1776	1509	1691	1687	1680	1691	0	1753
Q Serve(g_s), s	0.8	25.7	5.7	0.7	8.5	9.8	5.3	11.4	11.6	26.4	0.0	14.5
Cycle Q Clear(g_c), s	0.8	25.7	5.7	0.7	8.5	9.8	5.3	11.4	11.6	26.4	0.0	14.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.32	1.00		0.07
Lane Grp Cap(c), veh/h	311	599	509	152	594	928	262	261	260	474	0	491
V/C Ratio(X)	0.07	0.86	0.25	0.12	0.36	0.34	0.41	0.81	0.82	1.22	0.00	0.63
Avail Cap(c_a), veh/h	360	693	589	206	693	1012	310	310	308	474	0	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.4	29.2	22.6	23.6	23.7	8.9	35.9	38.5	38.6	33.9	0.0	29.7
Incr Delay (d2), s/veh	0.1	9.9	0.3	0.3	0.4	0.2	1.0	12.6	14.0	116.3	0.0	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	14.1	2.4	0.3	4.2	7.1	2.5	6.2	6.4	27.5	0.0	7.4
LnGrp Delay(d),s/veh	20.5	39.1	22.8	24.0	24.0	9.1	36.9	51.1	52.6	150.2	0.0	32.2
LnGrp LOS	C	D	C	C	C	A	D	D	D	F		C
Approach Vol, veh/h		665			549			530			886	
Approach Delay, s/veh		35.4			15.3			48.9			109.1	
Approach LOS		D			B			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		19.6	6.5	36.8		31.4	6.8	36.5
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		17.3	4.5	36.8		26.4	4.5	36.8
Max Q Clear Time (g_c+I1), s		13.6	2.7	27.7		28.4	2.8	11.8
Green Ext Time (p_c), s		1.0	0.0	4.1		0.0	0.0	6.6

Intersection Summary		
HCM 2010 Ctrl Delay		58.7
HCM 2010 LOS		E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	19	326	92	39	313	403	149	435	53	338	206	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1845	1845	1845	1845	1845	1900	1900	1845	1900
Adj Flow Rate, veh/h	28	478	135	57	459	591	219	638	78	496	302	37
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	171	597	507	200	618	888	371	664	81	406	373	46
Arrive On Green	0.02	0.32	0.32	0.03	0.34	0.34	0.21	0.21	0.21	0.23	0.23	0.23
Sat Flow, veh/h	1757	1845	1568	1757	1845	1568	1757	3145	384	1757	1612	198
Grp Volume(v), veh/h	28	478	135	57	459	591	219	355	361	496	0	339
Grp Sat Flow(s),veh/h/ln	1757	1845	1568	1757	1845	1568	1757	1752	1777	1757	0	1810
Q Serve(g_s), s	1.1	23.5	6.3	2.1	21.9	26.1	11.2	19.9	20.0	23.0	0.0	17.6
Cycle Q Clear(g_c), s	1.1	23.5	6.3	2.1	21.9	26.1	11.2	19.9	20.0	23.0	0.0	17.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.22	1.00		0.11
Lane Grp Cap(c), veh/h	171	597	507	200	618	888	371	370	375	406	0	418
V/C Ratio(X)	0.16	0.80	0.27	0.29	0.74	0.67	0.59	0.96	0.96	1.22	0.00	0.81
Avail Cap(c_a), veh/h	213	677	575	221	677	938	371	370	375	406	0	418
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.0	30.7	24.9	24.3	29.3	15.0	35.4	38.8	38.8	38.2	0.0	36.2
Incr Delay (d2), s/veh	0.4	6.1	0.3	0.8	4.0	1.7	2.5	36.2	36.5	119.8	0.0	11.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	13.0	2.8	1.1	11.8	16.5	5.7	13.4	13.6	24.6	0.0	10.1
LnGrp Delay(d),s/veh	24.4	36.8	25.2	25.0	33.3	16.7	37.8	75.1	75.4	158.1	0.0	47.6
LnGrp LOS	C	D	C	C	C	B	D	E	E	F		D
Approach Vol, veh/h		641			1107			935			835	
Approach Delay, s/veh		33.8			24.0			66.5			113.2	
Approach LOS		C			C			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		26.0	8.3	37.2		28.0	7.2	38.3
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		21.0	4.5	36.5		23.0	4.5	36.5
Max Q Clear Time (g_c+I1), s		22.0	4.1	25.5		25.0	3.1	28.1
Green Ext Time (p_c), s		0.0	0.0	6.3		0.0	0.0	5.2

Intersection Summary	
HCM 2010 Ctrl Delay	58.3
HCM 2010 LOS	E

Intersection	
Int Delay, s/veh	5.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	477	254	26	364	84	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	250	150	-	0	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	7	7	7	7	7	7
Mvmt Flow	700	373	38	534	123	51

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	700	0	1310	700
Stage 1	-	-	-	-	700	-
Stage 2	-	-	-	-	610	-
Critical Hdwy	-	-	4.17	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.263	-	3.563	3.363
Pot Cap-1 Maneuver	-	-	874	-	171	431
Stage 1	-	-	-	-	483	-
Stage 2	-	-	-	-	533	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	874	-	164	431
Mov Cap-2 Maneuver	-	-	-	-	164	-
Stage 1	-	-	-	-	483	-
Stage 2	-	-	-	-	510	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	56.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	164	431	-	-	874	-
HCM Lane V/C Ratio	0.752	0.119	-	-	0.044	-
HCM Control Delay (s)	73.8	14.5	-	-	9.3	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	4.7	0.4	-	-	0.1	-

Intersection	
Int Delay, s/veh	33.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	494	256	54	622	100	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Yield
Storage Length	-	250	150	-	0	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	725	376	79	913	147	41

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	725	0	1796	725
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	1071	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	864	-	~ 87	420
Stage 1	-	-	-	-	474	-
Stage 2	-	-	-	-	325	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	864	-	~ 79	420
Mov Cap-2 Maneuver	-	-	-	-	~ 79	-
Stage 1	-	-	-	-	474	-
Stage 2	-	-	-	-	295	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	$ 407.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	79	420	-	-	864	-
HCM Lane V/C Ratio	1.857	0.098	-	-	0.092	-
HCM Control Delay (s)	$ 517.9	14.5	-	-	9.6	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	12.8	0.3	-	-	0.3	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	391	135	8	200	0	184	1	26	0	0	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1759	1900	1759	1759	1900	1759	1759	1900	1900	1759	1900
Adj Flow Rate, veh/h	3	574	198	12	293	0	270	1	38	0	0	0
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	8	8	8	8	8	8	8	8	8	8	8	8
Cap, veh/h	647	702	242	287	986	0	519	8	310	0	373	0
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.00	0.21	0.21	0.21	0.00	0.00	0.00
Sat Flow, veh/h	1022	1251	432	656	1759	0	1675	38	1463	0	1759	0
Grp Volume(v), veh/h	3	0	772	12	293	0	270	0	39	0	0	0
Grp Sat Flow(s),veh/h/ln	1022	0	1683	656	1759	0	1675	0	1501	0	1759	0
Q Serve(g_s), s	0.1	0.0	16.4	0.7	3.9	0.0	6.7	0.0	0.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.9	0.0	16.4	17.1	3.9	0.0	6.7	0.0	0.9	0.0	0.0	0.0
Prop In Lane	1.00		0.26	1.00		0.00	1.00		0.97	0.00		0.00
Lane Grp Cap(c), veh/h	647	0	944	287	986	0	519	0	318	0	373	0
V/C Ratio(X)	0.00	0.00	0.82	0.04	0.30	0.00	0.52	0.00	0.12	0.00	0.00	0.00
Avail Cap(c_a), veh/h	817	0	1224	396	1279	0	849	0	614	0	719	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00
Uniform Delay (d), s/veh	6.1	0.0	7.8	14.8	5.1	0.0	16.3	0.0	14.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	3.5	0.1	0.2	0.0	0.8	0.0	0.2	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	8.2	0.1	1.9	0.0	3.2	0.0	0.4	0.0	0.0	0.0
LnGrp Delay(d),s/veh	6.1	0.0	11.3	14.8	5.3	0.0	17.1	0.0	14.2	0.0	0.0	0.0
LnGrp LOS	A		B	B	A		B		B			
Approach Vol, veh/h		775			305			309			0	
Approach Delay, s/veh		11.3			5.6			16.7			0.0	
Approach LOS		B			A			B				
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		14.3		29.7		14.3		29.7				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		18.0		32.0		18.0		32.0				
Max Q Clear Time (g_c+I1), s		8.7		18.4		0.0		19.1				
Green Ext Time (p_c), s		0.7		5.8		0.0		5.6				
Intersection Summary												
HCM 2010 Ctrl Delay			11.3									
HCM 2010 LOS			B									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	273	227	51	480	1	167	0	21	2	1	2
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1792	1792	1900	1792	1792	1900	1792	1792	1900	1900	1792	1900
Adj Flow Rate, veh/h	0	401	333	75	704	1	245	0	31	3	1	3
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	6	6	6	6	6	6	6	6	6	6	6	6
Cap, veh/h	143	525	436	313	1037	1	445	0	338	209	84	143
Arrive On Green	0.00	0.58	0.58	0.58	0.58	0.58	0.22	0.00	0.22	0.22	0.22	0.22
Sat Flow, veh/h	712	907	753	693	1789	3	1354	0	1524	482	378	646
Grp Volume(v), veh/h	0	0	734	75	0	705	245	0	31	7	0	0
Grp Sat Flow(s),veh/h/ln	712	0	1660	693	0	1792	1354	0	1524	1506	0	0
Q Serve(g_s), s	0.0	0.0	16.8	4.6	0.0	13.7	8.4	0.0	0.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	16.8	21.4	0.0	13.7	8.6	0.0	0.8	0.2	0.0	0.0
Prop In Lane	1.00		0.45	1.00		0.00	1.00		1.00	0.43		0.43
Lane Grp Cap(c), veh/h	143	0	961	313	0	1038	445	0	338	436	0	0
V/C Ratio(X)	0.00	0.00	0.76	0.24	0.00	0.68	0.55	0.00	0.09	0.02	0.00	0.00
Avail Cap(c_a), veh/h	184	0	1056	353	0	1140	629	0	545	635	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	8.0	16.0	0.0	7.3	18.6	0.0	15.5	15.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	3.1	0.4	0.0	1.5	1.1	0.0	0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	8.4	0.9	0.0	7.1	3.3	0.0	0.3	0.1	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	11.0	16.4	0.0	8.8	19.6	0.0	15.7	15.3	0.0	0.0
LnGrp LOS			B	B		A	B		B	B		
Approach Vol, veh/h		734			780			276			7	
Approach Delay, s/veh		11.0			9.5			19.2			15.3	
Approach LOS		B			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		16.2		34.1		16.2		34.1
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s		18.0		32.0		18.0		32.0
Max Q Clear Time (g_c+I1), s		10.6		18.8		2.2		23.4
Green Ext Time (p_c), s		0.6		7.9		0.8		5.8

Intersection Summary	
HCM 2010 Ctrl Delay	11.7
HCM 2010 LOS	B

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/17/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*36th Ave. NE / Bootlegger Tr.*
Jurisdiction	*Great Falls*
Analysis Year	

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *36th Avenue NE* | North/South Street: *Bootlegger Trail*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*41*	*32*	*0*	*0*	*151*	*12*
Peak-Hour Factor, PHF	*0.64*	*0.80*	*0.25*	*0.25*	*0.79*	*0.60*
Hourly Flow Rate, HFR (veh/h)	*64*	*39*	*0*	*0*	*191*	*19*
Percent Heavy Vehicles	*5*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*13*	*0*	*290*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.81*	*0.25*	*0.76*	*0.25*	*0.25*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*16*	*0*	*381*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*3*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*64*	*0*		*0*			*397*	
C (m) (veh/h)	*1343*	*1584*					*822*	
v/c	*0.05*	*0.00*					*0.48*	
95% queue length	*0.15*	*0.00*					*2.67*	
Control Delay (s/veh)	*7.8*	*7.3*					*13.4*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*13.4*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/17/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*36th Ave. NE / Bootlegger Tr.*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *36th Avenue NE* North/South Street: *Bootlegger Trail*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*236*	*111*	*0*	*0*	*58*	*18*
Peak-Hour Factor, PHF	*0.88*	*0.84*	*0.25*	*0.25*	*0.85*	*0.75*
Hourly Flow Rate, HFR (veh/h)	*268*	*132*	*0*	*0*	*68*	*24*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*33*	*0*	*92*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.64*	*0.25*	*0.92*	*0.25*	*0.25*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*51*	*0*	*99*	*0*	*0*	*0*
Percent Heavy Vehicles	*3*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*268*	*0*		*0*			*150*	
C (m) (veh/h)	*1515*	*1466*					*530*	
v/c	*0.18*	*0.00*					*0.28*	
95% queue length	*0.64*	*0.00*					*1.16*	
Control Delay (s/veh)	*7.9*	*7.5*					*14.5*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*14.5*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Bootlegger Tr. / U.S. 87*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Bootlegger Trail* North/South Street: *U.S. 87*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*106*	*118*	*5*	*0*	*113*	*8*
Peak-Hour Factor, PHF	*0.76*	*0.92*	*0.42*	*0.25*	*0.71*	*0.67*
Hourly Flow Rate, HFR (veh/h)	*139*	*128*	*11*	*0*	*159*	*11*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*0*	*2*	*0*
Configuration	*L*	*T*	*TR*	*LT*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*10*	*0*	*435*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.63*	*0.25*	*0.73*	*0.25*	*0.25*	*0.25*
Hourly Flow Rate, HFR (veh/h)	*15*	*0*	*595*	*0*	*0*	*0*
Percent Heavy Vehicles	*10*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*LT*		*LTR*			*LTR*	
v (veh/h)	*139*	*0*		*0*			*610*	
C (m) (veh/h)	*1420*	*1457*					*946*	
v/c	*0.10*	*0.00*					*0.64*	
95% queue length	*0.32*	*0.00*					*4.88*	
Control Delay (s/veh)	*7.8*	*7.5*					*15.4*	
LOS	*A*	*A*					*C*	
Approach Delay (s/veh)	--	--				*15.4*		
Approach LOS	--	--				*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Bootlegger Tr. / U.S. 87*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Bootlegger Trail* North/South Street: *U.S. 87*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	391	174	0	0	177	11
Peak-Hour Factor, PHF	0.80	0.91	0.25	0.25	0.81	
Hourly Flow Rate, HFR (veh/h)	488	191	0	0	218	11
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T	TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	0	216	6	0	1
Peak-Hour Factor, PHF	0.63	0.25	0.83	0.75	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	7	0	260	8	0	4
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	LT		LTR			LTR	
v (veh/h)	488	0		12			267	
C (m) (veh/h)	1351	1395		96			750	
v/c	0.36	0.00		0.13			0.36	
95% queue length	1.67	0.00		0.41			1.62	
Control Delay (s/veh)	9.2	7.6		47.8			12.4	
LOS	A	A		E			B	
Approach Delay (s/veh)	--	--	47.8			12.4		
Approach LOS	--	--	E			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*Old Havre Hwy / 15th St. N*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*6/19/2013*	Analysis Year	*2013 - Existing*
Analysis Time Period	*AM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*	
East/West Street: *Old Havre Highway*	North/South Street: *15th Street North*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	8	135	7	0	379	181
Peak-Hour Factor, PHF	0.40	0.89	0.58	0.25	0.77	0.72
Hourly Flow Rate, HFR (veh/h)	19	151	12	0	492	251
Percent Heavy Vehicles	13	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			1
Lanes	1	2	0	1	2	1
Configuration	L	T	TR	L	T	R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	89	5	8	3	2	1
Peak-Hour Factor, PHF	0.86	0.63	0.50	0.38	0.25	0.25
Hourly Flow Rate, HFR (veh/h)	103	7	16	7	8	4
Percent Heavy Vehicles	20	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	19	0		19			126	
C (m) (veh/h)	994	1428		467			360	
v/c	0.02	0.00		0.04			0.35	
95% queue length	0.06	0.00		0.13			1.53	
Control Delay (s/veh)	8.7	7.5		13.0			20.3	
LOS	A	A		B			C	
Approach Delay (s/veh)	--	--	13.0			20.3		
Approach LOS	--	--	B			C		

 HCS+TM Version 5.6 Generated: 6/19/2013 11:30 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/19/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Old Havre Hwy / 15th St. N*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Old Havre Highway* | North/South Street: *15th Street North*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	9	323	8	1	181	161
Peak-Hour Factor, PHF	0.56	0.89	0.67	0.25	0.87	0.84
Hourly Flow Rate, HFR (veh/h)	16	362	11	4	208	191
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			1
Lanes	1	2	0	1	2	1
Configuration	L	T	TR	L	T	R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	188	4	10	4	5	0
Peak-Hour Factor, PHF	0.94	0.50	0.42	0.50	0.63	0.25
Hourly Flow Rate, HFR (veh/h)	200	8	23	8	7	0
Percent Heavy Vehicles	8	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	16	4		15			231	
C (m) (veh/h)	1375	1197		414			502	
v/c	0.01	0.00		0.04			0.46	
95% queue length	0.04	0.01		0.11			2.39	
Control Delay (s/veh)	7.6	8.0		14.0			18.1	
LOS	A	A		B			C	
Approach Delay (s/veh)	--	--	14.0			18.1		
Approach LOS	--	--	B			C		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*25th Ave. NE / 8th St. NE*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *25th Avenue NE* North/South Street: *8th Street NE*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*167*	*57*	*153*	*270*	*8*
Peak-Hour Factor, PHF	*0.63*	*0.62*	*0.59*	*0.74*	*0.73*	*0.68*
Hourly Flow Rate, HFR (veh/h)	*7*	*269*	*96*	*206*	*369*	*11*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*6*	*48*	*9*	*17*	*19*	*62*
Peak-Hour Factor, PHF	*0.50*	*0.92*	*0.56*	*0.53*	*0.53*	*0.71*
Hourly Flow Rate, HFR (veh/h)	*12*	*52*	*16*	*32*	*35*	*87*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*7*	*206*		*154*			*80*	
C (m) (veh/h)	*1182*	*1197*		*234*			*162*	
v/c	*0.01*	*0.17*		*0.66*			*0.49*	
95% queue length	*0.02*	*0.62*		*4.10*			*2.38*	
Control Delay (s/veh)	*8.1*	*8.6*		*45.8*			*47.2*	
LOS	*A*	*A*		*E*			*E*	
Approach Delay (s/veh)	--	--	*45.8*			*47.2*		
Approach LOS	--	--	*E*			*E*		

 *HCS+*TM Version 5.6 Generated: 6/28/2013 9:36 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*25th Ave. NE / 8th St. NE*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *25th Avenue NE* North/South Street: *8th Street NE*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*14*	*190*	*28*	*59*	*119*	*3*
Peak-Hour Factor, PHF	*0.50*	*0.78*	*0.88*	*0.87*	*0.83*	*0.38*
Hourly Flow Rate, HFR (veh/h)	*28*	*243*	*31*	*67*	*143*	*7*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*2*	*24*	*17*	*36*	*67*	*175*
Peak-Hour Factor, PHF	*0.25*	*0.75*	*0.53*	*0.75*	*0.84*	*0.84*
Hourly Flow Rate, HFR (veh/h)	*8*	*32*	*32*	*48*	*79*	*208*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*1*	*1*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

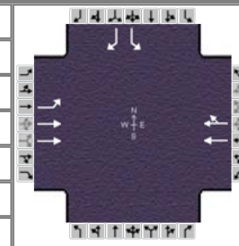
Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*28*	*67*		*335*			*72*	
C (m) (veh/h)	*1444*	*1301*		*546*			*448*	
v/c	*0.02*	*0.05*		*0.61*			*0.16*	
95% queue length	*0.06*	*0.16*		*4.12*			*0.57*	
Control Delay (s/veh)	*7.5*	*7.9*		*21.5*			*14.6*	
LOS	*A*	*A*		*C*			*B*	
Approach Delay (s/veh)	--	--	*21.5*			*14.6*		
Approach LOS	--	--	*C*			*B*		

 *HCS+*TM Version 5.6 Generated: 6/28/2013 9:44 AM

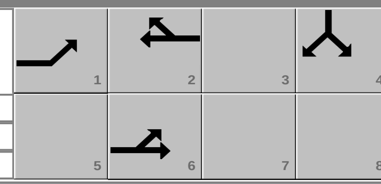
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.83
Intersection	Smelter Ave. / 6th St. NE	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	19_SmelterAve_6thStNE_AM.xus				
Project Description	Great Falls Area LRTP				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	39	915			810	29				177		143

Signal Information										
Cycle, s	100.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	5.4	62.0	18.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.9	3.9	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.9	1.1	1.1	0.0	0.0	0.0



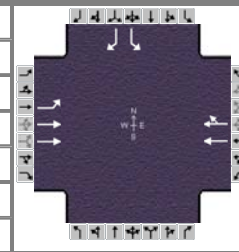
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	10.0	77.0		67.0				23.0
Change Period, *(Y+Rc)*, s	4.6	5.0		5.0				5.0
Max Allow Headway *(MAH)*, s	3.1	0.0		0.0				3.2
Queue Clearance Time *(gs)*, s	2.9							14.4
Green Extension Time *(ge)*, s	0.0	0.0		0.0				0.3
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.78

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				7		14
Adjusted Flow Rate *(v)*, veh/h	47	1102			509	502				213		172
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1556			1635	1612				1619		1441
Queue Service Time *(gs)*, s	0.9	15.4			17.2	17.2				12.4		11.1
Cycle Queue Clearance Time *(gc)*, s	0.9	15.4			17.2	17.2				12.4		11.1
Capacity *(c)*, veh/h	413	2241			1013	999				291		259
Volume-to-Capacity Ratio *(X)*	0.114	0.492			0.502	0.502				0.732		0.664
Available Capacity *(ca)*, veh/h	413	2241			1013	999				291		259
Back of Queue *(Q)*, veh/ln (50th percentile)	0.3	4.0			5.8	5.7				5.4		4.2
Overflow Queue *(Q3)*, veh/ln	0.0	0.0			0.0	0.0				0.0		0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00			0.00	0.00				0.00		0.00
Uniform Delay *(d1)*, s/veh	6.8	6.1			10.5	10.5				38.7		38.2
Incremental Delay *(d2)*, s/veh	0.0	0.8			1.8	1.8				8.0		5.1
Initial Queue Delay *(d3)*, s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay *(d)*, s/veh	6.9	6.8			12.3	12.3				46.7		43.3
Level of Service (LOS)	A	A			B	B				D		D
Approach Delay, s/veh / LOS	6.8	A		12.3	B		0.0			45.2	D	
Intersection Delay, s/veh / LOS	14.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.7	A	2.2	B	2.7	B	2.9	C
Bicycle LOS Score / LOS	1.4	A	1.3	A				F

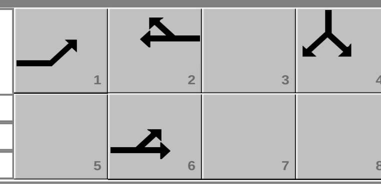
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.97
Intersection	Smelter Ave. / 6th St. NE	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	19_SmelterAve_6thStNE_PM.xus				
Project Description	Great Falls Area LRTP				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	76	1033			1300	72				102		103

Signal Information										
Cycle, s	110.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	5.4	75.0	15.0	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.7	3.9	3.9	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	0.9	1.1	1.1	0.0	0.0	0.0



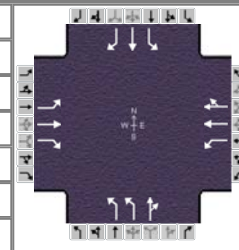
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2				4
Case Number	1.0	4.0		8.3				9.0
Phase Duration, s	10.0	90.0		80.0				20.0
Change Period, *(Y+Rc)*, s	4.6	5.0		5.0				5.0
Max Allow Headway *(MAH)*, s	3.1	0.0		0.0				3.2
Queue Clearance Time *(gs)*, s	3.4							9.6
Green Extension Time *(ge)*, s	0.0	0.0		0.0				0.2
Phase Call Probability	1.00							1.00
Max Out Probability	1.00							0.12

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6			2	12				7		14
Adjusted Flow Rate *(v)*, veh/h	78	1065			713	701				105		106
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1602			1667	1631				1619		1441
Queue Service Time *(gs)*, s	1.4	12.4			26.2	26.4				6.6		7.6
Cycle Queue Clearance Time *(gc)*, s	1.4	12.4			26.2	26.4				6.6		7.6
Capacity *(c)*, veh/h	315	2476			1136	1112				221		196
Volume-to-Capacity Ratio *(X)*	0.248	0.430			0.628	0.630				0.476		0.541
Available Capacity *(ca)*, veh/h	315	2476			1136	1112				221		196
Back of Queue *(Q)*, veh/ln (50th percentile)	0.5	3.0			8.8	8.7				2.6		2.7
Overflow Queue *(Q3)*, veh/ln	0.0	0.0			0.0	0.0				0.0		0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00			0.00	0.00				0.00		0.00
Uniform Delay *(d1)*, s/veh	8.2	4.3			9.7	9.8				43.9		44.3
Incremental Delay *(d2)*, s/veh	0.2	0.5			2.6	2.7				0.6		1.7
Initial Queue Delay *(d3)*, s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay *(d)*, s/veh	8.4	4.8			12.4	12.5				44.5		45.9
Level of Service (LOS)	A	A			B	B				D		D
Approach Delay, s/veh / LOS	5.0	A		12.4	B		0.0			45.2	D	
Intersection Delay, s/veh / LOS	11.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	0.6	A	2.2	B	2.7	B	2.9	C
Bicycle LOS Score / LOS	1.4	A	1.7	A				F

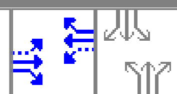
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.82
Intersection	Smelter Ave. / 10th St. NE	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	20_SmelterAve_10thStNE_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

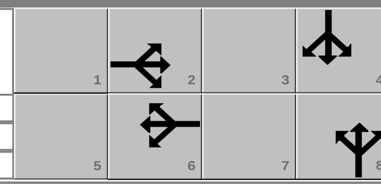


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	142	136	789	41	190	23	527	98	23	10	176	136

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	58.3	14.4	19.8	0.0	0.0	0.0
Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Red	3.0	1.9	2.2	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		5.0		6.0		10.0		9.0
Phase Duration, s		65.0		65.0		25.0		20.0
Change Period, *(Y+R$_c$)*, s		6.7		6.7		5.2		5.6
Max Allow Headway *(MAH)*, s		0.0		0.0		4.1		4.1
Queue Clearance Time *(g$_s$)*, s						21.8		16.1
Green Extension Time *(g$_e$)*, s		0.0		0.0		0.0		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

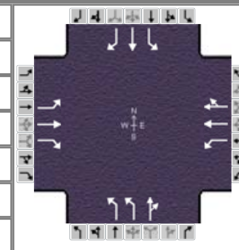
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	173	166	962	50	131	129	643	148		12	215	166
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1034	1650	1396	507	1650	1588	1541	1627		1619	1667	1295
Queue Service Time (*g$_s$*), s	11.3	5.8	58.3	6.3	4.5	4.6	19.8	9.0		0.7	14.1	14.0
Cycle Queue Clearance Time (*g$_c$*), s	15.9	5.8	58.3	12.1	4.5	4.6	19.8	9.0		0.7	14.1	14.0
Capacity (*c*), veh/h	571	875	740	308	875	842	555	293		212	218	170
Volume-to-Capacity Ratio *(X)*	0.303	0.190	1.301	0.163	0.150	0.153	1.158	0.504		0.058	0.984	0.978
Available Capacity (*c$_a$*), veh/h	571	875	740	308	875	842	555	293		212	218	170
Back of Queue (*Q*), veh/ln (50th percentile)	2.8	2.1	47.2	0.8	1.7	1.6	14.3	3.6		0.3	9.1	7.4
Overflow Queue (*Q$_3$*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (*d$_1$*), s/veh	17.3	13.5	25.9	16.7	13.2	13.2	45.1	40.7		41.9	47.7	47.6
Incremental Delay (*d$_2$*), s/veh	1.4	0.5	145.2	1.1	0.4	0.4	90.0	1.4		0.1	56.1	62.5
Initial Queue Delay (*d$_3$*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	18.6	14.0	171.1	17.8	13.6	13.6	135.1	42.0		42.0	103.8	110.2
Level of Service (LOS)	B	B	F	B	B	B	F	D		D	F	F
Approach Delay, s/veh / LOS	130.8	F		14.3	B		117.7	F		104.6	F	
Intersection Delay, s/veh / LOS	110.5						F					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.6	B	2.5	B	2.9	C
Bicycle LOS Score / LOS	2.6	B	0.7	A	1.8	A	1.1	A

 HCS 2010™ Streets Version 6.41 Generated: 9/16/2013 4:12:17 PM

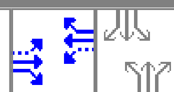
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.95
Intersection	Smelter Ave. / 10th St. NE	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	20_SmelterAve_10thStNE_PM.xus				
Project Description	Great Falls Area LRTP - 2014				

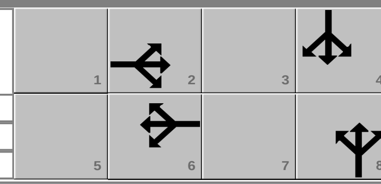


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	154	198	833	54	373	23	869	175	61	15	139	211

Signal Information			
Cycle, s	95.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	46.3	10.4	20.8	0.0	0.0	0.0
Yellow	3.7	3.7	3.0	0.0	0.0	0.0
Red	3.0	1.9	2.2	0.0	0.0	0.0



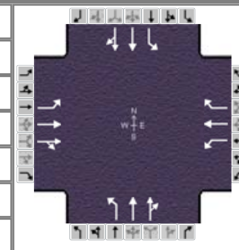
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		5.0		6.0		10.0		9.0
Phase Duration, s		53.0		53.0		26.0		16.0
Change Period, *(Y+Rc)*, s		6.7		6.7		5.2		5.6
Max Allow Headway *(MAH)*, s		0.0		0.0		4.1		4.2
Queue Clearance Time *(gs)*, s						22.8		12.4
Green Extension Time *(ge)*, s		0.0		0.0		0.0		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	162	208	877	57	210	207	915	248		16	146	222
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	965	1683	1397	528	1700	1665	1572	1624		1619	1667	1326
Queue Service Time *(gs)*, s	11.2	6.9	46.3	6.7	6.9	6.9	20.8	13.4		0.8	8.1	10.4
Cycle Queue Clearance Time *(gc)*, s	18.1	6.9	46.3	13.6	6.9	6.9	20.8	13.4		0.8	8.1	10.4
Capacity *(c)*, veh/h	476	820	681	295	829	811	688	356		177	182	145
Volume-to-Capacity Ratio *(X)*	0.341	0.254	1.288	0.193	0.253	0.255	1.329	0.698		0.089	0.802	1.531
Available Capacity *(ca)*, veh/h	476	820	681	295	829	811	688	356		177	182	145
Back of Queue *(Q)*, veh/ln (50th percentile)	2.6	2.6	40.1	0.9	2.6	2.6	22.7	5.7		0.3	4.4	14.2
Overflow Queue *(Q3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay *(d1)*, s/veh	19.6	14.2	24.4	18.2	14.2	14.3	37.1	34.2		38.0	41.3	42.3
Incremental Delay *(d2)*, s/veh	1.9	0.7	140.5	1.5	0.7	0.8	157.8	5.9		0.2	22.1	270.4
Initial Queue Delay *(d3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay *(d)*, s/veh	21.5	15.0	164.9	19.7	15.0	15.0	194.9	40.1		38.3	63.4	312.7
Level of Service (LOS)	C	B	F	B	B	B	F	D		D	E	F
Approach Delay, s/veh / LOS	121.2	F		15.6	B		161.9	F		206.5	F	
Intersection Delay, s/veh / LOS	130.4						F					

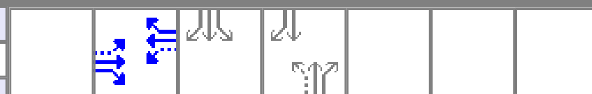
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.6	B	2.5	B	2.8	C
Bicycle LOS Score / LOS	2.5	B	0.9	A	2.4	B	1.1	A

HCS 2010 Signalized Intersection Results Summary

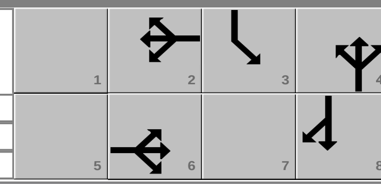
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/12/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	River Rd. / 9th St. N	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	RiverRd_9thStN_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	234	11	5	92	201	9	213	21	324	329	145



Signal Information										
Cycle, s	105.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	29.1	41.4	17.4	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.6	3.2	3.2	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.3	2.4	2.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4	3	8
Case Number		6.0		5.0		6.3	2.0	4.0
Phase Duration, s		35.0		35.0		23.0	47.0	70.0
Change Period, *(Y+R*$_c$*)*, s		5.9		5.9		5.6	5.6	5.6
Max Allow Headway *(MAH)*, s		0.0		0.0		2.1	2.6	2.1
Queue Clearance Time (g_s), s						9.3	19.7	9.8
Green Extension Time (g_e), s		0.0		0.0		0.5	0.4	0.5
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.01	0.00	0.00

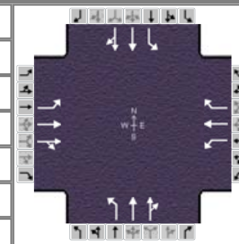
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	63	134	133	5	100	218	10	128	126	352	269	246
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1078	1700	1673	1130	1700	1441	894	1700	1646	1619	1700	1521
Queue Service Time (g_s), s	5.0	6.5	6.5	0.4	4.7	13.6	1.0	7.1	7.3	17.7	7.6	7.8
Cycle Queue Clearance Time (g_c), s	9.8	6.5	6.5	6.9	4.7	13.6	1.0	7.1	7.3	17.7	7.6	7.8
Capacity (*c*), veh/h	319	471	464	311	471	399	217	282	273	638	1043	933
Volume-to-Capacity Ratio *(X)*	0.198	0.284	0.286	0.017	0.212	0.547	0.045	0.455	0.463	0.552	0.258	0.264
Available Capacity (c_a), veh/h	319	471	464	311	471	399	217	282	273	638	1043	933
Back of Queue (*Q*), veh/ln (50th percentile)	1.4	2.8	2.8	0.1	2.0	5.2	0.2	3.0	2.9	6.7	2.6	2.4
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	32.9	29.8	29.8	32.5	29.1	32.3	36.9	39.5	39.6	24.6	9.3	9.4
Incremental Delay (d_2), s/veh	1.4	1.5	1.5	0.1	1.0	5.3	0.0	0.4	0.5	0.6	0.0	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	34.3	31.3	31.3	32.6	30.2	37.6	37.0	39.9	40.0	25.2	9.4	9.4
Level of Service (LOS)	C	C	C	C	C	D	D	D	D	C	A	A

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	31.9	C	35.3	D	39.9	D	15.8	B
Intersection Delay, s/veh / LOS	25.9				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.9	C	2.4	B
Bicycle LOS Score / LOS	0.8	A	1.0	A	0.7	A	1.2	A

HCS 2010 Signalized Intersection Results Summary

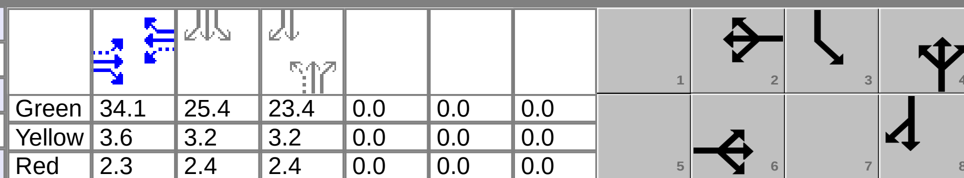
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/12/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	River Rd. / 9th St. N	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	RiverRd_9thStN_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	121	163	9	44	274	330	16	520	34	335	453	140

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	34.1	25.4	23.4	0.0	0.0	0.0
Yellow	3.6	3.2	3.2	0.0	0.0	0.0
Red	2.3	2.4	2.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		6		2		4	3	8
Case Number		6.0		5.0		6.3	2.0	4.0
Phase Duration, s		40.0		40.0		29.0	31.0	60.0
Change Period, *($Y+R_c$)*, s		5.9		5.9		5.6	5.6	5.6
Max Allow Headway *(MAH)*, s		0.0		0.0		2.1	2.6	2.1
Queue Clearance Time (g_s), s						19.2	24.5	13.3
Green Extension Time (g_e), s		0.0		0.0		0.6	0.1	0.9
Phase Call Probability						1.00	1.00	1.00
Max Out Probability						0.31	1.00	0.00

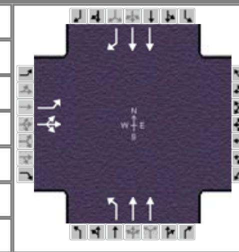
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	132	94	93	48	298	359	17	304	298	364	334	310
Adjusted Saturation Flow Rate (s), veh/h/ln	789	1518	1490	1094	1604	1385	798	1667	1630	1572	1700	1562
Queue Service Time (g_s), s	16.2	4.3	4.4	3.2	15.0	23.0	1.7	17.1	17.2	22.5	11.2	11.3
Cycle Queue Clearance Time (g_c), s	31.2	4.3	4.4	7.6	15.0	23.0	1.7	17.1	17.2	22.5	11.2	11.3
Capacity (c), veh/h	223	518	508	397	547	472	259	390	381	399	925	850
Volume-to-Capacity Ratio *(X)*	0.591	0.181	0.183	0.120	0.545	0.759	0.067	0.779	0.782	0.912	0.362	0.365
Available Capacity (c_a), veh/h	223	518	508	397	547	472	259	390	381	399	925	850
Back of Queue (*Q*), veh/ln (50th percentile)	3.7	1.6	1.6	0.9	6.1	8.8	0.3	7.7	7.6	11.0	4.0	3.7
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	39.3	23.1	23.2	25.8	26.7	29.3	30.0	35.9	35.9	36.2	12.9	13.0
Incremental Delay (d_2), s/veh	11.0	0.8	0.8	0.6	3.9	10.9	0.0	8.9	9.3	24.3	0.1	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	50.3	23.9	24.0	26.5	30.5	40.2	30.0	44.8	45.2	60.5	13.0	13.1
Level of Service (LOS)	D	C	C	C	C	D	C	D	D	E	B	B
Approach Delay, s/veh / LOS	34.8	C		35.2	D		44.6	D		30.2	C	
Intersection Delay, s/veh / LOS	35.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.8	C	2.4	B
Bicycle LOS Score / LOS	0.8	A	1.6	A	1.0	A	1.3	A

 HCS 2010™ Streets Version 6.41 Generated: 9/17/2013 10:14:36 AM

HCS 2010 Signalized Intersection Results Summary

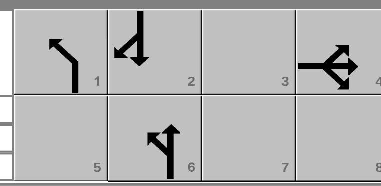
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/12/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.87
Intersection	NW Bypass / 3rd St. NW	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	NWBypass_3rdStNW_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	204	0	77				110	290			301	275

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	8.1	44.2	19.0	0.0	0.0	0.0
Yellow	3.9	3.9	3.6	0.0	0.0	0.0
Red	2.0	2.9	2.4	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			1	6		2
Case Number		10.0			1.0	4.0		7.3
Phase Duration, s		25.0			14.0	65.0		51.0
Change Period, *(Y+R$_c$)*, s		6.0			5.9	6.8		6.8
Max Allow Headway *(MAH)*, s		4.7			4.1	0.0		0.0
Queue Clearance Time *(g_s)*, s		14.0			5.0			
Green Extension Time *(g_e)*, s		0.7			0.1	0.0		0.0
Phase Call Probability		1.00			1.00			
Max Out Probability		0.89			1.00			

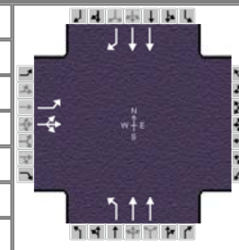
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14				1	6			2	12
Adjusted Flow Rate (*v*), veh/h	234	234					126	333			346	316
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1619	1619					1619	1618			1618	1441
Queue Service Time (g_s), s	12.0	12.0					3.0	3.7			5.5	12.9
Cycle Queue Clearance Time (g_c), s	12.0	12.0					3.0	3.7			5.5	12.9
Capacity (*c*), veh/h	342	342					564	2093			1590	708
Volume-to-Capacity Ratio *(X)*	0.686	0.686					0.224	0.159			0.218	0.447
Available Capacity (c_a), veh/h	342	342					564	2093			1590	708
Back of Queue (*Q*), veh/ln (50th percentile)	5.1	5.1					1.0	1.1			1.9	4.3
Overflow Queue (Q_3), veh/ln	0.0	0.0					0.0	0.0			0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00					0.00	0.00			0.00	0.00
Uniform Delay (d_1), s/veh	32.7	32.7					8.1	6.3			13.0	14.9
Incremental Delay (d_2), s/veh	5.9	5.9					0.2	0.2			0.3	2.0
Initial Queue Delay (d_3), s/veh	0.0	0.0					0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh	38.7	38.7					8.3	6.4			13.4	17.0
Level of Service (LOS)	D	D					A	A			B	B
Approach Delay, s/veh / LOS	36.4	D		0.0			6.9	A		15.1	B	
Intersection Delay, s/veh / LOS	17.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	1.9	A	2.3	B
Bicycle LOS Score / LOS	1.0	A			0.9	A	1.0	A

 HCS 2010™ Streets Version 6.41 Generated: 9/17/2013 9:43:12 AM

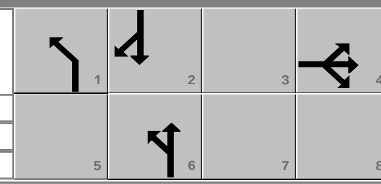
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/12/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	NW Bypass / 3rd St. NW	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	NWBypass_3rdStNW_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	474	0	189				290	749			636	664

Signal Information										
Cycle, s	155.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	13.1	78.2	44.2	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	On	Yellow	3.9	3.9	3.9	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.9	2.9	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4			1	6		2
Case Number		10.0			1.0	4.0		7.3
Phase Duration, s		51.0			19.0	104.0		85.0
Change Period, *(Y+Rc)*, s		6.8			5.9	6.8		6.8
Max Allow Headway *(MAH)*, s		4.7			4.1	0.0		0.0
Queue Clearance Time *(gs)*, s		46.2			15.1			
Green Extension Time *(ge)*, s		0.0			0.0	0.0		0.0
Phase Call Probability		1.00			1.00			
Max Out Probability		1.00			1.00			

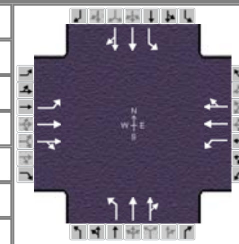
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14				1	6			2	12
Adjusted Flow Rate *(v)*, veh/h	515	515					315	814			691	722
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1572	1572					1619	1587			1571	1412
Queue Service Time *(gs)*, s	44.2	44.2					13.1	19.9			21.7	78.2
Cycle Queue Clearance Time *(gc)*, s	44.2	44.2					13.1	19.9			21.7	78.2
Capacity *(c)*, veh/h	448	448					324	1990			1585	713
Volume-to-Capacity Ratio *(X)*	1.149	1.149					0.972	0.409			0.436	1.013
Available Capacity *(ca)*, veh/h	448	448					324	1990			1585	713
Back of Queue *(Q)*, veh/ln (50th percentile)	28.6	28.6					17.1	7.3			8.3	33.5
Overflow Queue *(Q3)*, veh/ln	0.0	0.0					0.0	0.0			0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00					0.00	0.00			0.00	0.00
Uniform Delay *(d1)*, s/veh	55.4	55.4					27.2	14.5			24.4	38.4
Incremental Delay *(d2)*, s/veh	90.3	90.3					42.3	0.6			0.9	36.9
Initial Queue Delay *(d3)*, s/veh	0.0	0.0					0.0	0.0			0.0	0.0
Control Delay *(d)*, s/veh	145.7	145.7					69.5	15.1			25.3	75.3
Level of Service (LOS)	F	F					E	B			C	F
Approach Delay, s/veh / LOS	117.7	F		0.0			30.3	C		50.8	D	
Intersection Delay, s/veh / LOS	58.5						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	1.9	A	2.3	B
Bicycle LOS Score / LOS	1.7	A			1.4	A	1.7	A

 HCS 2010™ Streets Version 6.41 Generated: 9/17/2013 10:12:26 AM

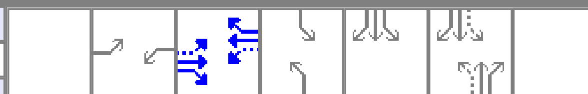
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 12, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	Central Ave. NW / 6th St. N	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	CentralAveNW_6thStNW_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

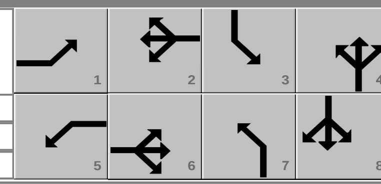


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	662	78	141	286	50	78	337	85	108	215	23

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.0	40.5	4.0	1.0	19.5	0.0
Yellow	3.0	3.2	3.0	0.0	3.2	0.0
Red	2.0	2.3	2.0	0.0	2.3	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	9.0	46.0	9.0	46.0	9.0	25.0	10.0	26.0
Change Period, *($Y+R_c$)*, s	5.0	5.5	5.0	5.5	5.0	5.5	5.0	5.5
Max Allow Headway *(MAH)*, s	3.6	0.0	3.6	0.0	3.6	3.6	3.6	3.6
Queue Clearance Time *(g_s)*, s	3.3		6.0		5.8	13.8	7.0	8.1
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.7
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.45	1.00	0.04

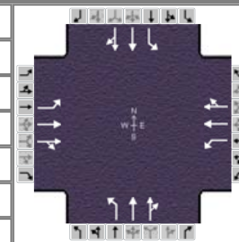
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	43	410	395	153	186	180	85	236	223	117	130	128
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1572	1635	1573	1557	1491	1414	1587	1683	1561	1619	1650	1594
Queue Service Time (*g_s*), s	1.3	16.6	16.6	4.0	7.0	7.2	3.8	11.5	11.8	5.0	6.0	6.1
Cycle Queue Clearance Time (*g_c*), s	1.3	16.6	16.6	4.0	7.0	7.2	3.8	11.5	11.8	5.0	6.0	6.1
Capacity (*c*), veh/h	521	736	708	325	671	636	329	365	338	252	376	363
Volume-to-Capacity Ratio *(X)*	0.083	0.557	0.558	0.472	0.277	0.282	0.257	0.646	0.659	0.467	0.347	0.353
Available Capacity (*c_a*), veh/h	521	736	708	325	671	636	329	365	338	252	376	363
Back of Queue (*Q*), veh/ln (50th percentile)	0.4	6.4	6.2	1.7	2.4	2.4	1.4	4.9	4.7	1.9	2.3	2.3
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (*d_1*), s/veh	12.1	18.2	18.2	17.0	15.5	15.6	26.1	32.1	32.2	26.0	29.1	29.2
Incremental Delay (*d_2*), s/veh	0.1	3.0	3.2	0.8	1.0	1.1	0.3	3.6	4.3	1.0	0.4	0.4
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	12.2	21.2	21.3	17.7	16.6	16.7	26.4	35.7	36.5	27.0	29.5	29.6
Level of Service (LOS)	B	C	C	B	B	B	C	D	D	C	C	C
Approach Delay, s/veh / LOS	20.8	C		17.0	B		34.6	C		28.8	C	
Intersection Delay, s/veh / LOS	24.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.2	A	0.9	A	0.9	A	0.8	A

 HCS 2010™ Streets Version 6.41 Generated: 9/17/2013 9:16:01 AM

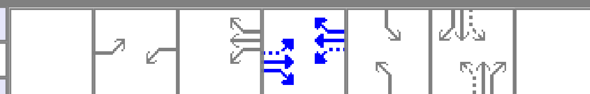
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 12, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	Central Ave. NW / 6th St. N	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	CentralAveNW_6thStNW_PM.xus				
Project Description	Great Falls Area LRTP - 2014				

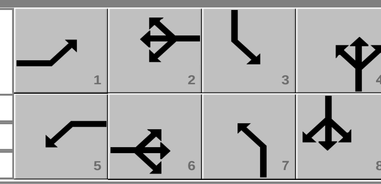


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	38	482	97	415	677	153	88	323	90	140	370	30

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	4.0	6.0	32.5	4.0	17.5	0.0
Yellow	3.0	3.0	3.2	3.0	3.2	0.0
Red	2.0	2.0	2.3	2.0	2.3	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2	7	4	3	8
Case Number	1.1	4.0	1.1	4.0	1.1	4.0	1.1	4.0
Phase Duration, s	9.0	38.0	20.0	49.0	9.0	23.0	9.0	23.0
Change Period, *(Y+R$_c$)*, s	5.0	5.5	5.0	5.5	5.0	5.5	5.0	5.5
Max Allow Headway *(MAH)*, s	3.6	0.0	3.6	0.0	3.6	3.6	3.6	3.6
Queue Clearance Time *(g_s)*, s	3.5		13.7		6.0	13.8	6.0	13.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.2	0.0	0.0	1.1	0.0	1.2
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		1.00	0.97	1.00	0.76

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	41	323	306	451	466	436	96	231	218	152	220	215
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1527	1650	1552	1587	1650	1543	1603	1683	1555	1603	1683	1633
Queue Service Time (g_s), s	1.5	14.0	14.1	11.7	18.3	18.3	4.0	11.5	11.8	4.0	10.9	11.0
Cycle Queue Clearance Time (g_c), s	1.5	14.0	14.1	11.7	18.3	18.3	4.0	11.5	11.8	4.0	10.9	11.0
Capacity (*c*), veh/h	314	596	561	507	798	746	221	327	302	211	327	318
Volume-to-Capacity Ratio *(X)*	0.132	0.542	0.546	0.891	0.584	0.585	0.434	0.705	0.721	0.721	0.671	0.677
Available Capacity (c_a), veh/h	314	596	561	507	798	746	221	327	302	211	327	318
Back of Queue (*Q*), veh/ln (50th percentile)	0.5	5.7	5.5	6.8	7.1	6.6	1.7	5.1	5.0	2.2	4.7	4.7
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	16.7	22.8	22.9	15.0	16.7	16.7	29.2	33.8	34.0	34.8	33.6	33.6
Incremental Delay (d_2), s/veh	0.1	3.5	3.8	17.4	3.1	3.3	1.0	6.3	7.7	10.8	4.9	5.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	16.8	26.4	26.7	32.4	19.9	20.1	30.2	40.2	41.7	45.6	38.5	38.9
Level of Service (LOS)	B	C	C	C	B	C	C	D	D	D	D	D
Approach Delay, s/veh / LOS	25.9	C		24.1	C		39.0	D		40.5	D	
Intersection Delay, s/veh / LOS	30.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.8	C	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.0	A	1.6	A	0.9	A	1.0	A

 HCS 2010™ Streets Version 6.41 Generated: 9/17/2013 9:17:06 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*6th St. SW / 4th Ave. SW*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*7/2/2013*	Analysis Year	*2013 - Existing*
Analysis Time Period	*AM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *4th Avenue SW* | North/South Street: *6th Street SW*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	227	292	2	316	2
Peak-Hour Factor, PHF	0.38	0.86	0.73	0.50	0.83	0.50
Hourly Flow Rate, HFR (veh/h)	7	263	399	4	380	4
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	1	7	41	1	4
Peak-Hour Factor, PHF	0.25	0.25	0.88	0.60	0.25	0.33
Hourly Flow Rate, HFR (veh/h)	4	4	7	68	4	12
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	7	4		84			15	
C (m) (veh/h)	1186	936		358			419	
v/c	0.01	0.00		0.23			0.04	
95% queue length	0.02	0.01		0.90			0.11	
Control Delay (s/veh)	8.1	8.9		18.1			13.9	
LOS	A	A		C			B	
Approach Delay (s/veh)	--	--	18.1			13.9		
Approach LOS	--	--	C			B		

 HCS+™ Version 5.6 Generated: 7/2/2013 9:42 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/2/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*6th St. SW / 4th Ave. SW*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *4th Avenue SW* — North/South Street: *6th Street SW*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	10	443	137	4	726	9
Peak-Hour Factor, PHF	0.83	0.89	0.75	0.50	0.89	0.56
Hourly Flow Rate, HFR (veh/h)	12	497	182	8	815	16
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	1	2	14	70	1	4
Peak-Hour Factor, PHF	0.25	0.50	0.70	0.76	0.25	0.50
Hourly Flow Rate, HFR (veh/h)	4	4	20	92	4	8
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

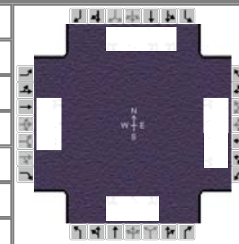
Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	12	8		104			28	
C (m) (veh/h)	808	923		182			303	
v/c	0.01	0.01		0.57			0.09	
95% queue length	0.05	0.03		3.05			0.30	
Control Delay (s/veh)	9.5	8.9		48.3			18.1	
LOS	A	A		E			C	
Approach Delay (s/veh)	--	--	48.3			18.1		
Approach LOS	--	--	E			C		

 HCS+^{TM} Version 5.6 Generated: 7/2/2013 9:52 AM

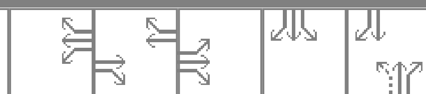
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 29, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.77
Intersection	Central Ave. W / 3rd St. NV	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	16_CentralAveW_3rdStNW_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

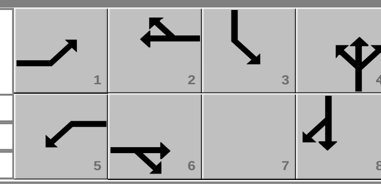


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	102	791	1	50	441	245	2	157	190	488	29	92

Signal Information			
Cycle, s	102.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.1	17.8	14.1	22.0	16.0	0.0
Yellow	3.0	3.2	3.0	3.9	3.6	0.0
Red	2.0	2.3	2.0	1.6	2.4	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4	3	8
Case Number	2.0	4.0	2.0	3.0		5.3	2.0	3.0
Phase Duration, s	19.1	42.4	10.1	33.4		22.0	27.5	49.5
Change Period, *(Y+R$_c$)*, s	5.5	5.5	5.0	5.5		6.0	5.5	6.0
Max Allow Headway *(MAH)*, s	4.1	4.1	3.2	4.2		4.3	4.2	4.3
Queue Clearance Time *(g_s)*, s	10.5	32.3	6.0	23.6		18.0	22.5	8.3
Green Extension Time *(g_e)*, s	0.0	4.6	0.0	4.3		0.0	0.0	2.5
Phase Call Probability	0.98	1.00	0.84	1.00		1.00	1.00	1.00
Max Out Probability	1.00	0.01	1.00	0.00		1.00	1.00	0.00

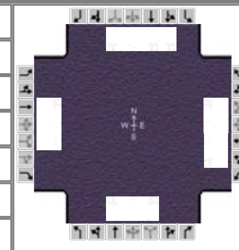
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	132	514	514	65	573	318	3	204	247	634	38	119
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1513	1619	1618	1619	1513	1410	1234	1667	1435	1557	1700	1224
Queue Service Time (*g_s*), s	8.5	30.3	30.3	4.0	17.3	21.6	0.2	12.0	16.0	20.5	1.3	6.3
Cycle Queue Clearance Time (*g_c*), s	8.5	30.3	30.3	4.0	17.3	21.6	0.2	12.0	16.0	20.5	1.3	6.3
Capacity (*c*), veh/h	201	586	586	81	828	386	264	261	225	671	725	522
Volume-to-Capacity Ratio *(X)*	0.657	0.878	0.878	0.802	0.692	0.824	0.010	0.780	1.096	0.944	0.052	0.229
Available Capacity (*c_a*), veh/h	201	1095	1095	127	1839	857	264	261	225	671	725	522
Back of Queue (*Q*), veh/ln (50th percentile)	3.6	12.2	12.2	1.8	6.4	3.9	0.1	5.9	11.1	9.8	0.5	0.0
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (*d_1*), s/veh	42.0	30.4	30.4	48.0	33.2	10.4	36.3	41.3	43.0	39.4	17.2	18.6
Incremental Delay (*d_2*), s/veh	7.6	4.4	4.4	8.3	1.0	4.5	0.0	14.0	88.1	22.0	0.0	0.2
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	49.6	34.9	34.9	56.3	34.2	14.9	36.4	55.3	131.1	61.4	17.2	18.8
Level of Service (LOS)	D	C	C	E	C	B	D	E	F	E	B	B
Approach Delay, s/veh / LOS	36.5	D		29.3	C		96.5	F		52.9	D	
Intersection Delay, s/veh / LOS	46.4						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.6	B	3.0	C	2.8	C
Bicycle LOS Score / LOS	1.4	A	1.3	A	1.2	A	1.8	A

 HCS 2010™ Streets Version 6.41 Generated: 9/16/2013 4:02:27 PM

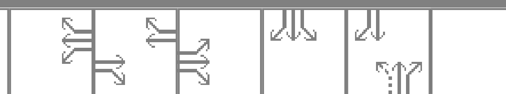
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 29, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	Central Ave. W / 3rd St. NV	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	16_CentralAveW_3rdStNW_PM.xus				
Project Description	Great Falls Area LRTP - 2014				

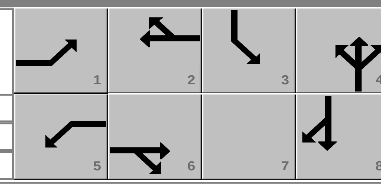


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	168	617	3	100	1068	696	4	130	79	497	65	191

Signal Information			
Cycle, s	138.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	11.1	47.9	19.0	24.0	9.0	0.0
Yellow	3.0	3.2	3.0	3.9	3.6	0.0
Red	2.0	2.3	2.0	1.6	2.4	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4	3	8
Case Number	2.0	4.0	2.0	3.0		5.3	2.0	3.0
Phase Duration, s	24.0	77.4	16.1	69.5		15.0	29.5	44.5
Change Period, $(Y+R_c)$, s	5.5	5.5	5.0	5.5		6.0	5.5	6.0
Max Allow Headway *(MAH)*, s	4.1	4.1	3.2	4.2		4.4	4.2	4.4
Queue Clearance Time (g_s), s	17.9	19.2	11.2	66.0		11.0	25.7	19.4
Green Extension Time (g_e), s	0.7	3.3	0.0	0.0		0.0	0.0	1.9
Phase Call Probability	1.00	1.00	0.98	1.00		1.00	1.00	1.00
Max Out Probability	0.01	0.01	1.00	1.00		1.00	1.00	0.01

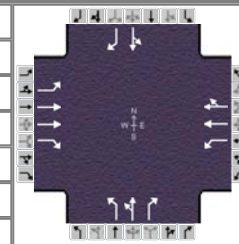
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	183	337	337	109	1161	757	4	141	86	540	71	208
Adjusted Saturation Flow Rate (s), veh/h/ln	1557	1635	1632	1603	1602	1441	727	1700	1414	1572	1700	1396
Queue Service Time (g_s), s	15.9	17.2	17.2	9.2	42.1	64.0	0.8	9.0	8.3	23.7	4.3	17.4
Cycle Queue Clearance Time (g_c), s	15.9	17.2	17.2	9.2	42.1	64.0	0.8	9.0	8.3	23.7	4.3	17.4
Capacity (c), veh/h	209	852	850	129	1486	668	100	111	92	547	474	389
Volume-to-Capacity Ratio (X)	0.874	0.396	0.396	0.843	0.781	1.133	0.044	1.275	0.931	0.988	0.149	0.533
Available Capacity (c_a), veh/h	462	852	850	163	1486	668	100	111	92	547	474	389
Back of Queue (Q), veh/ln (50th percentile)	6.9	6.7	6.6	4.6	16.7	27.5	0.1	9.3	4.8	12.1	1.8	6.2
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio (RQ) (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	58.6	19.9	19.9	62.6	31.1	15.9	60.7	64.5	64.2	56.9	37.4	42.2
Incremental Delay (d_2), s/veh	10.8	0.3	0.3	22.3	2.8	77.4	0.2	176.5	71.4	35.3	0.1	1.4
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	69.4	20.2	20.2	84.9	33.9	93.3	60.9	241.0	135.6	92.2	37.6	43.6
Level of Service (LOS)	E	C	C	F	C	F	E	F	F	F	D	D
Approach Delay, s/veh / LOS	30.7		C	58.8		E	198.5		F	75.2		E
Intersection Delay, s/veh / LOS	64.3						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.6	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	1.2	A	2.2	B	0.9	A	1.8	A

 HCS 2010™ Streets Version 6.41 Generated: 9/16/2013 4:06:10 PM

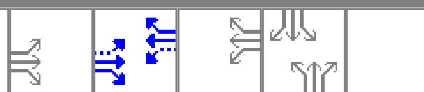
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.79
Intersection	River Dr. / 1st Ave. N	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	18_RiverDr_1stAveN_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

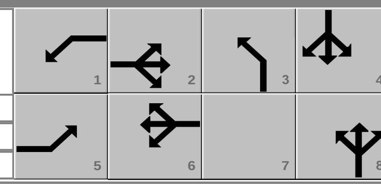


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	193	899	317	42	525	29	191	84	54	13	76	120

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.5	56.0	4.5	14.0	21.0	0.0
Yellow	3.0	3.2	3.0	3.2	3.2	0.0
Red	2.5	2.8	2.5	2.8	2.8	0.0



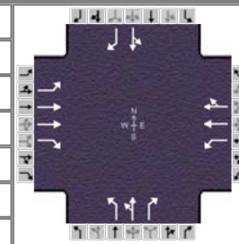
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.2	3.0	1.3	4.0		9.0		11.0
Phase Duration, s	11.0	73.0	10.0	72.0		27.0		20.0
Change Period, *(Y+R$_c$)*, s	5.5	6.0	6.0	6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	3.2	0.0	3.2	0.0		4.2		4.3
Queue Clearance Time *(g$_s$)*, s	7.5		2.0			21.4		16.0
Green Extension Time *(g$_e$)*, s	0.0	0.0	0.5	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	244	1138	401	53	354	347	242	106	68		113	152
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1619	1618	1373	1619	1683	1647	1603	1683	1389		1639	1414
Queue Service Time (*g$_s$*), s	5.5	34.2	26.0	0.0	17.1	17.1	19.4	7.4	5.6		8.6	14.0
Cycle Queue Clearance Time (*g$_c$*), s	5.5	34.2	26.0	0.0	17.1	17.1	19.4	7.4	5.6		8.6	14.0
Capacity (*c*), veh/h	350	1668	708	186	855	836	259	272	224		176	152
Volume-to-Capacity Ratio *(X)*	0.697	0.682	0.567	0.285	0.414	0.415	0.934	0.391	0.305		0.638	0.998
Available Capacity (*c$_a$*), veh/h	350	1668	708	186	855	836	259	272	224		176	152
Back of Queue (*Q*), veh/ln (50th percentile)	4.9	13.3	6.4	1.5	7.0	6.9	10.6	3.2	2.0		3.9	8.0
Overflow Queue (*Q$_3$*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Uniform Delay (*d$_1$*), s/veh	31.3	23.5	12.0	41.2	20.0	20.0	53.8	48.8	48.1		55.6	58.0
Incremental Delay (*d$_2$*), s/veh	5.0	2.3	3.3	0.3	1.5	1.5	38.4	0.9	0.8		7.5	72.3
Initial Queue Delay (*d$_3$*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh	36.3	25.8	15.3	41.5	21.4	21.5	92.2	49.7	48.8		63.0	130.2
Level of Service (LOS)	D	C	B	D	C	C	F	D	D		E	F
Approach Delay, s/veh / LOS	24.9	C		22.9	C		74.2	E		101.6	F	
Intersection Delay, s/veh / LOS	37.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.5	B	2.3	B	2.9	C	3.1	C
Bicycle LOS Score / LOS	2.0	A	1.1	A	1.2	A	0.9	A

HCS 2010 Signalized Intersection Results Summary

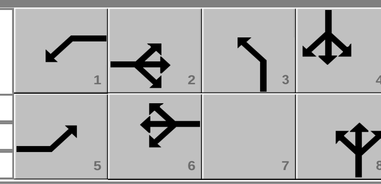
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Jul 30, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.90
Intersection	River Dr. / 1st Ave. N	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	18_RiverDr_1stAveN_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	165	808	392	78	1230	23	660	109	115	32	114	386

Signal Information			
Cycle, s	165.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	4.5	51.0	7.5	28.0	45.0	0.0
Yellow	3.0	3.2	3.0	3.2	3.2	0.0
Red	2.5	2.8	2.5	2.8	2.8	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6		8		4
Case Number	1.3	3.0	1.2	4.0		9.0		11.0
Phase Duration, s	13.0	70.0	10.0	67.0		51.0		34.0
Change Period, *(Y+R$_c$)*, s	6.0	6.0	5.5	6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	3.2	0.0	3.2	0.0		4.2		4.4
Queue Clearance Time *(g_s)*, s	9.0		6.5			47.0		30.0
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	183	898	436	87	698	694	733	121	128		162	429
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1618	1396	1619	1700	1687	1619	1683	1426		1665	1415
Queue Service Time (*g_s*), s	7.0	38.8	45.8	4.5	61.0	61.0	45.0	9.3	11.8		14.8	28.0
Cycle Queue Clearance Time (*g_c*), s	7.0	38.8	45.8	4.5	61.0	61.0	45.0	9.3	11.8		14.8	28.0
Capacity (*c*), veh/h	112	1255	542	119	628	624	442	459	389		283	240
Volume-to-Capacity Ratio *(X)*	1.632	0.715	0.804	0.730	1.111	1.113	1.661	0.264	0.328		0.574	1.787
Available Capacity (*c_a*), veh/h	112	1255	542	119	628	624	442	459	389		283	240
Back of Queue (*Q*), veh/ln (50th percentile)	14.8	16.2	17.7	2.3	38.2	38.0	56.2	4.0	4.3		6.5	30.3
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Uniform Delay (*d_1*), s/veh	77.6	42.8	44.9	52.2	52.0	52.0	60.0	47.0	47.9		63.0	23.4
Incremental Delay (*d_2*), s/veh	321.1	3.5	12.0	18.0	70.3	71.0	307.3	0.3	0.5		2.8	370.2
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Control Delay (*d*), s/veh	398.8	46.3	56.9	70.1	122.3	123.0	367.3	47.3	48.4		65.8	393.6
Level of Service (LOS)	F	D	E	E	F	F	F	D	D		E	F
Approach Delay, s/veh / LOS	91.9		F	119.6		F	286.3		F	303.6		F
Intersection Delay, s/veh / LOS	170.1						F					

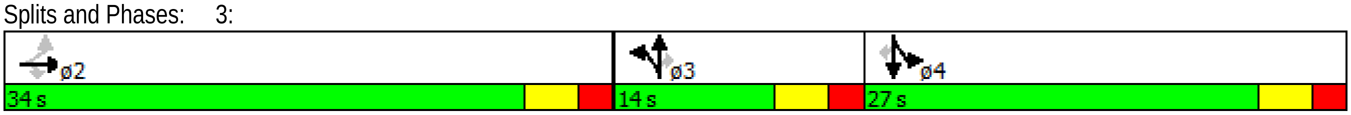
Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	2.9	C	3.1	C
Bicycle LOS Score / LOS	1.7	A	1.7	A	2.1	B	1.5	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	564	214	0	0	0	116	22	19	16	68	364
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.996					0.950	0.967		0.950		
Satd. Flow (prot)	0	3154	1417	0	0	0	1504	1531	1417	1583	1667	1417
Flt Permitted		0.996					0.950	0.967		0.950		
Satd. Flow (perm)	0	3154	1417	0	0	0	1504	1531	1417	1583	1667	1417
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			334						102			568
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1038			1127			1081			976	
Travel Time (s)		23.6			25.6			24.6			22.2	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Growth Factor	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	72	880	334	0	0	0	181	34	30	25	106	568
Shared Lane Traffic (%)							41%					
Lane Group Flow (vph)	0	952	334	0	0	0	107	108	30	25	106	568
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1				1	2	1	1	2	1
Detector Template	Left	Thru	Right				Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20				20	100	20	20	100	20
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0				0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20				20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94						94			94	
Detector 2 Size(ft)		6						6			6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm				Split	NA	Perm	Split	NA	Perm
Protected Phases		2					3	3		4	4	
Permitted Phases	2		2						3			4
Detector Phase	2	2	2				3	3	3	4	4	4
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0				7.0	7.0	7.0	7.0	7.0	7.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	21.0	21.0	21.0				12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	34.0	34.0	34.0				14.0	14.0	14.0	27.0	27.0	27.0
Total Split (%)	45.3%	45.3%	45.3%				18.7%	18.7%	18.7%	36.0%	36.0%	36.0%
Maximum Green (s)	29.0	29.0	29.0				9.0	9.0	9.0	22.0	22.0	22.0
Yellow Time (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0				2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0				5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max				None	None	None	None	None	None
Walk Time (s)	5.0	5.0	5.0				5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0				11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	2	2	2				3	3	3	0	0	0
Act Effct Green (s)		30.0	30.0				9.7	9.7	9.7	12.3	12.3	12.3
Actuated g/C Ratio		0.47	0.47				0.15	0.15	0.15	0.19	0.19	0.19
v/c Ratio		0.65	0.40				0.47	0.47	0.10	0.08	0.33	0.78
Control Delay		19.0	3.8				34.8	34.5	0.7	22.8	26.5	10.9
Queue Delay		0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		19.0	3.8				34.8	34.5	0.7	22.8	26.5	10.9
LOS		B	A				C	C	A	C	C	B
Approach Delay		15.1						30.5			13.7	
Approach LOS		B						C			B	
90th %ile Green (s)	29.0	29.0	29.0				16.0	16.0	16.0	22.0	22.0	22.0
90th %ile Term Code	MaxR	MaxR	MaxR				Ped	Ped	Ped	Max	Max	Max
70th %ile Green (s)	29.0	29.0	29.0				9.0	9.0	9.0	14.8	14.8	14.8
70th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Gap	Gap	Gap
50th %ile Green (s)	29.0	29.0	29.0				9.0	9.0	9.0	11.2	11.2	11.2
50th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Gap	Gap	Gap
30th %ile Green (s)	29.0	29.0	29.0				8.4	8.4	8.4	8.8	8.8	8.8
30th %ile Term Code	MaxR	MaxR	MaxR				Gap	Gap	Gap	Gap	Gap	Gap
10th %ile Green (s)	29.0	29.0	29.0				0.0	0.0	0.0	7.0	7.0	7.0
10th %ile Term Code	MaxR	MaxR	MaxR				Skip	Skip	Skip	Min	Min	Min
Stops (vph)		505	25				69	70	0	17	62	56
Fuel Used(gal)		11	2				2	2	0	0	1	4
CO Emissions (g/hr)		792	165				113	115	13	23	97	314
NOx Emissions (g/hr)		154	32				22	22	3	4	19	61
VOC Emissions (g/hr)		184	38				26	27	3	5	22	73
Dilemma Vehicles (#)		0	0				0	0	0	0	0	0
Queue Length 50th (ft)		145	0				41	42	0	8	37	0
Queue Length 95th (ft)		239	23				81	82	0	23	68	21
Internal Link Dist (ft)		958			1047			1001			896	
Turn Bay Length (ft)												
Base Capacity (vph)		1474	840				243	248	315	561	591	869
Starvation Cap Reductn		0	0				0	0	0	0	0	0
Spillback Cap Reductn		0	0				0	0	0	0	0	0
Storage Cap Reductn		0	0				0	0	0	0	0	0
Reduced v/c Ratio		0.65	0.40				0.44	0.44	0.10	0.04	0.18	0.65

Intersection Summary	
Area Type: Other	
Cycle Length: 75	
Actuated Cycle Length: 64.2	
Natural Cycle: 60	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 46.3%	ICU Level of Service A
Analysis Period (min) 15	
90th %ile Actuated Cycle: 82	
70th %ile Actuated Cycle: 67.8	
50th %ile Actuated Cycle: 64.2	
30th %ile Actuated Cycle: 61.2	
10th %ile Actuated Cycle: 46	

Splits and Phases: 3:



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	617	174	0	0	0	432	20	51	9	43	526
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt			0.850						0.850			0.850
Flt Protected		0.996					0.950	0.956		0.950		
Satd. Flow (prot)	0	3154	1417	0	0	0	1504	1514	1417	1583	1667	1417
Flt Permitted		0.996					0.950	0.956		0.950		
Satd. Flow (perm)	0	3154	1417	0	0	0	1504	1514	1417	1583	1667	1417
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214						102			648
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1038			1127			1081			976	
Travel Time (s)		23.6			25.6			24.6			22.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%	117%
Adj. Flow (vph)	74	760	214	0	0	0	532	25	63	11	53	648
Shared Lane Traffic (%)							48%					
Lane Group Flow (vph)	0	834	214	0	0	0	277	280	63	11	53	648
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1				1	2	1	1	2	1
Detector Template	Left	Thru	Right				Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20				20	100	20	20	100	20
Trailing Detector (ft)	0	0	0				0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0				0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20				20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94						94			94	
Detector 2 Size(ft)		6						6			6	
Detector 2 Type		Cl+Ex						Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0						0.0			0.0	
Turn Type	Perm	NA	Perm				Split	NA	Perm	Split	NA	Perm
Protected Phases		2					3	3		4	4	
Permitted Phases	2		2						3			4
Detector Phase	2	2	2				3	3	3	4	4	4
Switch Phase												
Minimum Initial (s)	15.0	15.0	15.0				7.0	7.0	7.0	7.0	7.0	7.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	21.0	21.0	21.0				12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	29.0	29.0	29.0				22.0	22.0	22.0	24.0	24.0	24.0
Total Split (%)	38.7%	38.7%	38.7%				29.3%	29.3%	29.3%	32.0%	32.0%	32.0%
Maximum Green (s)	24.0	24.0	24.0				17.0	17.0	17.0	19.0	19.0	19.0
Yellow Time (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0				2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0				5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Max	Max	Max				None	None	None	None	None	None
Walk Time (s)	5.0	5.0	5.0				5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0				11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	7	7	7				2	2	2	2	2	2
Act Effct Green (s)		24.2	24.2				15.8	15.8	15.8	11.7	11.7	11.7
Actuated g/C Ratio		0.36	0.36				0.24	0.24	0.24	0.18	0.18	0.18
v/c Ratio		0.73	0.33				0.78	0.78	0.15	0.04	0.18	0.83
Control Delay		24.8	4.7				42.8	42.9	3.0	22.2	24.5	12.9
Queue Delay		0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		24.8	4.7				42.8	42.9	3.0	22.2	24.5	12.9
LOS		C	A				D	D	A	C	C	B
Approach Delay		20.7						38.8			13.9	
Approach LOS		C						D			B	
90th %ile Green (s)	24.0	24.0	24.0				17.0	17.0	17.0	19.0	19.0	19.0
90th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Max	Max	Max
70th %ile Green (s)	24.0	24.0	24.0				17.0	17.0	17.0	17.4	17.4	17.4
70th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Gap	Gap	Gap
50th %ile Green (s)	24.0	24.0	24.0				17.0	17.0	17.0	9.4	9.4	9.4
50th %ile Term Code	MaxR	MaxR	MaxR				Max	Max	Max	Gap	Gap	Gap
30th %ile Green (s)	24.0	24.0	24.0				16.3	16.3	16.3	7.4	7.4	7.4
30th %ile Term Code	MaxR	MaxR	MaxR				Gap	Gap	Gap	Gap	Gap	Gap
10th %ile Green (s)	24.0	24.0	24.0				11.6	11.6	11.6	7.0	7.0	7.0
10th %ile Term Code	MaxR	MaxR	MaxR				Gap	Gap	Gap	Min	Min	Min
Stops (vph)		637	26				218	220	5	10	41	76
Fuel Used(gal)		14	2				6	6	1	0	1	7
CO Emissions (g/hr)		973	138				399	404	40	12	60	470
NOx Emissions (g/hr)		189	27				78	79	8	2	12	91
VOC Emissions (g/hr)		226	32				93	94	9	3	14	109
Dilemma Vehicles (#)		0	0				0	0	0	0	0	0
Queue Length 50th (ft)		146	0				105	106	0	4	19	0
Queue Length 95th (ft)		#281	44				#258	#262	13	16	46	#104
Internal Link Dist (ft)		958			1047			1001			896	
Turn Bay Length (ft)												
Base Capacity (vph)		1144	650				386	388	439	454	478	868
Starvation Cap Reductn		0	0				0	0	0	0	0	0
Spillback Cap Reductn		0	0				0	0	0	0	0	0
Storage Cap Reductn		0	0				0	0	0	0	0	0
Reduced v/c Ratio		0.73	0.33				0.72	0.72	0.14	0.02	0.11	0.75

Intersection Summary	
Area Type: Other	
Cycle Length: 75	
Actuated Cycle Length: 66.8	
Natural Cycle: 55	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay: 23.4	Intersection LOS: C
Intersection Capacity Utilization 67.3%	ICU Level of Service C
Analysis Period (min) 15	
90th %ile Actuated Cycle: 75	
70th %ile Actuated Cycle: 73.4	
50th %ile Actuated Cycle: 65.4	
30th %ile Actuated Cycle: 62.7	
10th %ile Actuated Cycle: 57.6	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 3:

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	372	18	62	0	0	87
Sign Control	Free		Stop			Stop
Grade	0%		0%			0%
Peak Hour Factor	0.76	0.90	0.71	0.92	0.92	0.75
Hourly flow rate (vph)	489	20	87	0	0	116
Pedestrians	9					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		999	9	1042	989
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		999	9	1042	989
tC, single (s)	4.1		6.5	6.2	7.1	6.5
tC, 2 stage (s)						
tF (s)	2.2		4.0	3.3	3.5	4.0
p0 queue free %	70		49	100	100	33
cM capacity (veh/h)	1623		170	1065	97	172

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	326	183	87	116
Volume Left	326	163	0	0
Volume Right	0	20	0	0
cSH	1623	1623	170	172
Volume to Capacity	0.30	0.30	0.51	0.67
Queue Length 95th (ft)	32	32	64	99
Control Delay (s)	8.2	7.6	46.6	60.7
Lane LOS	A	A	E	F
Approach Delay (s)	7.9		46.6	60.7
Approach LOS			E	F

Intersection Summary			
Average Delay	21.3		
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	558	25	79	0	0	100
Sign Control	Free		Stop			Stop
Grade	0%		0%			0%
Peak Hour Factor	0.89	0.62	0.82	0.92	0.92	0.83
Hourly flow rate (vph)	627	40	96	0	0	120
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		1294	2	1324	1274
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		1294	2	1324	1274
tC, single (s)	4.1		6.5	6.2	7.1	6.5
tC, 2 stage (s)						
tF (s)	2.2		4.0	3.3	3.5	4.0
p0 queue free %	61		3	100	100	0
cM capacity (veh/h)	1623		100	1080	12	103

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	418	249	96	120
Volume Left	418	209	0	0
Volume Right	0	40	0	0
cSH	1623	1623	100	103
Volume to Capacity	0.39	0.39	0.97	1.17
Queue Length 95th (ft)	47	47	145	198
Control Delay (s)	8.6	7.8	159.0	221.3
Lane LOS	A	A	F	F
Approach Delay (s)	8.3		159.0	221.3
Approach LOS			F	F

Intersection Summary			
Average Delay	53.7		
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*River Dr. S / 3rd Ave. S*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*7/1/2013*	Analysis Year	*2013 - Existing*
Analysis Time Period	*AM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *3rd Avenue South*	North/South Street: *River Drive South*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*183*	*47*	*115*	*267*	
Peak-Hour Factor, PHF	*1.00*	*0.70*	*0.73*	*0.70*	*0.87*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*261*	*64*	*164*	*306*	*0*
Percent Heavy Vehicles	*0*	--	--	*1*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration			*TR*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*11*		*104*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.69*	*1.00*	*0.79*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*15*	*0*	*131*
Percent Heavy Vehicles	*0*	*0*	*0*	*18*	*0*	*3*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*		*LR*				
v (veh/h)		*164*		*146*				
C (m) (veh/h)		*1240*		*611*				
v/c		*0.13*		*0.24*				
95% queue length		*0.46*		*0.93*				
Control Delay (s/veh)		*8.3*		*12.7*				
LOS		*A*		*B*				
Approach Delay (s/veh)	--	--	*12.7*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*River Dr. S / 3rd Ave. S*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*7/1/2013*	Analysis Year	*2013 - Existing*
Analysis Time Period	*PM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *3rd Avenue South* | North/South Street: *River Drive South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		161	33	79	331	
Peak-Hour Factor, PHF	1.00	0.76	0.69	0.86	0.92	1.00
Hourly Flow Rate, HFR (veh/h)	0	211	47	91	359	0
Percent Heavy Vehicles	0	--	--	1	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration			TR	L	T	
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				61		281
Peak-Hour Factor, PHF	1.00	1.00	1.00	0.59	1.00	0.59
Hourly Flow Rate, HFR (veh/h)	0	0	0	103	0	476
Percent Heavy Vehicles	0	0	0	2	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	0
Configuration					LR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		L		LR				
v (veh/h)		91		579				
C (m) (veh/h)		1293		630				
v/c		0.07		0.92				
95% queue length		0.23		11.89				
Control Delay (s/veh)		8.0		44.4				
LOS		A		E				
Approach Delay (s/veh)	--	--	44.4					
Approach LOS	--	--	E					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*2nd St. S / 3rd Ave. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *3rd Avenue South*	North/South Street: *2nd Street South*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*153*	*157*			*81*	*25*
Peak-Hour Factor, PHF	*0.71*	*0.77*	*1.00*	*1.00*	*0.81*	*0.69*
Hourly Flow Rate, HFR (veh/h)	*215*	*203*	*0*	*0*	*99*	*36*
Percent Heavy Vehicles	*2*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*30*		*98*			
Peak-Hour Factor, PHF	*0.83*	*1.00*	*0.77*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*36*	*0*	*127*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*4*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*215*						*163*	
C (m) (veh/h)	*1449*						*658*	
v/c	*0.15*						*0.25*	
95% queue length	*0.52*						*0.97*	
Control Delay (s/veh)	*7.9*						*12.3*	
LOS	*A*						*B*	
Approach Delay (s/veh)	--	--				*12.3*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*2nd St. S / 3rd Ave. S*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*7/1/2013*	Analysis Year	*2013 - Existing*
Analysis Time Period	*PM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*	
East/West Street: *3rd Avenue South*	North/South Street: *2nd Street South*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*286*	*170*			*219*	*45*
Peak-Hour Factor, PHF	*0.78*	*0.71*	*1.00*	*1.00*	*0.91*	*0.66*
Hourly Flow Rate, HFR (veh/h)	*366*	*239*	*0*	*0*	*240*	*68*
Percent Heavy Vehicles	*1*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*39*		*114*			
Peak-Hour Factor, PHF	*0.89*	*1.00*	*0.77*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*43*	*0*	*148*	*0*	*0*	*0*
Percent Heavy Vehicles	*3*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration		*LR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*366*						*191*	
C (m) (veh/h)	*1254*						*371*	
v/c	*0.29*						*0.51*	
95% queue length	*1.22*						*2.83*	
Control Delay (s/veh)	*9.0*						*24.6*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--				*24.6*		
Approach LOS	--	--				*C*		

 HCS+™ Version 5.6 Generated: 7/1/2013 4:10 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Fox Farm Rd. / 18th Ave. SW*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *18th Avenue SW* North/South Street: *Fox Farm Road*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*602*	*1*	*4*	*165*	*52*
Peak-Hour Factor, PHF	*0.31*	*0.71*	*0.25*	*0.50*	*0.88*	*0.65*
Hourly Flow Rate, HFR (veh/h)	*16*	*847*	*4*	*8*	*187*	*80*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*1*	*1*	*0*
Configuration	*LTR*			*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*195*	*4*	*12*	*2*	*2*	*13*
Peak-Hour Factor, PHF	*0.81*	*0.50*	*0.75*	*0.50*	*0.50*	*0.54*
Hourly Flow Rate, HFR (veh/h)	*240*	*8*	*16*	*4*	*4*	*24*
Percent Heavy Vehicles	*1*	*0*	*8*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*L*		*LTR*			*LTR*	
v (veh/h)	*16*	*8*		*32*			*264*	
C (m) (veh/h)	*1304*	*796*		*288*			*169*	
v/c	*0.01*	*0.01*		*0.11*			*1.56*	
95% queue length	*0.04*	*0.03*		*0.37*			*17.52*	
Control Delay (s/veh)	*7.8*	*9.6*		*19.1*			*328.8*	
LOS	*A*	*A*		*C*			*F*	
Approach Delay (s/veh)	--	--		*19.1*			*328.8*	
Approach LOS	--	--		*C*			*F*	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Fox Farm Rd. / 18th Ave. SW*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *18th Avenue SW* North/South Street: *Fox Farm Road*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	3	310	0	13	612	167
Peak-Hour Factor, PHF	0.75	0.83	0.25	0.54	0.92	0.84
Hourly Flow Rate, HFR (veh/h)	4	373	0	24	665	198
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	1	1	0
Configuration	LTR			L		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	76	3	6	0	0	3
Peak-Hour Factor, PHF	0.79	0.38	0.50	0.25	0.25	0.38
Hourly Flow Rate, HFR (veh/h)	96	7	12	0	0	7
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	L		LTR			LTR	
v (veh/h)	4	24		7			115	
C (m) (veh/h)	788	1193		673			171	
v/c	0.01	0.02		0.01			0.67	
95% queue length	0.02	0.06		0.03			3.94	
Control Delay (s/veh)	9.6	8.1		10.4			61.0	
LOS	A	A		B			F	
Approach Delay (s/veh)	--	--		10.4			61.0	
Approach LOS	--	--		B			F	

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Fox Farm Rd. / Park Garden Rd.*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Park Garden Road* | North/South Street: *Fox Farm Road*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	13	415	1	11	104	30
Peak-Hour Factor, PHF	0.81	0.79	0.25	0.31	0.59	0.75
Hourly Flow Rate, HFR (veh/h)	16	525	4	35	176	40
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	102	3	5	1	8	36
Peak-Hour Factor, PHF	0.75	0.75	0.63	0.25	0.40	0.53
Hourly Flow Rate, HFR (veh/h)	136	4	7	4	19	67
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	35		90			147	
C (m) (veh/h)	1343	1047		441			222	
v/c	0.01	0.03		0.20			0.66	
95% queue length	0.04	0.10		0.76			4.09	
Control Delay (s/veh)	7.7	8.6		15.2			48.2	
LOS	A	A		C			E	
Approach Delay (s/veh)	--	--	15.2			48.2		
Approach LOS	--	--	C			E		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/18/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Fox Farm Rd. / Park Garden Rd.*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Park Garden Road* | North/South Street: *Fox Farm Road*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	18	195	5	46	391	130
Peak-Hour Factor, PHF	0.75	0.73	0.31	0.72	0.84	0.77
Hourly Flow Rate, HFR (veh/h)	24	267	16	63	465	168
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	69	6	25	6	8	27
Peak-Hour Factor, PHF	0.75	0.50	0.69	0.50	0.40	0.68
Hourly Flow Rate, HFR (veh/h)	92	12	36	12	19	39
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	24	63		70			140	
C (m) (veh/h)	958	1287		321			213	
v/c	0.03	0.05		0.22			0.66	
95% queue length	0.08	0.15		0.82			4.00	
Control Delay (s/veh)	8.9	7.9		19.3			49.4	
LOS	A	A		C			E	
Approach Delay (s/veh)	--	--	19.3			49.4		
Approach LOS	--	--	C			E		

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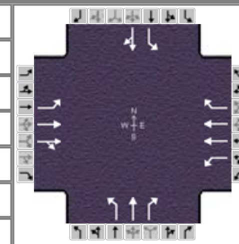
HCS 2010 Signalized Intersection Results Summary

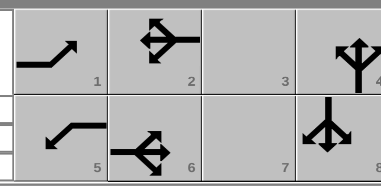
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 1, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	10th Ave. S / 2nd St.	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_2ndSt_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	107	1275	0	25	587	230	44	3	210	69	3	33

Signal Information			
Cycle, s	130.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.7	1.0	80.0	25.5	0.0	0.0
Yellow	3.6	0.0	3.6	4.0	0.0	0.0
Red	1.7	0.0	2.4	2.5	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	4.0	1.1	3.0		5.0		6.0
Phase Duration, s	12.0	87.0	11.0	86.0		32.0		32.0
Change Period, *(Y+R$_c$)*, s	6.3	6.0	5.3	6.0		6.5		6.5
Max Allow Headway *(MAH)*, s	4.1	0.0	1.1	0.0		4.4		4.4
Queue Clearance Time *(g_s)*, s	5.4		2.8			22.1		9.4
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0		0.5		1.4
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		0.00			1.00		0.01

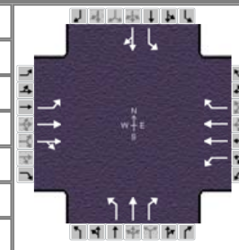
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (*v*), veh/h	116	1386	0	27	638	250	48	3	228	75	39	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1603	1650	0	1619	1571	1441	1311	1700	1412	1167	1459	
Queue Service Time (g_s), s	3.4	35.5	0.0	0.8	12.7	10.5	4.1	0.2	20.1	7.2	2.9	
Cycle Queue Clearance Time (g_c), s	3.4	35.5	0.0	0.8	12.7	10.5	6.9	0.2	20.1	7.4	2.9	
Capacity (*c*), veh/h	451	2057		265	1934	887	284	333	277	283	286	
Volume-to-Capacity Ratio *(X)*	0.258	0.674	0.000	0.102	0.330	0.282	0.169	0.010	0.824	0.265	0.137	
Available Capacity (c_a), veh/h	451	2057		265	1934	887	284	333	277	283	286	
Back of Queue (*Q*), veh/ln (50th percentile)	1.1	13.0		0.3	4.4	3.5	1.3	0.1	8.4	2.1	1.1	
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	8.7	15.9		12.6	12.1	11.6	46.0	42.1	50.1	45.1	43.2	
Incremental Delay (d_2), s/veh	0.3	1.8	0.0	0.1	0.5	0.8	0.3	0.0	17.9	0.5	0.2	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (*d*), s/veh	9.0	17.7		12.6	12.5	12.4	46.3	42.1	68.0	45.6	43.4	
Level of Service (LOS)	A	B		B	B	B	D	D	E	D	D	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	17.0	B	12.5	B	64.0	E	44.8	D
Intersection Delay, s/veh / LOS	21.4				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.2	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	1.7	A	1.2	A	0.9	A	0.7	A

HCS 2010 Signalized Intersection Results Summary

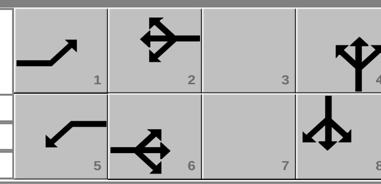
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 1, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	10th Ave. S / 2nd St.	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_2ndSt_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	56	1139	0	63	1819	324	65	3	222	182	17	243

Signal Information			
Cycle, s	135.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.7	5.7	78.0	21.5	0.0	0.0
Yellow	3.6	3.0	3.6	4.0	0.0	0.0
Red	1.7	3.3	2.4	2.5	0.0	0.0



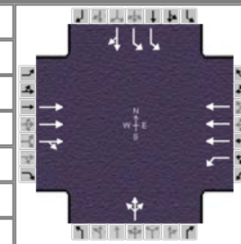
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		4		8
Case Number	1.1	4.0	1.1	3.0		5.0		6.0
Phase Duration, s	23.0	96.0	11.0	84.0		28.0		28.0
Change Period, ($Y+R_c$), s	6.3	6.0	5.3	6.0		6.5		6.5
Max Allow Headway (MAH), s	4.1	0.0	1.1	0.0		4.5		4.5
Queue Clearance Time (g_s), s	3.0		4.3			23.5		23.5
Green Extension Time (g_e), s	0.1	0.0	0.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		0.46			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14	3	8	18
Adjusted Flow Rate (v), veh/h	61	1238	0	68	1977	352	71	3	241	198	283	
Adjusted Saturation Flow Rate (s), veh/h/ln	1619	1667	0	1587	1602	1441	1081	1700	1421	1142	1455	
Queue Service Time (g_s), s	1.0	26.6	0.0	2.3	78.0	18.4	0.0	0.2	21.5	21.3	21.5	
Cycle Queue Clearance Time (g_c), s	1.0	26.6	0.0	2.3	78.0	18.4	21.5	0.2	21.5	21.5	21.5	
Capacity (c), veh/h	254	2222		331	1852	832	53	271	226	233	232	
Volume-to-Capacity Ratio (X)	0.240	0.557	0.000	0.207	1.068	0.423	1.325	0.012	1.066	0.848	1.219	
Available Capacity (c_a), veh/h	254	2222		331	1852	832	53	271	226	233	232	
Back of Queue (Q), veh/ln (50th percentile)	1.4	9.5		0.8	38.6	6.3	5.3	0.1	12.6	8.4	16.3	
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Queue Storage Ratio (RQ) (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Uniform Delay (d_1), s/veh	34.0	11.9		11.1	28.5	15.9	67.5	47.8	56.8	57.8	56.8	
Incremental Delay (d_2), s/veh	0.5	1.0	0.0	0.1	41.7	1.6	232.6	0.0	78.4	24.2	131.2	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	34.5	12.9		11.2	70.2	17.5	300.1	47.8	135.1	82.0	188.0	
Level of Service (LOS)	C	B		B	F	B	F	D	F	F	F	
Approach Delay, s/veh / LOS	14.0	B		60.8	E		171.2	F		144.3	F	
Intersection Delay, s/veh / LOS	63.9						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.4	B	2.3	B	3.0	C	2.9	C
Bicycle LOS Score / LOS	1.6	A	2.5	B	1.0	A	1.3	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 7, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.88
Intersection	10th Ave. S / 5th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_5thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1560	19	16	1054		48	0	22	120	37	58

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	82.0	11.0	9.0	0.0	0.0	0.0
Yellow	3.6	3.1	3.0	0.0	0.0	0.0
Red	2.4	2.9	3.0	0.0	0.0	0.0

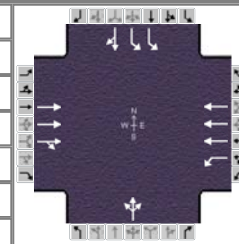
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		6.0		12.0		10.0
Phase Duration, s		88.0		88.0		15.0		17.0
Change Period, *(Y+R$_c$)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.2		4.2
Queue Clearance Time *(g$_s$)*, s						8.0		10.8
Green Extension Time *(g$_e$)*, s		0.0		0.0		0.0		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		1199	596	18	1198			80		136	108	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1650	1640	267	1484			1556		1456	1451	
Queue Service Time (*g$_s$*), s		21.7	21.7	4.4	14.0			6.0		5.4	8.8	
Cycle Queue Clearance Time (*g$_c$*), s		21.7	21.7	26.0	14.0			6.0		5.4	8.8	
Capacity (*c*), veh/h		2256	1121	194	3043			117		267	133	
Volume-to-Capacity Ratio *(X)*		0.531	0.532	0.094	0.394			0.681		0.511	0.812	
Available Capacity (*c$_a$*), veh/h		2256	1121	194	3043			117		267	133	
Back of Queue (*Q*), veh/ln (50th percentile)		7.3	7.5	0.3	4.2			2.8		2.0	4.3	
Overflow Queue (*Q$_3$*), veh/ln		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	
Uniform Delay (*d$_1$*), s/veh		9.4	9.4	15.9	8.2			54.1		51.9	53.5	
Incremental Delay (*d$_2$*), s/veh		0.9	1.8	1.0	0.4			15.0		1.6	30.3	
Initial Queue Delay (*d$_3$*), s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Control Delay (*d*), s/veh		10.3	11.3	16.9	8.6			69.1		53.6	83.8	
Level of Service (LOS)		B	B	B	A			E		D	F	
Approach Delay, s/veh / LOS	10.6		B	8.7		A	69.1		E	66.9		E
Intersection Delay, s/veh / LOS	15.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.3	C	3.2	C
Bicycle LOS Score / LOS	1.5	A	1.2	A	0.6	A	0.9	A

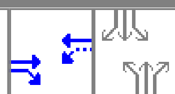
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 7, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.90
Intersection	10th Ave. S / 5th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_5thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				

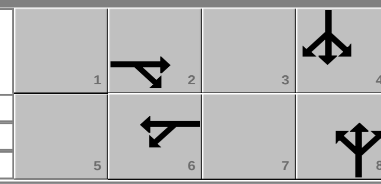


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1589	27	35	1917		167	0	53	259	51	136

Signal Information				
Cycle, s	120.0	Reference Phase	2	
Offset, s	0	Reference Point	End	
Uncoordinated	No	Simult. Gap E/W	On	
Force Mode	Fixed	Simult. Gap N/S	On	



Green	68.0	16.0	18.0	0.0	0.0	0.0
Yellow	3.6	3.1	3.0	0.0	0.0	0.0
Red	2.4	2.9	3.0	0.0	0.0	0.0



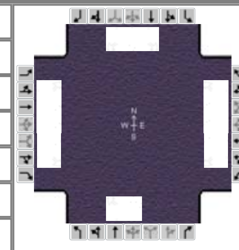
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		6.0		12.0		10.0
Phase Duration, s		74.0		74.0		24.0		22.0
Change Period, *(Y+R$_c$)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.2		4.2
Queue Clearance Time *(g$_s$)*, s						20.0		18.0
Green Extension Time *(g$_e$)*, s		0.0		0.0		0.0		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		1200	595	39	2130			244		288	208	
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1683	1668	267	1513			1567		1541	1474	
Queue Service Time (*g$_s$*), s		28.8	28.8	13.8	46.0			18.0		10.7	16.0	
Cycle Queue Clearance Time (*g$_c$*), s		28.8	28.8	42.6	46.0			18.0		10.7	16.0	
Capacity (*c*), veh/h		1908	945	147	2573			235		411	197	
Volume-to-Capacity Ratio *(X)*		0.629	0.630	0.264	0.828			1.040		0.700	1.057	
Available Capacity (*c$_a$*), veh/h		1908	945	147	2573			235		411	197	
Back of Queue (*Q*), veh/ln (50th percentile)		11.0	11.3	1.1	15.9			11.5		4.4	10.2	
Overflow Queue (*Q$_3$*), veh/ln		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	
Uniform Delay (*d$_1$*), s/veh		17.5	17.5	31.9	21.2			51.0		49.7	52.0	
Incremental Delay (*d$_2$*), s/veh		1.6	3.2	4.3	3.2			69.5		5.2	80.2	
Initial Queue Delay (*d$_3$*), s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Control Delay (*d*), s/veh		19.1	20.7	36.2	24.5			120.5		54.9	132.2	
Level of Service (LOS)		B	C	D	C			F		D	F	
Approach Delay, s/veh / LOS	19.6		B	24.7		C	120.5		F	87.3		F
Intersection Delay, s/veh / LOS	34.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.3	C	3.2	C
Bicycle LOS Score / LOS	1.5	A	1.7	A	0.9	A	1.3	A

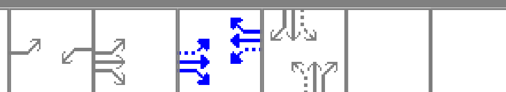
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/1/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.80
Intersection	10th Ave. S / 9th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_9thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

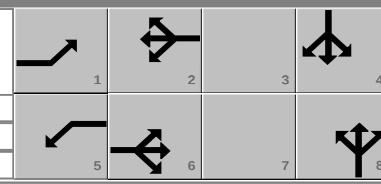


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	128	1437	49	24	1105	162	62	30	18	138	41	96

Signal Information			
Cycle, s	105.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	5.7	3.7	64.0	11.0	0.0	0.0
Yellow	3.7	3.7	3.7	3.0	0.0	0.0
Red	1.6	1.6	2.3	1.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		8		4
Case Number	1.1	3.0	1.1	3.0		6.0		5.0
Phase Duration, s	20.0	79.0	11.0	70.0		15.0		15.0
Change Period, *(Y+R$_c$)*, s	5.3	6.0	5.3	6.0		4.0		4.0
Max Allow Headway *(MAH)*, s	1.1	0.0	1.1	0.0		1.3		1.3
Queue Clearance Time *(g$_s$)*, s	3.7		2.7			11.4		13.0
Green Extension Time *(g$_e$)*, s	0.0	0.0	0.0	0.0		0.0		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		0.00			1.00		1.00

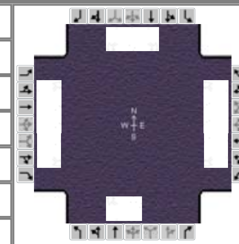
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	160	1796	61	30	1381	203	78	60		173	51	120
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1544	1441	1619	1544	1441	1233	1593		1364	1700	1441
Queue Service Time *(g$_s$)*, s	1.7	20.3	1.4	0.7	17.4	6.7	6.5	3.7		7.3	2.9	8.5
Cycle Queue Clearance Time *(g$_c$)*, s	1.7	20.3	1.4	0.7	17.4	6.7	9.4	3.7		11.0	2.9	8.5
Capacity *(c)*, veh/h	441	3220	1002	283	2823	878	163	167		164	178	151
Volume-to-Capacity Ratio *(X)*	0.363	0.558	0.061	0.106	0.489	0.231	0.474	0.360		1.054	0.288	0.795
Available Capacity *(c$_a$)*, veh/h	441	3220	1002	283	2823	878	163	167		164	178	151
Back of Queue *(Q)*, veh/ln (50th percentile)	1.5	5.8	0.4	0.2	5.6	2.1	2.0	1.5		8.1	1.2	4.0
Overflow Queue *(Q$_3$)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay *(d$_1$)*, s/veh	8.8	8.0	5.1	6.7	11.4	9.3	47.7	43.7		50.4	43.4	45.9
Incremental Delay *(d$_2$)*, s/veh	0.2	0.7	0.1	0.1	0.6	0.6	0.8	0.5		85.4	0.3	23.1
Initial Queue Delay *(d$_3$)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay *(d)*, s/veh	8.9	8.7	5.2	6.8	12.0	9.9	48.5	44.2		135.8	43.7	69.0
Level of Service (LOS)	A	A	A	A	B	A	D	D		F	D	E
Approach Delay, s/veh / LOS	8.6	A		11.7	B		46.6	D		98.7	F	
Intersection Delay, s/veh / LOS	18.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.2	B	2.4	B	3.4	C	3.4	C
Bicycle LOS Score / LOS	1.6	A	1.4	A	0.7	A	1.1	A

 HCS 2010™ Streets Version 6.41 Generated: 9/17/2013 8:50:30 AM

HCS 2010 Signalized Intersection Results Summary

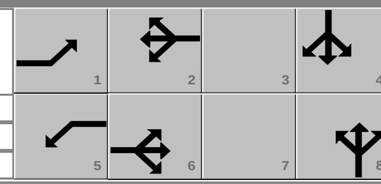
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/1/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.95
Intersection	10th Ave. S / 9th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_9thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	160	1563	133	61	1690	207	185	81	59	325	89	203

Signal Information			
Cycle, s	95.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.7	2.7	42.0	24.0	0.0	0.0
Yellow	3.7	3.7	3.7	3.0	0.0	0.0
Red	1.6	1.6	2.3	1.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		8		4
Case Number	1.1	3.0	1.1	3.0		6.0		5.0
Phase Duration, s	19.0	56.0	11.0	48.0		28.0		28.0
Change Period, $(Y+R_c)$, s	5.3	6.0	5.3	6.0		4.0		4.0
Max Allow Headway *(MAH)*, s	1.1	0.0	1.1	0.0		1.4		1.4
Queue Clearance Time (g_s), s	5.4		4.0			22.7		26.0
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0		0.1		0.0
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.00		0.15			1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	168	1645	140	64	1779	218	195	147		342	94	214
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1603	1513	1426	1619	1513	1441	1078	1580		1260	1700	1426
Queue Service Time (g_s), s	3.4	25.6	4.9	2.0	34.1	9.4	16.6	7.3		16.7	4.1	12.5
Cycle Queue Clearance Time (g_c), s	3.4	25.6	4.9	2.0	34.1	9.4	20.7	7.3		24.0	4.1	12.5
Capacity (*c*), veh/h	325	2389	751	242	2007	637	301	399		297	429	360
Volume-to-Capacity Ratio *(X)*	0.518	0.689	0.186	0.265	0.886	0.342	0.647	0.369		1.151	0.218	0.593
Available Capacity (c_a), veh/h	325	2389	751	242	2007	637	301	399		297	429	360
Back of Queue (*Q*), veh/ln (50th percentile)	2.0	8.4	1.6	0.7	12.5	3.2	4.5	2.7		15.1	1.7	4.4
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh	18.9	16.7	11.8	14.4	24.3	17.4	36.3	29.3		41.3	28.1	31.2
Incremental Delay (d_2), s/veh	0.7	1.6	0.5	0.2	6.2	1.5	3.7	0.2		99.4	0.1	1.8
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh	19.5	18.4	12.4	14.6	30.5	18.9	40.0	29.5		140.7	28.2	33.0
Level of Service (LOS)	B	B	B	B	C	B	D	C		F	C	C
Approach Delay, s/veh / LOS	18.0	B		28.8	C		35.5	D		89.0	F	
Intersection Delay, s/veh / LOS	32.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.4	B	3.4	C	3.4	C
Bicycle LOS Score / LOS	1.6	A	1.6	A	1.1	A	1.6	A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*13th Ave. S / 9th St.S*
Jurisdiction	*Great Falls*
Analysis Year	*Existing - 2013*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *13th Avenue South* North/South Street: *9th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	112	18	28	167	41
Peak-Hour Factor, PHF	0.63	0.70	0.64	0.54	0.67	0.60
Hourly Flow Rate, HFR (veh/h)	7	160	28	51	249	68
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	8	34	6	15	31	18
Peak-Hour Factor, PHF	0.67	0.71	0.75	0.54	0.71	0.56
Hourly Flow Rate, HFR (veh/h)	11	47	8	27	43	32
Percent Heavy Vehicles	0	3	17	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	7	51		102			66	
C (m) (veh/h)	1255	1370		457			409	
v/c	0.01	0.04		0.22			0.16	
95% queue length	0.02	0.12		0.85			0.57	
Control Delay (s/veh)	7.9	7.7		15.1			15.5	
LOS	A	A		C			C	
Approach Delay (s/veh)	--	--	15.1			15.5		
Approach LOS	--	--	C			C		

 *HCS+*TM Version 5.6 Generated: 7/1/2013 3:14 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Trisha Bodlovic*	Intersection	*13th Ave. S / 9th St.S*
Agency/Co.	*Robert Peccia & Associates*	Jurisdiction	*Great Falls*
Date Performed	*7/1/2013*	Analysis Year	*Existing - 2013*
Analysis Time Period	*PM Peak Hour*		

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *13th Avenue South*	North/South Street: *9th Street South*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	13	181	35	64	115	82
Peak-Hour Factor, PHF	0.81	0.91	0.80	0.62	0.87	0.82
Hourly Flow Rate, HFR (veh/h)	16	198	43	103	132	100
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	27	69	10	14	87	42
Peak-Hour Factor, PHF	0.68	0.82	0.50	0.58	0.78	0.70
Hourly Flow Rate, HFR (veh/h)	39	84	20	24	111	60
Percent Heavy Vehicles	4	0	0	0	1	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

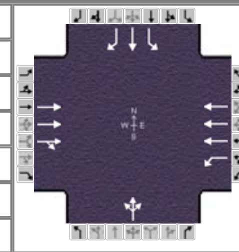
Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	16	103		195			143	
C (m) (veh/h)	1348	1319		389			317	
v/c	0.01	0.08		0.50			0.45	
95% queue length	0.04	0.25		2.71			2.24	
Control Delay (s/veh)	7.7	8.0		23.2			25.4	
LOS	A	A		C			D	
Approach Delay (s/veh)	--	--	23.2			25.4		
Approach LOS	--	--	C			D		

 HCS+TM Version 5.6 Generated: 7/1/2013 3:27 PM

HCS 2010 Signalized Intersection Results Summary

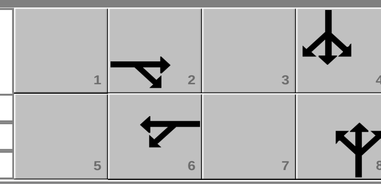
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/8/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.82
Intersection	10th Ave. S / 14th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_14thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1204	29	22	1240		7	0	9	157	97	177

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	58.0	18.0	6.0	0.0	0.0	0.0
Yellow	3.6	3.1	3.0	0.0	0.0	0.0
Red	2.4	2.9	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		6.0		12.0		9.0
Phase Duration, s		64.0		64.0		12.0		24.0
Change Period, *(Y+Rc)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		3.3		3.2
Queue Clearance Time *(gs)*, s						3.2		17.1
Green Extension Time *(ge)*, s		0.0		0.0		0.0		0.1
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

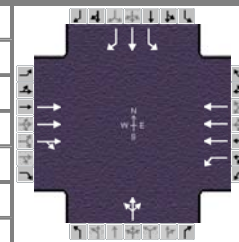
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h		1007	497	27	1512			20		191	118	216
Adjusted Saturation Flow Rate *(s)*, veh/h/ln		1650	1629	354	1499			1509		1619	1683	1385
Queue Service Time *(gs)*, s		18.4	18.4	5.0	21.3			1.2		11.0	6.2	15.1
Cycle Queue Clearance Time *(gc)*, s		18.4	18.4	23.4	21.3			1.2		11.0	6.2	15.1
Capacity *(c)*, veh/h		1915	945	212	2608			91		291	303	249
Volume-to-Capacity Ratio *(X)*		0.526	0.526	0.126	0.580			0.215		0.657	0.390	0.866
Available Capacity *(ca)*, veh/h		1915	945	212	2608			91		291	303	249
Back of Queue *(Q)*, veh/ln (50th percentile)		6.5	6.7	0.5	6.7			0.5		4.6	2.5	6.7
Overflow Queue *(Q3)*, veh/ln		0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	0.00
Uniform Delay *(d1)*, s/veh		12.7	12.7	19.8	13.3			44.8		38.1	36.2	39.8
Incremental Delay *(d2)*, s/veh		1.0	2.1	1.2	0.9			0.4		4.2	0.3	24.8
Initial Queue Delay *(d3)*, s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Control Delay *(d)*, s/veh		13.7	14.8	21.0	14.2			45.2		42.4	36.5	64.7
Level of Service (LOS)		B	B	C	B			D		D	D	E
Approach Delay, s/veh / LOS	14.1	B		14.4	B		45.2	D		50.2	D	
Intersection Delay, s/veh / LOS	19.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.3	C	3.2	C
Bicycle LOS Score / LOS	1.3	A	1.3	A	0.5	A	1.4	A

 HCS 2010™ Streets Version 6.41 Generated: 9/17/2013 8:58:32 AM

HCS 2010 Signalized Intersection Results Summary

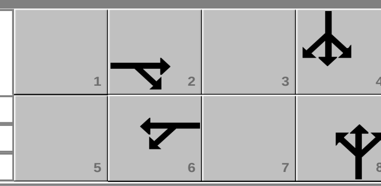
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/8/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.95
Intersection	10th Ave. S / 14th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_14thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		1780	41	28	1683		33	0	35	263	160	224

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	49.0	17.0	6.0	0.0	0.0	0.0
Yellow	3.6	3.1	3.0	0.0	0.0	0.0
Red	2.4	2.9	3.0	0.0	0.0	0.0



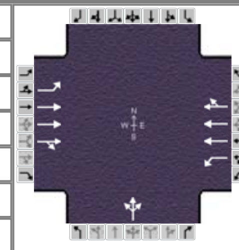
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		6.0		12.0		9.0
Phase Duration, s		55.0		55.0		12.0		23.0
Change Period, $(Y+R_c)$, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.3		4.2
Queue Clearance Time (g_s), s						6.1		17.1
Green Extension Time (g_e), s		0.0		0.0		0.0		0.0
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h		1283	634	29	1772			72		277	168	236
Adjusted Saturation Flow Rate (s), veh/h/ln		1683	1662	237	1499			1522		1619	1650	1390
Queue Service Time (g_s), s		25.2	25.3	9.4	26.7			4.1		15.1	8.3	14.9
Cycle Queue Clearance Time (g_c), s		25.2	25.3	34.7	26.7			4.1		15.1	8.3	14.9
Capacity (c), veh/h		1833	905	143	2448			101		306	312	263
Volume-to-Capacity Ratio (X)		0.700	0.701	0.207	0.724			0.705		0.905	0.540	0.898
Available Capacity (c_a), veh/h		1833	905	143	2448			101		306	312	263
Back of Queue (Q), veh/ln (50th percentile)		9.1	9.6	0.6	8.5			2.1		8.2	3.4	7.1
Overflow Queue (Q_3), veh/ln		0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Queue Storage Ratio (RQ) (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh		15.1	15.1	27.9	15.4			41.1		35.7	33.0	35.7
Incremental Delay (d_2), s/veh		2.3	4.5	3.3	1.9			19.9		28.6	1.9	30.5
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Control Delay (d), s/veh		17.3	19.6	31.1	17.3			61.0		64.4	34.8	66.2
Level of Service (LOS)		B	B	C	B			E		E	C	E
Approach Delay, s/veh / LOS	18.1	B		17.5	B		61.0	E		57.7	E	
Intersection Delay, s/veh / LOS	24.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.3	C	3.2	C
Bicycle LOS Score / LOS	1.5	A	1.5	A	0.6	A	1.6	A

HCS 2010 Signalized Intersection Results Summary

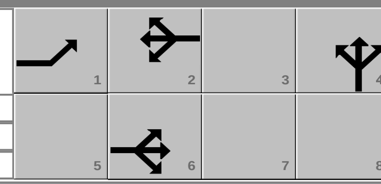
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 8, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.85
Intersection	10th Ave. S / 15th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_15thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	136	1309	10	4	1250	164	23	73	12			

Signal Information				
Cycle, s	115.0	Reference Phase	2	
Offset, s	0	Reference Point	End	
Uncoordinated	No	Simult. Gap E/W	On	
Force Mode	Fixed	Simult. Gap N/S	On	

Green	5.4	81.2	11.6	0.0	0.0	0.0
Yellow	3.6	3.6	3.0	0.0	0.0	0.0
Red	1.2	2.4	3.0	0.0	0.0	0.0



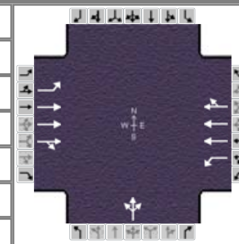
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2		4		
Case Number	1.0	4.0		6.3		12.0		
Phase Duration, s	10.2	97.4		87.2		17.6		
Change Period, *(Y+R*$_c$*)*, s	4.8	6.0		6.0		6.0		
Max Allow Headway *(MAH)*, s	4.1	0.0		0.0		3.1		
Queue Clearance Time *(g*$_s$*)*, s	5.0					10.8		
Green Extension Time *(g*$_e$*)*, s	0.4	0.0		0.0		0.1		
Phase Call Probability	0.99					0.98		
Max Out Probability	0.00					0.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14			
Adjusted Flow Rate (*v*), veh/h	160	1036	516	5	1132	531		127				
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1572	1650	1644	338	1683	1578		1616				
Queue Service Time (*g*$_s$), s	3.0	10.8	10.8	0.5	17.1	17.2		8.8				
Cycle Queue Clearance Time (*g*$_c$), s	3.0	10.8	10.8	1.1	17.1	17.2		8.8				
Capacity (*c*), veh/h	300	2623	1306	300	2377	1114		163				
Volume-to-Capacity Ratio *(X)*	0.533	0.395	0.395	0.016	0.476	0.477		0.778				
Available Capacity (*c*$_a$), veh/h	494	2623	1306	300	2377	1114		281				
Back of Queue (*Q*), veh/ln (50th percentile)	0.9	2.8	2.9	0.0	5.6	5.5		3.7				
Overflow Queue (*Q*$_3$), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0				
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00				
Uniform Delay (*d*$_1$), s/veh	6.9	3.5	3.5	5.2	7.5	7.5		50.4				
Incremental Delay (*d*$_2$), s/veh	1.5	0.4	0.9	0.1	0.7	1.5		3.0				
Initial Queue Delay (*d*$_3$), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0				
Control Delay (*d*), s/veh	8.3	4.0	4.4	5.3	8.2	9.0		53.4				
Level of Service (LOS)	A	A	A	A	A	A		D				
Approach Delay, s/veh / LOS	4.5		A	8.4		A	53.4		D	0.0		
Intersection Delay, s/veh / LOS	8.1						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	1.9	A	3.3	C	3.3	C
Bicycle LOS Score / LOS	1.4	A	1.4	A	0.7	A		

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 8, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.97
Intersection	10th Ave. S / 15th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_15thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	261	1890	46	23	1698	290	47	165	13			

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	11.7	55.1	16.4	0.0	0.0	0.0
Yellow	3.6	3.6	3.0	0.0	0.0	0.0
Red	1.2	2.4	3.0	0.0	0.0	0.0

1 2 3 4 5 6 7 8

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2		4		
Case Number	1.0	4.0		6.3		12.0		
Phase Duration, s	16.5	77.6		61.1		22.4		
Change Period, *(Y+R$_c$)*, s	4.8	6.0		6.0		6.0		
Max Allow Headway *(MAH)*, s	4.1	0.0		0.0		3.1		
Queue Clearance Time *(g_s)*, s	10.9					15.5		
Green Extension Time *(g_e)*, s	0.8	0.0		0.0		0.4		
Phase Call Probability	1.00					1.00		
Max Out Probability	0.00					0.00		

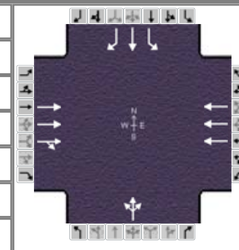
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	7	4	14			
Adjusted Flow Rate (*v*), veh/h	269	1336	660	24	1397	652		232				
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1603	1683	1662	220	1700	1568		1665				
Queue Service Time (*g_s*), s	8.9	18.7	18.8	5.7	31.4	32.0		13.5				
Cycle Queue Clearance Time (*g_c*), s	8.9	18.7	18.8	8.0	31.4	32.0		13.5				
Capacity (*c*), veh/h	307	2409	1189	188	1872	863		274				
Volume-to-Capacity Ratio *(X)*	0.877	0.554	0.555	0.126	0.746	0.756		0.847				
Available Capacity (*c_a*), veh/h	548	2409	1189	188	1872	863		549				
Back of Queue (*Q*), veh/ln (50th percentile)	6.9	5.6	5.9	0.3	11.8	11.9		5.6				
Overflow Queue (*Q_3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0				
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00				
Uniform Delay (*d_1*), s/veh	25.1	6.7	6.7	12.5	17.1	17.3		40.6				
Incremental Delay (*d_2*), s/veh	7.9	0.9	1.9	1.4	2.8	6.1		2.8				
Initial Queue Delay (*d_3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0				
Control Delay (*d*), s/veh	32.9	7.6	8.6	13.9	19.9	23.4		43.4				
Level of Service (LOS)	C	A	A	B	B	C		D				
Approach Delay, s/veh / LOS	10.9		B	20.9		C	43.4		D	0.0		
Intersection Delay, s/veh / LOS	17.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	1.9	A	3.3	C	3.3	C
Bicycle LOS Score / LOS	1.7	A	1.6	A	0.9	A		

 HCS 2010™ Streets Version 6.41 Generated: 9/17/2013 9:01:36 AM

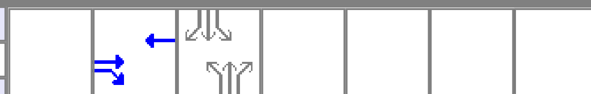
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/1/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.92
Intersection	10th Ave. S / 25th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_25thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				

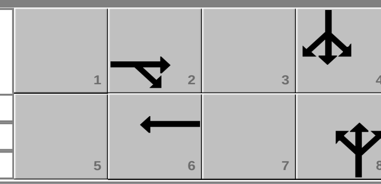


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		1177	18		1171		13	0	13	257	127	183

Signal Information			
Cycle, s	80.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	38.0	16.0	8.0	0.0	0.0	0.0
Yellow	3.7	3.2	3.2	0.0	0.0	0.0
Red	2.3	2.8	2.8	0.0	0.0	0.0



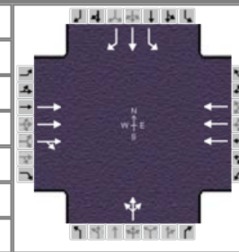
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		12.0		9.0
Phase Duration, s		44.0		44.0		14.0		22.0
Change Period, *(Y+R$_c$)*, s		6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s		0.0		0.0		4.3		4.2
Queue Clearance Time *(g$_s$)*, s						3.4		15.3
Green Extension Time *(g$_e$)*, s		0.0		0.0		0.0		0.2
Phase Call Probability						1.00		1.00
Max Out Probability						0.60		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6		3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h		868	431		1273			28		279	138	199
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1700	1686		1544			1525		1619	1700	1441
Queue Service Time (*g$_s$*), s		14.4	14.4		15.9			1.4		13.3	5.7	10.3
Cycle Queue Clearance Time (*g$_c$*), s		14.4	14.4		15.9			1.4		13.3	5.7	10.3
Capacity (*c*), veh/h		1615	801		2200			152		324	340	288
Volume-to-Capacity Ratio *(X)*		0.538	0.538		0.579			0.185		0.863	0.406	0.690
Available Capacity (*c$_a$*), veh/h		1615	801		2200			152		324	340	288
Back of Queue (*Q*), veh/ln (50th percentile)		5.3	5.5		5.2			0.5		6.8	2.3	3.9
Overflow Queue (*Q$_3$*), veh/ln		0.0	0.0		0.0			0.0		0.0	0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)		0.00	0.00		0.00			0.00		0.00	0.00	0.00
Uniform Delay (*d$_1$*), s/veh		14.8	14.8		15.2			33.0		30.9	27.9	29.7
Incremental Delay (*d$_2$*), s/veh		1.3	2.6		1.1			0.6		20.6	0.8	6.8
Initial Queue Delay (*d$_3$*), s/veh		0.0	0.0		0.0			0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		16.1	17.4		16.3			33.6		51.5	28.6	36.5
Level of Service (LOS)		B	B		B			C		D	C	D
Approach Delay, s/veh / LOS	16.5		B	16.3		B	33.6		C	41.5		D
Intersection Delay, s/veh / LOS	21.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.2	C	3.2	C
Bicycle LOS Score / LOS	1.2	A	1.2	A	0.5	A	1.5	A

HCS 2010 Signalized Intersection Results Summary

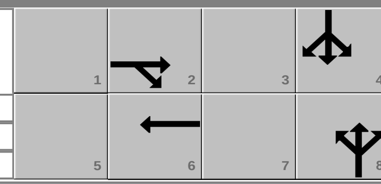
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	8/1/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.92
Intersection	10th Ave. S / 25th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_25thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h		1725	30		1570		47	0	15	206	134	217

Signal Information			
Cycle, s	100.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	52.0	20.0	10.0	0.0	0.0	0.0
Yellow	3.7	3.2	3.2	0.0	0.0	0.0
Red	2.3	2.8	2.8	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2		6		8		4
Case Number		8.0		8.0		12.0		9.0
Phase Duration, s		58.0		58.0		16.0		26.0
Change Period, $(Y+R_c)$, s		6.0		6.0		6.0		6.0
Max Allow Headway (MAH), s		0.0		0.0		4.2		4.2
Queue Clearance Time (g_s), s						6.0		17.7
Green Extension Time (g_e), s		0.0		0.0		0.0		0.6
Phase Call Probability						1.00		1.00
Max Out Probability						1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12		6		3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h		1275	632		1707			67		224	146	236
Adjusted Saturation Flow Rate (s), veh/h/ln		1700	1684		1544			1572		1619	1700	1441
Queue Service Time (g_s), s		28.8	28.9		28.0			4.0		12.8	7.5	15.7
Cycle Queue Clearance Time (g_c), s		28.8	28.9		28.0			4.0		12.8	7.5	15.7
Capacity (c), veh/h		1768	876		2408			157		324	340	288
Volume-to-Capacity Ratio (X)		0.721	0.722		0.709			0.429		0.691	0.428	0.819
Available Capacity (c_a), veh/h		1768	876		2408			157		324	340	288
Back of Queue (Q), veh/ln (50th percentile)		11.0	11.6		9.6			1.6		5.5	3.1	6.7
Overflow Queue (Q_3), veh/ln		0.0	0.0		0.0			0.0		0.0	0.0	0.0
Queue Storage Ratio (RQ) (50th percentile)		0.00	0.00		0.00			0.00		0.00	0.00	0.00
Uniform Delay (d_1), s/veh		18.4	18.4		18.2			42.3		37.1	35.0	38.3
Incremental Delay (d_2), s/veh		2.6	5.1		1.8			1.8		6.2	0.9	16.7
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0			0.0		0.0	0.0	0.0
Control Delay (d), s/veh		21.0	23.6		20.0			44.2		43.3	35.9	55.0
Level of Service (LOS)		C	C		C			D		D	D	E

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	21.9	C	20.0	C	44.2	D	46.1	D
Intersection Delay, s/veh / LOS	24.9				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.4	B	3.2	C	3.2	C
Bicycle LOS Score / LOS	1.5	A	1.4	A	0.6	A	1.5	A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*11th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *11th Avenue South* | North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	1	191	38	123	291	0
Peak-Hour Factor, PHF	0.25	0.87	0.68	0.79	0.69	0.25
Hourly Flow Rate, HFR (veh/h)	4	219	55	155	421	0
Percent Heavy Vehicles	0	--	--		--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	1	1
Configuration	LT		TR	LT		R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	2	1	0	27	1	88
Peak-Hour Factor, PHF	0.25	0.25	0.25	0.68	0.25	0.88
Hourly Flow Rate, HFR (veh/h)	8	4	0	39	4	100
Percent Heavy Vehicles	17	25	0	1	9	1
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	1
Configuration		LTR		LT		R

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT	LT		R		LTR	
v (veh/h)	4	155	43		100		12	
C (m) (veh/h)	1149	1286	175		914		174	
v/c	0.00	0.12	0.25		0.11		0.07	
95% queue length	0.01	0.41	0.93		0.37		0.22	
Control Delay (s/veh)	8.1	8.2	32.1		9.4		27.2	
LOS	A	A	D		A		D	
Approach Delay (s/veh)	--	--	16.3			27.2		
Approach LOS	--	--	C			D		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*11th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *11th Avenue South* North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*2*	*393*	*49*	*120*	*161*	*4*
Peak-Hour Factor, PHF	*0.50*	*0.86*	*0.53*	*0.94*	*0.92*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*4*	*456*	*92*	*127*	*174*	*8*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*1*	*1*
Configuration	*LT*		*TR*	*LT*		*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*0*	*1*	*1*	*42*	*2*	*294*
Peak-Hour Factor, PHF	*0.25*	*0.25*	*0.25*	*0.75*	*0.50*	*0.81*
Hourly Flow Rate, HFR (veh/h)	*0*	*4*	*4*	*56*	*4*	*362*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*1*
Configuration		*LTR*		*LT*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LT*	*LT*		*R*		*LTR*	
v (veh/h)	*4*	*127*	*60*		*362*		*8*	
C (m) (veh/h)	*1405*	*1032*	*193*		*770*		*345*	
v/c	*0.00*	*0.12*	*0.31*		*0.47*		*0.02*	
95% queue length	*0.01*	*0.42*	*1.26*		*2.54*		*0.07*	
Control Delay (s/veh)	*7.6*	*9.0*	*31.9*		*13.8*		*15.7*	
LOS	*A*	*A*	*D*		*B*		*C*	
Approach Delay (s/veh)	--	--	*16.3*			*15.7*		
Approach LOS	--	--	*C*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*13th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *13th Avenue South* | North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*12*	*190*	*5*	*29*	*287*	*26*
Peak-Hour Factor, PHF	*0.60*	*0.74*	*0.63*	*0.66*	*0.84*	*0.43*
Hourly Flow Rate, HFR (veh/h)	*19*	*256*	*7*	*43*	*341*	*60*
Percent Heavy Vehicles	*0*	*--*	*--*	*0*	*--*	*--*
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration	*LT*		*TR*	*LT*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*5*	*2*	*10*	*1*	*1*	*4*
Peak-Hour Factor, PHF	*0.63*	*0.25*	*0.36*	*0.25*	*0.25*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*7*	*8*	*27*	*4*	*4*	*8*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LT*		*LTR*			*LTR*	
v (veh/h)	*19*	*43*		*16*			*42*	
C (m) (veh/h)	*1159*	*1309*		*486*			*531*	
v/c	*0.02*	*0.03*		*0.03*			*0.08*	
95% queue length	*0.05*	*0.10*		*0.10*			*0.26*	
Control Delay (s/veh)	*8.2*	*7.8*		*12.7*			*12.4*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay (s/veh)	*--*	*--*	*12.7*			*12.4*		
Approach LOS	*--*	*--*	*B*			*B*		

 *HCS+*TM Version 5.6 Generated: 8/15/2013 2:35 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*13th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *13th Avenue South* | North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	8	401	6	33	169	22
Peak-Hour Factor, PHF	0.50	0.78	0.75	0.55	0.94	0.69
Hourly Flow Rate, HFR (veh/h)	16	514	8	59	179	31
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	2	0
Configuration	LT		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	26	1	10	1	1	6
Peak-Hour Factor, PHF	0.72	0.25	0.83	0.25	0.25	0.50
Hourly Flow Rate, HFR (veh/h)	36	4	12	4	4	12
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT		LTR			LTR	
v (veh/h)	16	59		20			52	
C (m) (veh/h)	1359	1055		433			371	
v/c	0.01	0.06		0.05			0.14	
95% queue length	0.04	0.18		0.14			0.48	
Control Delay (s/veh)	7.7	8.6		13.7			16.3	
LOS	A	A		B			C	
Approach Delay (s/veh)	--	--	13.7			16.3		
Approach LOS	--	--	B			C		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*15th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *15th Avenue South* North/South Street: *26th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*155*	*18*	*71*	*196*	*19*
Peak-Hour Factor, PHF	*0.42*	*0.84*	*0.50*	*0.71*	*0.78*	*0.68*
Hourly Flow Rate, HFR (veh/h)	*23*	*184*	*36*	*100*	*251*	*27*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*2*	*0*	*0*	*2*	*0*
Configuration	*LT*		*TR*	*LT*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*6*	*23*	*29*	*4*	*23*	*30*
Peak-Hour Factor, PHF	*0.75*	*0.52*	*0.66*	*0.50*	*0.48*	*0.75*
Hourly Flow Rate, HFR (veh/h)	*8*	*44*	*43*	*8*	*47*	*40*
Percent Heavy Vehicles	*0*	*0*	*3*	*0*	*0*	*3*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*	*LT*		*LTR*			*LTR*	
v (veh/h)	*23*	*100*		*95*			*95*	
C (m) (veh/h)	*1268*	*1357*		*432*			*431*	
v/c	*0.02*	*0.07*		*0.22*			*0.22*	
95% queue length	*0.06*	*0.24*		*0.83*			*0.83*	
Control Delay (s/veh)	*7.9*	*7.9*		*15.7*			*15.7*	
LOS	*A*	*A*		*C*			*C*	
Approach Delay (s/veh)	--	--	*15.7*			*15.7*		
Approach LOS	--	--	*C*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/1/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*15th Ave. S / 26th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *15th Avenue South*

North/South Street: *26th Street South*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	24	277	17	23	123	12
Peak-Hour Factor, PHF	0.50	0.82	0.60	0.64	0.83	0.75
Hourly Flow Rate, HFR (veh/h)	48	337	28	35	148	16
Percent Heavy Vehicles	0	--	--	4	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	2	0
Configuration	LT		TR	LT		TR
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	22	24	29	29	35	98
Peak-Hour Factor, PHF	0.79	0.50	0.81	0.73	0.73	0.70
Hourly Flow Rate, HFR (veh/h)	27	48	35	39	47	140
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT	LT		LTR			LTR	
v (veh/h)	48	35		226			110	
C (m) (veh/h)	1417	1170		531			421	
v/c	0.03	0.03		0.43			0.26	
95% queue length	0.11	0.09		2.11			1.03	
Control Delay (s/veh)	7.6	8.2		16.7			16.5	
LOS	A	A		C			C	
Approach Delay (s/veh)	--	--	16.7			16.5		
Approach LOS	--	--	C			C		

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Generated: 7/1/2013 10:49 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*10th Ave. S / 29th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *10th Avenue South* | North/South Street: *29th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	11	637	140	97	954	6
Peak-Hour Factor, PHF	0.55	0.85	0.61	0.71	0.79	0.50
Hourly Flow Rate, HFR (veh/h)	19	749	229	136	1207	12
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	1	24	3	3	17
Peak-Hour Factor, PHF	0.63	0.25	0.67	0.75	0.38	0.71
Hourly Flow Rate, HFR (veh/h)	7	4	35	4	7	23
Percent Heavy Vehicles	0	0	1	0	0	3
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	19	136		46			34	
C (m) (veh/h)	567	701		106			70	
v/c	0.03	0.19		0.43			0.49	
95% queue length	0.10	0.71		1.85			1.97	
Control Delay (s/veh)	11.6	11.4		62.8			97.7	
LOS	B	B		F			F	
Approach Delay (s/veh)	--	--	62.8			97.7		
Approach LOS	--	--	F			F		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/27/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*10th Ave. S / 29th St. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *10th Avenue South* | North/South Street: *29th Street South*

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	54	1307	39	25	1183	15
Peak-Hour Factor, PHF	0.68	0.98	0.75	0.63	0.95	0.75
Hourly Flow Rate, HFR (veh/h)	79	1333	52	39	1245	20
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	5	0	77	0	0	20
Peak-Hour Factor, PHF	0.42	0.25	0.88	0.25	0.25	0.71
Hourly Flow Rate, HFR (veh/h)	11	0	87	0	0	28
Percent Heavy Vehicles	0	0	1	0	0	3
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	79	39		98			28	
C (m) (veh/h)	545	490		131			476	
v/c	0.14	0.08		0.75			0.06	
95% queue length	0.50	0.26		4.34			0.19	
Control Delay (s/veh)	12.7	13.0		87.4			13.0	
LOS	B	B		F			B	
Approach Delay (s/veh)	--	--	87.4			13.0		
Approach LOS	--	--	F			B		

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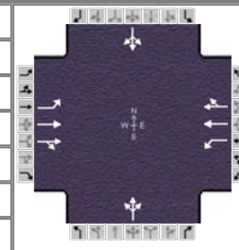
HCS 2010 Signalized Intersection Results Summary

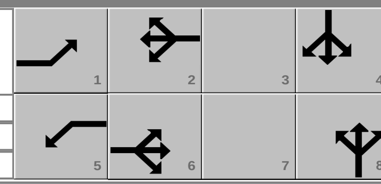
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	7/30/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.83
Intersection	10th Ave. S / 32nd St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10_10thAveS_32ndStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	20	664	37	26	916	3	145	22	19	32	39	85

Signal Information			
Cycle, s	95.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.0	1.0	52.0	20.0	0.0	0.0
Yellow	3.6	0.0	3.6	3.0	0.0	0.0
Red	1.4	0.0	2.4	3.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	11.0	59.0	10.0	58.0		26.0		26.0
Change Period, $(Y+R_c)$, s	5.0	6.0	5.0	6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	2.6	0.0	2.6	0.0		2.8		2.8
Queue Clearance Time (g_s), s	2.5		2.7			22.0		12.7
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0		0.0		0.4
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	0.14		1.00			1.00		0.03

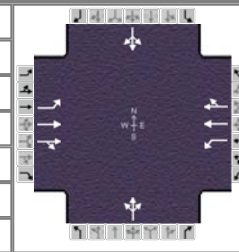
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	24	426	418	31	554	553		224			188	
Adjusted Saturation Flow Rate (s), veh/h/ln	1619	1650	1619	1619	1650	1649		921			1523	
Queue Service Time (g_s), s	0.5	14.6	14.6	0.7	21.7	21.7		9.3			0.0	
Cycle Queue Clearance Time (g_c), s	0.5	14.6	14.6	0.7	21.7	21.7		20.0			10.7	
Capacity (c), veh/h	343	921	903	428	903	902		261			366	
Volume-to-Capacity Ratio *(X)*	0.070	0.463	0.463	0.073	0.613	0.613		0.857			0.513	
Available Capacity (c_a), veh/h	343	921	903	428	903	902		261			366	
Back of Queue (Q), veh/ln (50th percentile)	0.2	5.3	5.3	0.2	8.1	8.1		6.9			3.9	
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00			0.00	
Uniform Delay (d_1), s/veh	9.8	12.5	12.5	8.8	14.6	14.6		40.5			33.9	
Incremental Delay (d_2), s/veh	0.0	1.7	1.7	0.0	3.1	3.1		22.6			0.5	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay (d), s/veh	9.8	14.2	14.2	8.8	17.8	17.8		63.1			34.4	
Level of Service (LOS)	A	B	B	A	B	B		E			C	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	14.1	B	17.5	B	63.1	E	34.4	C
Intersection Delay, s/veh / LOS	21.8				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.1	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.2	A	1.4	A	0.9	A	0.8	A

HCS 2010 Signalized Intersection Results Summary

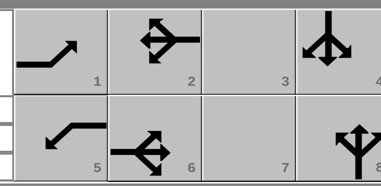
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	7/30/2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.83
Intersection	10th Ave. S / 32nd St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10_10thAveS_32ndStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	91	1361	27	59	1151	10	119	73	74	59	58	75

Signal Information			
Cycle, s	110.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.0	61.0	27.0	0.0	0.0	0.0
Yellow	3.6	3.6	3.0	0.0	0.0	0.0
Red	1.4	2.4	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6	5	2		8		4
Case Number	1.1	4.0	1.1	4.0		8.0		8.0
Phase Duration, s	10.0	67.0	10.0	67.0		33.0		33.0
Change Period, *($Y+R_c$)*, s	5.0	6.0	5.0	6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	4.1	0.0	4.1	0.0		4.3		4.3
Queue Clearance Time *(g_s)*, s	5.2		4.0			29.0		19.6
Green Extension Time *(g_e)*, s	0.0	0.0	0.0	0.0		0.0		1.4
Phase Call Probability	1.00		1.00			1.00		1.00
Max Out Probability	1.00		1.00			1.00		0.37

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	110	838	835	71	700	699		320			231	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1619	1683	1670	1619	1650	1645		1074			1290	
Queue Service Time *(g_s)*, s	3.2	48.6	49.0	2.0	36.1	36.1		9.4			0.0	
Cycle Queue Clearance Time *(g_c)*, s	3.2	48.6	49.0	2.0	36.1	36.1		27.0			17.6	
Capacity *(c)*, veh/h	228	933	926	172	915	912		311			359	
Volume-to-Capacity Ratio *(X)*	0.482	0.898	0.901	0.413	0.765	0.766		1.030			0.644	
Available Capacity *(c_a)*, veh/h	228	933	926	172	915	912		311			359	
Back of Queue *(Q)*, veh/ln (50th percentile)	1.2	20.9	21.0	1.1	14.3	14.3		13.6			6.0	
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00			0.00	
Uniform Delay *(d_1)*, s/veh	17.7	21.7	21.8	23.3	19.0	19.0		44.5			37.6	
Incremental Delay *(d_2)*, s/veh	1.6	13.1	13.6	1.6	6.1	6.1		59.0			3.9	
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay *(d)*, s/veh	19.3	34.9	35.4	24.9	25.0	25.1		103.5			41.5	
Level of Service (LOS)	B	C	D	C	C	C		F			D	
Approach Delay, s/veh / LOS	34.2	C		25.0	C		103.5	F		41.5	D	
Intersection Delay, s/veh / LOS	36.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.1	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	2.0	A	1.7	A	1.0	A	0.9	A

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/2/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*32nd St. S / 11th Ave. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *11th Avenue South* | North/South Street: *32nd Street South*

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	16	38	2	2	145	109
Peak-Hour Factor, PHF	0.67	0.79	0.25	0.25	0.59	0.68
Hourly Flow Rate, HFR (veh/h)	23	48	8	8	245	160
Percent Heavy Vehicles	0	--	--	50	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	9	0	5	4	51
Peak-Hour Factor, PHF	0.33	0.75	0.25	0.63	0.50	0.71
Hourly Flow Rate, HFR (veh/h)	12	12	0	7	8	71
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	23	8		24			86	
C (m) (veh/h)	1157	1287		437			660	
v/c	0.02	0.01		0.05			0.13	
95% queue length	0.06	0.02		0.17			0.45	
Control Delay (s/veh)	8.2	7.8		13.7			11.3	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	13.7			11.3		
Approach LOS	--	--	B			B		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*7/2/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*32nd St. S / 11th Ave. S*
Jurisdiction	*Great Falls*
Analysis Year	*2013 - Existing*

Project Description *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *11th Avenue South* | North/South Street: *32nd Street South*

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

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	74	146	10	2	87	90
Peak-Hour Factor, PHF	0.84	0.78	0.63	0.50	0.73	0.83
Hourly Flow Rate, HFR (veh/h)	88	187	15	4	119	108
Percent Heavy Vehicles	1	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	4	12	1	16	12	51
Peak-Hour Factor, PHF	0.50	0.60	0.25	0.80	0.75	0.80
Hourly Flow Rate, HFR (veh/h)	8	19	4	19	16	63
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	88	4		31			98	
C (m) (veh/h)	1345	1378		399			608	
v/c	0.07	0.00		0.08			0.16	
95% queue length	0.21	0.01		0.25			0.57	
Control Delay (s/veh)	7.9	7.6		14.8			12.1	
LOS	A	A		B			B	
Approach Delay (s/veh)	--	--	14.8			12.1		
Approach LOS	--	--	B			B		

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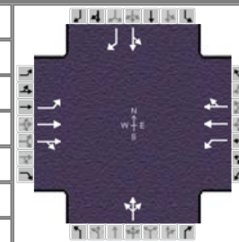
HCS 2010 Signalized Intersection Results Summary

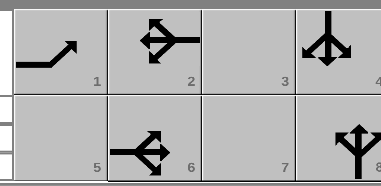
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 8, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	AM Peak Hour	PHF	0.85
Intersection	10th Ave. S / 38th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_38thStS_AM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	160	548	0	3	797	37	1	2	1	95	2	231

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	5.0	46.0	22.0	0.0	0.0	0.0
Yellow	3.6	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.7	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2		8		4
Case Number	1.0	4.0		6.3		8.0		7.0
Phase Duration, s	10.0	62.0		52.0		28.0		28.0
Change Period, ($Y+R_c$), s	5.0	6.0		6.0		6.0		6.0
Max Allow Headway (*MAH*), s	4.1	0.0		0.0		4.3		4.3
Queue Clearance Time (g_s), s	7.0					15.9		18.6
Green Extension Time (g_e), s	0.0	0.0		0.0		0.8		0.5
Phase Call Probability	1.00					1.00		1.00
Max Out Probability	1.00					0.46		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h	188	645	0	4	495	487		5			114	272
Adjusted Saturation Flow Rate (s), veh/h/ln	1557	1650	0	798	1635	1609		957			897	1382
Queue Service Time (g_s), s	5.0	8.3	0.0	0.2	19.1	19.1		0.0			2.0	16.6
Cycle Queue Clearance Time (g_c), s	5.0	8.3	0.0	0.2	19.1	19.1		13.9			14.9	16.6
Capacity (c), veh/h	334	2054		488	835	822		284			298	338
Volume-to-Capacity Ratio (X)	0.564	0.314	0.000	0.007	0.592	0.592		0.017			0.382	0.805
Available Capacity (c_a), veh/h	334	2054		488	835	822		284			298	338
Back of Queue (Q), veh/ln (50th percentile)	1.7	2.6		0.0	7.2	7.1		0.1			2.3	6.6
Overflow Queue (Q_3), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Queue Storage Ratio (*RQ*) (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00			0.00	0.00
Uniform Delay (d_1), s/veh	12.6	8.0		10.8	15.4	15.4		26.1			32.4	32.0
Incremental Delay (d_2), s/veh	2.2	0.4	0.0	0.0	3.1	3.1		0.0			0.8	13.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Control Delay (d), s/veh	14.8	8.4		10.8	18.5	18.5		26.2			33.2	45.2
Level of Service (LOS)	B	A		B	B	B		C			C	D
Approach Delay, s/veh / LOS	9.8	A		18.5	B		26.2	C		41.7	D	
Intersection Delay, s/veh / LOS	19.3						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.1	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.2	A	1.3	A	0.5	A	1.1	A

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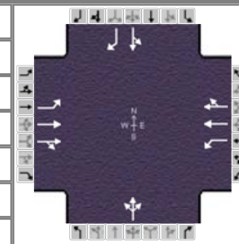
HCS 2010 Signalized Intersection Results Summary

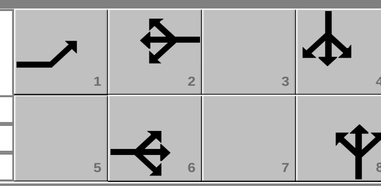
General Information				Intersection Information	
Agency	Robert Peccia & Associates			Duration, h	0.25
Analyst	Trisha Bodlovic	Analysis Date	Aug 8, 2013	Area Type	Other
Jurisdiction	Great Falls	Time Period	PM Peak Hour	PHF	0.91
Intersection	10th Ave. S / 38th St. S	Analysis Year	2035 - Future	Analysis Period	1> 7:00
File Name	10thAveS_38thStS_PM.xus				
Project Description	Great Falls Area LRTP - 2014				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	295	990	1	5	1103	95	4	2	3	132	5	212

Signal Information			
Cycle, s	85.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	12.0	42.0	14.0	0.0	0.0	0.0
Yellow	3.6	4.3	3.0	0.0	0.0	0.0
Red	1.4	1.7	3.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	1	6		2		8		4
Case Number	1.0	4.0		6.3		8.0		7.0
Phase Duration, s	17.0	65.0		48.0		20.0		20.0
Change Period, *(Y+Rc)*, s	5.0	6.0		6.0		6.0		6.0
Max Allow Headway *(MAH)*, s	3.1	0.0		0.0		4.3		4.3
Queue Clearance Time *(gs)*, s	10.6					16.0		16.0
Green Extension Time *(ge)*, s	0.1	0.0		0.0		0.0		0.0
Phase Call Probability	1.00					1.00		1.00
Max Out Probability	1.00					1.00		1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	1	6	16	5	2	12	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	324	545	544	5	667	650		10			151	233
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1619	1667	1666	526	1650	1604		282			786	1426
Queue Service Time (*gs*), s	8.6	12.6	12.6	0.5	29.1	29.3		0.0			0.0	13.9
Cycle Queue Clearance Time (*gc*), s	8.6	12.6	12.6	0.5	29.1	29.3		14.0			14.0	13.9
Capacity (*c*), veh/h	377	1157	1156	345	816	792		108			213	235
Volume-to-Capacity Ratio *(X)*	0.861	0.471	0.471	0.016	0.817	0.820		0.092			0.708	0.992
Available Capacity (*ca*), veh/h	377	1157	1156	345	816	792		108			213	235
Back of Queue (*Q*), veh/ln (50th percentile)	4.8	3.8	3.8	0.1	11.9	11.7		0.2			3.7	8.3
Overflow Queue (*Q3*), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Queue Storage Ratio *(RQ)* (50th percentile)	0.00	0.00	0.00	0.00	0.00	0.00		0.00			0.00	0.00
Uniform Delay (*d1*), s/veh	18.6	5.9	5.9	11.0	18.2	18.3		30.6			36.5	35.4
Incremental Delay (*d2*), s/veh	17.2	1.4	1.4	0.1	8.9	9.3		0.4			10.3	56.2
Initial Queue Delay (*d3*), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Control Delay (*d*), s/veh	35.8	7.3	7.3	11.1	27.2	27.6		31.0			46.8	91.7
Level of Service (LOS)	D	A	A	B	C	C		C			D	F
Approach Delay, s/veh / LOS	13.8		B	27.3		C	31.0		C	74.1		E
Intersection Delay, s/veh / LOS	27.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.0	B	2.3	B	2.8	C	2.8	C
Bicycle LOS Score / LOS	1.7	A	1.6	A	0.5	A	1.1	A

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/17/2013*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*38th St. / Central Ave.*
Jurisdiction	*Great Falls*
Analysis Year	

Project ID *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Central Avenue* North/South Street: *38th Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	8	147	46	39	101	69
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	48	193	47	45	203	21
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.73		0.68		0.89		0.81	
Flow Rate (veh/h)	274		306		321		330	
% Heavy Vehicles	0		0		1		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.24		0.27		0.29		0.29	
hd, final value (s)	6.90		6.78		6.79		6.80	
x, final value	0.53		0.58		0.61		0.62	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	4.9		4.8		4.8		4.8	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	460		478		484		487	
Delay (s/veh)	17.29		18.61		19.68		20.40	
LOS	C		C		C		C	
Approach: Delay (s/veh)	17.29		18.61		19.68		20.40	
LOS	C		C		C		C	
Intersection Delay (s/veh)	19.08							
Intersection LOS	C							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*Trisha Bodlovic*
Agency/Co.	*Robert Peccia & Associates*
Date Performed	*6/17/2013*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*38th St. / Central Ave.*
Jurisdiction	*Great Falls*
Analysis Year	

Project ID *Great Falls Area Long Range Transportation Plan - 2014*

East/West Street: *Central Avenue* | North/South Street: *38th Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	18	77	7	28	50	27
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	39	300	22	21	319	30
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.84		0.81		0.84		0.88	
Flow Rate (veh/h)	120		128		429		419	
% Heavy Vehicles	1		0		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

	EB L1	EB L2	WB L1	WB L2	NB L1	NB L2	SB L1	SB L2
Prop. Left-Turns	0.2		0.3		0.1		0.1	
Prop. Right-Turns	0.1		0.3		0.1		0.1	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.0		-0.1		-0.0		-0.0	

Departure Headway and Service Time

	EB L1	EB L2	WB L1	WB L2	NB L1	NB L2	SB L1	SB L2
hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.11		0.11		0.38		0.37	
hd, final value (s)	6.51		6.37		5.38		5.38	
x, final value	0.22		0.23		0.64		0.63	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	4.5		4.4		3.4		3.4	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	370		378		647		646	
Delay (s/veh)	11.30		11.23		17.50		16.94	
LOS	B		B		C		C	
Approach: Delay (s/veh)	11.30		11.23		17.50		16.94	
LOS	B		B		C		C	
Intersection Delay (s/veh)	15.87							
Intersection LOS	C							

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