BELGRADE to BOZEMAN corridor
FRONTAGE ROAD study

Appendix 4

Existing and Projected Conditions Report

BELGRADE to BOZEMAN corridor
FRONTAGE ROAD study

Existing and Projected Conditions

Technical Memorandum

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1.0. INTRODUCTION

This report identifies existing and projected conditions, as well as social, economic, and environmental factors for the Belgrade to Bozeman Frontage Road corridor in Gallatin County. The analyses performed include a planning-level examination of the corridor by applying technical and environmental considerations to determine known issues, constraints, and/or areas of concern.

The information contained in this report is based on existing and historic traffic data, field measurements and observations, roadway as-built plans, aerial imagery, geographic information system (GIS) data, and publically available environmental information and demographics.

1.1. Study Corridor

The study corridor for the *Belgrade to Bozeman Frontage Road Corridor Study* consists of approximately 10 miles of roadway. The corridor includes 1.4 miles of Main Street from Jackrabbit Lane to Airway Boulevard, 5.9 miles of Primary 205 (Frontage Road) from Airway Boulevard to Springhill Road, and 2.7 miles of Primary 118 (7th Avenue North) from Springhill Road to the west bound ramps of Interstate 90 (I-90). Additionally, the East Valley Center Spur Road is included as part of the study corridor. **Figure 1** presents the location of the corridor.

The south side of the corridor from Jackrabbit Lane to the railroad bridge on P-118 is generally constrained by the Montana Rail Link railroad. The character of the area ranges from urban within the cities of Belgrade and Bozeman to rural between the two cities. Adjacent land uses include commercial, residential, agricultural, industrial, and recreational.

The study corridor is divided into multiple highway segments. Between Jackrabbit Lane and Airway Boulevard, the roadway is designated as N-205 and is classified as a principal arterial on the Non-interstate National Highway System (NHS). The highway is designated as P-205 between Airway Boulevard and Springhill Road and as P-118 between Springhill Road and I-90. These two segments are classified as minor arterials on the primary highway system. The East Valley Center Spur Road is a local roadway. **Table 1** summarizes the designations of the study corridor.

Table 1: Study Corridor Segments

MDT DEPARTMENT ROUTE ID	DESCRIPTION	BEGIN RP	END RP	HIGHWAY SYSTEM	FUNCTIONAL CLASSIFICATION
N-205	Jackrabbit Lane to Airway Boulevard	19.7	21.1	NHS	Principal Arterial
P-205	Airway Boulevard to Springhill Road	21.1	27.0	Primary	Minor Arterial
P-118	Springhill Road to I-90 Exit 306 WB ramps	4.0	1.3	Primary	Minor Arterial
L-16-2074N	East Valley Center Spur Road	N/A	N/A	Local	Local

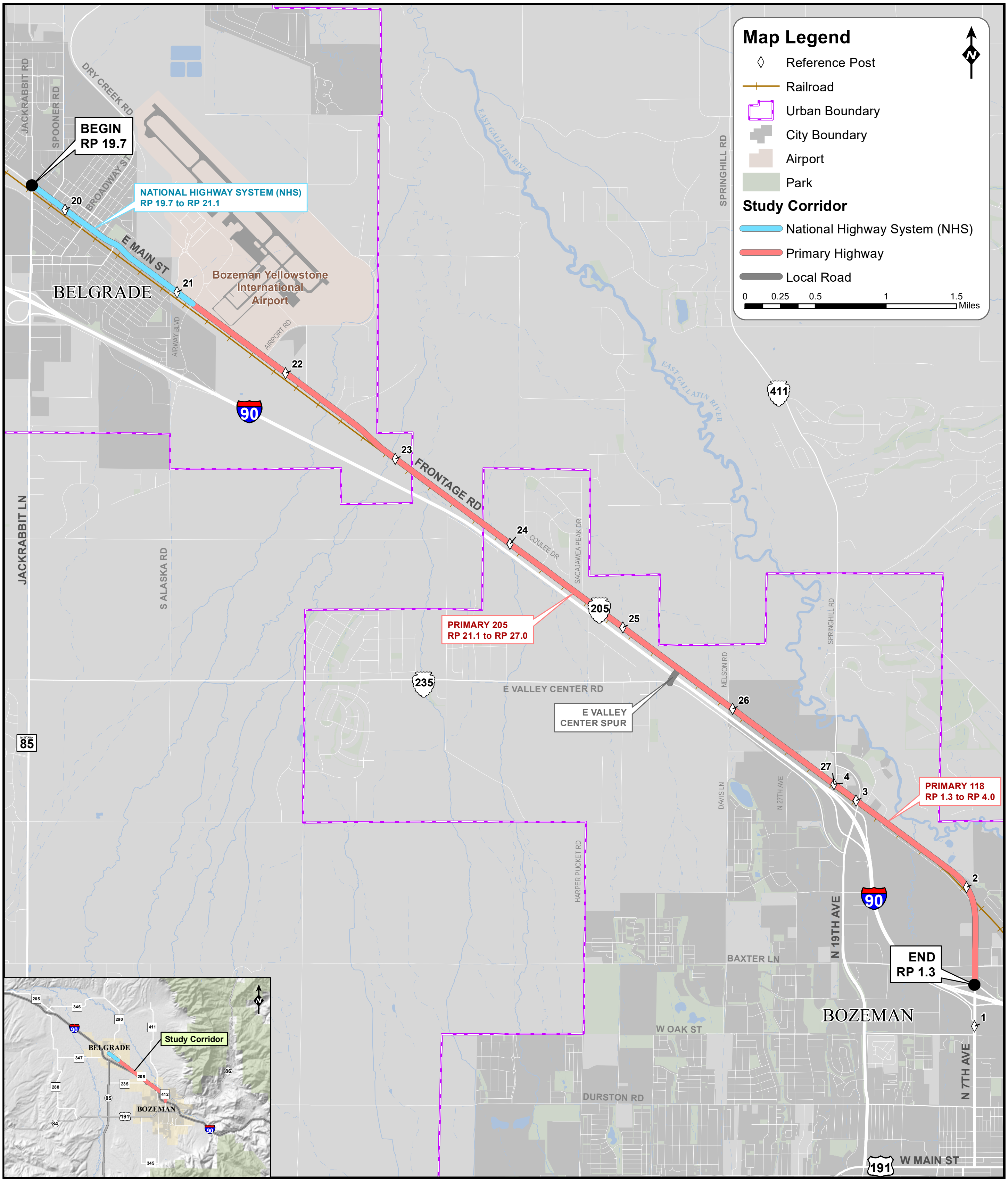


Figure 1: Study Corridor

1.2. Past, Current and Planned Projects

The roadway was originally constructed as early as 1922. Since then, numerous projects have been constructed. A search of the Montana Department of Transportation (MDT) online summary of road and bridge construction projects was reviewed to identify notable projects along the study corridor. A list of recent projects, along with the letting year and a brief description, are shown in **Table 2**. The list is not an all-inclusive list of projects; rather, it is a list of recent major projects completed along the corridor. The list does not include maintenance projects performed by MDT such as guardrail repair, pothole repair, striping, or other similar projects.

Table 2: Recent Projects along the Study Corridor

PROJECT NAME	UPN	LETTING YEAR	DESCRIPTION
2 Miles East of Belgrade	2444	1996	Curve flattening for 0.5 miles of the Frontage Road approximately 2 miles east of Belgrade.
Safety Improvement – West of Bozeman	4433	2004	Turn bays at the intersections with Nelson Road and with Valley Center Spur Road.
Main & Jackrabbit Lane – Belgrade	4471	2006	Realignment and signal installation at Main Street and Jackrabbit Lane.
Gallatin Field Road – East	6518	2009	Pavement preservation (from RP 20.9-26.8).
East Belgrade Interchange – North	5897	2013	New I-90 Interchange and associated connections.
2002 Signal – Junction S-411	5373	2002	Signal at intersection with Springhill and Frontage Road.
SF 139 – Butte Advance Signal Flasher	8120	2015	Upgrade advance warning flashers to standardize for uniformity at intersection with Springhill and Frontage Road.
Sidewalks II - Belgrade	8655	2015	CTEP Project: Sidewalk installation at the following locations: West side of Spooner Road (from Mayfair Drive north 580 feet); West side of Broadway Street (from 205 S. Broadway to Main Street); North side of Madison Avenue (from Broadway Street west 820 feet); East side of Jackrabbit Lane (between the Lee & Dads approach and Missoula Avenue); East side of Jackrabbit Lane (between 300 Jackrabbit Lane and Northern Pacific Avenue); and South side of Yellowstone Avenue (between Oregon and Montana Streets).
Valley Center / P-205 Intersection Study	8796	2015	Study Corridor / Traffic (P-205).
Bozeman Signal Upgrades	8036010	2015	Controllers and communication upgrades to promote traffic flow improvements via increased signal connectivity and synchronization. Traffic signal hardware was updated as well. Work on North 7th Avenue was from RP 1.22 to RP 1.5.
N. 7th Ave Signals (Bozeman)	8036012	2016	Signal synchronization to promote traffic flow improvements via increased signal connectivity and synchronization. Traffic signal hardware was updated with 8036010. Work on North 7th Avenue was from RP 0.126 to RP 1.212 and from RP 1.213 to RP 1.43 (overlapped the previous project in the row above).

There are two projects currently under development along the study corridor. One is to flatten slopes and provide turn lanes between RP 23.0 and RP 24.6; the other is to install traffic signals at the intersections of the East Valley Center Spur Road with the Frontage Road and with East Valley Center Road. Construction dates have not yet been identified for either project. A summary of the planned projects are shown in **Table 3**.

Table 3: Planned Projects along the Study Corridor

PROJECT NAME	UPN	LETTING YEAR	DESCRIPTION
SF 129 – Slope Flattening (Belgrade)	8031	2018	This project will completely reconstruct the roadway between RP 23.0 and RP 24.6. Wider shoulders, flatter slopes, and turn lanes will be constructed. The turn lanes will include left turn lanes at four approaches, a two-way left-turn lane and four right turn slip lanes. Shoulder rumble strips will be provided. Centerline rumble strips will be provided on the two lane section.
Valley Spur Intersection Improvements	9190	Unknown – Currently in design	Installation of traffic signals at both ends of Valley Spur Road (at the Frontage Road and East Valley Center Road intersections) just west of Bozeman. Geometric improvements to the intersections are anticipated, including a westbound right turn lane on Valley Center Road. Signal timing will be complex due to proximity of an at-grade railroad crossing. MDT is interested in an accelerated project development schedule for this project.
Griffin Drive Intersection Improvements	9312	2019	The intersection will be reconstructed to include dual westbound left-turn lanes. The northbound and southbound legs will be realigned to include left-turn lanes. Upgrades will be made to the traffic signal.

1.3. Local Planning

Local planning documents were reviewed for relevance to transportation along the study corridor. Improvement options identified as part of this study should be reviewed for continuity with existing local plans. In addition, a review for updated planning documents should take place during any project development process. The following provides a summary of relevant local planning documents.

1.3.1. Bozeman Transportation Master Plan

The *Bozeman Transportation Master Plan (TMP)*[1] was adopted by the Bozeman City Commission in 2017. The TMP serves as a guide for development of and investment in the community's transportation systems in a comprehensive manner. The TMP provides for guiding transportation infrastructure investments based on system needs and associated decision-making principles. The comprehensive plan identifies community goals and improvements to the transportation infrastructure and services within the city of Bozeman and that portion within Gallatin County that is likely to include future urban area expansion. The following is a summary of recommended improvements along the study corridor as identified in the TMP.

TSM-18: N. 7th Avenue and Griffin Drive

Modify the intersection of North 7th Avenue and Griffin Drive to add additional designated turning lanes on all approaches, and to provide revised traffic signalization.

Shared Use Path (SP-34): Frontage Road (I-90 WB on- & off-ramp to Study Area Boundary)

Shared use path contained in the *PROST Plan*; has robust public support. Locate to the north of existing Frontage Road and east of North 7th Avenue. Only includes portion of path between Bozeman (I-90) and TMP study area boundary (~5 miles in length). Approximately 4 miles remaining from TMP study area boundary to downtown Belgrade.

Bike Lane (BL-16): N. 7th Ave (Red Wing Dr to W. Oak St)

I-90 overpass was designed for bike lanes, but never had them marked or signed. This project completes the bike lanes, adds dotted lane line extensions across the I-90 ramps, and signs/marks bike lane on North 7th Avenue north of the interchange.

1.3.2. Greater Bozeman Area Long Range Transportation Plan (2007 Update)

The *Greater Bozeman Area Long Range Transportation Plan (2007 Update)*[2] is intended to offer guidance for the decision-makers in the Greater Bozeman Area by responding to existing and future transportation system concerns through a menu of large and small improvements to the transportation network. The plan provides a blueprint for guiding transportation infrastructure investments based on system needs and associated decision-making principles. The following provides a summary of recommended improvement options along the study corridor as identified in the 2007 LRTP.

Facility Recommendations

MSN-17: Frontage Road (N. 7th Avenue to Belgrade)

The Frontage Road between North 7th Avenue to Belgrade should be upgraded to a three-lane rural arterial roadway. This includes one travel lane in each direction and a two-way center turn lane where appropriate. This project is necessitated by the future development patterns in the region and will serve as a link between the Belgrade and Bozeman areas. Roadway shoulders should be included to facilitate bicycle travel. *This improvement has not been completed. A committed project will partially complete this recommendation between RP 23.0 and RP 24.6 and is referred to as the "SF 129 Slope Flattening" project. A construction date has not yet been identified.*

MSN-20: East Belgrade Interchange [Completed]

This project consists of constructing a new I-90 interchange to serve the airport and Belgrade areas. A northern interchange connection is to be made to connect with the Frontage Road. A southern connection to the interchange should be made to connect to Alaska Road. The interchange connections should be constructed to two-lane rural arterial standards complete with one travel lane in each direction. This project is necessitated by the future development in the region and the need for more adequate connection to the airport. Non-motorized facilities should be developed in association with this project as this interchange will serve important cross connectivity north and south of Interstate 90. *This improvement was completed in 2015.*

TSM-15: Nelson Road / Frontage Road

It is recommended that a left-turn lane be added to Nelson Road at the intersection with the Frontage Road as necessitated by the growing traffic demand. The intersection is a three-legged intersection with stop control on Nelson Road. The Frontage Road is a minor arterial roadway and Nelson Road is classified as a collector. A traffic signal, roundabout, or other traffic control device should be added to this intersection when warrants are met. *A traffic study is planned for this intersection to determine if signal warrants are met.*

TSM-16: Sacajawea Peak / Frontage Road

It is recommended that left-turn lanes be added to the intersection of Sacajawea Peak and Frontage Road as necessitated by the growing traffic demand. The intersection is a three-legged intersection with stop control on Sacajawea Peak. The Frontage Road is a minor arterial roadway and Sacajawea Peak is classified as a local. A traffic signal, roundabout, or other traffic control device should be added to this intersection when warrants are met. *This improvement has not been completed. A committed project will partially complete this recommendation between RP 23.0 and RP 24.6 and is referred to as the "SF 129 Slope Flattening" project. A construction date has not yet been identified.*

TSM-17: Gallatin Field / Frontage Road [Completed]

It is recommended that a traffic signal, roundabout, or other adequate traffic control device be installed at the intersection of Gallatin Field and Frontage Road when warrants are met. This is a three-legged intersection with stop control on Gallatin Field. There currently are designated left-turn lanes on each approach leg of this intersection. *This improvement was completed in 2015.*

Non-motorized Recommendations

Frontage Road (N. 7th Avenue at Flora Lane to Belgrade)

The LRTP recommended expanded shoulders on each side of the Frontage Road with a minimum width of 4-feet, in conjunction with future roadway improvements.

1.3.3. Bozeman Parks, Recreation, Open Space and Trails (PROST) Plan

The *Bozeman Parks, Recreation, Open Space and Trail (PROST) Plan*[3], while focusing primarily on Parks and the general operations of them, includes a chapter dedicated to trails and pathways. The PROST Plan represents the city of Bozeman's desire to proactively plan for these amenities and to achieve excellence in meeting both current and future needs. The Plan designates five classes of trail with multiple sub groups. These trail types address various transportation and recreation needs and range from paved paths 12-feet in width to narrow semi-separated equestrian trails.

Relevant to the study corridor, the Plan identifies a separated shared-use path running the length of the Frontage Road within the city of Bozeman's planning limits. The plan also identifies numerous trail connections to the north to residential neighborhoods, the East Gallatin River, and the Cherry River Fishing Access Site (FAS).

1.3.4. Belgrade Area Transportation Plan (June 2002)

The *Belgrade Area Transportation Plan*[4] identified a variety of improvements that were classified as "Major" and "Transportation System Management (TSM)" projects. Within the corridor, the following projects were identified:

Major Project ID-4: Airport Interchange [Completed]

Construct an Interstate 90 interchange in the area generally between Alaska Road and Love Lane. The connector road between the proposed interchange and Main Street is anticipated to pass under the railroad and intersect with Main Street at grade. This improvement would provide better intermodal access to Gallatin Field from Interstate 90 and would give Belgrade/Bozeman commuter traffic the option of accessing the Interstate without impacting old Highway 10 east of the study area, Jackrabbit Lane and a number of intersections within the Belgrade area. *This improvement was completed in 2015.*

Major Project ID-6: Reconstruct Main: Jackrabbit to Airport Access [Partially Completed]

Reconstruct this segment of Main Street in phases to a three-lane roadway complete with curb, gutter and sidewalks, dedicated left-turn bays at major intersections, and control of access to improve safety. The recommended first phase of improvements would extend generally from Broadway east to Oregon. The second phase would extend from Jackrabbit east to Broadway. The final phase would extend generally from the east end of phase one east to the Gallatin Field access road. This phasing scheme could certainly change as needed to respond to the effects of other transportation improvements, or other community needs. *This improvement has been partially completed directly east of Jackrabbit Lane to Quaw Boulevard.*

Major Project ID-10: Signalize Broadway and Main

Install a traffic signal and appropriate geometric improvements when Manual on Uniform Traffic Control Devices warrants are met. Existing buildings and high percentages of left turns indicate elimination of on-street parking on Main Street will be necessary to provide adequate turn bays. The length of parking removal on each leg will be determined at the time of geometric design of storage lane lengths. Given the proximity of the at-grade railroad crossing on Broadway south of Main, this signal must be interconnected with the railroad signal to prevent queued vehicles being stranded on the tracks.

Major Project ID-16: Pedestrian / Bicycle Path: Belgrade to Bozeman

Build a ten-foot wide path with an all-weather surface on the south side of old Highway 10 between Belgrade and Bozeman within either the railroad or the Interstate rights-of-way. Americans with Disabilities Act guidelines for pedestrian access should be followed.

TSM Project ID-a: Connect Arizona to Main [Completed]

Construct a short length of Arizona Street from its current terminus at Northern Pacific to Main Street, with a right-angle, at-grade crossing of the railroad. Appropriate traffic control devices should be installed at the same time the connection is constructed. *This improvement has been completed.*

TSM Project ID-d: Reconstruct Oregon and Main Intersection

Reconstruct the Oregon approach from Main Street south to Northern Pacific Avenue, with provisions for separate left and right turn lanes for northbound vehicles on Oregon Street. Rollover curb and gutter should be used to define the outside limits of the travel lanes while still allowing truck access to the property at the southeast corner of the intersection.

1.3.5. North Park Properties Concept Land Use Plan Master Plan (formerly Mandeville Industrial Park)

The 275-acre North Park property, formerly known as the Mandeville Farm, is roughly divided into an 80-acre tract owned by the City of Bozeman and the remainder held by the Montana Department of Natural Resources and Conservation (DNRC). A Master Plan was completed in 2012 that identified a development plan for the property[5]. The preferred development alternative utilizes a combination of roadways, paths and rail siding locations to provide access to the site. The Master Plan proposes linking roadways to North 7th Avenue at Red Wind Drive and Flora Lane. There are three additional connections to the Frontage Road proposed in the plan. The plan also proposes an overpass at Mandeville Lane to connect to East Baxter Lane east of I-90 to provide indirect access into the site and provide a community-wide east-west access road to North 19th Avenue and a direct east-west route for the community across I-90.

1.3.6. Gallatin Field Airport 2007 Master Plan Update

The Bozeman Yellowstone International Airport (formerly Gallatin Field Airport) completed a comprehensive Master Plan Update[6] which outlines growth over the planning horizon and annual projects. This effort was completed to identify future development needs and potential timelines for implementation. The Master Plan Update noted that airfield capacity calculations indicated the need to start planning for an additional runway, expanded parking, and improved access to accommodate future growth. Growth at the airport was also included in the Bozeman TMP travel demand model. Transportation infrastructure associated with the airport and growth has been substantially improved with the completion of the East Belgrade Interchange.

1.3.7. Streamline Transit Coordination Plans

Coordination Plans are prepared every year for Streamline Transit that evaluate ridership characteristics, needs and funding. Presently, transit service is provided by Streamline between Belgrade and Bozeman via the “greenline” route. That route does not utilize the Frontage Road, but rather uses Jackrabbit Lane and Huffine Lane for transit service. There are currently no Streamline routes along the study corridor.

1.3.8. 2016 Montana Rail Grade Separation Study

MDT commissioned an update to the *2003 Montana Rail Grade Separation Study* to address changed conditions and assess highway-rail crossing needs across the state. The purpose of the *2016 Montana Rail Grade Separation Study*[7] was to use a data-driven evaluation process to identify a list of at-grade and grade-separated railroad crossings where potential feasible improvements may be considered. Between Belgrade and Bozeman, two at-grade railroad crossings were studied for improvements, at Jackrabbit Lane and Broadway, respectively. After a screening process, Jackrabbit Lane was evaluated holistically with Broadway. A recommendation for new grade separation at Jackrabbit Lane was made in the form of an underpass with the following description: *A new grade separation of Jackrabbit Lane would improve traffic mobility in the area. While the Broadway Street at-grade crossing appears unable to be closed due to local business and residential traffic access, improvements to the intersection with Main Street north of the tracks could improve safety for the Broadway Street at-grade crossing*.

2.0. TRANSPORTATION SYSTEM

The study corridor serves as a key route connecting Belgrade and Bozeman and supports both local and regional travel demand. The following sections discuss the transportation-specific aspects of the study corridor. Information obtained from publically available sources, field observations, data collection efforts, GIS data, and as-built drawings were used to evaluate the transportation system.

2.1. Physical Features and Characteristics

The roadway was constructed at various times, beginning in 1922. The study corridor consists of two travel lanes, one in each direction. The south side of the roadway is generally constrained by a railroad mainline owned by BNSF Railway and leased by Montana Rail Link (MRL). West of Airway Boulevard, the corridor is more urban in nature with a mix of commercial, industrial, and residential development on both the north and south sides of the corridor. Between Airway Boulevard and Springhill Road, the surrounding land use is primarily agricultural with occasional residential areas. East of Springhill Road, the corridor transitions back to an urban character.

2.1.1. Posted Speeds

The posted speed limits within the study area vary from 25 mph within the Belgrade urban area to 50 mph along the rural portions of the corridor. The posted speed limits are shown in **Table 4** and in **Figure 2**.

Table 4: Posted Speed Limits

LOCATION	ROUTE	BEGIN RP	END RP	POSTED SPEED
Jackrabbit Lane to Birch Lane	N-205	19.7	20.5	25 mph
Birch Lane to Madison Avenue	N-205	20.5	20.7	35 mph
Madison Avenue to Airway Boulevard	N-205	20.7	21.1	45 mph
Airway Boulevard to Springhill Road	P-205	21.1	27.0	50 mph
Springhill Road to Railroad Overpass	P-118	4.0	1.8	50 mph
RR Overpass to I-90 WB Ramps	P-118	1.8	1.3	45 mph

A speed study was conducted by MDT in September 2014. The speed study evaluated vehicle speeds between Airport Road and the railroad viaduct on North 7th Avenue. The results of the speed study showed that the existing speed limit of 60 mph was consistent with the 85th percentile of measured speeds.

Comments were received from the City of Belgrade, Gallatin County, and the City of Bozeman regarding the speed study. The agencies recommended speed limits be set to 60 mph, 55 mph, and 50 mph, respectively. At the October 2015 Transportation Commission meeting, it was agreed to extend the 45 mph zone to the east of Airway Boulevard and to post a speed limit of 50 mph from east of Airway Boulevard to south of the railroad viaduct.

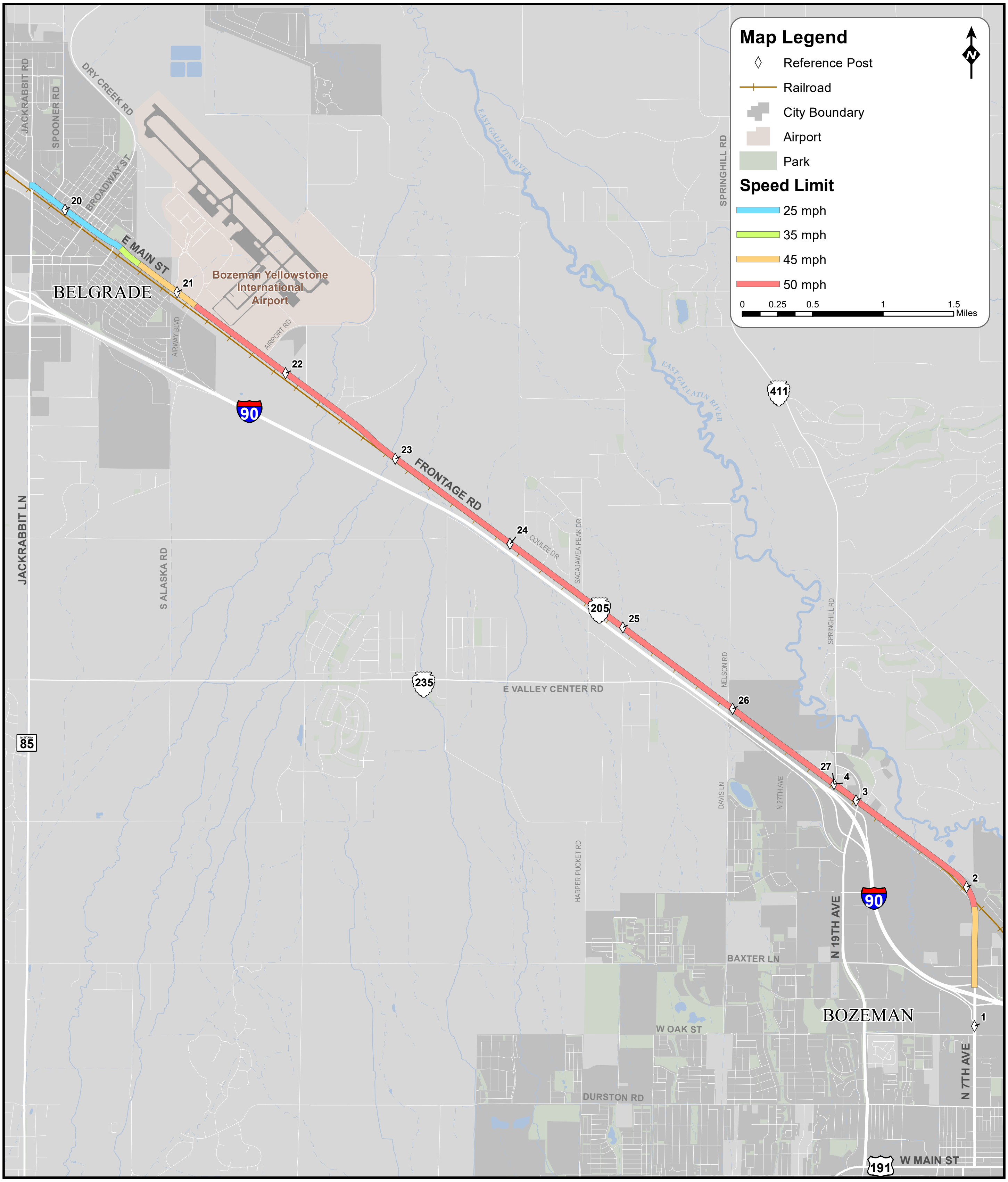


Figure 2: Posted Speed Limits

2.1.2. Roadway Surfacing

The MDT Road Log contains information for roadway surface width, lane width, shoulder width, surfacing thickness, and base thickness. The roadway surface width varies along the study corridor. The majority of the corridor has a paved surface width of 24 feet, which includes one travel lane in each direction and little or no shoulders. Through Belgrade, the roadway has shoulders/on-street parking and includes a center two-way left-turn lane (TWLTL) between Jackrabbit Lane and North Quaw Boulevard. The segment of the corridor reconstructed as part of the East Belgrade Interchange project is also wider with shoulders and turn-lanes at major intersections. Shoulders are also present as the corridor transitions into Bozeman near the Cherry River FAS.

MDT tracks and measures pavement condition on an annual basis. MDT's Pavement Management System (PvMS) is used to analyze the collected data to determine the condition of the pavement. Items of primary interest include the presence and degree of cracking and rutting, as well as overall ride quality. By understanding the condition of the pavement, MDT can identify the most appropriate treatments and resources needed to extend pavement life. Several pavement condition indices are monitored through MDT's PvMS. The performance measures and corresponding indices are such that the numerical value of 100 is assigned to a new pavement with no flaws, and zero is assigned to a highly degraded pavement. The following performance measures are routinely used to track pavement conditions:

- **Ride Index:** This is determined by using an internationally applied roughness index (IRI) in inches per mile and converting the number to a 0 to 100 scale.
- **Rut Index (RI):** This is calculated by converting rut depth to a 0 to 100 scale. Rut measurements are taken approximately every foot and averaged into one-tenth-mile reported depths.
- **Alligator Crack Index (ACI):** This is measured by combining all load-associated cracking and converting the index to a 0 to 100 scale.
- **Miscellaneous Cracking Index (MCI):** This is calculated by combining all non-load-associated cracking and converting the index to a 0 to 100 scale.
- **Overall Performance Index (OPI):** This is determined by combining and placing various weighting factors on the IRI, RI, ACI, and MCI figures and converting the index to a 0 to 100 scale. The OPI is calculated to provide a single index describing the current general health of a particular route or system.

The most important performance measure is the OPI, as this index includes all the aforementioned indices. An OPI of 80 to 100 is considered "good", 60 to 79.9 is "fair", and 0 to 59.9 is "poor". As shown in **Table 5**, the various pavement condition performance measures generally indicate fair or poor performance. The OPI indicates that the pavement is in poor condition. Note that some locations along the study corridor have been recently reconstructed and are not reflected in the table.

Table 5: Pavement Condition

CORRIDOR ROUTE		BEGIN RP	END RP	IRI	RI	ACI	MCI	OPI
C000250	**Jackrabbit Lane to Airway Boulevard**	19.7	21.1	66.5	59.0	86.6	98.6	53.7
C000205	**Airway Boulevard to Springhill Road**	21.1	26.8	73.2	54.0	99.1	98.5	59.9
C001207	**Springhill Road to I-90**	1.2	3.2	70.8	54.3	83.8	98.4	52.1

Source: MDT Pavement Management System, 2016, https://app.mt.gov/cgi-bin/pvms/pavement.cgi

2.1.3. Access and Right-of-Way

Access

There are numerous public and private access points along the study corridor. Access points were identified through a review of available GIS data accessed in October 2016, and aerial photography from 2015. Based on this review, there are approximately 111 access points along the corridor. Of the 111 total access points, 36 are public roadways, 71 are private approaches, and 4 are farm field approaches.

The angle of approaches are also of importance. The angle of approach is the angle at which the approaching road intersects the major road. Desirably, roadways should intersect at or as close to 90° as practical. Intersection skews greater than 30° from perpendicular are undesirable, as the driver's line of sight for one of the sight triangles becomes restricted. Accordingly, the approach angle should be between 60° and 120°. There were six access points that intersect the corridor at a skewed angle. Four of the six skewed approaches are public roadways.

Table 6 provides a summary of access points grouped in incremental segments along the study corridor. The table shows the number and density of approaches for the various roadway segments. Locations with a high density of approaches may indicate an area where a center left-turn lane may be desirable. The density of approaches per quarter mile is also shown in **Figure 3**.

Table 6: Access Points

SEGMENT	BEGIN RP	END RP	LENGTH (mi)	ACCESS POINTS			DENSITY (per mile)	SKEWED (<60° ANGLE)
				PUBLIC	PRIVATE	FARM		
Jackrabbit Lane to Quaw Boulevard	19.7	20.0	0.33	4	5	0	27.3	1 (public)
Quaw Boulevard to Davis Street	20.0	20.3	0.29	5	7	0	41.4	0
Davis Street to Airway Boulevard	20.3	21.1	0.83	7	11	0	21.7	2 (public)
Airway Boulevard to Airport Road	21.1	21.8	0.66	1	0	0	1.5	0
Airport Road to East of Dollar Drive	21.8	23.1	1.25	3	9	2	11.2	1 (public)
East of Dollar Drive	23.1	24.0	0.90	0	2	0	2.2	0
East of Dollar Drive to Nelson Road	24.0	25.9	1.93	5	13	1	9.8	2 (private)
Nelson Road to Springhill Road	25.9	27.0	0.93	2	4	1	7.5	0
Springhill Road to Cherry River Fishing Access	4.0	2.2	1.10	4	6	0	9.1	0
Cherry River Fishing Access to South End of Railroad Viaduct	2.2	1.8	0.22	0	0	0	0.0	0
South End of Railroad Viaduct to I-90 WB Ramps	1.8	1.3	0.47	5	14	0	40.4	0
		TOTAL	**8.91**	**36**	**71**	**4**	**12.5**	**6**

Right-of-Way

The majority of the Frontage Road is within railroad right-of-way through an easement granted by BNSF Railway (MRL leased) for that purpose. Exceptions exist in Belgrade and Bozeman proper, where right-of-way is generally owned by MDT. Additional investigation regarding railroad easements will be necessary depending on the location of potential improvement options within the corridor. MRL has stated that no additional easements shall be granted south of the existing roadway easement. MRL is open to granting additional roadway easements up to the northerly extent of their existing right-of-way. Aside from the Frontage Road itself, there appears to be private encroachments on the railroad right-of-way and MDT easements. Some of these encroachments may be affected by potential improvement options within the corridor.

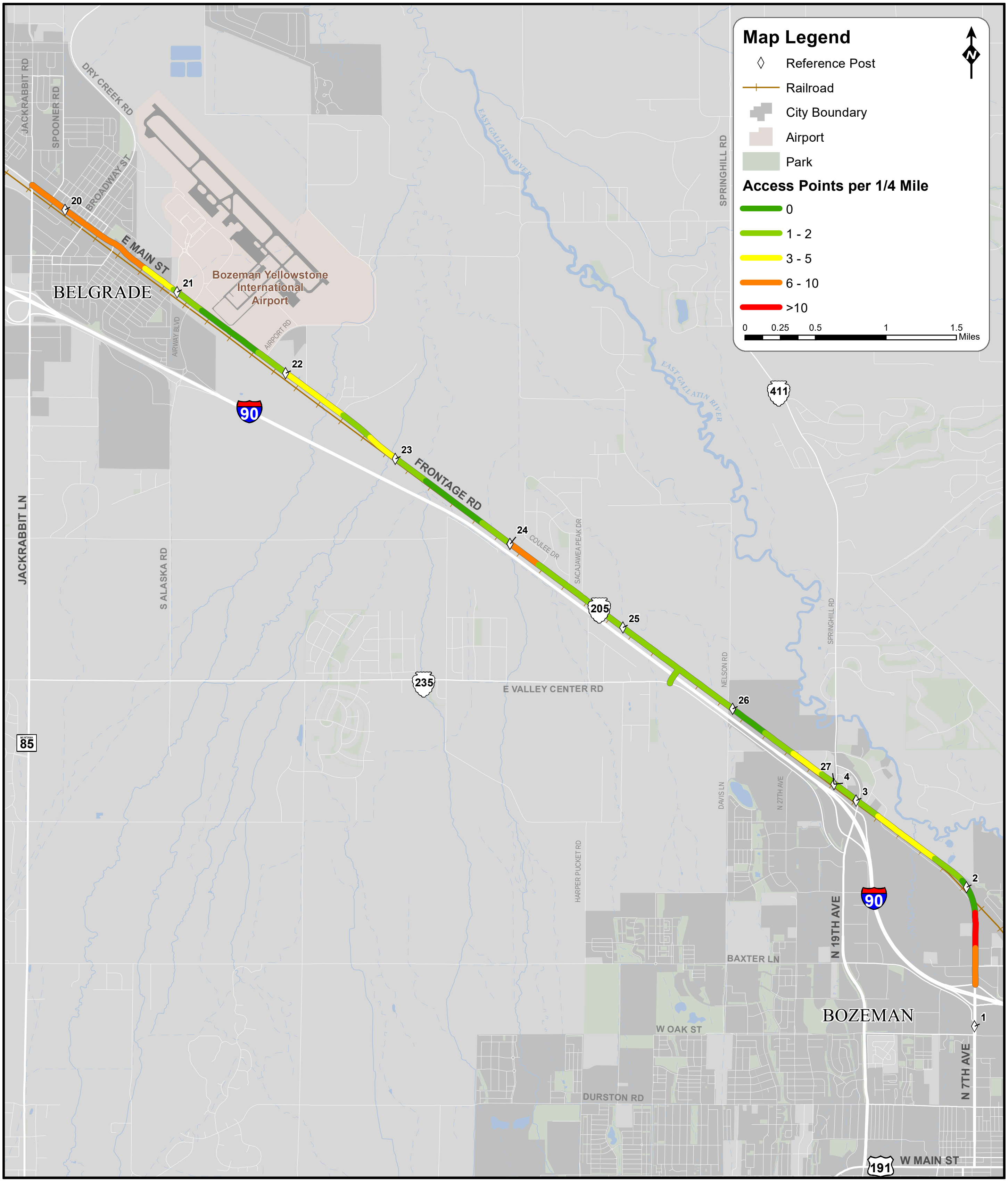


Figure 3: Access Density

2.1.4. Utilities

Northwestern Energy distributes natural gas and operates electric power generation, transmission, and distribution in the study corridor. Century Link, Charter Communications and Montana Opticom provide fiber optic communication services including telephone and internet. Charter Communications is the sole cable television provider. The City of Bozeman and City of Belgrade have buried water and sewer infrastructure in place on both ends of the corridor.

The Yellowstone Pipeline Company has a 10-inch pipe conveying crude oil and enters the study corridor from the north at approximately RP 25.5. The pipeline travels along the corridor until approximately RP 2.8 where it crosses the highway. The crude oil pipeline crosses again at RP 1.8.

A natural gas pipeline (size unknown) crosses the study corridor at approximately RP 26.7 and at RP 1.8. Due to legal protections regarding the terms of use and data sharing agreements, up-to-date mapping of these pipelines is not available. If improvements are proposed in these general areas, additional research and coordination with the owners will need to occur to identify if the pipelines currently exist at these locations and what, if any, potential conflicts exist with the pipelines.

2.1.5. Winter Operations

The study corridor is considered a Level I and Level I-A winter maintenance area according to the *MDT Maintenance Operations and Procedures Manual*[8]. A Level I winter maintenance area includes roadways within or adjacent to a 3-mile radius to towns or cities with an average daily traffic (ADT) greater than 5000 vpd. Level I routes are eligible to receive up to 24 hours-per-day coverage during a winter storm event. A Level I-A winter maintenance area includes roads outside of the 3-mile radius buffer which carry more than 3000 vpd. Level I-A routes are eligible for 19 hours-per-day coverage, typically between 5:00 AM and 12:00 AM, during a winter storm event. Coverage is at the discretion of MDT's Bozeman Area Maintenance Chief. The primary objective is to keep one lane in each direction open to traffic. Snow packed and/or icy surfaces are acceptable but they may be treated with abrasives or abrasive/chemical combination.

2.1.6. Railroads

A BNSF owned (MRL leased) railroad parallels the southern side of the Frontage Road. The track is referred to as the MRL (2^{nd} Subdivision). The track averages 21 daily trains, and the 90^{th} percentile is 26 daily trains. There are a total of five public and three private at-grade crossings adjacent to the study corridor. Daily rail traffic effects vehicle traffic operations at and near these at-grade crossings.

Based on data collected on July 29^{th}, 2016 as part of this planning study, it was observed that 23 trains crossed at the Jackrabbit Lane crossing. Of these trains, 7 were traveling westbound and the remaining 16 were traveling eastbound. It took an average of 107 seconds for the trains to clear the Jackrabbit Lane crossing. **Table 7** outlines general rail data at the crossing locations in and adjacent to the study area.

The existing distance from roadway center line to railroad centerline is approximately 115 feet between Sundown Creek Road east of Belgrade and the Railroad Viaduct along North 7^{th} Avenue north of Bozeman. Areas of the corridor closer to and within the cities of Belgrade and Bozeman have a greater distance between the roadway and railroad. MRL has given direction that the horizontal distance from the southernmost edge of roadway to the railway is not to be reduced with the planned slope flattening project (UPN 8031). Any improvement option(s) identified for those portions paralleling close to the tracks must not move the southern edge of the roadway shoulder any closer to the tracks.

Table 7: At-grade Railroad Crossing Data

US DOT CROSSING #	LOCATION	APPROACH TYPE	RAILROAD MP	MAXIMUM SPEED (MPH)	ROADWAY AADT (YEAR)
060 090P	Jackrabbit Lane (Belgrade)	Public	150.39	60	15,060 (2012)
060 085T	Broadway Street (Belgrade)	Public	149.98	60	6,570 (2012)
060 082X	Oregon Street (Belgrade)	Public	149.71	60	2,730 (2012)
060 079P	Unknown Road	Private	147.71	60	Unknown
060 078H	Sundown Creek Road	Private	147.33	60	Unknown
060 077B	Sundown Meadow Road	Private	147.12	60	Unknown
060 076U	Valley Center Road	Public	144.67	60	4,600 (2012)
060 075M	Red Wing Drive (Bozeman)	Public	142.97	60	170 (2012)

Source: Montana Department of Transportation, 2016

2.1.7. Passing Zones

Passing opportunities are provided along the corridor in areas where roadway geometrics allow. No passing zones are established in areas where there is insufficient passing sight distance or near public approaches. The following information summarizes the guidelines for no-passing zones as contained in the MDT *Traffic Engineering* Manual[9]:

- For determining a no-passing zone, the distance along a driver's line-of-sight is measured from a 3.5-foot height of eye to a 3.5-foot height of object.
- For 2-lane rural highways on the NHS, the no-passing zone design speed will be 70 mph. For a rural 2-lane primary highway, the design speed is 60 mph.
- The minimum passing sight distance required for a no-passing zone 1,200 feet and 1,000 feet for 70 and 60 mph design speeds, respectively.
- The minimum length for a no-passing zone is 500 feet.
- If the length between successive no-passing zones in the same direction of travel is less than 1,000 feet, then the gap between the no-passing zones should be closed.
- A no-passing zone should be marked in advance of intersections at a minimum distance of 500 feet.

Figure 4 shows the passing zones along the corridor as documented through on-site field review, aerial imagery, and *Google Street View* imagery. A total of 14 passing zones, seven eastbound and seven westbound, exist along the study corridor. Eight of the 14 passing zones are less than 1,000 feet in length.

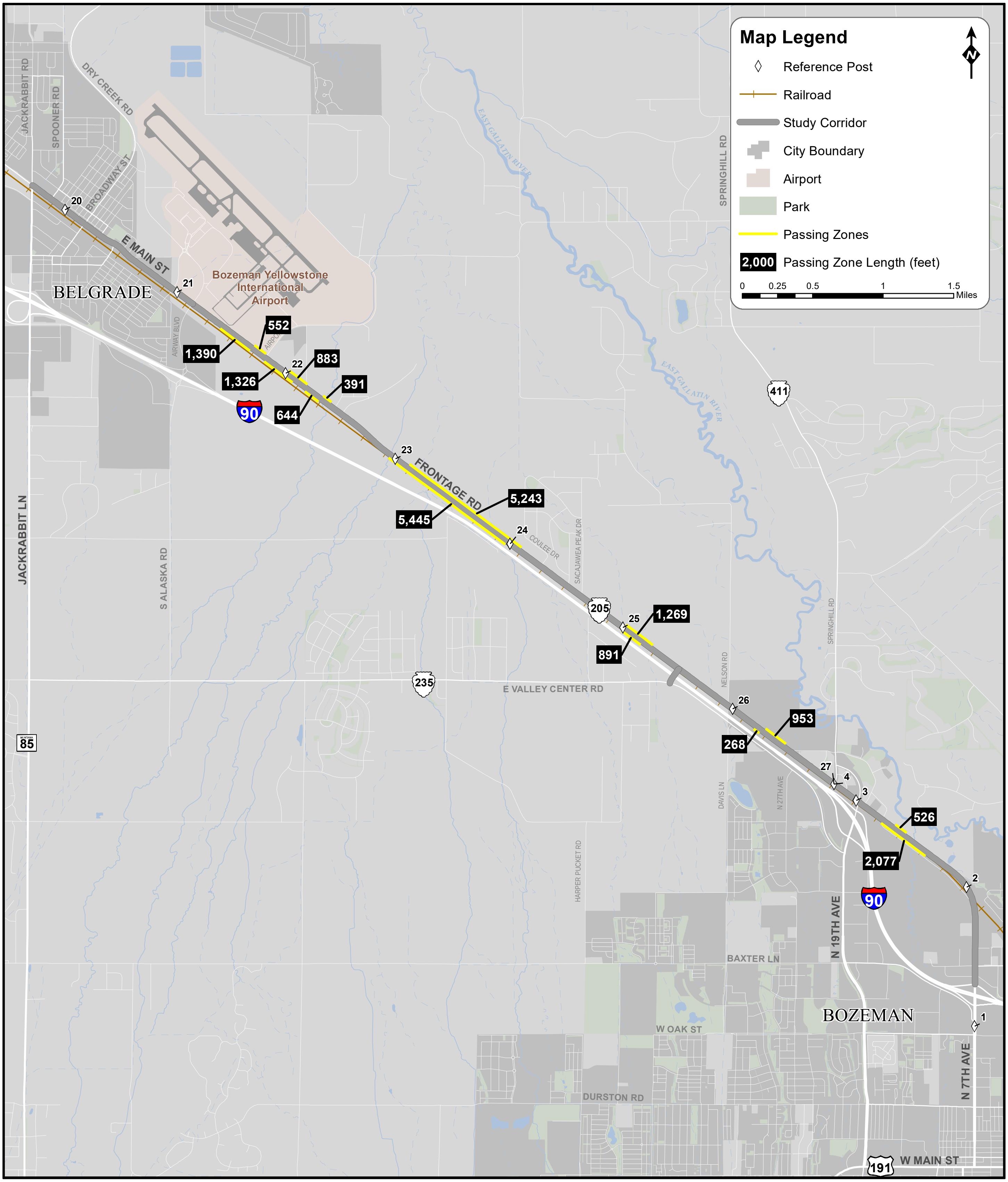


Figure 4: Passing Zones

2.1.8. Drainage Conditions

Due to the varied nature of the corridor (urban and rural), drainage conditions along the study corridor vary from curb and gutter with storm sewer to simple drainage ditches. Within Belgrade, curb and gutter is used to direct and control storm water. It was noted during the field review that many areas within Belgrade have poor drainage as evidenced by standing water in multiple locations.

In addition to storm water control, many other hydraulic structures are in place along the study corridor. **Table 8** tabulates location, construction date, and other details relevant to hydraulic structures along the study corridor.

Table 8: Hydraulic Structures

LOCATION	PROJECT NUMBER	CONSTRUCTION DATE	DETAILS
Jackrabbit Lane and Main Street	CN 4471 SFCU-STPS 291-1(5)1	2006	Project included new curb and gutter, storm drain with drainage sumps and new reinforced concrete pipe arch (RCPA) on the Mammoth Ditch crossing both Jackrabbit Lane and Main Street.
Airway Boulevard	UPN 5897001 IM-MT STPU 90-6(112)300	2015	This project eliminated some irrigation and minor drainage culverts crossing the Frontage Road and added a significant amount of curb and gutter and a storm drain system with detention/retention ponds to address storm runoff.
Spain Ferris Ditch (RP 22.3)	Unknown	Unknown	The Spain Ferris Ditch crosses the Frontage Road via a Reinforced Box Culvert (RBC) and includes two laterals east and west of the main crossing that are conveyed across the Frontage Road via culverts.
Hyalite Creek (RP 22.3)	STPHS 205-1(16)23	1997	Hyalite Creek crosses the Frontage Road via RBC with an overflow RCPA.
Baxter Creek (RP 23.2)	UPN 8031000 HSIP 205-1(45)23	Not yet constructed	Project in early stages of design. The project is primarily the replacement of the Baxter Creek culvert.
RP 25-27	UPN 4433 STPHS 205-1(26)26	2004	Miscellaneous irrigation and drainage culverts. Replaced culvert crossing on Spring Creek (RP 25.8).
Springhill Road to I-90 WB ramps	N/A	N/A	Miscellaneous irrigation and drainage culvert crossings. Close proximity to the City of Bozeman Waste Water Treatment Plant and may include several underground utilities.

2.1.9. Bridges

MDT's Highway Bridge Program (HBP) emphasizes asset management and preservation. This emphasis promotes a "right treatment at the right time" philosophy in prioritizing and selecting projects on MDTs bridge system. MDT has defined the bridge program objectives and performance measures. The objectives and measures are intended to identify the right treatments for Montana's bridge assets, as well as promoting cost-effective bridge preservation, appropriate safety-related work, and economic growth.

MDT uses a Structure Condition Performance Measure and a Deck Performance Condition Measure. These measures categorize bridge conditions as good, fair, or poor, based on the condition rating given to the bridge deck (riding surface), superstructure (generally beams underneath the riding surface), and substructure (support structure extending into the ground). Additionally, the Structure Condition Performance Measure assigns a poor rating to a bridge that is structurally deficient.

A bridge is considered structurally deficient if load-carrying elements have deteriorated enough to be considered in "poor condition" or the adequacy of the waterway opening provided by the bridge is insufficient, causing intolerable traffic interruptions. When a bridge is classified as structurally deficient, it does not mean that it is unsafe. A structurally deficient bridge typically requires increased maintenance and repair to remain in service and eventual rehabilitation or replacement to address overall deficiencies.

The deck condition performance measure uses the National Bridge Inventory (NBI) deck rating to give an indication of the deck condition and a planning level indication of needed preservation treatment. The deck condition ranking is a general indicator of the condition of any individual deck. The rankings are useful for planning purposes on a system wide basis.

There are two bridges along the study corridor. **Table 9** shows the bridge locations and condition ratings. The bridge at RP 26.6 has a structure condition of "poor" which means it is a candidate for repair or replacement. The bridge located at RP 2.1 over the railroad tracks has a structure condition of "good" which indicates it is a candidate for continued preservation. Both of the bridges have bridge deck ratings of "fair-1", which means they are candidates for healer/sealer treatments.

Table 9 also lists the width of each bridge within the study area. According to the MDT *Bridge Design Standards*, the bridge at RP 26.6 has a total bridge width narrower than the recommended standard for new bridges. The bridge at RP 2.1 has a width that meets standards for new bridges. Bridges to remain in place that do not meet the recommended width may be considered for additional signing or widening depending on further engineering analysis[10].

Table 9: Bridge Locations and Condition

LOCATION	FEATURE CROSSED	YEAR BUILT	WIDTH (ft)	LENGTH (ft)	STRUCTURE CONDITION	DECK CONDITION
RP 26.6 (P-205)	Unknown Creek	1950	29.5	42.6	POOR	FAIR-1
RP 2.1 (P-118)	Railroad Track	1993	42.3	391.0	GOOD	FAIR-1

Source: MDT Bridge Management System, 2016

2.1.10. Other Transportation Modes

Other transportation modes include any mode that does not use an automobile. These can include, but are not limited to, bicycles, walking, transit services, and other non-motorized forms of transportation. The following discusses these other transportation modes relative to the study corridor.

Non-motorized

Sidewalks are in place on both sides of the study corridor from Jackrabbit Lane to Kennedy Street in Belgrade. From Kennedy Street to the east of the Central Valley Fire Station, the north side of Main Street is striped as a buffered pedestrian area. There is sidewalk on the north side of Main Street from east of the Central Valley Fire Station to approximately Oregon Street. Multiple gaps in the sidewalk network exist within Belgrade south of Kennedy Street.

With the construction of the East Belgrade Interchange, sidewalks were constructed from Gallatin Field Road to east of Airway Boulevard. Between Redwing Road and the end of the study corridor, sidewalks are in place at spot locations on both sides of North 7th Avenue. There is approximately 310 feet of separated shared-use path constructed south of the Gallatin Veterinary Hospital and north of the Frontage Road east of the intersection with Campbell Road.

Local planning documents conflict on long-term non-motorized infrastructure recommendations for the Frontage Road (see **Section 1.3**). The following summarizes the relevant local plans, and their corresponding recommendations.

- **Greater Bozeman Area LRTP (2007 Update):** Recommends expanded shoulders on each side of the Frontage Road with a minimum width of 4-feet, in conjunction with future roadway improvements.
- **Bozeman PROST Plan:** Identifies a separated shared-use path running the length of the Frontage Road within the City planning limits, and numerous trail connections to the north connecting to residential neighborhoods, the East Gallatin River, and the Cherry River FAS.
- **Belgrade Transportation Plan:** Recommends a ten-foot wide path with an all-weather surface on the south side of old Highway 10 between Belgrade and Bozeman within either the railroad or the Interstate rights-of-way.
- **Draft Bozeman TMP:** Draft recommendations include a separated shared use path on the north side of the Frontage Road within the City planning limits.

The Union Pacific Railroad – BNSF Railway has guidelines for projects within railroad right-of-way. MRL, as a lessee, is required to seek BNSF concurrence as the underlying landowner on any easement for roadway purposes granted to MDT, and MRL seeks to avoid roadway designs which do not conform to BNSF's standards. The guidelines are intended to limit potential impacts on existing and future railroad operations. Compliance with the guidelines is required to expedite review and approval of design and construction projects. Any development of trails within or near the railroad would likely require coordination with the railroad. The following guidelines exist for trails parallel to tracks[11]:

- The Railroad does not allow trails parallel to the track on railroad right-of-way and does not permit the use of railroad access roads for trail use.
- Railroad structures cannot be used to serve trail traffic or support a structure serving trail traffic.
- Fences or barriers such as vegetation, ditches, and/or berms shall separate trails that are outside the railroad right-of-way and running parallel to the track to stop trespassers from entering the railroad right-of-way.

Transit

Public transit services are not present along this study corridor. The closest public transit is Streamline's Greenline route which services Jackrabbit Lane in Belgrade. Streamline is the only public bus service in the Livingston, Belgrade, Four Corners, and Bozeman areas.

2.2. Traffic Operations

An evaluation of traffic operations for the study corridor was completed using available data provided by MDT, as well as field-collected data. Turning-movement counts were conducted by MDT at nine major intersections within the study area over a 24-hour period. Mainline traffic volume data for existing and historic conditions were available at multiple locations within the study area. Visual observations were made for driver behavior, vehicle queuing, and general traffic characteristics. The following sections provide details about the existing and projected traffic characteristics for the study corridor. Detailed data are available in the appendix.

2.2.1. Traffic Volumes

Traffic volumes along the study corridor are collected annually as part of MDT's traffic data collection program. A total of 10 data collection sites are located along the study corridor. The data collected at each site is used to determine an average daily traffic (AADT) volume. AADT represents the average number of vehicles that pass a given point on a typical day of the year. Existing AADT volume on the study corridor ranged from a low of 5,250 vehicles per day (vpd) west of Broadway Street in Belgrade, to a high of 12,520 vpd south of Griffin Drive in Bozeman.

Projected Conditions

Historic and projected future conditions were evaluated to help identify an appropriate growth rate for the study corridor. The selection of an appropriate growth rate for the area is important for forecasting future traffic conditions and to help identify corridor needs. This section presents two methodologies for determining projected traffic conditions. The first approach utilizes available historic traffic data to define how conditions have changed in the past. The second approach uses a travel demand model to project how changes to area land use might affect traffic conditions in the future. The following sections discuss these methodologies in more detail.

Historic Traffic and Growth Rates

The historic traffic growth method utilized the AADT data available from MDT. AADT data for the past 20 years (1996 through 2015) were used to determine an average annual growth rate (AAGR) for the count sites along the study corridor.

Historic growth rates for the study corridor are used to help project future traffic conditions. Past growth is typically used as an indicator for future growth. Traffic volumes can vary greatly over short periods of time. As such, an analysis of multiple years of historic data is needed to more accurately project future conditions.

Traffic has shown moderate growth over the past 20 years. Between 1996 and 2015, traffic was shown to increase at an average annual rate of 1.0 percent along the study corridor. However, volumes are generally shown to decrease between 2014 and 2015 due to the opening of the East Belgrade Interchange. During this one year period, volumes dropped by just over 20 percent on average along the study corridor. Prior to the East Belgrade Interchange opening, traffic volumes grew at an average annual rate of 1.2 percent between 1995 and 2014. **Table 10** shows the change in traffic volumes since the East Belgrade Interchange was constructed. It is expected that traffic volumes will start to increase again after the initial reduction in volumes due the change in travel patterns from the new interchange.

Table 10: AADT Change between 2014 and 2015

LOCATION	2014 AADT	2015 AADT	% DIFFERENCE
East of Jackrabbit Lane	9,460	8,348	-11.8%
West of Broadway Street	7,210	5,250	-27.2%
East of Broadway Street	9,980	8,670	-13.1%
East of Madison Avenue	11,510	9,550	-17.0%
West of Valley Center Spur Road	11,360	7,478	-34.2%
West of Springhill Road	10,100	5,760	-43.0%
East of Springhill Road	8,370	5,300	-36.7%
North of Red Wing Drive	8,160	6,090	-25.4%
North of Griffin Drive	9,540	9,930	4.1%
South of Griffin Drive	14,410	12,520	-13.1%
		Average for Corridor	**-21.2%**

Travel Demand Model

A travel demand model was developed for Gallatin County as part of the *Bozeman TMP*. The model uses the transportation network and land use assignments to determine the number of trips for roadway segments. The model was initially developed and calibrate to existing conditions. To project future conditions, future land use assignments were completed using a combination of socioeconomic data and vetted through a workshop with staff from the City of Bozeman, Gallatin County, and MDT.

Future traffic volumes are estimated by projecting land use changes and applying those changes to the existing conditions model. In addition to land use changes, changes to the road network can be applied. Future projections were made out to the year 2040. The model projected an AAGR of 1.3 percent for the study corridor.

Projected Growth Summary

Over the past 20 years, the study corridor has experienced an AAGR of approximately 1.0 percent. The historic growth is influenced by the recent construction of the East Belgrade Interchange. As such, the travel demand model was used as a tool to help predict future conditions. The model suggests an AAGR of 1.3 percent for the study corridor.

Factoring in historic growth along with the results of the travel demand model, it was determined that an AAGR of 1.3 percent would be appropriate for the study corridor. As such, a 1.3 percent average annual growth rate was applied to existing traffic volumes for the projected operational analysis contained in this report. Projected AADT for the study corridor are shown in **Table 11**.

Table 11: Existing and Projected Traffic Volumes

SITE	LOCATION	2015 AADT	2040 AADT(i)
16-3-014	East of Jackrabbit Lane	8,348	11,350
16-3-015	West of Broadway Street	5,250	7,250
16-3-016	East of Broadway Street	8,670	11,970
16-3-017	East of Madison Avenue	9,550	13,190
16-3-032	West of Valley Center Spur Road	7,478	10,330
16-3A-017	West of Springhill Road	5,760	7,960
16-3A-016	East of Springhill Road	5,300	7,320
16-3B-119	North of Red Wing Drive	6,090	8,410
16-3B-019	North of Griffin Drive	9,930	13,710
16-3B-020	South of Griffin Drive	12,520	17,290

(i) *Projected based on an average annual growth rate of 1.3 percent.*

Heavy Vehicle Traffic

An analysis of heavy vehicle traffic along the study corridor was made using the 24-hour turning movement count data. The turning movement count data include breakouts for vehicle type. For this analysis, vehicles classified as single-unit trucks and articulated trucks were considered heavy vehicles.

Based on the turning movement counts, the percent of heavy vehicles at the major intersections ranges from just over two percent to almost seven percent of all vehicle traffic. On average, heavy vehicle traffic accounts for approximately 4.5 percent of traffic along the corridor. **Table 12** show the heavy vehicle traffic collected at each intersection over a 24-hour period.

Table 12: Heavy Vehicle Traffic

INTERSECTION	TOTAL VEHICLES	HEAVY VEHICLES	% HEAVY VEHICLES
1. Jackrabbit Lane	20,205	441	2.18
2. Broadway Street	12,134	489	4.03
3. Oregon Street	10,446	336	3.22
4. Airway Boulevard	17,629	1,173	6.65
5. Airport Road	9,074	569	6.27
6. Valley Center Spur Road	10,241	486	4.75
7. Nelson Road	7,743	479	6.19
8. Springhill Road	9,681	290	3.00
9. Griffin Drive	17,987	888	4.94
Average	**12,793**	**572**	**4.58**

School-related Traffic

Traffic data was originally collected during the summer months, while school was not in session. To supplement the data, additional field observations were made to evaluate the effects traffic related to Belgrade High School had on the study corridor. Observations were made in early November, 2016 during school pick-up and drop-off times. The field review showed that traffic operates relatively smoothly throughout most of the day. However, when students are released from school in the afternoon, traffic congestion and operational issues were observed.

When school gets out, a large number of vehicles are released onto the traffic network during a short period of time. The main roads connecting the school and Main Street are Grogan Street and Hoffman Street. The primary movement of vehicles involves right turns onto Main Street followed by left turns onto Jackrabbit Lane. This heavy movement results in long queues along Main Street between Jackrabbit Lane and Hoffman Street.

Vehicles attempting to turn from Grogan Street are effectively blocked from moving due to queues extending from the westbound left-turn movement at Jackrabbit Lane. Queues along both Grogan and Hoffman Streets were observed to extend to Central Avenue (approximately 500 feet). Traffic queueing was also noted at the intersection with Broadway Street with queues in the eastbound direction extending west of Quaw Boulevard (approximately 800 feet).

School bus traffic also influences traffic operations. School busses are required to stop at all railroad crossings. When a school bus turns onto Jackrabbit Lane, it must stop at the tracks immediately to the south of the intersection. With multiple busses in a row this can cause traffic to queue through the intersection with Jackrabbit Lane.

2.2.2. Major Intersections

The study corridor has multiple intersections of varying volume. Nine intersections were identified as major intersections which merit more in-depth investigation. Vehicle turning movement data was collected at each of the nine intersections over a 24-hour period. Each turning movement count was adjusted based on seasonal traffic adjustment factors published by MDT[12]. The data was used to evaluate intersection operations and peak hour conditions.

The operational conditions of the intersections are characterized by the Level of Service (LOS). The LOS is based on an alphabetic scale which represents the full range of operating conditions. This scale is defined based on the vehicle delay experienced at 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 13 summarizes the peak hour intersection operational analysis under existing and projected conditions. Additionally, **Figures 5** and **6** present the traffic operations graphically. The following discusses the general operational characteristics of the nine major intersections along the study corridor. More detailed information on the intersection operational analysis is provided in **Appendix 4**.

1. Jackrabbit Lane

The intersection with Jackrabbit Lane is currently signalized. The eastbound approach consists of dedicated right-turn, through, and left-turn lanes. The westbound approach consists of a dedicated left-turn lane and a shared through/right-turn lane. Both the northbound and southbound approaches consist of dedicated left-turn and through lanes along with right-turn slip lanes as a result of the skewed intersection.

The adjacent railroad pre-empts the traffic signal when a train approaches Jackrabbit Lane. Approximately 60 seconds before the train reaches Jackrabbit Lane, all northbound movements are given green signals and all other movements are given red signals. The northbound phase lasts for approximately 45 seconds, after which the east and westbound movements are given green signals. The traffic signal remains in this phase until the train has cleared the level crossing and the barrier gates have been raised.

Under existing traffic conditions, this intersection operates at a LOS of C during the AM and PM peak hours. Under projected conditions, the intersection is shown to remain at a LOS of C during the peak hours.

2. Broadway Street

The intersection with Broadway Street is a four-legged all-way stop controlled intersection. All of the approaches consist of a single shared lane allowing all movements. On-street parking is available on the north side of Main Street and on both sides of Broadway Street on the north approach. Angle parking is available on the south side of Main Street on the east approach. The MRL railroad line is located approximately 180 feet south of the northbound stop bar.

Under existing traffic conditions, the intersection operates at a LOS of A and C during the AM and PM peak hours, respectively. Under projected conditions, the intersection is shown to operate at a LOS of B and F during the respective peak hours. The failing projected PM peak hour is mainly a result of heavy westbound through and left-turn movements.

3. Oregon Street

The intersection of Oregon Street is a three-legged stop controlled intersection. The northbound approach is stop controlled and consists of channelized through/left- and right-turn lanes. There is a median dividing the right-turn and through/left-turn lanes. There is also a median dividing the southbound and northbound lanes. The eastbound and westbound approaches consist of single lanes with free movements. An entrance approach for a gas station is located on the north side of the intersection.

Under existing traffic conditions, the intersection operates at a LOS of C and D during the AM and PM peak hours, respectively. Under projected conditions, the intersection is shown to operate at a LOS of C and F during the respective peak hours. The intersection is shown to experience excessive delay for the northbound left-turn movement during the PM peak hour.

4. Airway Boulevard

The intersection with Airway Boulevard was recently reconstructed with the East Belgrade Interchange project. The intersection was reconstructed to include a traffic signal. All approaches at the intersection include dedicated right-turn, through, and left-turn lanes. The traffic signal operates with protected/permissive left-turn movements along all approaches. The intersection is shown to operate at a LOS of C or better during the peak hours under existing and projected conditions.

5. Airport Road

The intersection with Airport Road was also reconstructed with the East Belgrade Interchange project. Prior to reconstruction, the intersection was a four-legged intersection. The reconstruction of the intersection included the removal of the south approach leg. The intersection is now a three-legged intersection with stop control along the north approach. There are no dedicated turn lanes along any approach. The intersection is shown to operate at a LOS C during the peak hours under existing and projected conditions.

6. East Valley Center Spur Road

The intersection with East Valley Center Spur Road is a stop controlled four legged junction. However, the north leg is a closed private approach. The eastbound leg of the intersection consists of a dedicated right-turn, through, and left-turn lanes. The westbound leg consists of a dedicated left-turn bay and a shared through/right lane. The north-bound approach consists of a shared left/right-turn lane. The MRL rail line crosses East Valley Center Spur Road immediately south of the intersection. The at-grade crossing is controlled with an automatic crossing gate. The traffic control at the intersection is scheduled to be upgraded to signal control in the near future. As such, signalized traffic control was used for all projected traffic conditions.

Under existing traffic conditions (stop control along the northbound approach), the intersection operates at a LOS of C during the peak hours. Under projected conditions (traffic signal), the intersection is shown to operate at a LOS of B during the peak hours.

7. Nelson Road

The intersection with Nelson Road is a three-legged intersection with stop control along Nelson Road. The eastbound approach consists of a dedicated left-turn lane and a through lane. The westbound approach consists of a dedicated right-turn lane and a through lane. The southbound approach has a shared left/right-turn lane.

Under existing traffic conditions, the intersection operates at a LOS of B during the peak hours. Under projected conditions, the intersection is shown to operate at a LOS of C during the peak hours.

A traffic study is planned for this intersection to evaluate if signal warrants are met. The study is likely to take place during the winter of 2016/2017.

8. Springhill Road

The intersection with Springhill Road is a three-legged intersection. The intersection is controlled by a traffic signal. The southbound approach consists of dedicated left- and right-turn lanes. The eastbound approach consists of a dedicated left-turn lane and a through lane. The westbound approach includes a dedicated right-turn lane and a through lane. The intersection operates at a LOS B during the AM and PM peak hours under existing and projected conditions.

9. Griffin Drive

Griffin Drive and 7^{th} Avenue intersect at an urban four-legged signal controlled intersection. The northbound approach consists of a shared through/left-turn lane and a dedicated right-turn lane. The southbound approach has a shared through/left-turn lane and a shared through/right-turn lane. The eastbound and westbound approaches are single lanes which allow for all movements.

The traffic signal does not provide for protected left-turn movements along any approach and allows for permissive left-turn movements only. Under existing traffic conditions, the intersection operates at a LOS of C and D during the AM and PM peak hours, respectively. Under projected conditions, the intersection is shown to operate at a LOS of D and F during the respective peak hours. The intersection experiences delay due to the southbound and westbound left-turn movements.

A traffic and geometric analysis was completed for this intersection by MDT in October, 2016[13]. The purpose of the analysis was to identify improvements to signal timing and geometrics to address operational concerns. A recommendation was made to reconstruct the intersection to include dual westbound left-turn lanes and to realign the northbound and southbound legs to include left-turn lanes. The intersection is planned for reconstruction in 2019.

Table 13: Intersection Operations Analysis

INTERSECTION	EXISTING CONDITIONS (2016)				PROJECTED CONDITIONS (2040)			
	AM		PM		AM		PM	
	DELAY (S)	LOS	DELAY (S)	LOS	DELAY (S)	LOS	DELAY (S)	LOS
1. Jackrabbit Lane (S)	**23.8**	**C**	**21.1**	**C**	**31.4**	**C**	**24.2**	**C**
Northbound	*15.7*	*B*	*13.6*	*B*	*24.5*	*C*	*17.8*	*B*
Southbound	*24.5*	*C*	*19.3*	*B*	*36.7*	*D*	*14.3*	*B*
Eastbound	*31.9*	*C*	*28.9*	*C*	*37.8*	*D*	*35.0*	*C*
Westbound	*13.8*	*B*	*31.3*	*C*	*16.0*	*B*	*32.9*	*C*
2. Broadway Street (AWSC)	**9.2**	**A**	**15.5**	**C**	**11.0**	**B**	**57.7**	**F**
Northbound	*9.1*	*A*	*14.2*	*B*	*10.9*	*B*	*33.5*	*D*
Southbound	*8.8*	*A*	*12.0*	*B*	*9.9*	*A*	*18.9*	*C*
Eastbound	*9.4*	*A*	*12.9*	*B*	*11.4*	*B*	*26.1*	*D*
Westbound	*9.4*	*A*	*19.3*	*C*	*11.1*	*B*	*108.1*	*F*
3. Oregon Street (TWSC)	**16.8**	**C**	**27.1**	**D**	**22.3**	**C**	**98.9**	**F**
Northbound	*12.9*	*B*	*19.3*	*C*	*15.6*	*C*	*59.1*	*F*
Southbound	*14.4*	*B*	*16.8*	*C*	*18.4*	*C*	*30.7*	*D*
Eastbound	*0.8*	*A*	*0.8*	*A*	*0.8*	*A*	*0.9*	*A*
Westbound	*0.7*	*A*	*1.0*	*A*	*0.7*	*A*	*1.0*	*A*
4. Airway Boulevard (S)	**20.8**	**C**	**21.8**	**C**	**21.7**	**C**	**23.6**	**C**
Northbound	*14.9*	*B*	*14.4*	*B*	*18.4*	*B*	*20.1*	*C*
Southbound	*13.4*	*B*	*14.5*	*B*	*16.3*	*B*	*19.2*	*B*
Eastbound	*31.0*	*C*	*30.5*	*C*	*29.8*	*C*	*28.0*	*C*
Westbound	*22.1*	*C*	*27.5*	*C*	*20.3*	*C*	*26.9*	*C*
5. Airport Road (TWSC)	**15.7**	**C**	**17.6**	**C**	**19.1**	**C**	**24.8**	**C**
Southbound	*10.7*	*B*	*11.9*	*B*	*11.7*	*B*	*14.5*	*B*
Eastbound	*2.2*	*A*	*3.2*	*A*	*2.3*	*A*	*3.3*	*A*
Westbound	*0.0*	*A*	*0.0*	*A*	*0.0*	*A*	*0.0*	*A*
6. Valley Center Spur (TWSC/S)[(i)]	**15.8**	**C**	**23.1**	**C**	**12.8**	**B**	**13.4**	**B**
Northbound	*13.9*	*B*	*20.1*	*C*	*28.6*	*C*	*27.2*	*C*
Eastbound	*0.0*	*A*	*0.0*	*A*	*7.3*	*A*	*7.1*	*A*
Westbound	*3.5*	*A*	*2.4*	*A*	*8.2*	*A*	*10.3*	*B*
7. Nelson Road (TWSC)	**13.2**	**B**	**13.8**	**B**	**15.8**	**C**	**17.8**	**C**
Southbound	*12.2*	*B*	*12.9*	*B*	*14.3*	*B*	*16.4*	*C*
Eastbound	*0.2*	*A*	*0.6*	*A*	*0.2*	*A*	*0.7*	*A*
Westbound	*0.0*	*A*	*0.0*	*A*	*0.0*	*A*	*0.0*	*A*
8. Springhill Road (S)	**11.7**	**B**	**14.9**	**B**	**12.4**	**B**	**19.1**	**B**
Southbound	*29.5*	*C*	*27.0*	*C*	*28.5*	*C*	*25.2*	*C*
Eastbound	*4.4*	*A*	*5.5*	*A*	*5.7*	*A*	*8.4*	*A*
Westbound	*8.2*	*A*	*13.2*	*B*	*9.6*	*A*	*21.7*	*C*
9. Griffin Drive (S)	**30.9**	**C**	**54.3**	**D**	**45.2**	**D**	**184.3**	**F**
Northbound	*31.4*	*C*	*40.9*	*D*	*49.6*	*D*	*38.7*	*D*
Southbound	*25.8*	*C*	*47.6*	*D*	*29.3*	*C*	*82.9*	*F*
Eastbound	*20.7*	*C*	*14.5*	*B*	*21.5*	*C*	*21.8*	*C*
Westbound	*37.3*	*D*	*72.8*	*E*	*58.2*	*E*	*380.7*	*F*

(AWSC) – All-way Stop Control; (S) – Signal; (TWSC) – Two-way Stop Control

[(i)] Modeled as a two-way stop control under existing conditions and as a traffic signal under projected conditions.

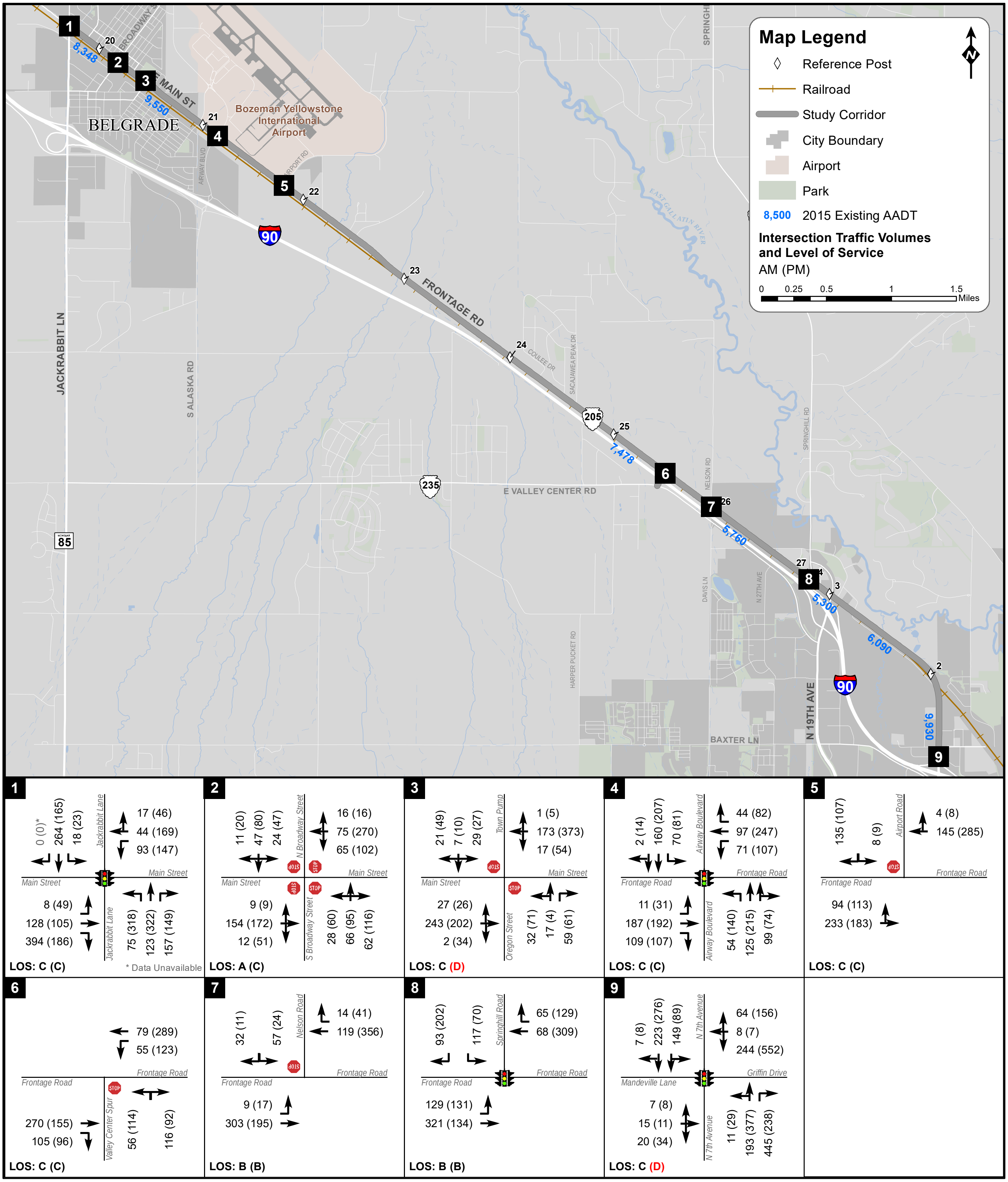


Figure 5: Existing Traffic Operations

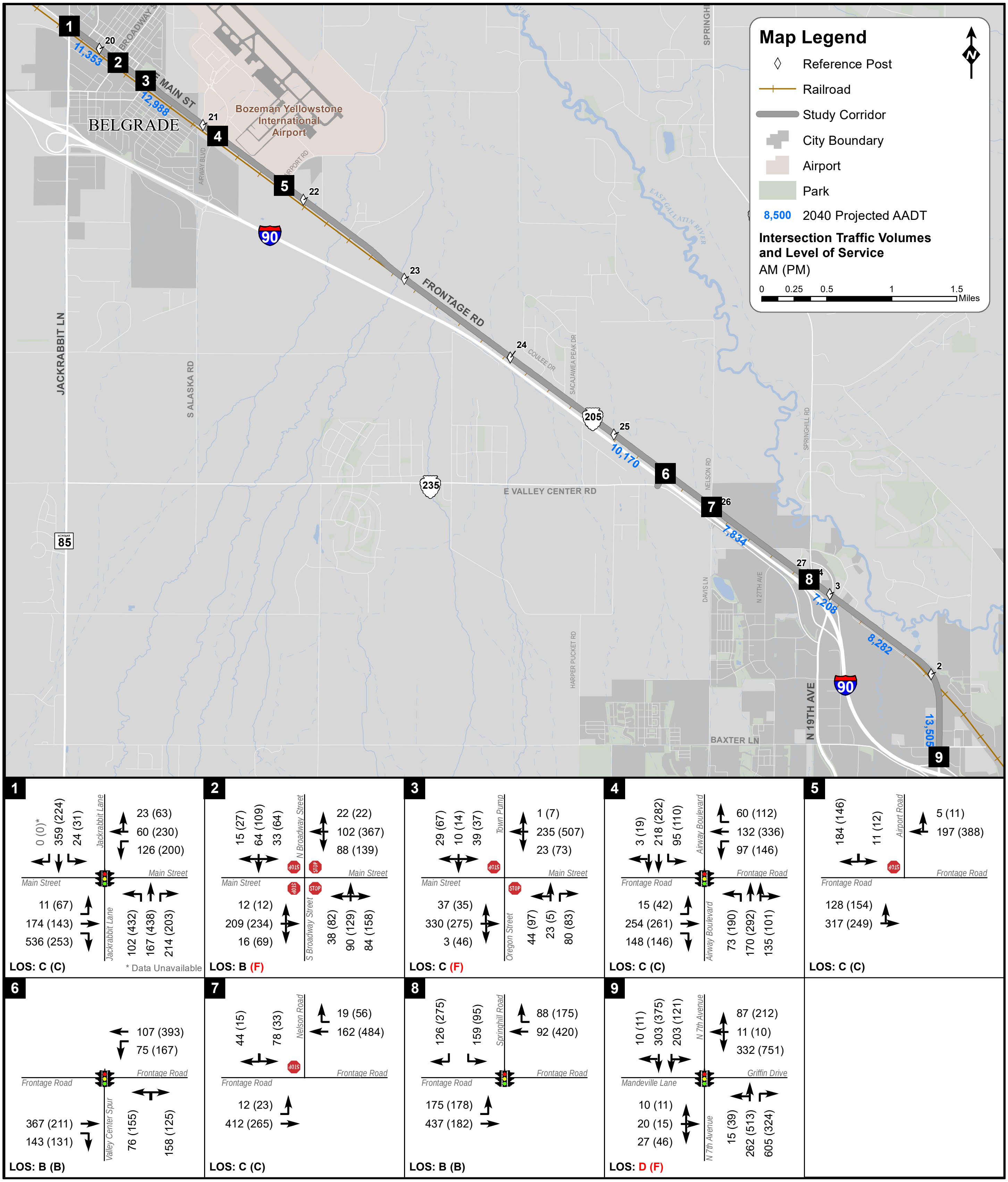


Figure 6: Projected Traffic Operations

2.2.3. Roadway Segments

The traffic operations of the study corridor were evaluated by dividing the corridor into roadway segments. The segments were generally defined between major intersections. Two categories of roadway segments can be used to describe each portion of the study corridor: urban and rural. Urban segments are characterized by frequent access points and intersections. Operations on urban segments are controlled by the intersections within the segment. An evaluation of the intersection operations is included in **Section 2.2.2**. The portions of the corridor between Jackrabbit Lane and Airway Boulevard and between the railroad viaduct and the I-90 ramps were considered urban in nature.

Rural segments are defined as having few access points and intersections. The operations on rural segments are controlled by driver's behavior on the segment. The corridor between Airway Boulevard and the railroad viaduct is generally more rural. The operational characteristics of the rural portion of the corridor were evaluated in terms of LOS. The LOS of rural two-lane segments can be further defined by one of the following three categories:

- **Class I** – Users can expect both high speeds and the ability to pass. Both average travel speed and percent time spent following criteria are used to determine LOS.
- **Class II** – Speed is rarely an issue as a result of restricted design speeds due to terrain or roadway context. Only percent time spent following is used to determine LOS.
- **Class III** – Speed limits are low due to surrounding development and passing is generally restricted. Only percent of free-flow speed is used to determine LOS.

The rural segments along the study corridor are likely categorized as Class III highways due to limited passing opportunities. It was assumed that the free flow speed for all segments is 55 miles per hour based on the existing speed limits and past speed studies conducted along the corridor. Each segment was further broken down into eastbound and westbound direction for peak hour operational analysis. The following discusses the operations of each rural roadway segment. A summary of the analysis findings is tabulated in **Table 14**.

Airway Boulevard to Airport Road

Airway Boulevard and Airport Road are approximately 0.8 miles apart. There are no approaches within this segment. The percent of the segment that is striped as no passing is 84 and 59 percent in the westbound and eastbound directions, respectively. Under existing conditions, the LOS for this segment is B and C in the westbound direction and B and B in the eastbound direction during the AM and PM peak hours, respectively. Under projected traffic conditions, the LOS is C for both directions of travel during the peak hours.

Airport Road to East Valley Center Spur Road

Airport Road and East Valley Center Spur Road are approximately 3.7 miles apart. The approach density on this segment is nine approaches per mile. The percent of the segment that is striped as no passing is 60 and 57 percent in the west and eastbound directions, respectively. Under existing conditions, the LOS for this segment is B in both directions during both peak hours. Under projected traffic conditions, the LOS is B and C in the west and eastbound directions during the AM peak hour and C for both directions during the PM peak hour.

East Valley Center Spur Road to Nelson Road

East Valley Center Road and Nelson Road are approximately 0.4 miles apart. The approach density on this segment is two approaches per mile. The percent of the segment that is striped as no passing is 100 percent in both the west and eastbound directions. Under existing traffic conditions, the LOS for this segment is B for both directions during the AM peak hour and C and B for the west and eastbound directions, respectively, during the PM peak hour. Under projected traffic conditions, the LOS remains the same as under existing traffic conditions.

Nelson Road to Springhill Road

Nelson Road and Springhill Road are approximately 0.9 miles apart. The approach density on this segment is six approaches per mile. The percent of the segment that is striped as no passing is 81 and 95 percent in the west and eastbound directions. Under existing traffic conditions, the LOS for this segment is B in both directions during the AM peak hour and C and B for the west and eastbound directions, respectively, during the PM peak hour. Under projected traffic conditions, the segment LOS is C and B for the west and eastbound directions during the AM peak hour and C in both directions during the PM peak hour.

Springhill Road to Rail Road Viaduct

The distance from Springhill Road to the south side of the rail road viaduct is approximately 1.4 miles. The approach density for this section is seven approaches per mile. The percent of the segment that is striped no passing is 93 and 73 percent for the west and eastbound directions, respectively. Under existing traffic conditions, the AM peak hour LOS is B for both directions. During the PM peak hour, the LOS is C and B for the west and eastbound directions, respectively. Under projected traffic conditions, the segment LOS is C in both directions during both the AM and PM peak hours.

Table 14: Existing and Projected Corridor Operations

Segment	Direction	EXISTING CONDITIONS (2016)				PROJECTED CONDITIONS (2040)			
		AM		PM		AM		PM	
		% FFS	LOS	% FFS	LOS	% FFS	LOS	% FFS	LOS
Airway Boulevard to Airport Road	Westbound	84.5	B	81.1	C	82.2	C	78.8	C
	Eastbound	84.3	B	83.7	B	81.8	C	80.6	C
Airport Road to East Valley Center Spur Road	Westbound	86.8	B	85.5	B	85.1	B	81.9	C
	Eastbound	86.9	B	85.7	B	83.1	C	83.2	C
East Valley Center Spur Road to Nelson Road	Westbound	85.9	B	82.2	C	84.1	B	79.7	C
	Eastbound	84.8	B	84.4	B	80.9	C	81.9	C
Nelson Road to Springhill Road	Westbound	85.5	B	81.0	C	83.5	B	78.0	C
	Eastbound	83.5	B	83.4	B	79.3	C	80.4	C
Springhill Road to south of railroad Viaduct	Westbound	85.3	B	81.1	C	83.1	C	78.2	C
	Eastbound	84.3	B	84.6	B	79.2	C	81.9	C

2.3. Geometric Conditions

Existing roadway geometrics were evaluated and compared to current MDT standards. The analysis was conducted based on a review of public information, MDT as-built drawings, GIS data, and field observations. The use of as-built drawings was limited due to the drawings being unavailable for some segments and out dated for other segments of the corridor.

2.3.1. Design Criteria

The MDT *Road Design Manual* specifies general design principles and controls that determine the overall operational characteristics of the roadway and enhance its aesthetic appearance. The geometric design criteria for the study corridor are based on the current MDT design criteria for principal arterials on the NHS and minor arterial non-NHS routes. Standards for rural and urban conditions for both classifications are appropriate for the corridor.

The portion of the corridor through Belgrade is an urban NHS principal arterial. Between Belgrade and Airway Boulevard, the roadway is likely a rural NHS principal arterial. East of Airway Boulevard to

Bozeman, the roadway is a rural minor arterial. Through Bozeman, the roadway is an urban minor arterial.

Table 15 provides existing standards for the various roadway classifications. Depending on classification, design speeds may vary from as low as 35 mph in the urban areas, up to 70 mph in the rural areas. The entire corridor is likely considered level terrain. The table provides critical design criteria depending on design speed and roadway classification. Further evaluation of design speed and terrain type may be necessary during the project development process.

Table 15: Recommended Geometric Design Criteria Standards

DESIGN ELEMENT			PRINCIPAL ARTERIAL			MINOR ARTERIAL		
			URBAN		RURAL	URBAN		RURAL
			CURBED	UNCURBED		CURBED	UNCURBED	
Design Controls	Design Forecast Year (Geometrics)		20 Years			20 Years		
	Design Speed[i]		40-45 mph	40-50 mph	70 mph	35 mph		60 mph
	Level of Service		Desirable: B Minimum: C		B	Desirable: B Minimum: C		B
Roadway Elements	Travel Lane Width[i]		12’			11’		12’
	Shoulder Width[i]		Varies			0’	4’	Varies
	Cross Slope[i]		2%			2%		
	Median Width		n/a		Varies	n/a		Varies
	TWLTL Width		16’		n/a	11’		n/a
Earth Cut Sections	Ditch	Inslope	n/a	Desirable: 6:1 Minimum: 4:1	6:1 Width: 10’	n/a	Desirable: 6:1 Minimum: 4:1	6:1 Width: 10’
		Width	n/a	10’ Min.		n/a	10’ Min.	
		Slope	n/a	20:1 towards back slope		n/a	20:1 towards back slope	
	Back Slope; Cut Depth at Slope Stake	0’-5’	5:1			5:1		
		5’-10’	4:1			4:1		
		10’-15’	3:1			3:1		
		15’-20’	2:1			2:1		
		>20’	1.5:1			1.5:1		
Earth Fill Slopes	Fill Height at Slope Stake	0’-10’	6:1			6:1		
		10’-20’	4:1			4:1		
		20’-30’	3:1			3:1		
		>30’	2:1			2:1		
Alignment Elements	Design Speed		40 mph	50 mph	70 mph	30 mph	40 mph	60 mph
	Stopping Sight Distance[i]		305’	425’	730’	200’	305’	570’
	Passing Sight Distance		n/a	n/a	2480’	n/a	n/a	2135’
	Minimum Radius[i]		533’	760’	1810’	250’	533’	1200’
	Superelevation Rate[i]		e_{max}=4.0%	e_{max}=8.0%		e_{max}=4.0%		e_{max}=8.0%
	Vertical Curvature[i]	Crest	44	84	247	19	44	151
		Sag	64	96	181	37	64	136
	Maximum Grade[i]		6%		3%	7%	6%	3%
	Minimum Vertical Clearance		17.0’			17.0’		

[i] *Controlling design criteria*
Source: MDT Road Design Manual, Chapter 12 Geometric Design Tables

2.3.2. Roadway Alignment

Roadway alignment can be viewed as a combination of two primary components: horizontal alignment and vertical alignment. Horizontal alignment is a measure of the degree of turns and bends in the road, and includes consideration of horizontal curvature, superelevation, curve type, and entering and passing sight distance. Geometric design criteria specific to horizontal alignment are based upon the functional classification of the roadway. Vertical alignment is a measure of the elevation change on a roadway, and includes consideration of grade, vertical curve length, vertical curve type (either a sag curve or a crest curve), and rate of curvature (K-value). K-value is the horizontal distance needed to produce a one percent change in gradient and is directly correlated to the roadway design speed and stopping sight distance.

Limited as-built information was available for the study corridor. As-built information available and provided by MDT included the following segments:

- Yellowstone Trail – 1921 (RP 20.7 to 23.4)
- Yellowstone Trail – 1933 (RP 25 to 29.2)
- Curve Realignment 2 Miles East of Belgrade – 1996 (RP 22.8)

Aside from the 1996 as-built plans, which realigned substandard horizontal curves to meet current design standards, the 1921 and 1933 as-built information is outdated and difficult to decipher. There have been other projects along the study corridor since that time for which as-built information is unavailable. This includes the urban roadway section between Jackrabbit Lane and Grogan Street (in Belgrade), the recently completed East Belgrade Interchange and connecting roads, interim intersection improvements at Valley Center Spur Road, improvements to the intersection with Nelson Road, and the bridge crossing the MRL tracks (constructed in 1993). All of these improvements brought the roadway and associated infrastructure up to standards current at the time.

Because of the relatively straight horizontal alignment that parallels the MRL tracks, and the relatively flat nature of the surrounding topography, it is likely that the roadway meets current geometric design standards for horizontal and vertical alignment. As improvement options are developed, detailed on-site investigation should be performed to confirm alignment standards are met.

2.3.3. Roadside Clear Zone

The roadside clear zone, starting at the edge of the traveled way, is the total roadside border area available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a recovery area. The desired clear zone width varies depending on traffic volumes, speeds and roadside geometry. Clear zones are evaluated individually based on the roadside cross section. According to MDT, clear zone should be attained by removing or shielding obstacles, if costs are reasonable.

In certain instances within the study area, it may be impractical to protect or remove certain obstacles within the clear zone. As improvement options develop, roadside clear zones should be designated, to a practical extent, to meet current MDT design standards.

2.4. Safety

Crash data were provided by the MDT Traffic and Safety Bureau for the six-year period between January 1st, 2010 and December 31st, 2015. The crash reports are a summation of information collected at the scene of the crash provided by responding officers. Some of the information contained in the crash reports may be subjective. Any crash records from other law enforcement agencies that were not reported to or by the Montana Highway Patrol were not contained in the database and are not included in this analysis.

The crash locations were plotted using latitude and longitude assigned to each record. The crashes were plotted and grouped based on if they occurred at an intersection or along a roadway segment. According to the records, there were 382 crashes reported along the study corridor during the six-year analysis period. The crash records were reviewed to identify trends, contributing factors, and characteristics. The crash locations are shown in **Figure 7**. An analysis of the crash data is provided in the following sections.

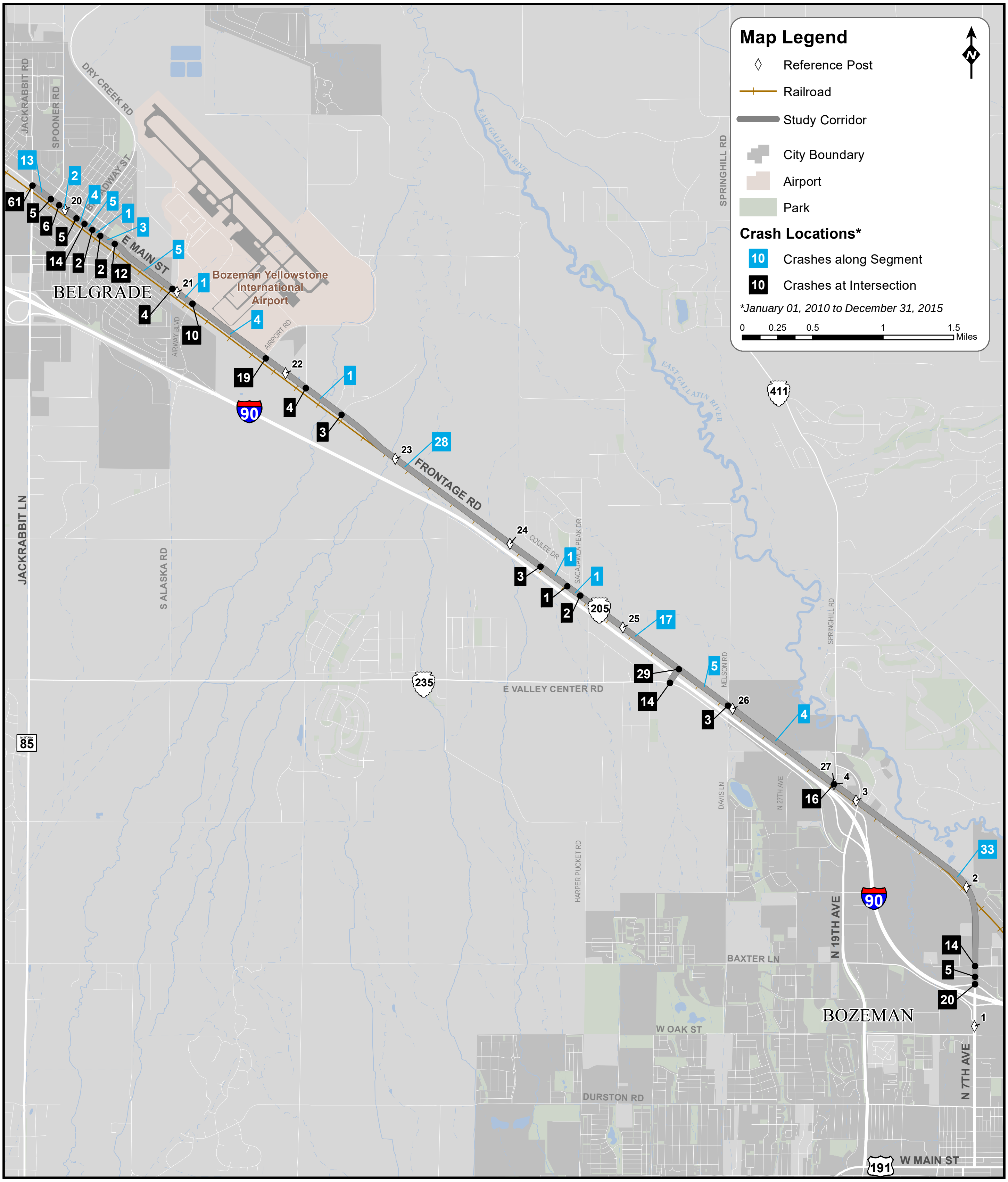


Figure 7: Crash Locations

2.4.1. Crash Type

Crash types were grouped into two categories, single and multiple vehicle crashes. Single vehicle crashes are those types that involve only one vehicle. Single vehicle crashes accounted for 27 percent (102) of all reported crashes. Of the single vehicle crashes, fixed object crashes were the most common type, followed by roll over and wild animal crashes.

Multiple vehicle crashes involve two or more vehicles. Multiple vehicle crashes accounted for 73 percent (280) of all crashes. The most common multiple vehicle crash types were rear-end and right angle crashes. **Figure 8** presents the distribution of crash types.

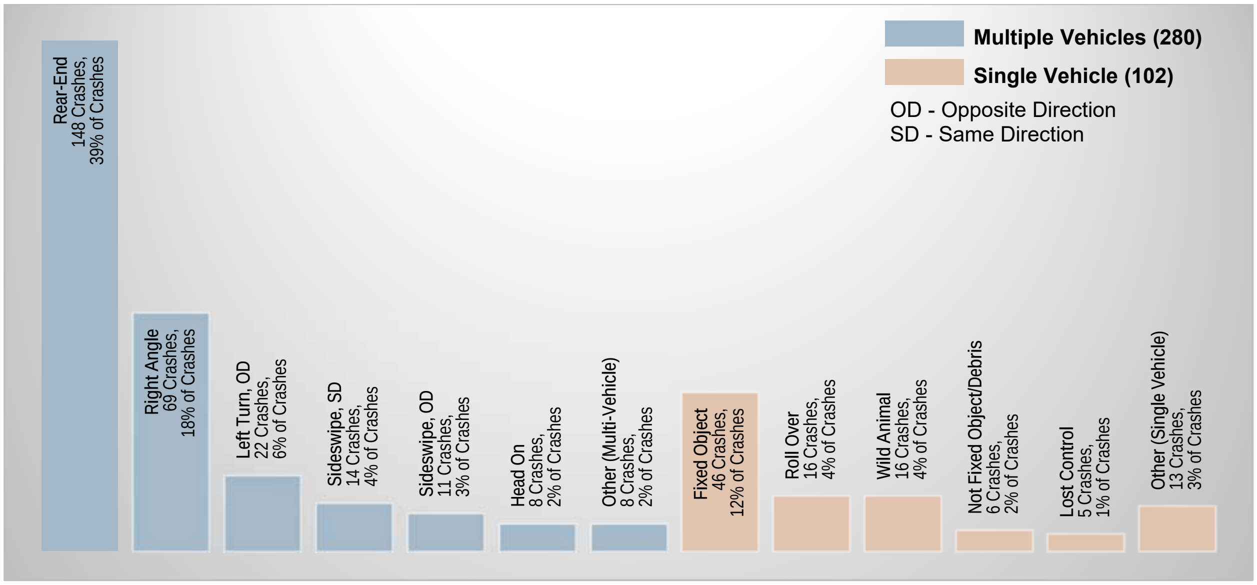


Figure 8: Crash Type

Crash types tend to be intrinsically associated with their relation to a junction (i.e. intersection or driveway). For example, multiple vehicle crashes are more common in locations near junctions. As such, analysis of relation to junction information can help to identify systemic issues within the study area. Of the 382 total reported crashes, 34 percent (131) of crashes were non-junction related. The remaining 66 percent (251) of crashes were, in some way, junction related.

2.4.2. Crash Severity

Crashes can be categorized by the severity that is reported. The most severe injury defines the severity for the crash. For example, if a crash results in a fatality and an injury, the crash would be defined as a fatal crash. Crash severity includes, from least severe to most, property damage only (PDO), possible injury, non-incapacitating evident injury, incapacitating injury, and fatal injury.

The distribution of reported crash severity is presented in **Figure 9**. There were three fatal crashes (0.8 percent) resulting in three fatalities. There were eight incapacitating injury crashes resulting in ten incapacitating injuries. The locations of severe crashes (fatal and incapacitating injury) are shown in **Figure 10**.

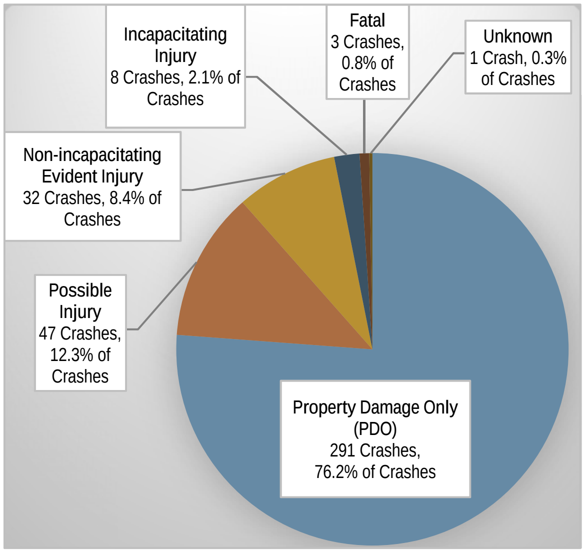


Figure 9: Crash Severity

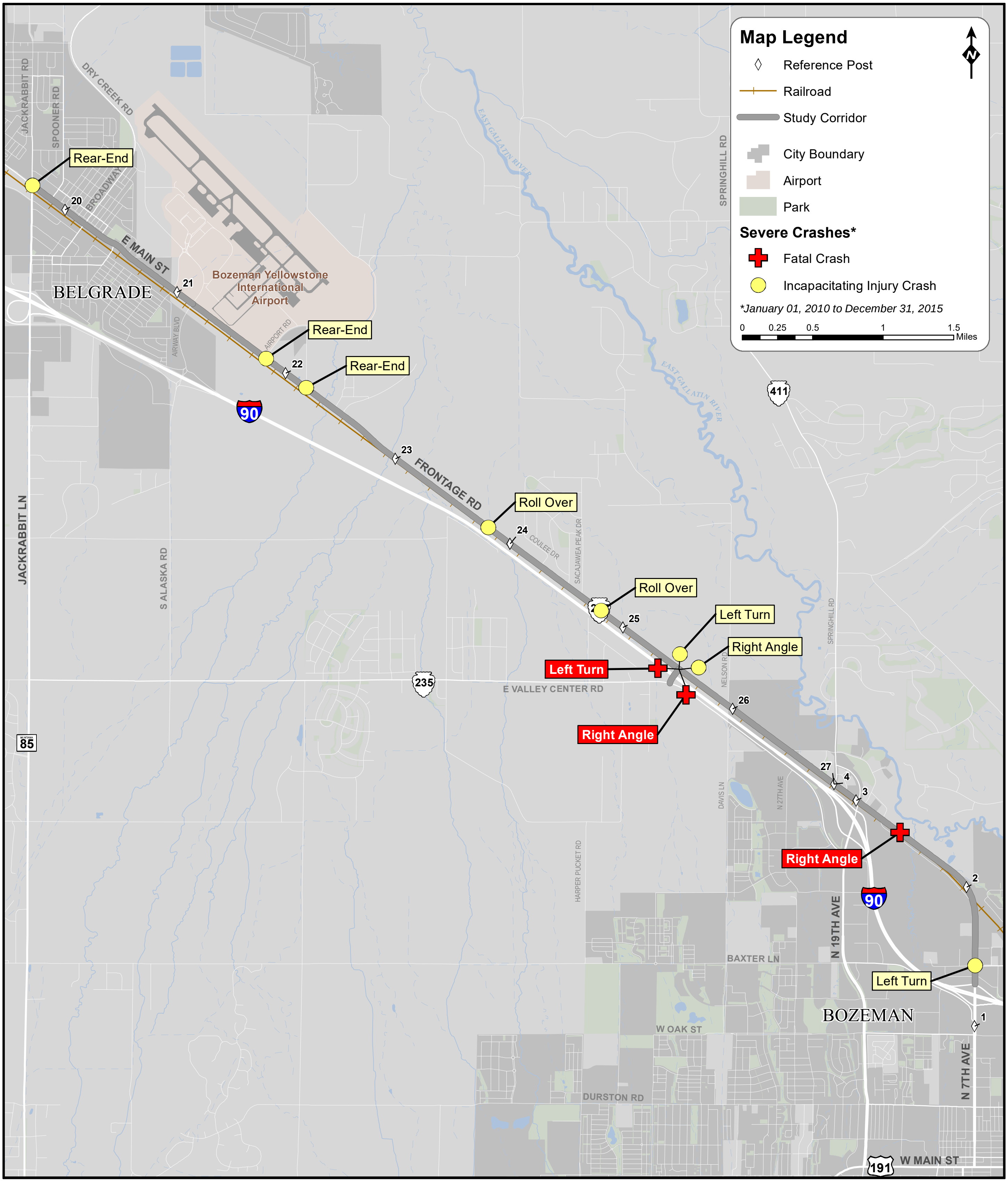


Figure 10: Severe Crashes

2.4.3. Crash Period

Each crash record includes the date and time when the crash occurred. These data can be used to determine seasonal and other time dependent trends. Time of day data was analyzed to determine if any specific trends were present. The data were plotted based on the hour the crash occurred and whether the crash occurred on a weekday or weekend. For weekday crashes (83 percent of all crashes), two peaks are apparent. One peak occurs between 7:00 and 8:00 AM which accounted for 9 percent of weekday crashes. The remaining peak occurs between 3:00 and 7:00 PM, accounting for 35 percent of crashes. For the weekend crashes (17 percent of all crashes), peak periods were less defined. **Figure 11** presents the distribution of crashes with respect to the time of day that the crashes occurred.

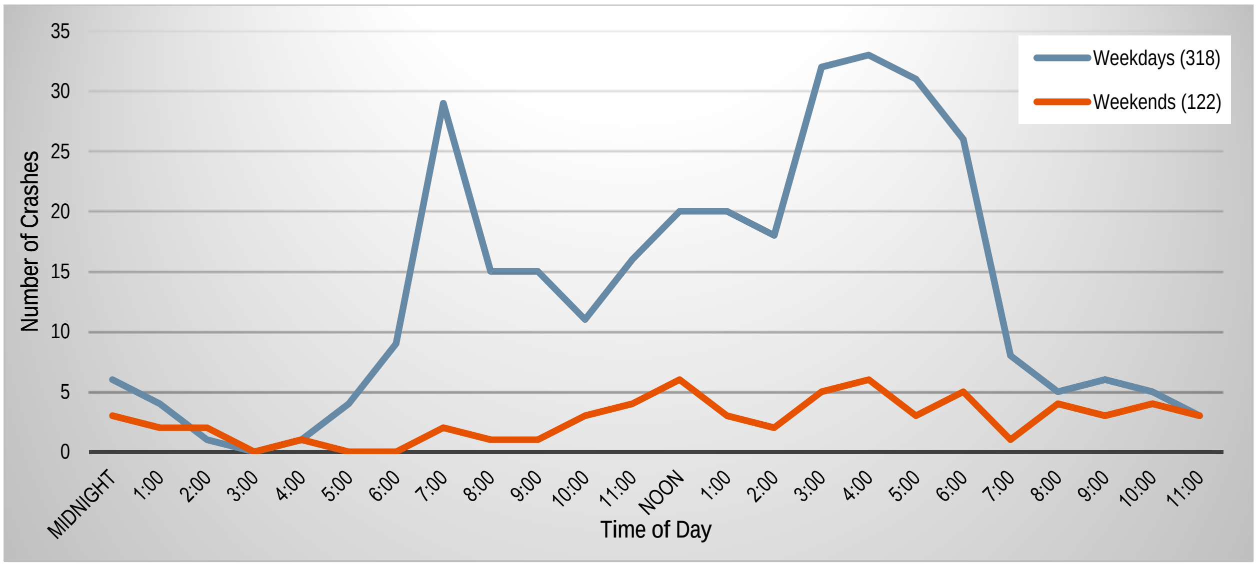


Figure 11: Crash Statistics for Time of Day

The frequency of crashes occurring on a given day and during each month were potted in **Figure 12**. As shown in the figures, the crashes were generally distributed throughout the week, with the fewest crashes occurring on a Sunday. Small peaks were observed during the early winter months and later summer. Between November and the end of January, there were 125 crashes (33 percent). There were 73 crashes (19 percent) in August and September.

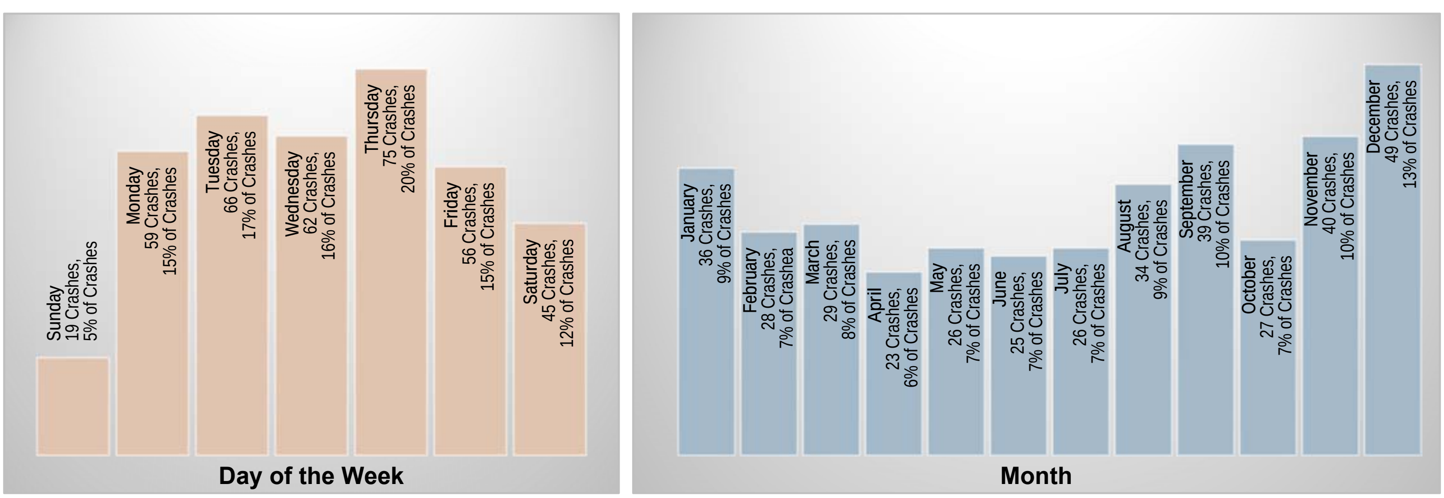


Figure 12: Crash Statistics for Day of the Week and Month

2.4.4. Environmental Factors

Each crash record includes information relating to environmental factors such as roadway surface, weather, and lighting conditions. This information was analyzed to determine in any trends exist. The road condition was reported as dry for 252 (66 percent) crashes. Daylight conditions were reported for 279 (73 percent) crashes. With respect to weather conditions, clear weather was reported for 218 (57 percent) crashes. **Table 16** details the relationship between the three environmental factors – weather, road, and lighting. **Figure 13** presents the distribution of crashes based on environmental factors.

Table 16: Relationship between Environmental Factors

ROAD CONDITION	WEATHER					
LIGHTING	CLEAR	CLOUDY	SNOW	RAIN	OTHER	TOTAL
Dry	**180**	**69**	**2**		**1**	**252**
Daylight	*140*	*58*			*1*	*199*
Dark-Lighted	*15*	*5*	*2*			*22*
Dark-Not Lighted	*20*	*3*				*23*
Other	*5*	*3*				*8*
Ice/Frost	**21**	**15**	**15**		**2**	**53**
Daylight	*15*	*7*	*7*		*1*	*30*
Dark-Lighted	*2*	*3*	*5*		*1*	*11*
Dark-Not Lighted	*3*	*3*	*2*			*8*
Other	*1*	*2*	*1*			*4*
Snow	**7**	**8**	**21**			**36**
Daylight	*5*	*6*	*12*			*23*
Dark-Lighted	*1*	*2*	*5*			*8*
Dark-Not Lighted	*1*		*4*			*5*
Wet	**6**	**11**	**2**	**11**	**1**	**31**
Daylight	*2*	*8*	*1*	*8*	*1*	*20*
Dark-Lighted		*2*		*2*		*4*
Dark-Not Lighted	*3*	*1*	*1*	*1*		*6*
Other	*1*					*1*
Other	**4**	**1**	**3**		**2**	**10**
Daylight	*4*	*1*	*2*			*8*
Dark-Not Lighted			*1*			*1*
Other					*2*	*2*
Total	**218**	**104**	**43**	**11**	**6**	**382**

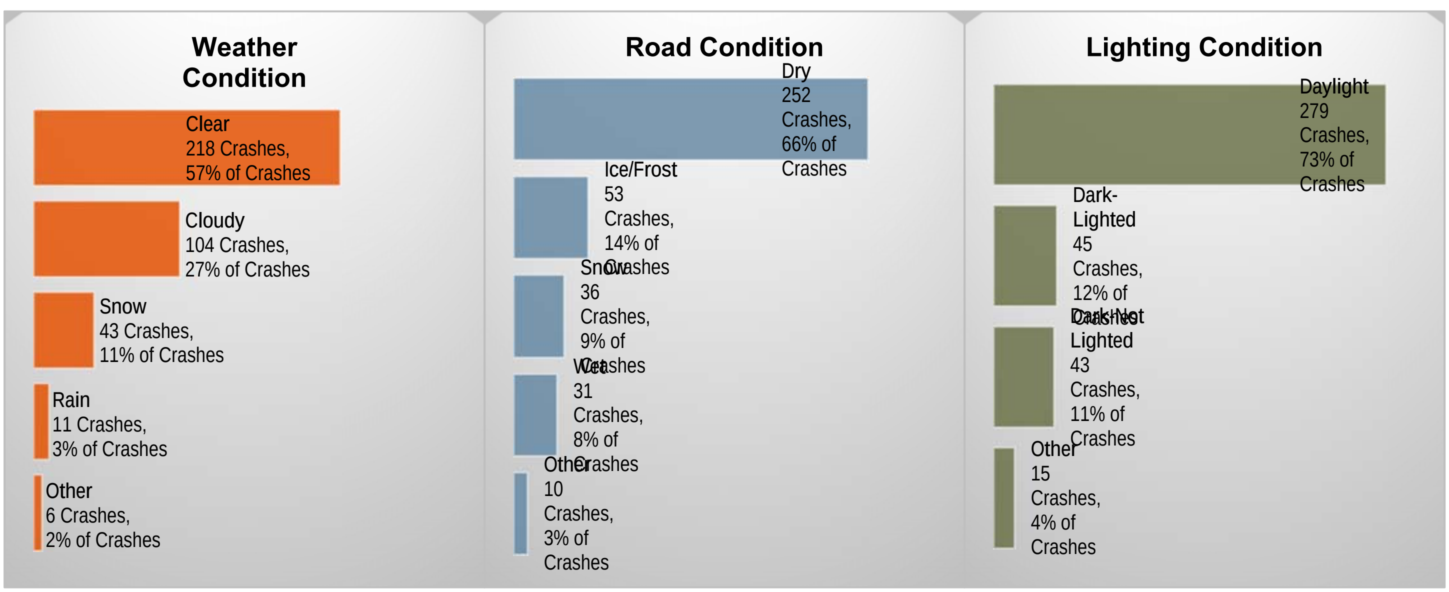


Figure 13: Environmental Factors

2.4.5. Driver Details

Driver gender and age were analyzed to identify any trends that may be present in the data set. Note that in multi-vehicle crashes there are two or more drivers, therefore the total number of drivers exceeds the total number of crashes. A total of 679 drivers were involved in the 382 reported crashes. Male drivers accounted for 361 (53 percent) drivers, while females accounted for 306 (45 percent) drivers. The remaining 12 (2 percent) drivers where reported as unknown gender.

With respect to driver's age, it was found that the average age of drivers was 38 years. The youngest and oldest drivers were reported as 15 and 90 years, respectively. Drivers younger than 20 years accounted for 102 (15 percent) drivers. The age distribution and gender of drivers involved in the reported crashes is shown in **Figure 14**.

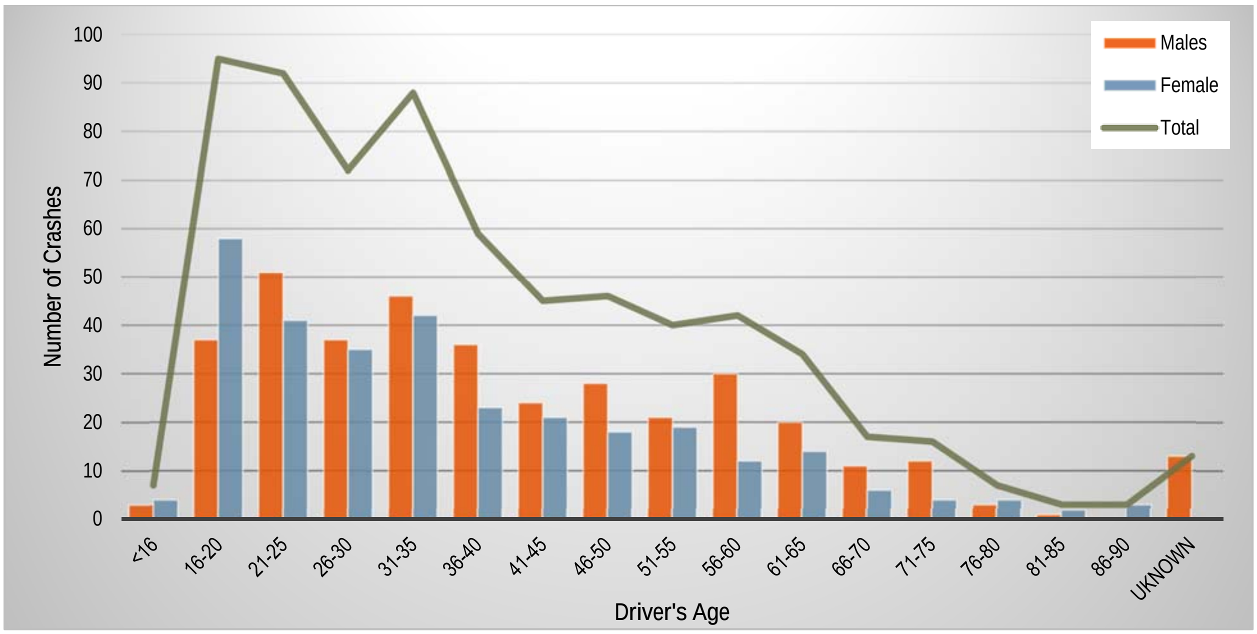


Figure 14: Driver's Age and Gender

2.4.6. Vehicle Details

A total of 689 vehicles were involved in the 382 reported crashes. The number of vehicles does not match the number of reported drivers due to bicyclists not being listed as drivers and some vehicles listed as "other" may not have a listed driver. Of the 689 vehicles involved in crashes, passenger vehicles accounted for 649 (94 percent). There were 16 heavy vehicles involved in crashes (2 percent) and 3 low speed vehicles (bicycles).

2.4.7. Crash Trends

Identification of crash trends based on the supplied data can help identify areas of concern and can inform possible mitigation options. Within the study area, multiple trends were identified. These trends vary based on type of crash, cluster location, and other factors. The following sections overview the identified trends.

Total Crashes

Crash clusters based on total number of crashes occurring in a given area were identified throughout the study area. These clusters tend to be located in areas with higher traffic volumes and at or near intersections. Between Jackrabbit Lane and Oregon Street, a total of 135 crashes were reported. This area is urban in character and represents a section of the corridor with higher traffic volumes. In the area surrounding the Valley Center Spur Road, a total of 46 crashes were reported. Again, this intersection is a location with high traffic volumes. Two other locations appear to have total crash clusters, Springhill Road and Griffin Drive with 18 and 41 reported crashes, respectively.

Rear-end Crashes

Rear-end crashes are more common in urban areas and near intersections. Rear-end crashes may be indicative of the need for improved traffic control or roadway geometrics. Between Jackrabbit Lane and Broadway Street, 66 rear-end crashes were reported. This section of the corridor is urban in nature with a large number of intersections and access points. The area surrounding Griffin Drive had 19 reported rear-end crashes. The area surrounding Airport Road had 11 reported rear-end crashes. Corridor wide, 102 of the 148 reported rear-end crashes (69 percent) occurred on dry roads.

Right Angle Crashes

Right angle crashes tend to occur in areas with higher traffic and high access density. Right angle crash clusters were identified between Jackrabbit Lane and Oregon Street with 28 crashes, the area surrounding Airport Road with 4 crashes, the area surrounding Valley Center Spur Road with 11 crashes, and the area surrounding Griffin Drive with 4 crashes. Each of these clusters is located at or near an intersection or access point.

Roadway conditions can be a factor in right-angle crashes. It was reported that corridor wide, 46 of the 69 right angle crashes (67 percent) occurred under dry roadway conditions.

Junction and Non-junction Related Crashes

Junction crashes include those in, or related to intersections or driveways. Junction crashes tend to be multi-vehicle crashes, conversely, non-junction related crashes tend to be single vehicle crashes. There were 254 junction crashes and 128 non-junction or segment crashes. This finding can be compared to the total number of multiple vehicle crashes at 280 and single vehicle crashes at 102 crashes.

Clusters of fixed object crashes were noted at many of the major intersections along to corridor. Of specific note is the cluster of four fixed object crashes near Nelson Road. Non-junction related crashes often include run-off-the-road crashes which are reported as roll-over, fixed object, and lost control type crashes. Between Dollar Drive and Sacajawea Peak Drive, 21 crashes were reported as either fixed object (10 crashes), lost control (3 crashes), or roll over crashes (8 crashes).

Urban versus Rural Crashes

In general, urban areas tend to see a higher percentage of crashes involving multiple vehicles. This is due to higher amounts of exposure to conflicts with vehicles. Conversely, rural areas tend to have higher percentages of single vehicle crashes. Within the study corridor there are two areas defined as urban, within Belgrade and within Bozeman. Between Belgrade and Bozeman, the corridor is considered rural. An evaluation of the number of single and multiple vehicle crashes was made for the urban and rural segments. Crashes within the urban areas accounted for just over half of all crashes along the corridor. Within the urban areas, over 87 percent of crashes involved two or more vehicles. Along the rural segments, multiple vehicle crashes accounted for 58 percent of reported crashes. The distribution of crashes along the urban and rural segments is shown in **Table 17**.

Table 17: Crashes within Urban and Rural Areas

TYPE	URBAN SEGMENTS		RURAL SEGMENTS	
Single Vehicle	26	12.9%	76	42.0%
Multiple Vehicle	175	87.1%	105	58.0%
Total	**201**	**52.6%**	**181**	**47.4%**

3.0. ENVIRONMENTAL SETTING

This section provides a summary of the *Environmental Scan*[14]. The primary objective of the *Environmental Scan* is to provide a planning-level overview of resources and to determine potential constraints and opportunities within the study area. As a planning-level scan, the information was obtained from various publicly available reports, websites, and other documentation, as well as a "windshield survey" conducted by MDT staff. The scan is not a detailed environmental investigation. Information in the scan is accurate as of May, 2015. Further analysis may be necessary during project development. Refer to the MDT *Environmental Scan* for more detailed information.

If improvement options are forwarded from this study into project development, an analysis for compliance with the National and Montana Environmental Policy Acts (NEPA and MEPA) will be completed as part of the project development process. Information provided in the Environmental scan may be included in the NEPA/MEPA process at that time.

3.1. Physical Environment

The following subsections present an overview of items related to the physical environment.

3.1.1. Soil Resources and Prime Farmland

Information obtained on soils is used to determine the presence of prime and unique farmland in the study area to demonstrate compliance with the Farmland Protection Policy Act (FPPA). Farmland includes prime farmland, some prime if irrigated farmland, unique farmland, and farmland (other than prime or unique farmland) that is of statewide or local importance. Prime farmland soils are those that have the best combination of physical and chemical characteristics for producing food, feed, and forage: the area must also be available for these uses. Prime farmland can be either non-irrigated or lands that would be considered prime if irrigated. Farmland of statewide importance is defined as follows: land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops.

Soil surveys of the study area are available from the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS). NRCS soil surveys indicate the presence of farmland of state or local importance, or prime farmland if irrigated within the study area. From approximately RP 22.5 to the east, the study area has a high percentage of farmland of state or local importance or prime farmland if irrigated. Some of this land has already been developed and is no longer subject to the FPPA.

If a federally funded improvement option forwarded from this study requires acquisition of land from these areas, MDT will have to complete a CPA-106 Farmland Conservation Impact Rating Form for Linear Projects and coordinate with NRCS. NRCS will use information from that form to keep an inventory of the prime and important farmlands within the state.

3.1.2. Geologic Resources

Information on the geology and seismicity in the study area was obtained from several published sources. Geologic mapping was reviewed for rock type, the presence of unconsolidated material, and fault lines. The seismicity and potential seismic hazards were also reviewed. This geologic information can help determine potential design and construction issues related to embankments and road design.

In the study area well rounded, poorly graded boulder gravel and sand, with some thin beds of clayey silt, are commonly encountered. Many gravel pits are adjacent to the study area. The majority of soils along the corridor are sandy gravel with cobbles and minor amounts of clay and silt. The soils west of Aajker Creek exhibit high corrosion potential for steel, and variable potential to the east. Corrosion potential for concrete is generally low throughout the study area.

Additionally, the Gallatin Valley consistently has an organic lean clay layer, which can be problematic for construction and long-term stability if not accounted for during design. The organic clay soils as the topmost layer should help to promote quick revegetation. If an area lacking a topsoil layer is encountered, the sandy gravel layer will be exposed and extra care will be required to provide vegetative soil stabilization.

Improvements brought forward from the study will be subject to a more detailed analysis of the aforementioned geotechnical risk factors. Part of this detailed analysis may involve taking advance borings to evaluate soil characteristics at exact project locations. This is standard procedure for most MDT road projects. The design of any improvements should consider specific requirements that come from the detailed analysis.

3.1.3. Surface Water

Topographic maps and GIS data were reviewed to identify the location of surface water bodies such as rivers, streams, lakes, and reservoirs within the study area. There are five streams and three irrigation ditch crossings within the study area.

Effects on water bodies near the study area will have to be identified and coordinated with applicable agencies during any future project design. Permitting may be required for improvement options involving construction in or near waterways. Coordination with federal, state, and local agencies would be necessary to determine the appropriate permits based on choice of improvement options forwarded from this study. Impacts should be avoided and minimized to the maximum extent practicable.

Total Maximum Daily Loads

Section 303 subsection "d" of the Clean Water Act requires the state of Montana to develop a list, subject to the United States Environmental Protection Agency (USEPA) approval, of water bodies that do not meet water quality standards. When water quality fails to meet state water quality standards, the Department of Environmental Quality (DEQ) determines the causes and sources of pollutants in a sub-basin assessment and set maximum pollutant levels called total maximum daily loads (TMDL).

TMDLs set by DEQ become the basis for implementation plans to restore water quality to a level that supports state designated beneficial water uses. The implementation plans identify and describe pollutant controls and management measures to be undertaken (such as best management practices), the mechanisms by which the selected measures would be put into action, and the individuals and entities responsible for implementation projects.

DEQ lists both Hyalite Creek and Mandeville Creek as having impairments. Both water bodies are category 4A, defined as waters where one or more applicable beneficial uses are impaired or threatened, and a TMDL has been completed to address the factors causing the impairment or threat. For Hyalite Creek inside the study area, probable sources of impairment are irrigated crop production, leaking underground storage tanks, managed pasture grazing, and natural sources. Mandeville Creek probable sources of impairment are municipal point source discharges, municipal (urbanized high-density area), and residential districts. Currently the probable sources of impairments are not listed as being associated with road construction activities. That said, if improvement options are advanced, it will be necessary to reevaluate the 303(d)/305(b) integrated report for changes to listed impairments along with possible changes to TMDLs on a project level if a project is forwarded from this study.

Storm water

The eastern end of the corridor is located within the Bozeman Municipal Separate Storm Sewer System (MS4) area. Under the current Small MS4 General Permit, new development or redevelopment projects greater than or equal to one acre in size must implement, when practicable, low impact development practices that infiltrate, evapo-transpire, or capture for reuse the runoff generated from the first half-inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation.

The City of Bozeman and MDT both manage MS4 programs that overlap the study area. Each program has specific requirements based on their individual Storm Water Management Plans. These and other MS4 issues will need to be further evaluated during any future project design. The current MS4 permit is in the process of being reissued and MDT has applied for an Individual MS4 permit. As such, it is likely the permit requirements will be slightly different in the future.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act, created by Congress in 1968, provided for the protection of certain rivers, and their immediate environments, that possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, or cultural resources, or similar values. Based on a review of the United States National Park Service website, none of the waterways within the study area carry the wild and scenic designation.

3.1.4. Groundwater

There are 16,770 wells on record in Gallatin County. Within the study area, there are numerous domestic wells and seven public water supply wells. Wells can be a costly item to mitigate if they are not avoided. Mitigation of a well usually involves drilling a new well for the owner in a new location that will not be impacted by the potential project. Well costs are based on per foot price; the deeper and higher volume needed results in a higher cost. In addition, there is a 100-foot setback requirement for public water supply wells in which no source of pollutant can be located. Public water supply wells can also be deeper and require a higher volume of water to be discharged. This can translate into a more expensive well to replace, along with affecting larger number of users compared to a private well if impacted. Impacts on existing wells should be considered if a project is forwarded from this study.

3.1.5. Wetlands

The U.S. Army Corps of Engineers (USACE) defines wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Based on review of available information, potential wetlands are present within the study area. Future wetland delineations would be required if improvement options are forwarded from this study that could potentially impact wetlands. Future projects in the study area would need to incorporated project design features to avoid and minimize adverse impacts to wetlands to the maximum extent practicable. Unavoidable impact to wetlands must be compensated through mitigation in accordance USACE regulatory requirements and/or requirements of Executive Order 11990. The need for any stream or wetland mitigation would be identified and secured prior to the permitting process if a project was forwarded from this study.

3.1.6. Floodplains and Floodways

Executive Order 11988, Floodplain Management, requires federal agencies to avoid to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Federal Emergency Management Agency-issued flood maps for Gallatin County indicate that flood plain zones exist within or are adjacent to the study area.

If roadway improvements or developments could involve placement of fill within the regulatory flood plain then a flood plain permit would be required. Project development would then require coordination with Gallatin County to minimize flood plain impacts and obtain necessary floodplain permits for project construction. As only Zone X (outside the 500-year flood) cross into the study area, this should not impact possible improvements but should be reevaluated if a project is forwarded.

3.1.7. Irrigation

Irrigated agriculture land exists within the study area. Depending on the improvement option(s) proposed during the study, there is potential to impact irrigation facilities. Impacts to irrigation facilities should be avoided when practicable. Future modifications to existing irrigation canals, ditches, or pressurized systems could require redesigning and constructing in consultation with the owners to minimize impacts to agricultural operations. If there is impact to irrigation structures, there could be additional costs above typical project costs associated with the redesign or moving of the irrigation structure(s).The available Water Resources Survey data indicate that there is an abundance of water rights and agriculture land use throughout the study area. There are a large number of irrigation structures not easily identified at the high-level review appropriate for this study. An in-depth review for irrigation structures would occur at the project development stage to identify possible impacts if a project is forwarded from this study.

3.1.8. Air Quality

The USEPA designates communities that do not meet National Ambient Air Quality Standards (NAAQS) as “non-attainment areas”. States are the required to develop plans to control source emissions and ensure future attainment of NAAQS. The study area is not located in a non-attainment area for any of the criteria pollutants. Additionally, there are currently no non-attainment areas nearby. As a result, special design considerations are likely not required in future project design to accommodate NAAQS non-attainment issues.

Depending on the scope of improvements forwarded in the study area, an evaluation of mobile source air toxics (MSATs) may be required. MSATs are compounds emitted from highway vehicle and off-road equipment, which are known or suspected to cause cancer or other serious health and environmental effects.

3.1.9. Hazardous Substances

The NRIS and Montana Board of Oil and Gas databases were searched for information on underground storage tank sites, leaking underground storage tank sites, abandoned mine sites, remediation response sites, landfills, National Priority Lists sites, hazardous waste, crude oil pipelines, and toxic release inventory sites. There were no abandoned mines sites, National Priority List sites, oil and gas production wells, or toxic release inventory sites identified within the study area. At this time, none of the hazardous substances sites are expected to be “must avoid” locations or drivers of the ultimate project design. However, if a project were to overlap a hazardous substance site, a soil investigation would likely be needed. If contaminated soils are present, a special provision regarding handling contaminated soils is recommended to be included in project documentation. In addition, the contaminated soils could result in the need for remediation.

3.2. Biological Environment

The following information applies to the biological environment within the study area and reflects a baseline natural resource condition. Depending on the level of detail available through the high-level baseline scan, some of the information is presented at the country level, some at the study area level, and some at the corridor level.

3.2.1. Vegetation

According to the Montana Natural Heritage Program Land Cover Report, the dominate land cover type in the study area is a combination of high and light intensity residential development which is shown by human land use being 71 percent of land cover. Typically, any drainages within the study area are lined with deciduous riparian vegetation and some wetlands. The majority of the different land types in the study area are either moderately or highly disturbed.

If improvement options are forwarded from the study, practice outlined in MDT standard specifications should be followed to minimize adverse impact to vegetation and facilitate establishment of final stabilization of disturbed areas. Removal of mature trees and shrubs should be limited to the extent practicable.

3.2.2. Noxious Weeds

Noxious weeds can degrade native vegetative communities; damage riparian areas; compete with native plants; create fire hazards; degrade agricultural and recreational lands; pose threats to the viability of livestock, humans, and wildlife; and are expensive to manage. Areas with a history of disturbance, like highway right-of-ways, are at particular risk of weed encroachment.

The Invaders Database System lists 262 exotic plant species and 49 noxious weed species in Gallatin County, some of which may be present in the study area. Gallatin County has weed management criteria in place that can be found on their website.

Reseeding of disturbed areas with desirable native plant species will help to reduce the spread and establishment of noxious weeds and to re-establish permanent vegetation. If improvements are forwarded from this study, field surveys for noxious weeds should take place prior to any ground disturbance and coordination with the Gallatin County Weed Board should occur. Proposed projects should incorporate the practices outlined in MDT standard specifications to minimize adverse impacts.

3.2.3. General Wildlife Species

The following subsections present an overview of the mammals, fish, birds, and amphibians and reptiles that may be found in or near the study area.

Mammals

Wildlife species inhabiting or traversing the study area are typical of those that occur in moderately developed areas of southwest Montana. Since many species in this area are habituated to somewhat disturbed areas and are tolerant of moderate levels of development, species present in this area are predominately, though not exclusively, generalists. Mammal species present, but not limited to, the study area include whitetail and mule deer, coyote, red fox, porcupine, raccoon, striped skunk, badger, beaver, muskrat, Richardson's ground squirrel, deer mouse, vole species, and a variety of bat species. Black bear, bobcat, mountain lion, and wolf may also occur as transients through the study area on occasion. Moose may occasionally occur along the drainages and riparian areas in proximity to the study area.

Whitetail and mule deer are prevalent in the study area, traversing between the riparian corridors and agricultural fields for daily resource needs, and a resident migrants. A review of the MDT Maintenance Animal Incident Database between January 1st, 2009 and December 31st, 2013, indicates that 27 animal carcasses were collected throughout the length of the corridor. The reported carcasses were all deer, mostly whitetail deer. If improvement options are forwarded from this study, the need for and viability of wildlife crossing mitigation measures should be explored during the project development phase.

Fisheries

There are four perennial streams in the study area listed as providing suitable habitat for an array of cold-water species. Other unnamed stream crossings exist that could also support fish species within the study area. Permitting from regulatory agencies for any future study areas improvements will require incorporation of design measures to facilitate aquatic species passage.

Birds

The MNHP Natural Heritage Tracker database indicates a variety of birds have been documented with the potential to occur and nest in the study area. These species include representative songbirds, birds of prey, waterfowl, owls, and shorebirds. Additionally, game birds including the gray (Hungarian) partridge, pheasant, and sharp-tailed grouse have habitat present in the study area. The study area provides marginal habitat for migratory birds which may nest in the mature trees or move through the area as seasonal migrants.

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA). Under this strict liability law, it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess; offer to sell, barter, purchase, deliver; cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. Direct disturbance of a nest occupied with birds or eggs is prohibited under the law. The destruction of unoccupied nest of eagles; colonial nesters such as cormorants, herons, and pelicans; and some ground/cavity nesters such as burrowing owls or bank or cliff swallows may also be prohibited under the MBTA.

There are multiple bald eagle nest which occur within the general proximity of the study area. However, currently the half-mile buffer areas around these nest do not cross into the study area. The study area is not typical golden eagle habitat, so the presence of golden eagle nests is unlikely.

Any improvements forwarded form this study should consider potential constraints that may result from nesting/breeding periods of migratory birds and presence of unknown or future bald and golden eagle nest. If a project is forwarded that involves tree and shrub removal and/or structure replacement or rehabilitation must be conducted in compliance with MBTA, which may entail a timing restriction between April 15th and August 15th.

Amphibians and Reptiles

The presence of amphibians and reptiles in the study area is likely limited by a lack of suitable habitat and level of development. Common species may occur in low numbers along irrigation facilities, drainages, and within wetland areas. Any improvements forwarded from the study should take into consideration and minimize impacts to amphibian and reptile habitat where practicable.

Crucial Area Planning System

The Montana Fish, Wildlife, and Parks (FWP) Crucial Planning System (CAPS) is a resource intended to provide non-regulatory information during early planning stages of projects, conservation opportunities, and environmental review. The finest data resolution within CAPS is at the square-mile section scale or water body. Use of these data layers at a more localized scale is not appropriate and may lead to inaccurate interpretations since the classification may or may not apply to the entire square-mile section.

CAPS provides general and specific recommendations for transportation projects for both terrestrial and aquatic species and habitats. These recommendations from CAPS can have a generic application to possible project locations moving forward from the study. Coordination with FWP wildlife biologists should occur if a project is forwarded from this study.

3.2.4. Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) maintains the federal list of threatened and endangered species. Species on this list receive protection under the Endangered Species Act. An “endangered” species is in danger of extinction throughout all or a significant portion of its range. A “threatened” species is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species that are candidates or proposed for possible addition to the federal list. As of May, 2015, the following six threatened, endangered, proposed, or candidate species are listed as occurring in Gallatin County according to USFWS:

- Greater Sage-Grouse (Candidate)
- Sprague’s Pipit (Candidate)
- Whitebark Pine (Candidate)
- Grizzly Bear (Threatened)
- Canada Lynx (Threatened and Critical Habitat)
- Ute Ladies’ Tresses (Threatened)

The Montana Natural Heritage Program – Natural Heritage Map Viewer database records and maps documented observations of species in a known location. According to the database, there are no records of any threatened, endangered, proposed, or candidate species within the study area. Due to the lack of suitable habitat resulting from the level of development in the study area, density of roads, and presence of the interstate and railroad, it is not anticipated that any of the listed species occurring in Gallatin County would normally occur in the study area. It is anticipated that any project forwarded from this study would result in a *“no effect”* determination for listed species in Gallatin County.

If improvements are forwarded from this study, an evaluation of potential effects to threatened and endangered species will need to be completed during the project development process. As the federal status of protected species changes over time, reevaluation of the listed status and afforded protection to each species should be completed prior to issuing a determination of effect relative to potential impacts.

3.2.5. Species of Concern

Montana species of concern (SOC) are native plants or native animals breeding in the stat that are considered to be “at risk” due to declining population trends, threats to their habitats, and/or restricted distribution. Designation of a species as a Montana SOC is not a statutory or regulatory classification. Instead, these designations provide a basis for resource managers and decision-makers to direct limited resources to priority data collection needs and address conservation needs proactively.

A search of the MNHP species of special concern database in May, 2015 revealed eleven SOC in Gallatin County that have the potential to occur and breed in the study area based on presence of suitable habitat. These species are as follows:

Mammals

- **Little Brown Myotis** – Documented presence in study area; found in variety of habitats including structures

Birds

- **Bobolink** – Historic record 1911; far western edge of range; tall grass specialist, “old” hay fields.
- **Bald Eagle** – Four active nests located between 1.0 and 3.0 miles from the study area.
- **Great Blue Heron** – Cottonwood galleries in riparian corridors of rivers and lakes; urban wetlands.

- **Pacific Wren** – Large uncut stands of old-growth and mature coniferous forests; riparian cottonwoods and aspens.
- **Veery** – Riparian forests with moderate disturbance and denser understory; willow thickets and cottonwood galleries along streams and lakes.

Insects

- **Hooked Snowfly** – Found along creeks and rivers; small winter stonefly; shredder-detritivore; 1977 last record

Mussels/Clams

- **Western Pearlshell Mussel** – East Gallatin River north of Bozeman; cold running streams, low-mod gradient, stable sand or gravel substrates.

Plants

- **Small Drop Seed** – Historic record 1941; dry packed soil at road crossing of railroad track in Belgrade area.
- **Slender Wedgegrass** – Historic record unknown; prefers wet sites often in disturbance-prone settings.
- **Rocky Mountain Twinpod** – Historic record 1899; sandstone ledges in Bozeman area.

A thorough field investigation for the presence and extent of these species should be conducted if improvement options are forwarded from this study. If present, special conditions that apply to the project design and/or during construction such as timing restrictions should be considered to avoid or minimize impacts to these species.

3.3. Social and Cultural Environment

The following subsections present an overview of the social and cultural environment within the study area.

3.3.1. Population Demographics and Economic Conditions

Under NEPA/MEPA and associated implementing regulations, state and federal agencies are required to assess potential social and economic impacts resulting from proposed actions. FHWA guidelines recommend consideration of impacts to neighborhoods and community cohesion, social groups including minority populations, and local and/or regional economies, as well as growth and development that may be induced by transportation improvements. Demographic and economic information presented in this section is intended to assist in identifying human populations that might be affected by improvements within the study area.

Title VI of the United States Civil Rights Act of 1964, as amended (USC 2000(d)) and Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, require that no minority, or by extension, low-income person shall be disproportionately adversely impacted by any project receiving federal funds. For transportation projects, this means that no particular minority or low-income person may be disproportionately isolated, displaces, or otherwise subjected to adverse effects. If a project is forwarded from the improvement option(s), environmental justice will need to be further evaluated during the project development process.

According to the United States Census Bureau's estimate, Gallatin County had a population of 94,720 people in 2013, and was the 3rd most populous county in Montana. Bozeman, the 4th largest city in the state, had a population of 39,860, with Belgrade coming in 13th at 7,620. As presented in **Figure 15**, Gallatin County has experienced large growth in population over the last 25 years, from around 50,000 in 1990 to nearly 95,000 in 2015 and that trend is likely to continue. Montana State University, Big Sky Resort, Yellowstone National Park, and a thriving high tech industry are the key drivers of population and economic growth in Gallatin County. As shown in **Figure 16**, Gallatin County population growth has outpaced Montana over the last 15 years and that trend is projected to continue.

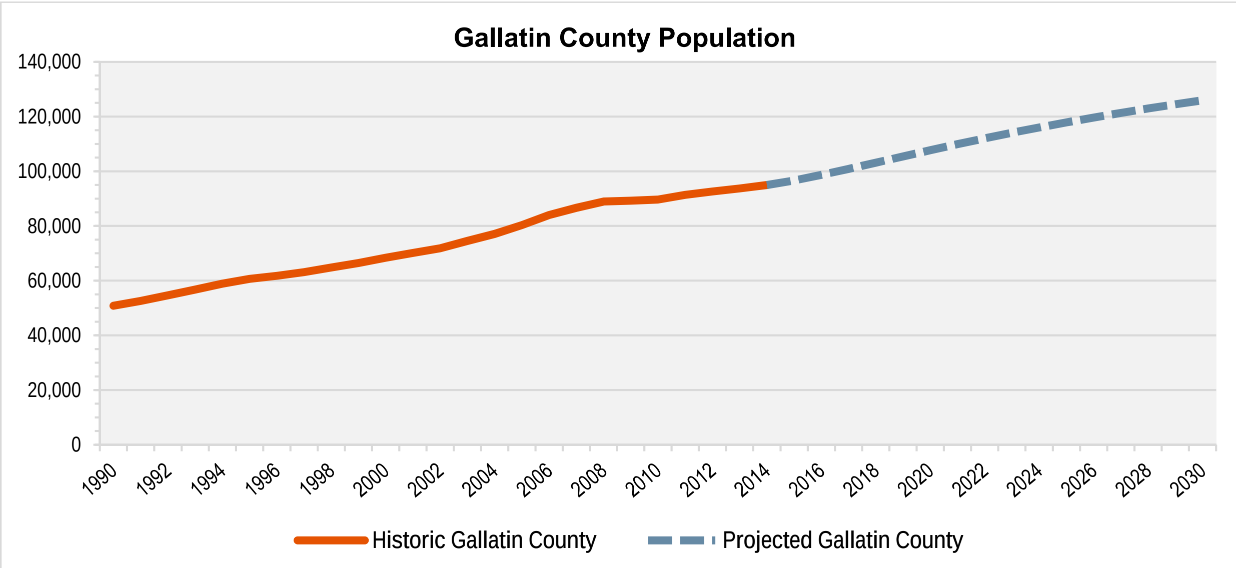


Figure 15: Gallatin County Population

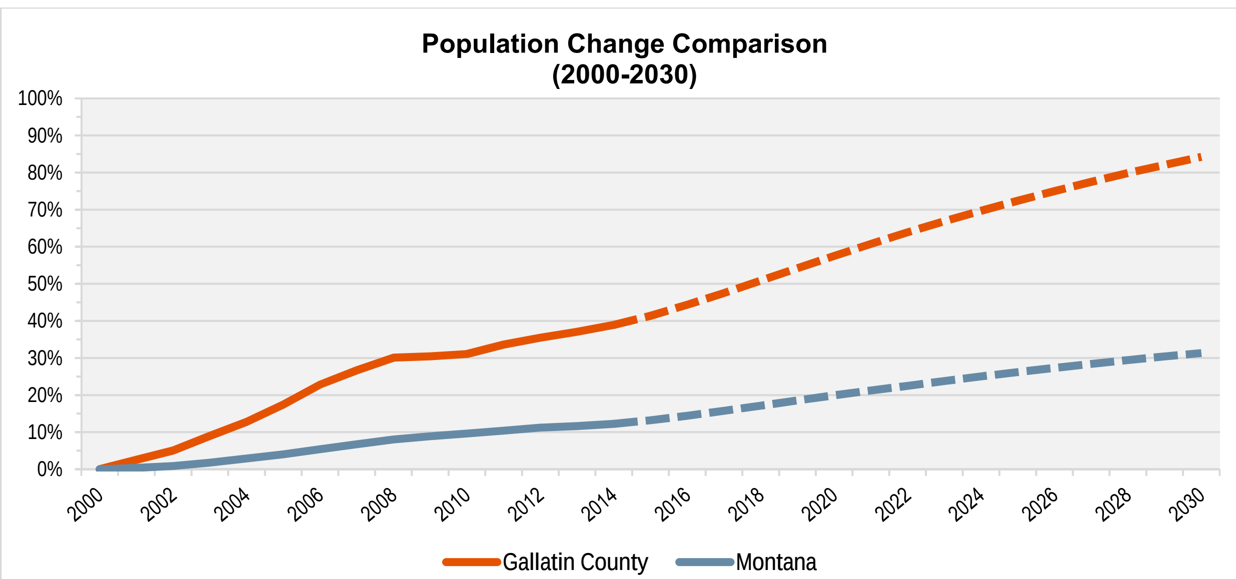


Figure 16: Population Comparison (Gallatin County and Montana)

The distribution of ethnicity in Gallatin County is primarily white/Caucasian (95.4 percent). Hispanic or Latino individuals comprise 3.1 percent of the population. Gallatin County has a slightly less diverse ethnic distribution as compared to the Montana average. There are no American Indian Reservations within a short distance of Gallatin County, which could be an indicator for the lower diversity seen in Gallatin County as compared to Montana.

Gallatin County residents are younger on average than the average Montana resident. The median age of 32.8 years is relatively young, but this is explained in part by considering that Bozeman is home to Montana State University, and has a large population of 18 to 25 year olds. Bozeman has a median age of 27.3 years while Belgrade's median age is 28.6, both of which pull Gallatin County's average lower.

Gallatin County's labor market has shown strong performance as evidenced by its 3.2 percent unemployment rate. The county is one of many in Montana showing strong labor market conditions and low unemployment, especially as compared to the rest of the United States. The high tech industry accounts for 12.1 percent of employment in Gallatin County. Retail trade and arts, entertainment, and accommodation industries employ 13.1 percent and 13.6 percent, respectively, of the employed population (16 years and over) of Gallatin County.

A factor for the high retail and entertainment numbers is the large amount of tourism and subsequent out-of-state dollars spend in Gallatin County. As the largest urban center in southwest Montana, Bozeman serves as a hub for people travelling to Yellowstone National Park as well as Big Sky Resort. Both Yellowstone and Big Sky attract many tourists each year in both winter and summer seasons whereas in many Montana destinations, tourism is largely a summer occurrence. A large part of Bozeman's economy is in some way related to Montana State University. Growth in enrollment is expected to continue and the economic effects are likely to increase in coming years.

Median household income for Gallatin County is $52,833, which is above state average. Bozeman proper has a median household income of $44,615 while Belgrade's median household income is $38,343, both lower than state averages. Bozeman's perceived high quality of life and college town labor market could play a role in this fact. The poverty level is 14.1 percent in Gallatin County, which is slightly lower than Montana. Bozeman however, has a poverty rate of 21.2 percent, which is well above the Montana average, due in part to college students.

Gallatin County has one of the strongest economies in Montana and the outlook for future growth is positive. The development of the high tech sector has created many well-paying jobs and Montana State University continues to grow. Additionally, strong non-resident travel numbers have solidified Bozeman and Gallatin County as one of Montana's best performing economies after the recession. Gallatin County's economy is predicted to remain strong in the coming years. Even though the Gallatin County median income is above the Montana average further investigation should take place to determine the possibility of low-income person(s) being disproportionately isolated, displaced, or otherwise subjected to adverse effect by any forwarded improvements on a project-by-project basis.

3.3.2. Land Ownership

Ownership of land in the study area is predominantly private, with some interspersed state and federal owners. The specific public landowners are the FWP, Montana State Trust, and MDT. The FWP land, which is on the east end of the study area, is a fishing access site. Directly across Frontage Road from the FWP land is the Montana State Trust lands. The remainder of the state-owned land is MDT land, which is the roadway around which the study area is structured. Much of the private land throughout the study area is residential or agricultural. Commercial land use is seen at a higher frequency near the cities of Belgrade and Bozeman. Gallatin Field – Bozeman Yellowstone International Airport has a sizable amount of land adjacent to the east side of Belgrade.

Mixed land use arises from the varied land ownership throughout the study area. These land uses include commercial, industrial, crop/pasture, and mixed urban. Even though there is a large amount of privately owned land in the study area, the need to purchase right-of-way for possible improvements is minimal as most improvements expected to be brought forward would not require additional right-of-way. In Addition, the corridor parallels Montana Rail Link tracks for a large portion of the study area. The railroads have strict policies on working near or in their right-of-way, which could add time constraints to projects along with limiting the ability to acquire right-of-way on the south side of

Frontage Road. If improvements are forwarded from this study, land use at and adjacent to possible projects will need to be considered during design.

3.3.3. Recreational Resources

Gallatin County and the Belgrade/Bozeman area offer a variety of year round outdoor activities including fishing, hiking, hunting, boating, and swimming in the summer. In the winter, snowmobiling, ice-skating, downhill skiing, and cross-country skiing occur in the surrounding area. There are a collection of city parks within Bozeman, but none of them are within the study area. The city of Belgrade has one city park within the study area.

Recreational resource information was gathered through review of FWP resource lists for Gallatin County. Recreational areas may be protected under Section 4(f) of the US Department of Transportation Act of 1966, which was enacted to protect publically owned parks, recreation areas, wildlife and waterfowl refuges, and public and private historic sites of local, state, and national significance. Federally funded transportation projects cannot impact Section 4(f)-protected properties unless there are no feasible and prudent avoidance alternatives and all possible planning to minimize harm has occurred.

From a high level evaluation there appears to be two recreational-related potential 4(f) resources that could potentially be impacted from possible improvements with the study area. These are the Belgrade Lewis and Clark Park located at approximately RP 20.4 and Cherry River Fishing Access Site located at approximately RP 2.25. In addition there is a linear parcel adjacent to the Las Campanas Subdivision along the northeast side of I-90 between Sunnyside Park and Alaska Road owned by the city of Belgrade. This parcel of land is currently used as a pedestrian path and dog trail. MDT has previously corresponded with city of Belgrade officials who agree that this park was not significant; therefore, section 4(f) does not apply. Acquiring right-of-way from potential 4(f) lands would need to go through the evaluation process described above which could add time and costs to a project.

According to the FWP National Land and Water Conservation Fund Act (LWCFA) Sites by County, there are two Section 6(f) resources within the study area. The Cherry River fishing access site and Belgrade's Lewis and Clark Park have both received LWCFA funds. These 6(f) resources should be taken into consideration for any potential forwarded projects, as converting to a non-recreational resource will be both difficult and time-consuming.

Reevaluation of 4(f) and 6(f) resources would be completed if a project was forwarded from this study. If future resources are discovered, efforts should be made to avoid adverse impacts to, or right-of-way acquisition from, these community recreational resources.

3.3.4. Cultural Resources

A file search of the study area through the Montana State Historic Preservation Office revealed four cultural resources and historical properties. These properties include the Northern Pacific Railway, Farmers' Canal Co., Spain-Ferris Ditch Co., and Mammoth Ditch Co.

In addition to the known historic resources, other potentially historic resources exist in the study area. An examination of the Montana Cadastral Survey information for the designated corridor indicates that at least 39 historic-age properties face onto Frontage Road. Twenty of the properties are residences and 19 are commercial businesses. Furthermore, a historic district potentially exists along Main Street in Belgrade.

In addition to the historic properties, there are two cemeteries located within the corridor study area. The Holy Cross Cemetery is located at the intersection of North 7th Avenue and Mandeville Drive. The Sunset Memorial Gardens cemetery is located in Section 16, T1S, R5E.

Direct and indirect impacts (such as visual, noise, and access impacts) to eligible or listed properties would need to be considered if improvement options are carried forward. If a project is forwarded from this study, a cultural resource survey for unrecorded historic and archaeological properties with the area of potential effect will need to be completed during the project development process.

3.3.5. Noise

Traffic noise may have to be evaluated for planned improvements to the study corridor. Noise analysis is necessary for “Type I” projects. If the roadway improvements are limited (e.g., the horizontal and vertical alignments are not changes, and the highway remains a two-lane facility), then the project would not be considered a Type I project.

If the improvements planned for the road would include a substantial shift in the horizontal or vertical alignments, increasing the number of through-lanes, passing lanes, or turning lanes, or increasing the traffic speed and volume, then the project would be considered a Type I project, which would require a detailed noise analysis. The analysis would include measuring ambient noise levels at selected receivers and modeling design-year noise levels using projected traffic volumes.

Noise abatement measures would be considered for the project if noise levels would approach or substantially exceed the noise abatement criteria. The noise abatement measures must be considered reasonable and feasible before implementation. If noise abatement measures were deemed necessary, they could increase costs of proposed future Type I roadway improvements. Construction activities in the study area may cause localized, short-duration noise impacts. These impacts can be minimized by using standard MDT specifications for the control of noise sources during construction.

3.3.6. Visual Resources

The visual resources of an area include landforms, vegetation, water features, and physical modifications caused by human activities that give the landscape its visual character and aesthetic qualities. Visual resources are typically assessed based on the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), and landscape quality (relative distance to seen areas) of geographically defines view shed. There are no properties or corridors within the study area listed on the Department of Interior’s National Landscape Monument System.

4.0. AREAS OF CONCERN AND CONSIDERATION

This section provides a list and description of areas of concern and consideration along the study corridor. These areas were identified through review of as-built drawings, field review, public databases, and other resources. More discussion has been provided in the previous sections, and it is reiterated here as appropriate.

4.1. Transportation System

Physical Features and Characteristics

- The roadway surfacing is generally considered in poor condition.
- The majority of the Frontage Road sits within railroad right-of-way through easement. Additional investigation regarding railroad easements will be necessary depending on the location of potential improvement options within the corridor.
- There is a crude oil pipeline along the study corridor beginning at approximately RP 25.5. The pipeline travels along the study corridor until approximately RP 2.8 where it crosses Primary 118 then crosses again at RP 1.8 of Primary 118. A natural gas pipeline also crosses the study corridor at approximately RP 26.7 of the Frontage Road and RP 1.8 of Primary 118.
- A BNSF owned (MRL leased) railroad parallels the southern side of the Frontage Road. Any improvement option(s) identified for portions of the corridor paralleling close to the tracks must not move the southern edge of the roadway shoulder any closer to the tracks.
- There are gaps in the sidewalk network within Belgrade east of Kennedy Street and within Bozeman south of the railroad viaduct.
- A total of 14 passing zones, seven eastbound and seven westbound, exist along the study corridor. Eight of the passing zones are less than 1,000 feet in length.
- Many areas of the study corridor, particularly within Belgrade, have poor drainage due to flat slopes and topography.
- The bridge located at RP 26.6 has a structure condition of “poor” which means it is a candidate for repair or replacement. The bridge also has a width narrower than the recommended standard for new bridges. The bridge located at RP 2.1 over the railroad tracks has a structure condition of “good” which indicates it is a candidate for continued preservation. Both of the bridges have bridge deck ratings of “fair-1”, which means they are candidates for healer/sealer treatments.
- Local planning documents conflict on long-term non-motorized infrastructure for the Frontage Road. Guidelines for the railway state that trails parallel to the track on railroad right-of-way are not permitted.

Traffic Operations

- Existing AADT volume on the study corridor ranged from a low of 5,250 vehicles per day (vpd) west of Broadway Street in Belgrade, to a high of 12,520 vpd south of Griffin Drive in Bozeman. Volumes are projected to grow at an average annual rate of 1.3 percent.
- On average, heavy vehicle traffic accounts for approximately 4.5 percent of vehicles along the study corridor.
- The intersections with Broadway Street, Oregon Street, and Griffin Drive are projected to have failing operations in the future.
- The corridor operates, or is projected to operate, at a LOS of C. Standards recommend a LOS of B for the rural portions of the corridor and a desirable LOS of B and minimal LOS of C for the urban portions.

- During the school year, Main Street between Jackrabbit Lane and Broadway Street experiences congestion due to students leaving the schools.

Geometric Conditions

- The corridor is divided into segments classified as both urban and rural NHS principal arterials and minor arterial roadways.
- The horizontal and vertical alignments are generally flat with little to no deflection.

Safety

- There were 382 crashes along the study corridor during the six-year analysis period. Approximately 52 percent of crashes occurred within the cities of Belgrade and Bozeman.
- Corridor-wide, 75 percent of reported crashes involved multiple vehicles. The most common crash type was rear-end crashes, which accounted for almost 40 percent of all reported crashes.
- Over 87 percent of crashes in Belgrade or Bozeman involved multiple vehicles. Within the rural areas, multiple vehicle crashes accounted for 58 percent of crashes.
- There were three fatal crashes resulting in three fatalities and eight incapacitating injury crashes resulting in ten incapacitating injuries.

4.2. Environmental Considerations

Physical Environment

- The majority of the study area is either farmland of local or statewide importance, prime farmland if irrigated, or prime farmland. Much of the designated farmland areas have been developed in or near the urban areas of Belgrade and Bozeman.
- Study area soils are considered to have moderate frost susceptibility. Moisture-sensitive soils occur in the study area. There is an organic lean clay layer in the Gallatin Valley which can be problematic for construction and long-term stability if not taken into consideration during design. This organic clay layer ranges from zero to eight (0 to 8) feet thick.
- There are four perennial streams that are located in the study area; Hyalite Creek, Aajker / McDonald Creek, Baxter Creek and Mandeville Creek. One unnamed intermittent/ephemeral stream is also present and parallels and/or crosses the Frontage Road at various locations.
- Narrow emergent wetland fringe is common along the banks of irrigation ditches/canals crossing the Frontage Road within the study area boundary.
- Approximately 60 private wells are located within the study area, with hundreds more immediately adjacent to and outside of the boundary. These wells are primarily used for domestic water followed by irrigation. Seven public water supply wells are found within the study area boundary.
- There are three primary irrigation ditch crossings of the Frontage Road in the study area. These crossings are Mammoth Ditch (RP 19.8), Spain Ferris Fork Ditch (RP 21.0) and Dry Creek (RP 22.3).
- Outside of the study area and to the north, numerous lateral ditches are present, providing diverted irrigation water to farmland in the area.
- There are no floodplain zones located within the study area. There are three floodplain zones, however, just to the north of the study area associated with the East Gallatin River.
- There are five active UST sites, two active LUST sites, two petroleum pipelines, and one remediation response site located within the study area. Several other hazardous sites are located outside of the study area of all types. Additionally, there are three open cut permits for

sand and gravel pits. None of the hazardous substances sites discussed are expected to be "must avoid" locations or drivers of any ultimate project design.

Biological Environment

- Several noxious weeds have been observed in the study area. Gallatin County has weed management criteria in place.
- The study area and vicinity are home to a number of wildlife species, and are considered primary, general, secondary, transient and/or winter range for white-tailed deer, mule deer, black bear, moose, and other small mammals. Additionally, there are four streams in the area that support fish species.
- Due to the lack of suitable habitat resulting from the level of development in the study area, density of roads and presence of the Interstate and railroad, it is not anticipated that any of the T/E/SOC/SPC listed in Gallatin County would normally occur in the study area.

Social and Cultural Environment

- Future land use growth areas for residential, commercial, and industrial use are located north of the study area between Belgrade and Bozeman.
- Recreational resources within the study area include the Lewis and Clark Park in Belgrade, and the Cherry River Fishing Access Site (FAS).
- Section 6(f) grants were used for both of the recreational sites noted above.
- Two historic properties face onto the Frontage Road; one has since been obliterated (Northern Pacific Railway's Low Line) and the other has been previously recorded (Northern Pacific Railway).
- There are six irrigation ditches that are historic and likely eligible for registration.
- There are at least 39 historic-age properties within Belgrade that face the Frontage Road; 20 of the properties are residences and 19 are commercial businesses. Thus, it is likely that a historic district potentially exists along Main Street in Belgrade.

5.0. REFERENCES

[1] *Bozeman Transportation Master Plan*, Robert Peccia and Associates, April 25, 2017

[2] *Greater Bozeman Area Transportation Plan (2007 Update)*, Robert Peccia and Associates, December 2008, http://gallatincomt.virtualtownhall.net/public_documents/gallatincomt_plandept/Plans&Policies/tp

[3] *Bozeman Parks, Recreation, Open Space and Trails (PROST) Plan*, City of Bozeman, December 17, 2007, https://www.bozeman.net/Smarty/files/78/78215f19-19b9-44c0-8fd9-7df9068aebe0.pdf

[4] *Belgrade Area Transportation Plan*, Morrison Maierle, Inc., June 2002

[5] *North Park Properties Concept Land Use Plan*, CTA Architects Engineers Planners, August 2012, http://weblink.bozeman.net/WebLink8/ElectronicFile.aspx?docid=50658&dbid=0

[6] *Gallatin Field Airport 2007 Master Plan Update*, Morrison Maierle, April 2008

[7] *Montana Rail Grade Separation Study,* Montana Department of Transportation, May 2016, https://www.mdt.mt.gov/publications/docs/brochures/MDT-RGSS-Final-Report-2016.pdf

[8] *Maintenance Operations and Procedures Manual*, Montana Department of Transportation, Chapter 9, Winter Maintenance Program, December 2009, http://www.mdt.mt.gov/publications/docs/manuals/mmanual/chapt9c.pdf

[9] *Traffic Engineering Manual*, Montana Department of Transportation, November 2007, Chapter 19 Pavement Markings, Section 19.3 No-passing Zones, http://www.mdt.mt.gov/other/webdata/external/traffic/manual/chapter_19.pdf

[10] *Bridge Design Standards*, Montana Department of Transportation, http://www.mdt.mt.gov/other/webdata/external/bridge/design-stds-manual/design_stds_manual.pdf

[11] Union Pacific Railroad – BNSF Railway, Guidelines for Railroad Grade Separation Projects, May 2016, https://www.up.com/cs/groups/public/documents/document/pdf_rr_grade_sep_projects.pdf

[12] *Seasonal Day of the Week for Axle Counts*, Montana Department of Transportation, 2015, http://www.mdt.mt.gov/other/webdata/external/Planning/seasonal_axle/AXLE_FACTORS_2015.PDF

[13] *Geometric Analysis, North 7th Street Intersections – Bozeman*, UPN 8036012, October 4, 2016, Montana Department of Transportation

[14] *Environmental Scan*, Montana Department of Transportation, May 01, 2015, http://www.mdt.mt.gov/belgradetobozeman/docs/FrontageRoad-EScan.pdf

Appendix A

DATA COLLECTION

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Count Name: Jackrabbit and E Main Belgrade
Site Code:
Start Date: 08/29/2016

Turning Movement Data

Start Time	Northbound Approach Northbound					Southbound Approach Southbound				Eastbound Approach Eastbound					Westbound Approach Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
9:00 AM	18	25	22	0	65	6	37	0	43	4	11	42	0	57	33	12	2	0	47	212
9:15 AM	22	14	36	1	73	2	32	0	34	4	13	42	0	59	36	13	5	0	54	220
9:30 AM	26	24	30	0	80	3	28	0	31	1	17	47	0	65	40	10	2	0	52	228
9:45 AM	28	33	33	0	94	7	40	0	47	1	20	42	0	63	29	9	2	0	40	244
Hourly Total	94	96	121	1	312	18	137	0	155	10	61	173	0	244	138	44	11	0	193	904
10:00 AM	18	21	37	1	77	6	38	0	44	5	13	34	0	52	32	16	7	0	55	228
10:15 AM	35	24	37	0	96	6	37	0	43	3	23	39	0	65	53	18	4	0	75	279
10:30 AM	39	27	30	0	96	5	39	0	44	3	14	36	0	53	52	21	4	0	77	270
10:45 AM	25	31	49	0	105	7	40	0	47	0	17	50	0	67	45	17	2	0	64	283
Hourly Total	117	103	153	1	374	24	154	0	178	11	67	159	0	237	182	72	17	0	271	1060
11:00 AM	36	22	47	0	105	3	34	0	37	1	16	40	0	57	44	14	3	0	61	260
11:15 AM	42	32	36	0	110	5	37	0	42	3	22	31	0	56	54	22	0	0	76	284
11:30 AM	40	37	39	0	116	7	35	0	42	2	21	53	0	76	37	27	4	0	68	302
11:45 AM	39	39	46	0	124	10	48	0	58	3	29	51	0	83	35	19	1	0	55	320
Hourly Total	157	130	168	0	455	25	154	0	179	9	88	175	0	272	170	82	8	0	260	1166
12:00 PM	60	38	53	0	151	4	72	0	76	0	17	57	0	74	58	17	2	0	77	378
12:15 PM	45	46	51	0	142	1	56	0	57	1	13	58	0	72	62	22	6	0	90	361
12:30 PM	53	55	55	0	163	9	48	0	57	2	24	58	0	84	65	20	6	0	91	395
12:45 PM	53	47	55	0	155	8	52	0	60	3	19	47	0	69	43	13	13	0	69	353
Hourly Total	211	186	214	0	611	22	228	0	250	6	73	220	0	299	228	72	27	0	327	1487
1:00 PM	39	45	46	0	130	4	43	0	47	1	27	51	0	79	58	18	3	0	79	335
1:15 PM	50	33	50	0	133	7	47	0	54	5	19	36	0	60	58	26	3	0	87	334
1:30 PM	63	48	42	0	153	7	32	0	39	2	26	48	0	76	44	26	4	0	74	342
1:45 PM	48	40	43	0	131	6	44	0	50	2	26	46	0	74	44	24	5	0	73	328
Hourly Total	200	166	181	0	547	24	166	0	190	10	98	181	0	289	204	94	15	0	313	1339
2:00 PM	57	33	40	0	130	13	43	0	56	3	28	44	0	75	53	28	8	0	89	350
2:15 PM	41	40	48	0	129	6	40	0	46	4	23	47	0	74	45	23	3	0	71	320
2:30 PM	49	28	34	0	111	7	39	0	46	3	31	56	0	90	45	32	4	0	81	328
2:45 PM	61	44	57	0	162	4	38	0	42	4	27	46	0	77	46	21	13	0	80	361
Hourly Total	208	145	179	0	532	30	160	0	190	14	109	193	0	316	189	104	28	0	321	1359
3:00 PM	52	38	37	0	127	7	36	0	43	2	14	60	0	76	60	19	8	0	87	333
3:15 PM	56	46	53	0	155	7	41	0	48	0	26	54	0	80	44	31	8	0	83	366
3:30 PM	53	52	50	0	155	9	38	0	47	5	32	40	0	77	39	34	11	0	84	363
3:45 PM	73	42	46	0	161	3	31	0	34	3	27	49	0	79	64	34	9	0	107	381
Hourly Total	234	178	186	0	598	26	146	0	172	10	99	203	0	312	207	118	36	0	361	1443
4:00 PM	77	42	52	0	171	5	56	0	61	0	24	37	0	61	80	29	7	0	116	409
4:15 PM	75	63	55	0	193	1	55	0	56	5	13	38	0	56	45	27	5	0	77	382
4:30 PM	79	61	46	0	186	4	46	0	50	6	39	41	0	86	53	37	6	0	96	418
4:45 PM	93	55	56	0	204	5	31	0	36	5	17	50	0	72	63	36	10	0	109	421
Hourly Total	324	221	209	0	754	15	188	0	203	16	93	166	0	275	241	129	28	0	398	1630
5:00 PM	85	58	46	0	189	5	41	0	46	5	28	44	0	77	51	54	7	0	112	424
5:15 PM	97	84	45	0	226	8	39	0	47	6	31	49	0	86	29	52	12	0	93	452
5:30 PM	90	84	24	0	198	5	40	0	45	12	16	46	0	74	39	38	12	0	89	406
5:45 PM	74	124	47	0	245	4	39	0	43	24	26	40	0	90	41	40	19	0	100	478
Hourly Total	346	350	162	0	858	22	159	0	181	47	101	179	0	327	160	184	50	0	394	1760
6:00 PM	82	86	48	0	216	4	45	0	49	15	19	41	0	75	47	30	15	0	92	432
6:15 PM	85	78	35	0	198	5	48	0	53	9	21	29	0	59	41	32	4	0	77	387
6:30 PM	68	66	46	0	180	8	76	0	84	6	19	35	0	60	60	35	8	0	103	427
6:45 PM	80	46	31	0	157	6	66	0	72	3	11	35	0	49	41	18	5	0	64	342
Hourly Total	315	276	160	0	751	23	235	0	258	33	70	140	0	243	189	115	32	0	336	1588
7:00 PM	59	49	28	0	136	8	79	0	87	1	19	33	0	53	29	27	10	0	66	342
7:15 PM	33	37	24	0	94	7	36	0	43	3	13	30	0	46	29	26	1	0	56	239
7:30 PM	46	34	43	0	123	4	51	0	55	1	12	40	0	53	34	23	3	0	60	291
7:45 PM	46	45	19	0	110	3	40	0	43	4	13	29	0	46	21	17	7	0	45	244
Hourly Total	184	165	114	0	463	22	206	0	228	9	57	132	0	198	113	93	21	0	227	1116
8:00 PM	43	44	20	0	107	2	24	0	26	1	6	28	0	35	27	13	4	0	44	212
8:15 PM	41	37	17	0	95	6	20	0	26	1	15	19	0	35	28	14	6	0	48	204
8:30 PM	42	32	18	0	92	2	14	0	16	1	4	26	0	31	27	13	5	0	45	184
8:45 PM	36	37	15	0	88	5	23	0	28	3	7	21	0	31	10	6	1	0	17	164
Hourly Total	162	150	70	0	382	15	81	0	96	6	32	94	0	132	92	46	16	0	154	764
9:00 PM	16	26	9	0	51	1	14	0	15	2	9	15	0	26	14	7	3	0	24	116
9:15 PM	27	25	12	0	64	1	9	0	10	3	9	9	0	21	14	9	1	0	24	119
9:30 PM	26	27	13	0	66	1	11	0	12	2	6	15	0	23	19	4	1	0	24	125
9:45 PM	18	14	13	0	45	0	15	0	15	2	3	16	0	21	21	11	1	0	33	114
Hourly Total	87	92	47	0	226	3	49	0	52	9	27	55	0	91	68	31	6	0	105	474

10:00 PM	21	14	2	0	37	1	6	0	7	1	5	9	0	15	12	5	3	0	20	79
10:15 PM	14	15	8	0	37	0	11	0	11	0	5	8	0	13	5	5	1	0	11	72
10:30 PM	14	11	3	0	28	1	4	0	5	0	5	4	0	9	5	6	1	0	12	54
10:45 PM	13	9	6	0	28	1	6	0	7	2	3	6	0	11	5	2	3	0	10	56
Hourly Total	62	49	19	0	130	3	27	0	30	3	18	27	0	48	27	18	8	0	53	261
11:00 PM	15	8	1	0	24	0	4	0	4	0	0	3	0	3	6	1	2	0	9	40
11:15 PM	5	5	1	0	11	0	5	0	5	0	1	2	0	3	4	2	0	0	6	25
11:30 PM	4	5	2	0	11	0	7	0	7	0	1	4	0	5	3	0	2	0	5	28
11:45 PM	6	7	4	0	17	0	5	0	5	0	1	1	0	2	1	1	1	0	3	27
Hourly Total	30	25	8	0	63	0	21	0	21	0	3	10	0	13	14	4	5	0	23	120
12:00 AM	2	10	5	0	17	0	2	0	2	2	0	2	0	4	1	3	0	0	4	27
12:15 AM	2	5	3	0	10	1	3	0	4	0	2	2	0	4	3	3	0	0	6	24
12:30 AM	4	6	3	0	13	0	3	0	3	1	0	1	0	2	2	0	2	0	4	22
12:45 AM	2	5	0	0	7	0	1	0	1	1	0	1	0	2	2	0	0	0	2	12
Hourly Total	10	26	11	0	47	1	9	0	10	4	2	6	0	12	8	6	2	0	16	85
1:00 AM	4	2	3	0	9	1	0	0	1	0	1	1	0	2	0	0	0	0	0	12
1:15 AM	2	4	1	0	7	0	0	0	0	0	0	0	0	0	2	1	0	0	3	10
1:30 AM	3	0	1	0	4	0	1	0	1	0	1	3	0	4	2	0	0	0	2	11
1:45 AM	1	3	1	0	5	0	2	0	2	0	0	0	0	0	1	0	1	0	2	9
Hourly Total	10	9	6	0	25	1	3	0	4	0	2	4	0	6	5	1	1	0	7	42
2:00 AM	1	3	0	0	4	0	5	0	5	0	0	3	0	3	3	1	0	0	4	16
2:15 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	3	1	0	0	4	6
2:30 AM	0	0	0	0	0	0	2	0	2	0	1	1	0	2	0	0	0	0	0	4
2:45 AM	4	3	0	0	7	0	1	0	1	1	0	1	0	2	2	0	0	0	2	12
Hourly Total	6	7	0	0	13	0	8	0	8	1	1	5	0	7	8	2	0	0	10	38
3:00 AM	1	1	1	0	3	0	2	0	2	0	2	1	0	3	0	1	0	0	1	9
3:15 AM	3	0	2	0	5	0	2	0	2	0	0	0	0	0	1	1	0	0	2	9
3:30 AM	1	2	1	0	4	0	4	0	4	0	4	3	0	7	1	0	0	0	1	16
3:45 AM	1	1	0	0	2	0	3	0	3	0	1	2	0	3	3	0	0	0	3	11
Hourly Total	6	4	4	0	14	0	11	0	11	0	7	6	0	13	5	2	0	0	7	45
4:00 AM	1	2	0	0	3	0	3	0	3	0	0	3	0	3	1	0	0	0	1	10
4:15 AM	0	0	1	0	1	0	6	0	6	0	2	4	0	6	1	1	1	0	3	16
4:30 AM	1	0	2	0	3	0	5	0	5	0	2	8	0	10	5	0	0	0	5	23
4:45 AM	2	2	3	0	7	1	6	0	7	1	3	8	0	12	2	0	0	0	2	28
Hourly Total	4	4	6	0	14	1	20	0	21	1	7	23	0	31	9	1	1	0	11	77
5:00 AM	1	1	2	0	4	1	8	0	9	1	3	15	0	19	5	1	0	0	6	38
5:15 AM	3	6	1	0	10	2	19	0	21	2	3	20	0	25	9	3	0	0	12	68
5:30 AM	7	5	4	0	16	1	32	0	33	2	7	47	0	56	9	5	0	0	14	119
5:45 AM	11	8	5	0	24	3	30	0	33	2	8	42	0	52	9	4	1	0	14	123
Hourly Total	22	20	12	0	54	7	89	0	96	7	21	124	0	152	32	13	1	0	46	348
6:00 AM	10	2	6	0	18	3	30	0	33	2	16	43	0	61	17	6	0	0	23	135
6:15 AM	8	4	6	0	18	2	39	0	41	0	15	54	0	69	19	1	0	0	20	148
6:30 AM	4	7	25	0	36	2	58	0	60	1	24	77	0	102	31	4	2	0	37	235
6:45 AM	18	29	22	0	69	2	71	0	73	3	21	79	0	103	21	4	2	0	27	272
Hourly Total	40	42	59	0	141	9	198	0	207	6	76	253	0	335	88	15	4	0	107	790
7:00 AM	14	16	16	0	46	3	62	0	65	0	17	57	0	74	23	5	4	0	32	217
7:15 AM	17	22	29	0	68	5	68	0	73	0	31	98	0	129	21	9	1	0	31	301
7:30 AM	19	36	31	0	86	10	76	0	86	3	40	102	0	145	26	15	6	0	47	364
7:45 AM	22	43	70	0	135	1	66	0	67	1	32	104	0	137	29	10	9	0	48	387
Hourly Total	72	117	146	0	335	19	272	0	291	4	120	361	0	485	99	39	20	0	158	1269
8:00 AM	24	33	41	0	98	1	44	0	45	4	20	75	0	99	25	14	2	0	41	283
8:15 AM	20	18	28	0	66	5	45	0	50	2	26	61	0	89	35	13	3	0	51	256
8:30 AM	18	18	33	0	69	5	45	0	50	2	27	65	0	94	40	6	3	0	49	262
8:45 AM	28	20	29	0	77	4	35	0	39	3	19	55	0	77	32	11	3	0	46	239
Hourly Total	90	89	131	0	310	15	169	0	184	11	92	256	0	359	132	44	11	0	187	1040
Grand Total	2991	2650	2366	2	8009	325	2890	0	3215	227	1324	3145	0	4696	2608	1329	348	0	4285	20205
Approach %	37.3	33.1	29.5	0.0	-	10.1	89.9	0.0	-	4.8	28.2	67.0	0.0	-	60.9	31.0	8.1	0.0	-	-
Total %	14.8	13.1	11.7	0.0	39.6	1.6	14.3	0.0	15.9	1.1	6.6	15.6	0.0	23.2	12.9	6.6	1.7	0.0	21.2	-
Motorcycles	19	8	11	0	38	2	15	0	17	0	10	8	0	18	13	3	2	0	18	91
% Motorcycles	0.6	0.3	0.5	0.0	0.5	0.6	0.5	-	0.5	0.0	0.8	0.3	-	0.4	0.5	0.2	0.6	-	0.4	0.5
Cars	2415	2160	1585	1	6161	289	2329	0	2618	221	1067	2414	0	3702	1993	1211	330	0	3534	16015
% Cars	80.7	81.5	67.0	50.0	76.9	88.9	80.6	-	81.4	97.4	80.6	76.8	-	78.8	76.4	91.1	94.8	-	82.5	79.3
Light Goods Vehicles	475	445	685	1	1606	29	502	0	531	3	219	615	0	837	537	91	15	0	643	3617
% Light Goods Vehicles	15.9	16.8	29.0	50.0	20.1	8.9	17.4	-	16.5	1.3	16.5	19.6	-	17.8	20.6	6.8	4.3	-	15.0	17.9
Buses	1	1	1	0	3	0	2	0	2	3	5	3	0	11	2	7	0	0	9	25
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0.1	1.3	0.4	0.1	-	0.2	0.1	0.5	0.0	-	0.2	0.1
Single-Unit Trucks	56	32	48	0	136	5	32	0	37	0	18	71	0	89	39	15	1	0	55	317
% Single-Unit Trucks	1.9	1.2	2.0	0.0	1.7	1.5	1.1	-	1.2	0.0	1.4	2.3	-	1.9	1.5	1.1	0.3	-	1.3	1.6
Articulated Trucks	25	1	31	0	57	0	4	0	4	0	5	34	0	39	22	2	0	0	24	124
% Articulated Trucks	0.8	0.0	1.3	0.0	0.7	0.0	0.1	-	0.1	0.0	0.4	1.1	-	0.8	0.8	0.2	0.0	-	0.6	0.6
Bicycles on Road	0	3	5	0	8	0	6	0	6	0	0	0	0	0	2	0	0	0	2	16
% Bicycles on Road	0.0	0.1	0.2	0.0	0.1	0.0	0.2	-	0.2	0.0	0.0	0.0	-	0.0	0.1	0.0	0.0	-	0.0	0.1

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Southbound Approach

Out	In	Total
10	17	27
2711	2618	5329
463	531	994
4	2	6
37	47	84
3225	**3215**	**6440**

T	L	U
15	2	0
2329	289	0
502	29	0
2	0	0
42	5	0
2890	**325**	**0**

Eastbound Approach [EB]

Out	In	Total
22	18	40
3626	3702	7328
566	837	1403
8	11	19
98	128	226
4320	**4696**	**9016**

U	L	T	R
0	0	10	8
0	221	1067	2414
0	3	219	615
0	3	5	3
0	0	23	105
0	**227**	**1324**	**3145**

08/29/2016 9:00 AM
Ending At
08/30/2016 9:00 AM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

Westbound Approach [WB]

Out	In	Total
23	18	41
2941	3534	6475
933	643	1576
6	9	15
112	81	193
4015	**4285**	**8300**

R	T	L	U
2	3	13	0
330	1211	1993	0
15	91	537	0
0	7	2	0
1	17	63	0
348	**1329**	**2608**	**0**

U	L	T	R
0	19	8	11
1	2415	2160	1585
1	475	445	685
0	1	1	1
0	81	36	84
2	**2991**	**2650**	**2366**

Out	In	Total
36	38	74
6737	6161	12898
1655	1606	3261
7	3	10
210	201	411
8645	**8009**	**16654**

Northbound Approach

Turning Movement Data Plot

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Northbound Approach Northbound Left	Thru	Right	U-Turn	App. Total	Southbound Approach Southbound Left	Thru	U-Turn	App. Total	Eastbound Approach Eastbound Left	Thru	Right	U-Turn	App. Total	Westbound Approach Westbound Left	Thru	Right	U-Turn	App. Total	Int. Total
12:00 PM	60	38	53	0	151	4	72	0	76	0	17	57	0	74	58	17	2	0	77	378
12:15 PM	45	46	51	0	142	1	56	0	57	1	13	58	0	72	62	22	6	0	90	361
12:30 PM	53	55	55	0	163	9	48	0	57	2	24	58	0	84	65	20	6	0	91	395
12:45 PM	53	47	55	0	155	8	52	0	60	3	19	47	0	69	43	13	13	0	69	353
Total	211	186	214	0	611	22	228	0	250	6	73	220	0	299	228	72	27	0	327	1487
Approach %	34.5	30.4	35.0	0.0	-	8.8	91.2	0.0	-	2.0	24.4	73.6	0.0	-	69.7	22.0	8.3	0.0	-	-
Total %	14.2	12.5	14.4	0.0	41.1	1.5	15.3	0.0	16.8	0.4	4.9	14.8	0.0	20.1	15.3	4.8	1.8	0.0	22.0	-
PHF	0.879	0.845	0.973	0.000	0.937	0.611	0.792	0.000	0.822	0.500	0.760	0.948	0.000	0.890	0.877	0.818	0.519	0.000	0.898	0.941
Motorcycles	5	1	0	0	6	1	1	0	2	0	1	1	0	2	2	0	1	0	3	13
% Motorcycles	2.4	0.5	0.0	-	1.0	4.5	0.4	-	0.8	0.0	1.4	0.5	-	0.7	0.9	0.0	3.7	-	0.9	0.9
Cars	158	159	137	0	454	18	183	0	201	6	49	159	0	214	150	66	24	0	240	1109
% Cars	74.9	85.5	64.0	-	74.3	81.8	80.3	-	80.4	100.0	67.1	72.3	-	71.6	65.8	91.7	88.9	-	73.4	74.6
Light Goods Vehicles	43	19	66	0	128	2	44	0	46	0	20	47	0	67	67	5	2	0	74	315
% Light Goods Vehicles	20.4	10.2	30.8	-	20.9	9.1	19.3	-	18.4	0.0	27.4	21.4	-	22.4	29.4	6.9	7.4	-	22.6	21.2
Buses	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	1.4	0.0	-	0.3	0.0	0.0	0.0	-	0.0	0.1
Single-Unit Trucks	2	7	9	0	18	1	0	0	1	0	2	9	0	11	3	1	0	0	4	34
% Single-Unit Trucks	0.9	3.8	4.2	-	2.9	4.5	0.0	-	0.4	0.0	2.7	4.1	-	3.7	1.3	1.4	0.0	-	1.2	2.3
Articulated Trucks	3	0	2	0	5	0	0	0	0	0	0	4	0	4	6	0	0	0	6	15
% Articulated Trucks	1.4	0.0	0.9	-	0.8	0.0	0.0	-	0.0	0.0	0.0	1.8	-	1.3	2.6	0.0	0.0	-	1.8	1.0
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (5:00 PM)

Start Time	Northbound Approach Northbound					Southbound Approach Southbound				Eastbound Approach Eastbound					Westbound Approach Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
5:00 PM	85	58	46	0	189	5	41	0	46	5	28	44	0	77	51	54	7	0	112	424
5:15 PM	97	84	45	0	226	8	39	0	47	6	31	49	0	86	29	52	12	0	93	452
5:30 PM	90	84	24	0	198	5	40	0	45	12	16	46	0	74	39	38	12	0	89	406
5:45 PM	74	124	47	0	245	4	39	0	43	24	26	40	0	90	41	40	19	0	100	478
Total	346	350	162	0	858	22	159	0	181	47	101	179	0	327	160	184	50	0	394	1760
Approach %	40.3	40.8	18.9	0.0	-	12.2	87.8	0.0	-	14.4	30.9	54.7	0.0	-	40.6	46.7	12.7	0.0	-	-
Total %	19.7	19.9	9.2	0.0	48.8	1.3	9.0	0.0	10.3	2.7	5.7	10.2	0.0	18.6	9.1	10.5	2.8	0.0	22.4	-
PHF	0.892	0.706	0.862	0.000	0.876	0.688	0.970	0.000	0.963	0.490	0.815	0.913	0.000	0.908	0.784	0.852	0.658	0.000	0.879	0.921
Motorcycles	1	0	1	0	2	0	1	0	1	0	0	0	0	0	2	1	0	0	3	6
% Motorcycles	0.3	0.0	0.6	-	0.2	0.0	0.6	-	0.6	0.0	0.0	0.0	-	0.0	1.3	0.5	0.0	-	0.8	0.3
Cars	325	267	116	0	708	21	140	0	161	47	95	169	0	311	145	168	48	0	361	1541
% Cars	93.9	76.3	71.6	-	82.5	95.5	88.1	-	89.0	100.0	94.1	94.4	-	95.1	90.6	91.3	96.0	-	91.6	87.6
Light Goods Vehicles	18	78	43	0	139	1	16	0	17	0	6	5	0	11	11	15	2	0	28	195
% Light Goods Vehicles	5.2	22.3	26.5	-	16.2	4.5	10.1	-	9.4	0.0	5.9	2.8	-	3.4	6.9	8.2	4.0	-	7.1	11.1
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	2	2	0	0	4	0	2	0	2	0	0	4	0	4	2	0	0	0	2	12
% Single-Unit Trucks	0.6	0.6	0.0	-	0.5	0.0	1.3	-	1.1	0.0	0.0	2.2	-	1.2	1.3	0.0	0.0	-	0.5	0.7
Articulated Trucks	0	1	2	0	3	0	0	0	0	0	0	1	0	1	0	0	0	0	0	4
% Articulated Trucks	0.0	0.3	1.2	-	0.3	0.0	0.0	-	0.0	0.0	0.0	0.6	-	0.3	0.0	0.0	0.0	-	0.0	0.2
Bicycles on Road	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Bicycles on Road	0.0	0.6	0.0	-	0.2	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.1

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (7:15 AM)

	Northbound Approach					Southbound Approach				Eastbound Approach					Westbound Approach					
	Northbound					Southbound				Eastbound					Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:15 AM	17	22	29	0	68	5	68	0	73	0	31	98	0	129	21	9	1	0	31	301
7:30 AM	19	36	31	0	86	10	76	0	86	3	40	102	0	145	26	15	6	0	47	364
7:45 AM	22	43	70	0	135	1	66	0	67	1	32	104	0	137	29	10	9	0	48	387
8:00 AM	24	33	41	0	98	1	44	0	45	4	20	75	0	99	25	14	2	0	41	283
Total	82	134	171	0	387	17	254	0	271	8	123	379	0	510	101	48	18	0	167	1335
Approach %	21.2	34.6	44.2	0.0	-	6.3	93.7	0.0	-	1.6	24.1	74.3	0.0	-	60.5	28.7	10.8	0.0	-	-
Total %	6.1	10.0	12.8	0.0	29.0	1.3	19.0	0.0	20.3	0.6	9.2	28.4	0.0	38.2	7.6	3.6	1.3	0.0	12.5	-
PHF	0.854	0.779	0.611	0.000	0.717	0.425	0.836	0.000	0.788	0.500	0.769	0.911	0.000	0.879	0.871	0.800	0.500	0.000	0.870	0.862
Motorcycles	0	0	0	0	0	1	2	0	3	0	2	1	0	3	0	0	0	0	0	6
% Motorcycles	0.0	0.0	0.0	-	0.0	5.9	0.8	-	1.1	0.0	1.6	0.3	-	0.6	0.0	0.0	0.0	-	0.0	0.4
Cars	70	101	116	0	287	14	186	0	200	7	103	300	0	410	71	36	18	0	125	1022
% Cars	85.4	75.4	67.8	-	74.2	82.4	73.2	-	73.8	87.5	83.7	79.2	-	80.4	70.3	75.0	100.0	-	74.9	76.6
Light Goods Vehicles	10	31	46	0	87	2	62	0	64	1	18	76	0	95	27	11	0	0	38	284
% Light Goods Vehicles	12.2	23.1	26.9	-	22.5	11.8	24.4	-	23.6	12.5	14.6	20.1	-	18.6	26.7	22.9	0.0	-	22.8	21.3
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	1	2	5	0	8	0	1	0	1	0	0	0	0	0	3	1	0	0	4	13
% Single-Unit Trucks	1.2	1.5	2.9	-	2.1	0.0	0.4	-	0.4	0.0	0.0	0.0	-	0.0	3.0	2.1	0.0	-	2.4	1.0
Articulated Trucks	1	0	4	0	5	0	1	0	1	0	0	2	0	2	0	0	0	0	0	8
% Articulated Trucks	1.2	0.0	2.3	-	1.3	0.0	0.4	-	0.4	0.0	0.0	0.5	-	0.4	0.0	0.0	0.0	-	0.0	0.6
Bicycles on Road	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	2
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.8	-	0.7	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.1

Location: 45.776226, -111.177134

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Belgrade_Main_Broadway (Gallatin)
Site Code:
Start Date: 08/04/2016

Turning Movement Data

Start Time	16-3-023 Northbound					16-3-022 Southbound					16-3-015 Eastbound					16-3-016 Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
8:30 AM	4	15	14	0	33	2	22	5	0	29	7	38	7	0	52	20	28	5	0	53	167
8:45 AM	7	11	14	0	32	6	5	1	0	12	5	35	8	0	48	20	46	3	0	69	161
Hourly Total	11	26	28	0	65	8	27	6	0	41	12	73	15	0	100	40	74	8	0	122	328
9:00 AM	10	15	23	0	48	5	18	3	0	26	2	37	8	0	47	12	35	2	0	49	170
9:15 AM	5	18	13	0	36	6	16	3	0	25	6	33	5	0	44	22	21	7	0	50	155
9:30 AM	4	22	24	0	50	4	9	5	0	18	2	31	5	0	38	21	23	3	0	47	153
9:45 AM	15	23	23	0	61	8	15	6	0	29	3	35	15	0	53	22	34	4	0	60	203
Hourly Total	34	78	83	0	195	23	58	17	0	98	13	136	33	0	182	77	113	16	0	206	681
10:00 AM	9	15	16	0	40	4	16	2	0	22	1	41	9	0	51	22	24	5	0	51	164
10:15 AM	11	19	22	0	52	7	15	6	0	28	3	41	9	0	53	24	36	3	0	63	196
10:30 AM	8	26	16	0	50	11	13	2	0	26	2	32	13	0	47	20	42	5	0	67	190
10:45 AM	4	20	22	0	46	10	20	3	0	33	8	32	16	0	56	21	45	3	0	69	204
Hourly Total	32	80	76	0	188	32	64	13	0	109	14	146	47	0	207	87	147	16	0	250	754
11:00 AM	10	26	23	0	59	7	25	9	0	41	6	40	12	0	58	30	40	7	0	77	235
11:15 AM	9	19	30	0	58	5	18	6	0	29	2	48	12	0	62	27	33	2	0	62	211
11:30 AM	6	24	34	0	64	9	14	7	0	30	2	37	8	0	47	21	46	6	0	73	214
11:45 AM	10	20	28	0	58	10	18	5	0	33	5	39	17	0	61	34	47	9	0	90	242
Hourly Total	35	89	115	0	239	31	75	27	0	133	15	164	49	0	228	112	166	24	0	302	902
12:00 PM	12	18	30	0	60	10	25	9	0	44	3	40	11	0	54	31	45	10	0	86	244
12:15 PM	16	22	28	0	66	13	18	3	0	34	5	37	12	0	54	27	39	7	0	73	227
12:30 PM	15	19	29	0	63	9	25	9	0	43	2	41	17	0	60	28	41	7	0	76	242
12:45 PM	14	25	27	0	66	4	22	5	0	31	6	37	5	0	48	31	42	10	0	83	228
Hourly Total	57	84	114	0	255	36	90	26	0	152	16	155	45	0	216	117	167	34	0	318	941
1:00 PM	12	30	26	0	68	9	18	6	0	33	3	38	9	0	50	25	43	4	0	72	223
1:15 PM	13	17	29	0	59	11	13	4	0	28	3	38	12	0	53	45	49	6	0	100	240
1:30 PM	5	29	31	0	65	3	15	4	0	22	4	32	15	0	51	33	41	5	0	79	217
1:45 PM	23	23	24	0	70	9	20	5	0	34	8	33	11	0	52	39	49	3	0	91	247
Hourly Total	53	99	110	0	262	32	66	19	0	117	18	141	47	0	206	142	182	18	0	342	927
2:00 PM	6	25	25	0	56	8	21	1	0	30	5	40	10	0	55	33	54	8	0	95	236
2:15 PM	7	32	28	0	67	8	17	5	0	30	4	49	11	0	64	24	48	4	0	76	237
2:30 PM	8	21	25	0	54	5	17	8	0	30	3	35	10	0	48	24	40	6	0	70	202
2:45 PM	12	19	26	0	57	6	19	9	0	34	3	40	8	0	51	16	46	5	0	67	209
Hourly Total	33	97	104	0	234	27	74	23	0	124	15	164	39	0	218	97	188	23	0	308	884
3:00 PM	15	15	19	0	49	7	19	8	0	34	4	26	15	0	45	28	43	6	0	77	205
3:15 PM	6	25	16	0	47	6	26	3	0	35	3	40	11	0	54	21	49	2	0	72	208
3:30 PM	21	32	18	0	71	11	20	2	0	33	3	34	14	0	51	34	43	3	0	80	235
3:45 PM	12	26	23	0	61	8	26	6	0	40	0	35	14	0	49	29	62	6	0	97	247
Hourly Total	54	98	76	0	228	32	91	19	0	142	10	135	54	0	199	112	197	17	0	326	895
4:00 PM	8	18	24	0	50	11	9	2	0	22	0	36	11	0	47	28	65	6	0	99	218
4:15 PM	14	21	18	0	53	7	18	4	0	29	1	44	11	0	56	30	57	6	0	93	231
4:30 PM	16	21	34	0	71	14	20	9	0	43	3	47	17	0	67	25	64	8	0	97	278
4:45 PM	9	17	17	0	43	11	18	0	0	29	2	40	11	0	53	38	84	3	0	125	250
Hourly Total	47	77	93	0	217	43	65	15	0	123	6	167	50	0	223	121	270	23	0	414	977
5:00 PM	15	24	32	0	71	12	18	8	0	38	2	50	12	0	64	24	67	4	0	95	268
5:15 PM	18	29	29	0	76	8	21	2	0	31	3	50	15	0	68	24	78	2	0	104	279
5:30 PM	13	25	23	0	61	8	17	3	0	28	1	39	12	0	52	42	63	6	0	111	252
5:45 PM	7	19	12	0	38	4	9	2	0	15	5	36	18	0	59	26	63	7	0	96	208
Hourly Total	53	97	96	0	246	32	65	15	0	112	11	175	57	0	243	116	271	19	0	406	1007
6:00 PM	13	18	29	0	60	4	14	4	0	22	5	49	7	0	61	25	47	3	0	75	218
6:15 PM	9	19	25	0	53	1	10	3	0	14	1	29	5	0	35	12	57	4	0	73	175
6:30 PM	5	27	19	0	51	1	13	3	0	17	2	27	8	0	37	21	58	7	0	86	191
6:45 PM	10	7	16	0	33	6	14	4	0	24	5	32	8	0	45	14	43	6	0	63	165
Hourly Total	37	71	89	0	197	12	51	14	0	77	13	137	28	0	178	72	205	20	0	297	749
7:00 PM	11	13	19	0	43	6	10	1	0	17	0	28	6	0	34	16	28	3	0	47	141
7:15 PM	7	9	13	0	29	4	11	1	0	16	0	32	5	0	37	18	34	3	0	55	137
7:30 PM	11	8	14	0	33	7	4	3	0	14	3	27	9	0	39	12	24	2	0	38	124
7:45 PM	6	10	19	0	35	1	3	0	0	4	1	30	7	0	38	16	34	3	0	53	130
Hourly Total	35	40	65	0	140	18	28	5	0	51	4	117	27	0	148	62	120	11	0	193	532
8:00 PM	4	8	12	0	24	3	7	4	0	14	0	25	2	0	27	13	23	1	0	37	102
8:15 PM	4	11	8	0	23	2	3	2	0	7	1	16	5	0	22	29	32	3	0	64	116
8:30 PM	3	9	7	0	19	0	11	1	0	12	1	18	5	0	24	24	38	5	0	67	122
8:45 PM	4	11	10	0	25	3	10	3	0	16	0	15	0	0	15	11	25	2	0	38	94
Hourly Total	15	39	37	0	91	8	31	10	0	49	2	74	12	0	88	77	118	11	0	206	434
9:00 PM	0	10	1	0	11	1	6	1	0	8	1	15	3	0	19	10	28	1	0	39	77

9:15 PM	2	8	7	0	17	4	5	0	0	9	0	18	2	0	20	10	25	3	0	38	84
9:30 PM	6	4	7	0	17	5	6	1	0	12	1	8	0	0	9	12	24	0	0	36	74
9:45 PM	3	1	8	0	12	0	3	0	0	3	2	7	3	0	12	13	26	2	0	41	68
Hourly Total	11	23	23	0	57	10	20	2	0	32	4	48	8	0	60	45	103	6	0	154	303
10:00 PM	2	3	2	0	7	3	6	0	0	9	2	9	0	1	12	7	22	2	0	31	59
10:15 PM	2	6	6	0	14	0	2	2	0	4	1	9	1	0	11	14	17	1	0	32	61
10:30 PM	1	3	4	0	8	1	5	0	0	6	0	2	0	0	2	5	10	0	0	15	31
10:45 PM	0	4	3	0	7	1	0	0	0	1	0	7	2	0	9	9	14	2	0	25	42
Hourly Total	5	16	15	0	36	5	13	2	0	20	3	27	3	1	34	35	63	5	0	103	193
11:00 PM	2	3	1	0	6	1	2	0	0	3	0	6	2	0	8	11	17	1	0	29	46
11:15 PM	0	2	2	0	4	0	2	1	0	3	0	4	2	0	6	2	9	0	0	11	24
11:30 PM	1	2	2	0	5	2	1	1	0	4	0	7	0	0	7	1	6	1	0	8	24
11:45 PM	1	2	2	0	5	0	0	0	0	0	0	4	1	0	5	5	6	0	0	11	21
Hourly Total	4	9	7	0	20	3	5	2	0	10	0	21	5	0	26	19	38	2	0	59	115
12:00 AM	0	1	7	0	8	0	0	0	0	0	1	4	0	0	5	6	7	1	0	14	27
12:15 AM	0	1	4	0	5	0	1	0	0	1	0	2	0	0	2	4	8	2	0	14	22
12:30 AM	1	0	1	0	2	0	0	2	0	2	1	1	2	0	4	2	13	0	0	15	23
12:45 AM	0	0	2	0	2	1	0	0	0	1	0	5	0	0	5	14	11	0	0	25	33
Hourly Total	1	2	14	0	17	1	1	2	0	4	2	12	2	0	16	26	39	3	0	68	105
1:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	4	9	0	0	13	14
1:15 AM	0	1	2	0	3	0	1	0	0	1	0	1	1	0	2	3	3	0	0	6	12
1:30 AM	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	1	4	0	0	5	8
1:45 AM	0	1	1	0	2	0	1	0	0	1	0	2	0	0	2	0	1	0	0	1	6
Hourly Total	0	3	4	0	7	0	4	0	0	4	0	3	1	0	4	8	17	0	0	25	40
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	1	4	0	0	5	7
2:15 AM	0	0	1	0	1	0	0	0	0	0	0	3	0	0	3	0	8	1	0	9	13
2:30 AM	1	3	0	0	4	0	0	0	0	0	0	0	1	0	1	0	2	0	0	2	7
2:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Hourly Total	1	3	1	0	5	0	0	0	0	0	0	6	1	0	7	1	14	1	0	16	28
3:00 AM	0	3	0	0	3	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	6
3:15 AM	0	2	1	0	3	0	0	0	0	0	0	2	0	0	2	0	2	0	0	2	7
3:30 AM	0	1	2	0	3	0	0	0	0	0	2	1	0	0	3	1	0	0	0	1	7
3:45 AM	0	0	2	0	2	0	1	1	0	2	0	4	0	0	4	1	1	0	0	2	10
Hourly Total	0	6	5	0	11	0	1	1	0	2	3	9	0	0	12	2	3	0	0	5	30
4:00 AM	0	4	5	0	9	1	1	0	0	2	1	1	0	0	2	0	1	0	0	1	14
4:15 AM	0	2	6	0	8	0	0	0	0	0	1	4	0	0	5	1	3	0	0	4	17
4:30 AM	1	3	8	0	12	1	0	0	0	1	1	5	0	0	6	1	4	0	0	5	24
4:45 AM	0	1	3	0	4	0	2	0	0	2	0	5	0	0	5	8	5	0	0	13	24
Hourly Total	1	10	22	0	33	2	3	0	0	5	3	15	0	0	18	10	13	0	0	23	79
5:00 AM	1	2	3	0	6	0	2	0	0	2	1	7	0	0	8	4	3	0	0	7	23
5:15 AM	2	0	4	0	6	0	0	0	0	0	0	6	0	0	6	6	8	1	0	15	27
5:30 AM	1	1	9	0	11	3	1	0	0	4	0	14	1	0	15	4	4	1	0	9	39
5:45 AM	3	3	11	0	17	1	2	1	0	4	0	16	1	0	17	3	2	1	0	6	44
Hourly Total	7	6	27	0	40	4	5	1	0	10	1	43	2	0	46	17	17	3	0	37	133
6:00 AM	1	3	9	0	13	0	3	0	0	3	0	12	1	0	13	6	7	0	0	13	42
6:15 AM	0	5	8	0	13	1	4	0	0	5	0	22	0	0	22	12	5	1	0	18	58
6:30 AM	1	1	10	0	12	1	5	3	0	9	0	33	2	0	35	10	9	2	0	21	77
6:45 AM	1	6	11	0	18	4	10	0	0	14	1	33	4	0	38	12	23	3	0	38	108
Hourly Total	3	15	38	0	56	6	22	3	0	31	1	100	7	0	108	40	44	6	0	90	285
7:00 AM	2	5	9	0	16	2	8	0	0	10	0	19	3	0	22	18	14	2	0	34	82
7:15 AM	4	17	16	0	37	5	12	0	0	17	3	46	1	0	50	16	23	4	0	43	147
7:30 AM	9	15	10	0	34	9	14	3	0	26	1	46	3	0	50	16	14	3	0	33	143
7:45 AM	9	18	16	0	43	7	10	5	0	22	2	39	4	0	45	18	24	6	0	48	158
Hourly Total	24	55	51	0	130	23	44	8	0	75	6	150	11	0	167	68	75	15	0	158	530
8:00 AM	5	13	18	0	36	2	9	3	0	14	4	36	5	0	45	21	21	4	0	46	141
8:15 AM	7	6	16	0	29	4	16	2	0	22	2	34	7	0	43	14	28	5	0	47	141
Grand Total	565	1142	1327	0	3034	394	928	235	0	1557	178	2288	555	1	3022	1538	2693	290	0	4521	12134
Approach %	18.6	37.6	43.7	0.0	-	25.3	59.6	15.1	0.0	-	5.9	75.7	18.4	0.0	-	34.0	59.6	6.4	0.0	-	-
Total %	4.7	9.4	10.9	0.0	25.0	3.2	7.6	1.9	0.0	12.8	1.5	18.9	4.6	0.0	24.9	12.7	22.2	2.4	0.0	37.3	-
Motorcycles	7	5	9	0	21	3	5	4	0	12	1	29	6	0	36	7	33	4	0	44	113
% Motorcycles	1.2	0.4	0.7	-	0.7	0.8	0.5	1.7	-	0.8	0.6	1.3	1.1	0.0	1.2	0.5	1.2	1.4	-	1.0	0.9
Cars	397	705	857	0	1959	286	577	148	0	1011	113	1496	392	1	2002	1043	1772	191	0	3006	7978
% Cars	70.3	61.7	64.6	-	64.6	72.6	62.2	63.0	-	64.9	63.5	65.4	70.6	100.0	66.2	67.8	65.8	65.9	-	66.5	65.7
Light Goods Vehicles	156	375	404	0	935	101	297	75	0	473	60	660	141	0	861	409	784	85	0	1278	3547
% Light Goods Vehicles	27.6	32.8	30.4	-	30.8	25.6	32.0	31.9	-	30.4	33.7	28.8	25.4	0.0	28.5	26.6	29.1	29.3	-	28.3	29.2
Buses	0	0	0	0	0	0	0	1	0	1	1	1	0	0	2	2	1	1	0	4	7
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.4	-	0.1	0.6	0.0	0.0	0.0	0.1	0.1	0.0	0.3	-	0.1	0.1
Single-Unit Trucks	5	23	44	0	72	4	17	7	0	28	3	56	16	0	75	46	75	5	0	126	301
% Single-Unit Trucks	0.9	2.0	3.3	-	2.4	1.0	1.8	3.0	-	1.8	1.7	2.4	2.9	0.0	2.5	3.0	2.8	1.7	-	2.8	2.5
Articulated Trucks	0	34	13	0	47	0	32	0	0	32	0	46	0	0	46	31	28	4	0	63	188
% Articulated Trucks	0.0	3.0	1.0	-	1.5	0.0	3.4	0.0	-	2.1	0.0	2.0	0.0	0.0	1.5	2.0	1.0	1.4	-	1.4	1.5

Location: 45.776226, -111.177134

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Belgrade_Main_Broadway (Gallatin)
Site Code:
Start Date: 08/04/2016
Page No: 3

08/04/2016 8:30 AM
Ending At
08/05/2016 8:30 AM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

16-3-022 [SB]

	Out	In	Total
Motorcycles	10	12	22
Cars	1009	1011	2020
Light Goods Vehicles	520	473	993
Buses	2	1	3
Other	69	60	129
	1610	**1557**	**3167**

	R	T	L	U
Motorcycles	4	5	3	0
Cars	148	577	286	0
Light Goods Vehicles	75	297	101	0
Buses	1	0	0	0
Other	7	49	4	0
	235	**928**	**394**	**0**

16-3-015 [EB]

	Out	In	Total
Motorcycles	44	36	80
Cars	2318	2002	4320
Light Goods Vehicles	1015	861	1876
Buses	2	2	4
Other	115	121	236
	3494	**3022**	**6516**

	U	L	T	R
Motorcycles	0	1	29	6
Cars	1	113	1496	392
Light Goods Vehicles	0	60	660	141
Buses	0	1	1	0
Other	0	3	102	16
	1	**178**	**2288**	**555**

16-3-016 [WB]

	Out	In	Total
Motorcycles	41	44	85
Cars	2639	3006	5645
Light Goods Vehicles	1165	1278	2443
Buses	1	4	5
Other	163	189	352
	4009	**4521**	**8530**

	R	T	L	U
Motorcycles	4	33	7	0
Cars	191	1772	1043	0
Light Goods Vehicles	85	784	409	0
Buses	1	1	2	0
Other	9	103	77	0
	290	**2693**	**1538**	**0**

	U	L	T	R
Motorcycles	0	7	5	9
Cars	0	397	705	857
Light Goods Vehicles	0	156	375	404
Buses	0	0	0	0
Other	0	5	57	57
	0	**565**	**1142**	**1327**

	Out	In	Total
Motorcycles	18	21	39
Cars	2012	1959	3971
Light Goods Vehicles	847	935	1782
Buses	2	0	2
Other	142	119	261
	3021	**3034**	**6055**

16-3-023 [NB]

Turning Movement Data Plot

Turning Movement Peak Hour Data (11:45 AM)

Start Time	16-3-023 Northbound					16-3-022 Southbound					16-3-015 Eastbound					16-3-016 Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
11:45 AM	10	20	28	0	58	10	18	5	0	33	5	39	17	0	61	34	47	9	0	90	242
12:00 PM	12	18	30	0	60	10	25	9	0	44	3	40	11	0	54	31	45	10	0	86	244
12:15 PM	16	22	28	0	66	13	18	3	0	34	5	37	12	0	54	27	39	7	0	73	227
12:30 PM	15	19	29	0	63	9	25	9	0	43	2	41	17	0	60	28	41	7	0	76	242
Total	53	79	115	0	247	42	86	26	0	154	15	157	57	0	229	120	172	33	0	325	955
Approach %	21.5	32.0	46.6	0.0	-	27.3	55.8	16.9	0.0	-	6.6	68.6	24.9	0.0	-	36.9	52.9	10.2	0.0	-	-
Total %	5.5	8.3	12.0	0.0	25.9	4.4	9.0	2.7	0.0	16.1	1.6	16.4	6.0	0.0	24.0	12.6	18.0	3.5	0.0	34.0	-
PHF	0.828	0.898	0.958	0.000	0.936	0.808	0.860	0.722	0.000	0.875	0.750	0.957	0.838	0.000	0.939	0.882	0.915	0.825	0.000	0.903	0.978
Motorcycles	0	0	1	0	1	0	1	0	0	1	0	0	1	0	1	1	0	1	0	2	5
% Motorcycles	0.0	0.0	0.9	-	0.4	0.0	1.2	0.0	-	0.6	0.0	0.0	1.8	-	0.4	0.8	0.0	3.0	-	0.6	0.5
Cars	35	49	84	0	168	36	54	15	0	105	8	106	39	0	153	66	117	20	0	203	629
% Cars	66.0	62.0	73.0	-	68.0	85.7	62.8	57.7	-	68.2	53.3	67.5	68.4	-	66.8	55.0	68.0	60.6	-	62.5	65.9
Light Goods Vehicles	18	22	25	0	65	6	27	9	0	42	7	44	17	0	68	43	46	12	0	101	276
% Light Goods Vehicles	34.0	27.8	21.7	-	26.3	14.3	31.4	34.6	-	27.3	46.7	28.0	29.8	-	29.7	35.8	26.7	36.4	-	31.1	28.9
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	5	5	0	10	0	0	2	0	2	0	4	0	0	4	5	7	0	0	12	28
% Single-Unit Trucks	0.0	6.3	4.3	-	4.0	0.0	0.0	7.7	-	1.3	0.0	2.5	0.0	-	1.7	4.2	4.1	0.0	-	3.7	2.9
Articulated Trucks	0	3	0	0	3	0	4	0	0	4	0	3	0	0	3	5	2	0	0	7	17
% Articulated Trucks	0.0	3.8	0.0	-	1.2	0.0	4.7	0.0	-	2.6	0.0	1.9	0.0	-	1.3	4.2	1.2	0.0	-	2.2	1.8

Turning Movement Peak Hour Data (4:30 PM)

Start Time	16-3-023 Northbound					16-3-022 Southbound					16-3-015 Eastbound					16-3-016 Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
4:30 PM	16	21	34	0	71	14	20	9	0	43	3	47	17	0	67	25	64	8	0	97	278
4:45 PM	9	17	17	0	43	11	18	0	0	29	2	40	11	0	53	38	84	3	0	125	250
5:00 PM	15	24	32	0	71	12	18	8	0	38	2	50	12	0	64	24	67	4	0	95	268
5:15 PM	18	29	29	0	76	8	21	2	0	31	3	50	15	0	68	24	78	2	0	104	279
Total	58	91	112	0	261	45	77	19	0	141	10	187	55	0	252	111	293	17	0	421	1075
Approach %	22.2	34.9	42.9	0.0	-	31.9	54.6	13.5	0.0	-	4.0	74.2	21.8	0.0	-	26.4	69.6	4.0	0.0	-	-
Total %	5.4	8.5	10.4	0.0	24.3	4.2	7.2	1.8	0.0	13.1	0.9	17.4	5.1	0.0	23.4	10.3	27.3	1.6	0.0	39.2	-
PHF	0.806	0.784	0.824	0.000	0.859	0.804	0.917	0.528	0.000	0.820	0.833	0.935	0.809	0.000	0.926	0.730	0.872	0.531	0.000	0.842	0.963
Motorcycles	2	2	2	0	6	2	1	0	0	3	0	3	0	0	3	1	2	0	0	3	15
% Motorcycles	3.4	2.2	1.8	-	2.3	4.4	1.3	0.0	-	2.1	0.0	1.6	0.0	-	1.2	0.9	0.7	0.0	-	0.7	1.4
Cars	38	59	74	0	171	27	51	15	0	93	7	123	40	0	170	89	191	13	0	293	727
% Cars	65.5	64.8	66.1	-	65.5	60.0	66.2	78.9	-	66.0	70.0	65.8	72.7	-	67.5	80.2	65.2	76.5	-	69.6	67.6
Light Goods Vehicles	18	28	34	0	80	15	22	3	0	40	3	59	15	0	77	18	87	4	0	109	306
% Light Goods Vehicles	31.0	30.8	30.4	-	30.7	33.3	28.6	15.8	-	28.4	30.0	31.6	27.3	-	30.6	16.2	29.7	23.5	-	25.9	28.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	1	2	0	3	1	2	1	0	4	0	2	0	0	2	2	12	0	0	14	23
% Single-Unit Trucks	0.0	1.1	1.8	-	1.1	2.2	2.6	5.3	-	2.8	0.0	1.1	0.0	-	0.8	1.8	4.1	0.0	-	3.3	2.1
Articulated Trucks	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	1	1	0	0	2	4
% Articulated Trucks	0.0	1.1	0.0	-	0.4	0.0	1.3	0.0	-	0.7	0.0	0.0	0.0	-	0.0	0.9	0.3	0.0	-	0.5	0.4

Location: 45.776226, -111.177134

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Belgrade_Main_Broadway (Gallatin)
Site Code:
Start Date: 08/04/2016

Turning Movement Peak Hour Data (7:15 AM)

Start Time	16-3-023 Northbound					16-3-022 Southbound					16-3-015 Eastbound					16-3-016 Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:15 AM	4	17	16	0	37	5	12	0	0	17	3	46	1	0	50	16	23	4	0	43	147
7:30 AM	9	15	10	0	34	9	14	3	0	26	1	46	3	0	50	16	14	3	0	33	143
7:45 AM	9	18	16	0	43	7	10	5	0	22	2	39	4	0	45	18	24	6	0	48	158
8:00 AM	5	13	18	0	36	2	9	3	0	14	4	36	5	0	45	21	21	4	0	46	141
Total	27	63	60	0	150	23	45	11	0	79	10	167	13	0	190	71	82	17	0	170	589
Approach %	18.0	42.0	40.0	0.0	-	29.1	57.0	13.9	0.0	-	5.3	87.9	6.8	0.0	-	41.8	48.2	10.0	0.0	-	-
Total %	4.6	10.7	10.2	0.0	25.5	3.9	7.6	1.9	0.0	13.4	1.7	28.4	2.2	0.0	32.3	12.1	13.9	2.9	0.0	28.9	-
PHF	0.750	0.875	0.833	0.000	0.872	0.639	0.804	0.550	0.000	0.760	0.625	0.908	0.650	0.000	0.950	0.845	0.854	0.708	0.000	0.885	0.932
Motorcycles	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	3
% Motorcycles	0.0	0.0	0.0	-	0.0	0.0	4.4	0.0	-	2.5	0.0	0.6	0.0	-	0.5	0.0	0.0	0.0	-	0.0	0.5
Cars	22	40	33	0	95	20	29	6	0	55	6	106	11	0	123	37	56	12	0	105	378
% Cars	81.5	63.5	55.0	-	63.3	87.0	64.4	54.5	-	69.6	60.0	63.5	84.6	-	64.7	52.1	68.3	70.6	-	61.8	64.2
Light Goods Vehicles	5	22	22	0	49	3	12	5	0	20	4	53	2	0	59	28	23	5	0	56	184
% Light Goods Vehicles	18.5	34.9	36.7	-	32.7	13.0	26.7	45.5	-	25.3	40.0	31.7	15.4	-	31.1	39.4	28.0	29.4	-	32.9	31.2
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	0	2	0	2	0	0	0	0	0	0	3	0	0	3	3	2	0	0	5	10
% Single-Unit Trucks	0.0	0.0	3.3	-	1.3	0.0	0.0	0.0	-	0.0	0.0	1.8	0.0	-	1.6	4.2	2.4	0.0	-	2.9	1.7
Articulated Trucks	0	1	3	0	4	0	2	0	0	2	0	4	0	0	4	3	1	0	0	4	14
% Articulated Trucks	0.0	1.6	5.0	-	2.7	0.0	4.4	0.0	-	2.5	0.0	2.4	0.0	-	2.1	4.2	1.2	0.0	-	2.4	2.4

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Data

Start Time	Northbound Approach Northbound					Southbound Approach Southbound					Eastbound Approach Eastbound					Westbound Approach Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
9:00 AM	4	5	7	0	16	8	1	3	0	12	4	37	2	0	43	1	32	1	0	34	105
9:15 AM	5	5	13	0	23	5	3	3	0	11	5	34	2	0	41	1	31	0	0	32	107
9:30 AM	5	0	8	0	13	4	3	9	0	16	8	59	3	0	70	7	51	0	0	58	157
9:45 AM	3	1	7	0	11	4	0	5	0	9	7	48	6	0	61	7	57	0	0	64	145
Hourly Total	17	11	35	0	63	21	7	20	0	48	24	178	13	0	215	16	171	1	0	188	514
10:00 AM	5	1	11	0	17	3	3	10	0	16	11	35	4	0	50	7	58	0	0	65	148
10:15 AM	3	1	12	0	16	4	2	7	0	13	4	64	4	0	72	9	68	0	0	77	178
10:30 AM	3	2	13	0	18	7	2	8	0	17	5	50	3	0	58	8	52	0	0	60	153
10:45 AM	5	1	8	0	14	7	1	8	0	16	6	58	8	0	72	6	44	0	0	50	152
Hourly Total	16	5	44	0	65	21	8	33	0	62	26	207	19	0	252	30	222	0	0	252	631
11:00 AM	8	2	15	0	25	4	3	8	0	15	4	62	5	0	71	4	54	1	0	59	170
11:15 AM	9	0	12	0	21	8	1	5	0	14	5	51	4	0	60	1	52	1	0	54	149
11:30 AM	5	1	16	0	22	2	1	9	0	12	4	58	8	0	70	9	58	2	0	69	173
11:45 AM	7	2	11	0	20	6	1	7	0	14	9	41	6	0	56	9	78	3	0	90	180
Hourly Total	29	5	54	0	88	20	6	29	0	55	22	212	23	0	257	23	242	7	0	272	672
12:00 PM	6	0	6	0	12	3	0	9	0	12	4	75	10	0	89	10	58	1	0	69	182
12:15 PM	5	2	14	0	21	4	3	9	0	16	11	55	12	1	79	8	60	0	0	68	184
12:30 PM	11	1	17	0	29	8	2	4	0	14	7	81	7	0	95	13	71	1	0	85	223
12:45 PM	12	0	12	0	24	6	1	7	0	14	8	70	4	0	82	8	81	0	0	89	209
Hourly Total	34	3	49	0	86	21	6	29	0	56	30	281	33	1	345	39	270	2	0	311	798
1:00 PM	4	0	20	0	24	3	1	8	0	12	8	62	8	0	78	14	65	2	0	81	195
1:15 PM	2	1	4	0	7	4	0	8	0	12	4	53	9	0	66	12	82	2	0	96	181
1:30 PM	3	3	12	0	18	3	3	12	0	18	3	64	7	0	74	13	71	0	0	84	194
1:45 PM	8	1	16	0	25	2	2	10	0	14	2	50	4	0	56	10	67	1	0	78	173
Hourly Total	17	5	52	0	74	12	6	38	0	56	17	229	28	0	274	49	285	5	0	339	743
2:00 PM	7	1	10	0	18	4	0	12	0	16	6	47	8	0	61	5	67	3	0	75	170
2:15 PM	7	2	14	0	23	2	1	6	0	9	1	50	4	0	55	10	58	0	0	68	155
2:30 PM	4	0	10	0	14	4	2	6	0	12	5	56	7	0	68	5	69	2	0	76	170
2:45 PM	12	4	9	0	25	5	0	7	0	12	7	41	7	0	55	4	64	1	0	69	161
Hourly Total	30	7	43	0	80	15	3	31	0	49	19	194	26	0	239	24	258	6	0	288	656
3:00 PM	4	3	6	0	13	4	2	7	0	13	3	49	8	0	60	9	61	2	0	72	158
3:15 PM	10	1	10	0	21	4	5	5	0	14	2	52	5	0	59	5	75	1	0	81	175
3:30 PM	7	0	14	0	21	3	7	13	0	23	9	48	12	0	69	11	81	5	0	97	210
3:45 PM	11	2	13	0	26	3	2	17	0	22	6	55	7	0	68	6	77	1	0	84	200
Hourly Total	32	6	43	0	81	14	16	42	0	72	20	204	32	0	256	31	294	9	0	334	743
4:00 PM	5	3	12	0	20	1	1	9	0	11	2	67	7	0	76	7	75	3	0	85	192
4:15 PM	6	1	16	0	23	3	4	11	0	18	11	63	9	0	83	9	74	5	0	88	212
4:30 PM	6	0	15	0	21	7	0	10	0	17	13	68	8	0	89	10	76	3	0	89	216
4:45 PM	9	2	14	0	25	0	2	8	0	10	4	49	15	0	68	13	106	2	0	121	224
Hourly Total	26	6	57	0	89	11	7	38	0	56	30	247	39	0	316	39	331	13	0	383	844
5:00 PM	7	1	21	0	29	6	1	11	0	18	8	55	8	0	71	11	91	3	0	105	223
5:15 PM	12	3	17	0	32	9	4	15	0	28	7	66	7	0	80	17	93	0	0	110	250
5:30 PM	14	0	14	0	28	7	2	15	0	24	6	48	13	0	67	17	101	2	0	120	239
5:45 PM	35	0	7	0	42	5	3	8	0	16	7	51	9	0	67	14	120	0	0	134	259
Hourly Total	68	4	59	0	131	27	10	49	0	86	28	220	37	0	285	59	405	5	0	469	971
6:00 PM	10	2	3	0	15	4	1	14	0	19	12	53	8	0	73	4	82	2	0	88	195
6:15 PM	11	5	11	0	27	9	4	11	0	24	6	39	15	0	60	5	63	2	0	70	181
6:30 PM	4	4	11	0	19	2	8	8	0	18	10	49	17	0	76	10	61	1	0	72	185
6:45 PM	10	6	12	0	28	5	5	6	0	16	10	49	14	0	73	13	37	0	0	50	167
Hourly Total	35	17	37	0	89	20	18	39	0	77	38	190	54	0	282	32	243	5	0	280	728
7:00 PM	10	0	13	0	23	7	5	5	0	17	7	63	16	0	86	8	41	4	0	53	179
7:15 PM	6	2	8	0	16	4	3	11	0	18	6	36	11	0	53	10	44	1	0	55	142
7:30 PM	3	2	6	0	11	2	3	3	0	8	5	20	9	0	34	5	40	0	0	45	98
7:45 PM	6	4	7	0	17	3	3	6	0	12	2	20	9	0	31	2	28	1	0	31	91
Hourly Total	25	8	34	0	67	16	14	25	0	55	20	139	45	0	204	25	153	6	0	184	510
8:00 PM	3	0	3	0	6	4	0	3	0	7	3	20	3	0	26	5	18	0	0	23	62
8:15 PM	9	3	6	0	18	5	2	6	0	13	5	29	6	0	40	12	23	0	0	35	106
8:30 PM	2	3	3	0	8	1	5	3	0	9	2	17	3	0	22	3	20	0	0	23	62
8:45 PM	2	2	8	0	12	3	4	2	0	9	5	13	3	0	21	4	17	1	0	22	64
Hourly Total	16	8	20	0	44	13	11	14	0	38	15	79	15	0	109	24	78	1	0	103	294
9:00 PM	2	4	4	0	10	2	2	2	0	6	2	18	7	0	27	3	24	0	0	27	70
9:15 PM	2	0	3	0	5	1	1	5	0	7	5	15	2	0	22	5	27	0	0	32	66
9:30 PM	0	1	3	0	4	0	1	5	0	6	2	13	3	0	18	4	13	0	0	17	45
9:45 PM	3	0	0	0	3	1	2	1	0	4	4	12	3	0	19	3	23	0	0	26	52
Hourly Total	7	5	10	0	22	4	6	13	0	23	13	58	15	0	86	15	87	0	0	102	233

10:00 PM	2	3	2	0	7	2	2	3	0	7	2	10	4	0	16	2	7	1	0	10	40
10:15 PM	1	0	2	0	3	0	0	4	0	4	4	9	1	0	14	3	8	0	0	11	32
10:30 PM	2	0	3	0	5	2	1	3	0	6	1	4	2	0	7	2	8	0	0	10	28
10:45 PM	0	0	1	0	1	2	1	1	0	4	1	6	1	0	8	1	8	0	0	9	22
Hourly Total	5	3	8	0	16	6	4	11	0	21	8	29	8	0	45	8	31	1	0	40	122
11:00 PM	0	0	0	0	0	0	0	0	0	0	1	4	2	0	7	0	8	0	0	8	15
11:15 PM	0	0	4	0	4	0	2	0	0	2	0	4	2	0	6	2	7	0	0	9	21
11:30 PM	1	2	4	0	7	1	0	4	0	5	0	0	0	0	0	2	6	0	0	8	20
11:45 PM	1	1	0	0	2	2	0	1	0	3	0	3	1	0	4	1	4	0	0	5	14
Hourly Total	2	3	8	0	13	3	2	5	0	10	1	11	5	0	17	5	25	0	0	30	70
12:00 AM	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	2	5	0	0	7	9
12:15 AM	0	0	0	0	0	2	0	2	0	4	3	1	1	0	5	1	5	0	0	6	15
12:30 AM	1	0	2	0	3	0	0	0	0	0	2	1	1	0	4	2	4	0	0	6	13
12:45 AM	0	1	2	0	3	0	2	0	0	2	0	3	0	0	3	0	1	0	0	1	9
Hourly Total	2	1	4	0	7	3	2	2	0	7	5	5	2	0	12	5	15	0	0	20	46
1:00 AM	0	1	0	0	1	2	1	0	0	3	0	1	1	0	2	0	1	0	0	1	7
1:15 AM	0	0	1	0	1	1	0	3	0	4	0	2	0	0	2	0	4	0	0	4	11
1:30 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	3
1:45 AM	0	0	1	0	1	0	0	2	0	2	2	0	0	0	2	2	2	0	0	4	9
Hourly Total	0	1	3	0	4	3	1	5	0	9	2	3	1	0	6	3	8	0	0	11	30
2:00 AM	1	1	2	0	4	0	1	0	0	1	0	2	0	0	2	0	6	1	0	7	14
2:15 AM	1	0	0	0	1	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	4
2:30 AM	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
2:45 AM	0	1	1	0	2	1	0	0	0	1	0	2	0	0	2	0	1	0	0	1	6
Hourly Total	2	2	4	0	8	1	1	1	0	3	0	7	0	0	7	0	7	1	0	8	26
3:00 AM	0	0	0	0	0	1	0	1	0	2	0	3	3	0	6	0	0	0	0	0	8
3:15 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	2	0	0	2	4
3:30 AM	3	0	1	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
3:45 AM	1	0	0	0	1	0	0	1	0	1	1	4	0	0	5	0	1	0	0	1	8
Hourly Total	4	0	1	0	5	1	0	2	0	3	1	10	3	0	14	0	3	0	0	3	25
4:00 AM	0	0	1	0	1	0	0	2	0	2	0	1	0	0	1	0	1	0	0	1	5
4:15 AM	0	2	1	0	3	2	0	1	0	3	1	4	2	0	7	1	1	0	0	2	15
4:30 AM	1	0	1	0	2	1	0	0	0	1	0	7	0	0	7	0	3	0	0	3	13
4:45 AM	0	0	2	0	2	0	0	2	0	2	4	10	0	0	14	0	7	0	0	7	25
Hourly Total	1	2	5	0	8	3	0	5	0	8	5	22	2	0	29	1	12	0	0	13	58
5:00 AM	2	0	3	0	5	3	0	2	0	5	1	11	0	0	12	0	5	1	0	6	28
5:15 AM	0	3	1	0	4	4	1	0	0	5	0	9	0	0	9	0	8	0	0	8	26
5:30 AM	3	0	5	0	8	3	1	3	0	7	4	15	2	0	21	0	8	0	0	8	44
5:45 AM	2	2	7	0	11	4	0	2	0	6	4	21	0	0	25	0	6	0	0	6	48
Hourly Total	7	5	16	0	28	14	2	7	0	23	9	56	2	0	67	0	27	1	0	28	146
6:00 AM	5	2	6	0	13	6	1	3	0	10	4	22	1	0	27	2	16	1	0	19	69
6:15 AM	6	3	4	0	13	9	1	3	0	13	9	30	3	0	42	3	18	0	0	21	89
6:30 AM	5	2	8	0	15	6	1	3	0	10	11	39	1	0	51	1	12	0	0	13	89
6:45 AM	7	6	3	0	16	9	4	4	0	17	11	58	5	0	74	2	33	0	0	35	142
Hourly Total	23	13	21	0	57	30	7	13	0	50	35	149	10	0	194	8	79	1	0	88	389
7:00 AM	4	2	6	0	12	6	1	3	0	10	8	34	0	0	42	3	17	0	0	20	84
7:15 AM	6	6	17	0	29	14	1	10	0	25	11	70	0	0	81	3	24	0	0	27	162
7:30 AM	5	3	17	0	25	8	0	6	0	14	9	87	0	0	96	5	56	0	0	61	196
7:45 AM	12	1	15	0	28	4	3	4	0	11	6	63	0	0	69	5	72	1	0	78	186
Hourly Total	27	12	55	0	94	32	5	23	0	60	34	254	0	0	288	16	169	1	0	186	628
8:00 AM	8	6	8	0	22	3	3	1	0	7	3	44	2	0	49	5	36	0	0	41	119
8:15 AM	8	3	16	0	27	8	4	3	0	15	7	53	6	0	66	0	44	0	0	44	152
8:30 AM	5	2	12	0	19	6	0	2	0	8	7	62	2	0	71	5	45	0	0	50	148
8:45 AM	10	1	9	0	20	7	3	5	0	15	5	50	3	0	58	8	47	2	0	57	150
Hourly Total	31	12	45	0	88	24	10	11	0	45	22	209	13	0	244	18	172	2	0	192	569
Grand Total	456	144	707	0	1307	335	152	485	0	972	424	3193	425	1	4043	470	3587	67	0	4124	10446
Approach %	34.9	11.0	54.1	0.0	-	34.5	15.6	49.9	0.0	-	10.5	79.0	10.5	0.0	-	11.4	87.0	1.6	0.0	-	-
Total %	4.4	1.4	6.8	0.0	12.5	3.2	1.5	4.6	0.0	9.3	4.1	30.6	4.1	0.0	38.7	4.5	34.3	0.6	0.0	39.5	-
Motorcycles	0	1	2	0	3	0	3	4	0	7	2	26	3	0	31	4	26	0	0	30	71
% Motorcycles	0.0	0.7	0.3	-	0.2	0.0	2.0	0.8	-	0.7	0.5	0.8	0.7	0.0	0.8	0.9	0.7	0.0	-	0.7	0.7
Cars	336	110	462	0	908	199	114	317	0	630	294	2076	347	1	2718	329	2489	44	0	2862	7118
% Cars	73.7	76.4	65.3	-	69.5	59.4	75.0	65.4	-	64.8	69.3	65.0	81.6	100.0	67.2	70.0	69.4	65.7	-	69.4	68.1
Light Goods Vehicles	104	32	223	0	359	132	34	150	0	316	122	953	66	0	1141	123	942	21	0	1086	2902
% Light Goods Vehicles	22.8	22.2	31.5	-	27.5	39.4	22.4	30.9	-	32.5	28.8	29.8	15.5	0.0	28.2	26.2	26.3	31.3	-	26.3	27.8
Buses	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	9	0	0	9	11
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.2	-	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	-	0.2	0.1
Single-Unit Trucks	14	1	17	0	32	4	1	11	0	16	4	97	8	0	109	14	84	2	0	100	257
% Single-Unit Trucks	3.1	0.7	2.4	-	2.4	1.2	0.7	2.3	-	1.6	0.9	3.0	1.9	0.0	2.7	3.0	2.3	3.0	-	2.4	2.5
Articulated Trucks	2	0	3	0	5	0	0	1	0	1	1	36	1	0	38	0	35	0	0	35	79
% Articulated Trucks	0.4	0.0	0.4	-	0.4	0.0	0.0	0.2	-	0.1	0.2	1.1	0.2	0.0	0.9	0.0	1.0	0.0	-	0.8	0.8
Bicycles on Road	0	0	0	0	0	0	0	1	0	1	1	4	0	0	5	0	2	0	0	2	8
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.2	-	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.1	0.0	-	0.0	0.1

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Count Name: E. Main and Oregon (Belgrade)
Site Code:
Start Date: 08/29/2016
Page No: 3

Southbound Approach

Out	In	Total
3	7	10
448	630	1078
175	316	491
0	1	1
9	18	27
635	**972**	**1607**

R	T	L	U
4	3	0	0
317	114	199	0
150	34	132	0
1	0	0	0
13	1	4	0
485	**152**	**335**	**0**

Eastbound Approach [EB]

Out	In	Total
30	31	61
3143	2718	5861
1196	1141	2337
10	1	11
150	152	302
4529	**4043**	**8572**

U	L	T	R
0	2	26	3
1	294	2076	347
0	122	953	66
0	0	1	0
0	6	137	9
1	**424**	**3193**	**425**

08/29/2016 9:00 AM
Ending At
08/30/2016 9:00 AM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

Westbound Approach [WB]

Out	In	Total
28	30	58
2737	2862	5599
1308	1086	2394
1	9	10
161	137	298
4235	**4124**	**8359**

R	T	L	U
0	26	4	0
44	2489	329	0
21	942	123	0
0	9	0	0
2	121	14	0
67	**3587**	**470**	**0**

U	L	T	R
0	0	1	2
0	336	110	462
0	104	32	223
0	0	0	0
0	16	1	20
0	**456**	**144**	**707**

Out	In	Total
10	3	13
790	908	1698
223	359	582
0	0	0
24	37	61
1047	**1307**	**2354**

Northbound Approach

Turning Movement Data Plot

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (12:00 PM)

	Northbound Approach					Southbound Approach					Eastbound Approach					Westbound Approach					
	Northbound					Southbound					Eastbound					Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
12:00 PM	6	0	6	0	12	3	0	9	0	12	4	75	10	0	89	10	58	1	0	69	182
12:15 PM	5	2	14	0	21	4	3	9	0	16	11	55	12	1	79	8	60	0	0	68	184
12:30 PM	11	1	17	0	29	8	2	4	0	14	7	81	7	0	95	13	71	1	0	85	223
12:45 PM	12	0	12	0	24	6	1	7	0	14	8	70	4	0	82	8	81	0	0	89	209
Total	34	3	49	0	86	21	6	29	0	56	30	281	33	1	345	39	270	2	0	311	798
Approach %	39.5	3.5	57.0	0.0	-	37.5	10.7	51.8	0.0	-	8.7	81.4	9.6	0.3	-	12.5	86.8	0.6	0.0	-	-
Total %	4.3	0.4	6.1	0.0	10.8	2.6	0.8	3.6	0.0	7.0	3.8	35.2	4.1	0.1	43.2	4.9	33.8	0.3	0.0	39.0	-
PHF	0.708	0.375	0.721	0.000	0.741	0.656	0.500	0.806	0.000	0.875	0.682	0.867	0.688	0.250	0.908	0.750	0.833	0.500	0.000	0.874	0.895
Motorcycles	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	1	2	0	0	3	5
% Motorcycles	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.7	0.0	0.0	0.6	2.6	0.7	0.0	-	1.0	0.6
Cars	29	2	30	0	61	12	5	19	0	36	23	196	27	1	247	28	176	2	0	206	550
% Cars	85.3	66.7	61.2	-	70.9	57.1	83.3	65.5	-	64.3	76.7	69.8	81.8	100.0	71.6	71.8	65.2	100.0	-	66.2	68.9
Light Goods Vehicles	4	1	19	0	24	9	1	9	0	19	6	66	6	0	78	9	77	0	0	86	207
% Light Goods Vehicles	11.8	33.3	38.8	-	27.9	42.9	16.7	31.0	-	33.9	20.0	23.5	18.2	0.0	22.6	23.1	28.5	0.0	-	27.7	25.9
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	-	0.3	0.1
Single-Unit Trucks	1	0	0	0	1	0	0	0	0	0	1	13	0	0	14	1	7	0	0	8	23
% Single-Unit Trucks	2.9	0.0	0.0	-	1.2	0.0	0.0	0.0	-	0.0	3.3	4.6	0.0	0.0	4.1	2.6	2.6	0.0	-	2.6	2.9
Articulated Trucks	0	0	0	0	0	0	0	1	0	1	0	3	0	0	3	0	7	0	0	7	11
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	3.4	-	1.8	0.0	1.1	0.0	0.0	0.9	0.0	2.6	0.0	-	2.3	1.4
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0	0.0	-	0.0	0.1

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (5:00 PM)

	Northbound Approach Northbound					Southbound Approach Southbound					Eastbound Approach Eastbound					Westbound Approach Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
5:00 PM	7	1	21	0	29	6	1	11	0	18	8	55	8	0	71	11	91	3	0	105	223
5:15 PM	12	3	17	0	32	9	4	15	0	28	7	66	7	0	80	17	93	0	0	110	250
5:30 PM	14	0	14	0	28	7	2	15	0	24	6	48	13	0	67	17	101	2	0	120	239
5:45 PM	35	0	7	0	42	5	3	8	0	16	7	51	9	0	67	14	120	0	0	134	259
Total	68	4	59	0	131	27	10	49	0	86	28	220	37	0	285	59	405	5	0	469	971
Approach %	51.9	3.1	45.0	0.0	-	31.4	11.6	57.0	0.0	-	9.8	77.2	13.0	0.0	-	12.6	86.4	1.1	0.0	-	-
Total %	7.0	0.4	6.1	0.0	13.5	2.8	1.0	5.0	0.0	8.9	2.9	22.7	3.8	0.0	29.4	6.1	41.7	0.5	0.0	48.3	-
PHF	0.486	0.333	0.702	0.000	0.780	0.750	0.625	0.817	0.000	0.768	0.875	0.833	0.712	0.000	0.891	0.868	0.844	0.417	0.000	0.875	0.937
Motorcycles	0	0	0	0	0	0	0	1	0	1	0	3	0	0	3	0	3	0	0	3	7
% Motorcycles	0.0	0.0	0.0	-	0.0	0.0	0.0	2.0	-	1.2	0.0	1.4	0.0	-	1.1	0.0	0.7	0.0	-	0.6	0.7
Cars	49	2	39	0	90	15	5	31	0	51	17	142	31	0	190	42	284	3	0	329	660
% Cars	72.1	50.0	66.1	-	68.7	55.6	50.0	63.3	-	59.3	60.7	64.5	83.8	-	66.7	71.2	70.1	60.0	-	70.1	68.0
Light Goods Vehicles	19	2	18	0	39	12	5	16	0	33	10	68	6	0	84	15	113	2	0	130	286
% Light Goods Vehicles	27.9	50.0	30.5	-	29.8	44.4	50.0	32.7	-	38.4	35.7	30.9	16.2	-	29.5	25.4	27.9	40.0	-	27.7	29.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	0	2	0	2	0	0	1	0	1	1	5	0	0	6	2	5	0	0	7	16
% Single-Unit Trucks	0.0	0.0	3.4	-	1.5	0.0	0.0	2.0	-	1.2	3.6	2.3	0.0	-	2.1	3.4	1.2	0.0	-	1.5	1.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.9	0.0	-	0.7	0.0	0.0	0.0	-	0.0	0.2
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (7:15 AM)

Start Time	Northbound Approach Northbound					Southbound Approach Southbound					Eastbound Approach Eastbound					Westbound Approach Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:15 AM	6	6	17	0	29	14	1	10	0	25	11	70	0	0	81	3	24	0	0	27	162
7:30 AM	5	3	17	0	25	8	0	6	0	14	9	87	0	0	96	5	56	0	0	61	196
7:45 AM	12	1	15	0	28	4	3	4	0	11	6	63	0	0	69	5	72	1	0	78	186
8:00 AM	8	6	8	0	22	3	3	1	0	7	3	44	2	0	49	5	36	0	0	41	119
Total	31	16	57	0	104	29	7	21	0	57	29	264	2	0	295	18	188	1	0	207	663
Approach %	29.8	15.4	54.8	0.0	-	50.9	12.3	36.8	0.0	-	9.8	89.5	0.7	0.0	-	8.7	90.8	0.5	0.0	-	-
Total %	4.7	2.4	8.6	0.0	15.7	4.4	1.1	3.2	0.0	8.6	4.4	39.8	0.3	0.0	44.5	2.7	28.4	0.2	0.0	31.2	-
PHF	0.646	0.667	0.838	0.000	0.897	0.518	0.583	0.525	0.000	0.570	0.659	0.759	0.250	0.000	0.768	0.900	0.653	0.250	0.000	0.663	0.846
Motorcycles	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
% Motorcycles	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.4	0.0	-	0.3	0.0	0.0	0.0	-	0.0	0.2
Cars	23	10	34	0	67	13	4	17	0	34	19	164	1	0	184	11	140	0	0	151	436
% Cars	74.2	62.5	59.6	-	64.4	44.8	57.1	81.0	-	59.6	65.5	62.1	50.0	-	62.4	61.1	74.5	0.0	-	72.9	65.8
Light Goods Vehicles	8	5	22	0	35	16	3	3	0	22	10	86	1	0	97	6	41	0	0	47	201
% Light Goods Vehicles	25.8	31.3	38.6	-	33.7	55.2	42.9	14.3	-	38.6	34.5	32.6	50.0	-	32.9	33.3	21.8	0.0	-	22.7	30.3
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	1	1	0	2	0	0	1	0	1	0	9	0	0	9	1	5	1	0	7	19
% Single-Unit Trucks	0.0	6.3	1.8	-	1.9	0.0	0.0	4.8	-	1.8	0.0	3.4	0.0	-	3.1	5.6	2.7	100.0	-	3.4	2.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	2	0	0	2	6
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	1.5	0.0	-	1.4	0.0	1.1	0.0	-	1.0	0.9
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Location: 45.76803, -
111.161218

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name:
Bozeman_Frontage_Airway Blvd
(Gallatin)
Site Code:
Start Date: 08/03/2016

Turning Movement Data

Start Time	16-3-086 Northbound					16-3-048 Southbound					16-3-017 Eastbound					16-3-032 Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:00 AM	11	30	27	0	68	16	31	1	0	48	0	32	25	0	57	19	14	12	0	45	218
7:15 AM	11	28	23	0	62	17	37	0	0	54	3	43	23	0	69	11	30	11	0	52	237
7:30 AM	13	29	28	0	70	20	56	0	0	76	4	74	41	0	119	20	23	10	0	53	318
7:45 AM	19	38	21	0	78	17	36	1	0	54	5	54	30	0	89	27	38	15	0	80	301
Hourly Total	54	125	99	0	278	70	160	2	0	232	12	203	119	0	334	77	105	48	0	230	1074
8:00 AM	13	13	13	0	39	13	23	0	0	36	6	51	18	0	75	14	31	10	0	55	205
8:15 AM	9	21	14	0	44	15	40	0	0	55	8	53	14	0	75	16	24	9	0	49	223
8:30 AM	12	21	17	0	50	14	33	0	0	47	12	36	19	0	67	15	39	9	0	63	227
8:45 AM	8	34	14	0	56	16	31	0	0	47	6	46	18	0	70	21	38	12	0	71	244
Hourly Total	42	89	58	0	189	58	127	0	0	185	32	186	69	0	287	66	132	40	0	238	899
9:00 AM	11	28	15	0	54	19	23	1	0	43	10	44	10	0	64	13	24	12	0	49	210
9:15 AM	11	44	13	0	68	17	27	0	0	44	12	42	20	0	74	17	34	14	0	65	251
9:30 AM	7	35	19	0	61	15	46	5	0	66	10	40	14	0	64	18	40	14	0	72	263
9:45 AM	18	25	14	0	57	13	27	3	0	43	10	47	20	0	77	11	43	24	0	78	255
Hourly Total	47	132	61	0	240	64	123	9	0	196	42	173	64	0	279	59	141	64	0	264	979
10:00 AM	8	28	5	0	41	12	28	7	0	47	13	53	14	0	80	11	37	21	0	69	237
10:15 AM	9	40	8	0	57	13	23	4	0	40	30	26	15	0	71	7	35	21	0	63	231
10:30 AM	14	48	13	0	75	14	28	1	0	43	22	45	21	0	88	15	32	16	0	63	269
10:45 AM	11	43	18	0	72	10	27	4	0	41	21	54	18	0	93	10	46	24	0	80	286
Hourly Total	42	159	44	0	245	49	106	16	0	171	86	178	68	0	332	43	150	82	0	275	1023
11:00 AM	16	72	9	0	97	16	20	1	0	37	22	27	19	0	68	20	49	26	0	95	297
11:15 AM	8	61	13	0	82	21	44	0	0	65	21	36	19	0	76	15	42	35	0	92	315
11:30 AM	17	68	18	0	103	22	52	2	0	76	20	39	21	0	80	15	50	31	0	96	355
11:45 AM	12	51	17	0	80	35	78	4	0	117	19	47	18	0	84	26	58	20	0	104	385
Hourly Total	53	252	57	0	362	94	194	7	0	295	82	149	77	0	308	76	199	112	0	387	1352
12:00 PM	23	49	12	0	84	25	59	4	0	88	11	45	28	0	84	15	64	18	0	97	353
12:15 PM	19	54	15	0	88	29	36	5	0	70	21	48	20	0	89	15	50	26	0	91	338
12:30 PM	16	48	11	0	75	16	44	3	0	63	29	47	18	0	94	22	44	37	0	103	335
12:45 PM	21	57	11	0	89	22	38	2	0	62	30	47	23	0	100	14	56	33	0	103	354
Hourly Total	79	208	49	0	336	92	177	14	0	283	91	187	89	0	367	66	214	114	0	394	1380
1:00 PM	14	47	13	0	74	29	57	8	0	94	22	37	15	0	74	12	55	27	0	94	336
1:15 PM	19	37	11	0	67	29	62	4	0	95	5	39	19	0	63	10	46	13	0	69	294
1:30 PM	18	25	22	0	65	24	56	5	0	85	5	59	22	0	86	13	35	13	0	61	297
1:45 PM	11	34	22	0	67	19	41	5	0	65	4	45	15	0	64	13	47	19	0	79	275
Hourly Total	62	143	68	0	273	101	216	22	0	339	36	180	71	0	287	48	183	72	0	303	1202
2:00 PM	17	21	17	0	55	18	26	2	0	46	12	35	12	0	59	16	45	11	0	72	232
2:15 PM	15	18	22	0	55	13	29	2	0	44	10	36	16	0	62	14	36	18	1	69	230
2:30 PM	15	23	8	0	46	16	28	2	0	46	7	49	15	0	71	16	49	18	0	83	246
2:45 PM	20	34	15	0	69	12	22	4	0	38	7	32	25	0	64	12	49	16	0	77	248
Hourly Total	67	96	62	0	225	59	105	10	0	174	36	152	68	0	256	58	179	63	1	301	956
3:00 PM	14	31	15	0	60	11	25	0	0	36	6	49	12	0	67	15	55	11	0	81	244
3:15 PM	27	28	20	0	75	20	40	3	0	63	8	50	22	0	80	17	73	13	0	103	321
3:30 PM	17	34	9	0	60	10	24	1	0	35	6	48	23	0	77	18	55	19	0	92	264
3:45 PM	32	37	19	0	88	18	37	6	0	61	11	39	14	0	64	17	66	15	0	98	311
Hourly Total	90	130	63	0	283	59	126	10	0	195	31	186	71	0	288	67	249	58	0	374	1140
4:00 PM	36	35	13	0	84	12	17	5	0	34	10	48	18	0	76	22	48	11	0	81	275
4:15 PM	27	52	18	0	97	13	16	8	0	37	11	38	15	0	64	21	50	24	0	95	293
4:30 PM	39	45	18	0	102	20	42	7	0	69	13	37	24	0	74	31	72	22	0	125	370
4:45 PM	31	60	17	0	108	16	50	5	0	71	8	41	26	0	75	27	57	26	0	110	364
Hourly Total	133	192	66	0	391	61	125	25	0	211	42	164	83	0	289	101	227	83	0	411	1302
5:00 PM	36	57	19	0	112	23	62	4	0	89	7	55	37	0	99	31	67	19	0	117	417
5:15 PM	39	47	13	0	99	23	43	2	0	68	9	54	31	0	94	28	84	28	0	140	401
5:30 PM	34	51	25	0	110	19	52	3	0	74	10	59	22	0	91	30	61	16	0	107	382
5:45 PM	20	48	14	0	82	14	29	3	0	46	2	34	24	0	60	28	63	9	0	100	288
Hourly Total	129	203	71	0	403	79	186	12	0	277	28	202	114	0	344	117	275	72	0	464	1488
6:00 PM	29	37	15	0	81	13	35	0	0	48	4	47	16	0	67	16	55	12	0	83	279
6:15 PM	19	30	23	0	72	9	17	1	0	27	10	39	14	0	63	13	49	8	0	70	232
6:30 PM	25	28	13	0	66	6	26	1	0	33	6	29	15	0	50	15	42	12	0	69	218
6:45 PM	20	29	11	0	60	7	15	0	0	22	9	27	15	0	51	16	31	11	0	58	191
Hourly Total	93	124	62	0	279	35	93	2	0	130	29	142	60	0	231	60	177	43	0	280	920
7:00 PM	19	21	18	0	58	11	8	1	0	20	5	34	10	0	49	10	34	14	0	58	185
7:15 PM	15	25	11	0	51	6	19	0	0	25	3	29	11	0	43	10	28	9	0	47	166
7:30 PM	11	17	8	0	36	10	18	0	0	28	6	27	12	0	45	6	25	5	0	36	145
7:45 PM	11	19	3	0	33	7	18	1	0	26	3	12	13	0	28	7	18	8	0	33	120

Hourly Total	56	82	40	0	178	34	63	2	0	99	17	102	46	0	165	33	105	36	0	174	616
8:00 PM	13	18	4	0	35	5	14	1	0	20	3	17	12	0	32	8	12	6	0	26	113
8:15 PM	15	18	7	0	40	5	10	2	0	17	10	22	9	0	41	13	20	9	0	42	140
8:30 PM	14	22	7	0	43	1	8	0	0	9	6	16	8	0	30	10	29	6	0	45	127
8:45 PM	4	20	6	0	30	7	29	1	0	37	3	18	12	0	33	8	15	12	0	35	135
Hourly Total	46	78	24	0	148	18	61	4	0	83	22	73	41	0	136	39	76	33	0	148	515
9:00 PM	13	30	9	0	52	5	28	1	0	34	1	25	7	0	33	8	23	8	0	39	158
9:15 PM	3	10	8	0	21	4	10	1	0	15	2	18	8	0	28	6	23	5	0	34	98
9:30 PM	10	13	9	0	32	5	10	0	0	15	3	13	6	0	22	4	13	3	0	20	89
9:45 PM	4	22	4	0	30	3	4	1	0	8	7	14	4	0	25	3	13	3	0	19	82
Hourly Total	30	75	30	0	135	17	52	3	0	72	13	70	25	0	108	21	72	19	0	112	427
10:00 PM	6	26	4	0	36	4	12	1	0	17	2	9	4	0	15	6	9	6	0	21	89
10:15 PM	3	26	4	0	33	9	11	1	0	21	6	9	6	0	21	2	8	6	0	16	91
10:30 PM	1	9	0	1	11	11	23	0	0	34	2	5	5	0	12	2	5	2	0	9	66
10:45 PM	5	9	2	0	16	2	12	1	0	15	2	8	3	0	13	0	8	3	0	11	55
Hourly Total	15	70	10	1	96	26	58	3	0	87	12	31	18	0	61	10	30	17	0	57	301
11:00 PM	1	5	4	0	10	0	2	0	0	2	1	0	5	0	6	4	8	2	0	14	32
11:15 PM	3	8	0	0	11	2	1	0	0	3	2	3	3	0	8	4	1	4	0	9	31
11:30 PM	4	25	1	0	30	1	0	0	0	1	5	4	1	0	10	1	2	10	0	13	54
11:45 PM	2	25	1	0	28	0	1	1	0	2	2	5	3	0	10	2	5	6	0	13	53
Hourly Total	10	63	6	0	79	3	4	1	0	8	10	12	12	0	34	11	16	22	0	49	170
12:00 AM	1	21	1	0	23	5	23	0	0	28	1	1	7	0	9	1	5	5	0	11	71
12:15 AM	1	19	2	0	22	15	55	1	0	71	4	4	6	0	14	0	4	6	0	10	117
12:30 AM	4	13	1	0	18	8	28	2	0	38	5	3	7	0	15	1	3	2	0	6	77
12:45 AM	0	4	0	0	4	11	30	1	0	42	2	1	11	0	14	1	1	3	0	5	65
Hourly Total	6	57	4	0	67	39	136	4	0	179	12	9	31	0	52	3	13	16	0	32	330
1:00 AM	0	7	2	0	9	10	11	0	0	21	0	3	2	0	5	1	0	4	0	5	40
1:15 AM	2	5	0	0	7	2	7	1	0	10	1	0	3	0	4	1	4	1	0	6	27
1:30 AM	0	0	0	0	0	3	1	0	0	4	0	1	1	0	2	1	4	1	0	6	12
1:45 AM	0	1	0	0	1	0	1	0	0	1	1	2	0	0	3	2	2	0	0	4	9
Hourly Total	2	13	2	0	17	15	20	1	0	36	2	6	6	0	14	5	10	6	0	21	88
2:00 AM	0	1	1	0	2	0	0	0	0	0	0	1	3	0	4	1	0	0	0	1	7
2:15 AM	3	2	1	0	6	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	7
2:30 AM	0	0	0	0	0	1	0	0	0	1	0	1	1	0	2	0	0	1	0	1	4
2:45 AM	0	1	0	0	1	0	1	1	0	2	0	0	1	0	1	0	1	0	0	1	5
Hourly Total	3	4	2	0	9	1	1	1	0	3	0	3	5	0	8	1	1	1	0	3	23
3:00 AM	2	1	0	0	3	0	2	0	0	2	0	1	2	0	3	0	0	0	0	0	8
3:15 AM	0	3	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	4
3:30 AM	1	9	0	0	10	0	1	0	0	1	1	0	1	0	2	2	1	2	0	5	18
3:45 AM	1	8	0	0	9	0	2	0	0	2	1	0	0	0	1	0	1	3	0	4	16
Hourly Total	4	21	0	0	25	0	5	0	0	5	2	1	4	0	7	2	2	5	0	9	46
4:00 AM	0	14	0	0	14	1	5	0	0	6	2	1	0	0	3	0	1	6	0	7	30
4:15 AM	0	25	1	0	26	1	8	0	0	9	7	1	2	0	10	1	0	18	0	19	64
4:30 AM	1	42	0	0	43	2	13	0	0	15	7	6	2	0	15	2	2	24	0	28	101
4:45 AM	3	32	1	0	36	10	22	0	0	32	5	4	6	0	15	1	2	25	0	28	111
Hourly Total	4	113	2	0	119	14	48	0	0	62	21	12	10	0	43	4	5	73	0	82	306
5:00 AM	1	26	1	0	28	6	10	1	0	17	7	8	2	0	17	2	3	9	0	14	76
5:15 AM	4	29	1	0	34	8	15	0	0	23	10	11	4	0	25	6	6	8	0	20	102
5:30 AM	3	34	5	0	42	4	19	0	0	23	8	5	11	0	24	4	8	12	0	24	113
5:45 AM	4	48	15	0	67	5	18	0	0	23	11	17	8	0	36	4	9	15	0	28	154
Hourly Total	12	137	22	0	171	23	62	1	0	86	36	41	25	0	102	16	26	44	0	86	445
6:00 AM	3	18	14	0	35	6	14	1	0	21	2	18	9	0	29	7	6	8	0	21	106
6:15 AM	3	21	12	0	36	5	24	0	0	29	5	23	15	0	43	16	10	3	0	29	137
6:30 AM	6	25	12	0	43	13	38	1	0	52	4	37	16	0	57	23	20	4	0	47	199
6:45 AM	9	27	15	0	51	17	23	1	0	41	6	32	23	0	61	20	24	8	0	52	205
Hourly Total	21	91	53	0	165	41	99	3	0	143	17	110	63	0	190	66	60	23	0	149	647
Grand Total	1100	2657	955	1	4713	1052	2347	152	0	3551	711	2572	1239	0	4522	1049	2647	1146	1	4843	17629
Approach %	23.3	56.4	20.3	0.0	-	29.6	66.1	4.3	0.0	-	15.7	56.9	27.4	0.0	-	21.7	54.7	23.7	0.0	-	-
Total %	6.2	15.1	5.4	0.0	26.7	6.0	13.3	0.9	0.0	20.1	4.0	14.6	7.0	0.0	25.7	6.0	15.0	6.5	0.0	27.5	-
Motorcycles	10	16	5	0	31	8	20	3	0	31	3	20	11	0	34	7	23	8	0	38	134
% Motorcycles	0.9	0.6	0.5	0.0	0.7	0.8	0.9	2.0	-	0.9	0.4	0.8	0.9	-	0.8	0.7	0.9	0.7	0.0	0.8	0.8
Cars	821	2059	468	1	3349	722	1831	101	0	2654	549	1682	984	0	3215	539	1655	907	0	3101	12319
% Cars	74.6	77.5	49.0	100.0	71.1	68.6	78.0	66.4	-	74.7	77.2	65.4	79.4	-	71.1	51.4	62.5	79.1	0.0	64.0	69.9
Light Goods Vehicles	238	480	319	0	1037	173	409	43	0	625	152	727	209	0	1088	328	813	101	1	1243	3993
% Light Goods Vehicles	21.6	18.1	33.4	0.0	22.0	16.4	17.4	28.3	-	17.6	21.4	28.3	16.9	-	24.1	31.3	30.7	8.8	100.0	25.7	22.7
Buses	1	3	1	0	5	0	2	0	0	2	0	3	0	0	3	0	0	0	0	0	10
% Buses	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	-	0.1	0.0	0.1	0.0	-	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Single-Unit Trucks	22	61	115	0	198	77	56	5	0	138	6	52	28	0	86	131	69	74	0	274	696
% Single-Unit Trucks	2.0	2.3	12.0	0.0	4.2	7.3	2.4	3.3	-	3.9	0.8	2.0	2.3	-	1.9	12.5	2.6	6.5	0.0	5.7	3.9
Articulated Trucks	8	38	47	0	93	72	29	0	0	101	1	88	7	0	96	44	87	56	0	187	477
% Articulated Trucks	0.7	1.4	4.9	0.0	2.0	6.8	1.2	0.0	-	2.8	0.1	3.4	0.6	-	2.1	4.2	3.3	4.9	0.0	3.9	2.7

Location: 45.76803, -111.161218

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_Frontage_Airway Blvd (Gallatin)
Site Code:
Start Date: 08/03/2016

16-3-048 [SB]

Out	In	Total
27	31	58
3515	2654	6169
733	625	1358
3	2	5
236	239	475
4514	**3551**	**8065**

R	T	L	U
3	20	8	0
101	1831	722	0
43	409	173	0
0	2	0	0
5	85	149	0
152	**2347**	**1052**	**0**

16-3-017 [EB]

Out	In	Total
36	34	70
2577	3215	5792
1094	1088	2182
1	3	4
191	182	373
3899	**4522**	**8421**

U	L	T	R
0	3	20	11
0	549	1682	984
0	152	727	209
0	0	3	0
0	7	140	35
0	**711**	**2572**	**1239**

08/03/2016 7:00 AM
Ending At
08/04/2016 7:00 AM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

16-3-032 [WB]

Out	In	Total
33	38	71
2872	3101	5973
1220	1243	2463
4	0	4
451	461	912
4580	**4843**	**9423**

R	T	L	U
8	23	7	0
907	1655	539	0
101	813	328	1
0	0	0	0
130	156	175	0
1146	**2647**	**1049**	**1**

U	L	T	R
0	10	16	5
1	821	2059	468
0	238	480	319
0	1	3	1
0	30	99	162
1	**1100**	**2657**	**955**

Out	In	Total
38	31	69
3355	3349	6704
946	1037	1983
2	5	7
295	291	586
4636	**4713**	**9349**

16-3-086 [NB]

Turning Movement Data Plot

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Turning Movement Peak Hour Data (7:00 AM)

	16-3-086 Northbound					16-3-048 Southbound					16-3-017 Eastbound					16-3-032 Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:00 AM	11	30	27	0	68	16	31	1	0	48	0	32	25	0	57	19	14	12	0	45	218
7:15 AM	11	28	23	0	62	17	37	0	0	54	3	43	23	0	69	11	30	11	0	52	237
7:30 AM	13	29	28	0	70	20	56	0	0	76	4	74	41	0	119	20	23	10	0	53	318
7:45 AM	19	38	21	0	78	17	36	1	0	54	5	54	30	0	89	27	38	15	0	80	301
Total	54	125	99	0	278	70	160	2	0	232	12	203	119	0	334	77	105	48	0	230	1074
Approach %	19.4	45.0	35.6	0.0	-	30.2	69.0	0.9	0.0	-	3.6	60.8	35.6	0.0	-	33.5	45.7	20.9	0.0	-	-
Total %	5.0	11.6	9.2	0.0	25.9	6.5	14.9	0.2	0.0	21.6	1.1	18.9	11.1	0.0	31.1	7.2	9.8	4.5	0.0	21.4	-
PHF	0.711	0.822	0.884	0.000	0.891	0.875	0.714	0.500	0.000	0.763	0.600	0.686	0.726	0.000	0.702	0.713	0.691	0.800	0.000	0.719	0.844
Motorcycles	0	1	0	0	1	1	2	0	0	3	1	0	0	0	1	1	1	0	0	2	7
% Motorcycles	0.0	0.8	0.0	-	0.4	1.4	1.3	0.0	-	1.3	8.3	0.0	0.0	-	0.3	1.3	1.0	0.0	-	0.9	0.7
Cars	42	74	51	0	167	46	116	2	0	164	7	136	81	0	224	36	60	25	0	121	676
% Cars	77.8	59.2	51.5	-	60.1	65.7	72.5	100.0	-	70.7	58.3	67.0	68.1	-	67.1	46.8	57.1	52.1	-	52.6	62.9
Light Goods Vehicles	9	45	34	0	88	7	31	0	0	38	4	57	32	0	93	32	35	8	0	75	294
% Light Goods Vehicles	16.7	36.0	34.3	-	31.7	10.0	19.4	0.0	-	16.4	33.3	28.1	26.9	-	27.8	41.6	33.3	16.7	-	32.6	27.4
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	3	4	8	0	15	8	7	0	0	15	0	3	2	0	5	4	2	7	0	13	48
% Single-Unit Trucks	5.6	3.2	8.1	-	5.4	11.4	4.4	0.0	-	6.5	0.0	1.5	1.7	-	1.5	5.2	1.9	14.6	-	5.7	4.5
Articulated Trucks	0	1	6	0	7	8	4	0	0	12	0	7	4	0	11	4	7	8	0	19	49
% Articulated Trucks	0.0	0.8	6.1	-	2.5	11.4	2.5	0.0	-	5.2	0.0	3.4	3.4	-	3.3	5.2	6.7	16.7	-	8.3	4.6

Turning Movement Peak Hour Data (11:30 AM)

Start Time	16-3-086 Northbound					16-3-048 Southbound					16-3-017 Eastbound					16-3-032 Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
11:30 AM	17	68	18	0	103	22	52	2	0	76	20	39	21	0	80	15	50	31	0	96	355
11:45 AM	12	51	17	0	80	35	78	4	0	117	19	47	18	0	84	26	58	20	0	104	385
12:00 PM	23	49	12	0	84	25	59	4	0	88	11	45	28	0	84	15	64	18	0	97	353
12:15 PM	19	54	15	0	88	29	36	5	0	70	21	48	20	0	89	15	50	26	0	91	338
Total	71	222	62	0	355	111	225	15	0	351	71	179	87	0	337	71	222	95	0	388	1431
Approach %	20.0	62.5	17.5	0.0	-	31.6	64.1	4.3	0.0	-	21.1	53.1	25.8	0.0	-	18.3	57.2	24.5	0.0	-	-
Total %	5.0	15.5	4.3	0.0	24.8	7.8	15.7	1.0	0.0	24.5	5.0	12.5	6.1	0.0	23.5	5.0	15.5	6.6	0.0	27.1	-
PHF	0.772	0.816	0.861	0.000	0.862	0.793	0.721	0.750	0.000	0.750	0.845	0.932	0.777	0.000	0.947	0.683	0.867	0.766	0.000	0.933	0.929
Motorcycles	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	2	4	0	0	6	8
% Motorcycles	0.0	0.0	0.0	-	0.0	0.9	0.4	0.0	-	0.6	0.0	0.0	0.0	-	0.0	2.8	1.8	0.0	-	1.5	0.6
Cars	56	185	16	0	257	79	188	9	0	276	63	117	71	0	251	36	127	69	0	232	1016
% Cars	78.9	83.3	25.8	-	72.4	71.2	83.6	60.0	-	78.6	88.7	65.4	81.6	-	74.5	50.7	57.2	72.6	-	59.8	71.0
Light Goods Vehicles	13	27	25	0	65	14	30	5	0	49	8	53	16	0	77	13	78	8	0	99	290
% Light Goods Vehicles	18.3	12.2	40.3	-	18.3	12.6	13.3	33.3	-	14.0	11.3	29.6	18.4	-	22.8	18.3	35.1	8.4	-	25.5	20.3
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	1	8	16	0	25	11	4	1	0	16	0	2	0	0	2	17	3	10	0	30	73
% Single-Unit Trucks	1.4	3.6	25.8	-	7.0	9.9	1.8	6.7	-	4.6	0.0	1.1	0.0	-	0.6	23.9	1.4	10.5	-	7.7	5.1
Articulated Trucks	1	2	5	0	8	6	2	0	0	8	0	7	0	0	7	3	10	8	0	21	44
% Articulated Trucks	1.4	0.9	8.1	-	2.3	5.4	0.9	0.0	-	2.3	0.0	3.9	0.0	-	2.1	4.2	4.5	8.4	-	5.4	3.1

Turning Movement Peak Hour Data (4:45 PM)

	16-3-086					16-3-048					16-3-017					16-3-032					
	Northbound					Southbound					Eastbound					Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
4:45 PM	31	60	17	0	108	16	50	5	0	71	8	41	26	0	75	27	57	26	0	110	364
5:00 PM	36	57	19	0	112	23	62	4	0	89	7	55	37	0	99	31	67	19	0	117	417
5:15 PM	39	47	13	0	99	23	43	2	0	68	9	54	31	0	94	28	84	28	0	140	401
5:30 PM	34	51	25	0	110	19	52	3	0	74	10	59	22	0	91	30	61	16	0	107	382
Total	140	215	74	0	429	81	207	14	0	302	34	209	116	0	359	116	269	89	0	474	1564
Approach %	32.6	50.1	17.2	0.0	-	26.8	68.5	4.6	0.0	-	9.5	58.2	32.3	0.0	-	24.5	56.8	18.8	0.0	-	-
Total %	9.0	13.7	4.7	0.0	27.4	5.2	13.2	0.9	0.0	19.3	2.2	13.4	7.4	0.0	23.0	7.4	17.2	5.7	0.0	30.3	-
PHF	0.897	0.896	0.740	0.000	0.958	0.880	0.835	0.700	0.000	0.848	0.850	0.886	0.784	0.000	0.907	0.935	0.801	0.795	0.000	0.846	0.938
Motorcycles	1	3	1	0	5	1	2	1	0	4	0	1	1	0	2	0	2	1	0	3	14
% Motorcycles	0.7	1.4	1.4	-	1.2	1.2	1.0	7.1	-	1.3	0.0	0.5	0.9	-	0.6	0.0	0.7	1.1	-	0.6	0.9
Cars	107	148	34	0	289	55	162	11	0	228	24	151	101	0	276	68	179	73	0	320	1113
% Cars	76.4	68.8	45.9	-	67.4	67.9	78.3	78.6	-	75.5	70.6	72.2	87.1	-	76.9	58.6	66.5	82.0	-	67.5	71.2
Light Goods Vehicles	30	61	30	0	121	21	36	2	0	59	10	50	11	0	71	39	78	12	0	129	380
% Light Goods Vehicles	21.4	28.4	40.5	-	28.2	25.9	17.4	14.3	-	19.5	29.4	23.9	9.5	-	19.8	33.6	29.0	13.5	-	27.2	24.3
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	1	1	6	0	8	1	5	0	0	6	0	6	2	0	8	6	8	3	0	17	39
% Single-Unit Trucks	0.7	0.5	8.1	-	1.9	1.2	2.4	0.0	-	2.0	0.0	2.9	1.7	-	2.2	5.2	3.0	3.4	-	3.6	2.5
Articulated Trucks	1	2	3	0	6	3	2	0	0	5	0	1	1	0	2	3	2	0	0	5	18
% Articulated Trucks	0.7	0.9	4.1	-	1.4	3.7	1.0	0.0	-	1.7	0.0	0.5	0.9	-	0.6	2.6	0.7	0.0	-	1.1	1.2

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Count Name: Frontage Rd and Airport Rd
Site Code:
Start Date: 08/30/2016
Page No: 1

Turning Movement Data

Start Time	Northbound Approach					Southbound Approach					Eastbound Approach					Westbound Approach					
	Northbound					Southbound					Eastbound					Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
1:00 PM	0	0	0	0	0	6	0	14	0	20	25	51	0	0	76	0	44	4	0	48	144
1:15 PM	0	0	0	0	0	1	0	24	0	25	21	52	0	0	73	0	57	2	0	59	157
1:30 PM	0	0	0	0	0	1	0	19	0	20	22	51	0	0	73	0	45	3	0	48	141
1:45 PM	0	0	0	0	0	3	0	12	0	15	17	58	0	0	75	0	52	2	0	54	144
Hourly Total	0	0	0	0	0	11	0	69	0	80	85	212	0	0	297	0	198	11	0	209	586
2:00 PM	0	0	0	0	0	1	0	10	0	11	14	43	0	0	57	0	51	8	0	59	127
2:15 PM	0	0	0	0	0	3	0	14	0	17	15	56	0	0	71	0	48	3	0	51	139
2:30 PM	0	0	0	0	0	2	0	21	0	23	19	58	0	0	77	0	45	2	0	47	147
2:45 PM	0	0	0	0	0	1	0	16	0	17	23	59	0	1	83	0	51	1	0	52	152
Hourly Total	0	0	0	0	0	7	0	61	0	68	71	216	0	1	288	0	195	14	0	209	565
3:00 PM	0	0	0	0	0	4	0	19	0	23	18	46	0	0	64	0	58	4	0	62	149
3:15 PM	0	0	0	0	0	4	0	21	0	25	20	41	0	0	61	0	67	2	0	69	155
3:30 PM	0	0	0	0	0	3	0	23	0	26	23	56	0	0	79	0	60	3	1	64	169
3:45 PM	0	0	0	0	0	1	0	26	0	27	24	44	0	0	68	0	65	3	0	68	163
Hourly Total	0	0	0	0	0	12	0	89	0	101	85	187	0	0	272	0	250	12	1	263	636
4:00 PM	0	0	0	0	0	2	0	28	0	30	17	59	0	0	76	0	51	2	0	53	159
4:15 PM	0	0	0	0	0	2	0	23	0	25	29	50	0	0	79	0	77	3	0	80	184
4:30 PM	0	0	0	0	0	2	0	28	0	30	32	48	0	0	80	0	78	3	0	81	191
4:45 PM	0	0	0	0	0	3	0	18	0	21	30	59	0	0	89	0	84	3	0	87	197
Hourly Total	0	0	0	0	0	9	0	97	0	106	108	216	0	0	324	0	290	11	0	301	731
5:00 PM	0	0	0	0	0	3	0	28	0	31	42	55	0	0	97	0	87	3	0	90	218
5:15 PM	0	0	0	0	0	1	0	33	0	34	36	64	1	0	101	0	103	1	0	104	239
5:30 PM	0	0	0	0	0	3	0	22	0	25	23	47	0	0	70	0	87	2	0	89	184
5:45 PM	0	0	0	0	0	5	0	29	0	34	32	46	0	0	78	0	66	0	0	66	178
Hourly Total	0	0	0	0	0	12	0	112	0	124	133	212	1	0	346	0	343	6	0	349	819
6:00 PM	0	0	0	0	0	0	0	23	0	23	32	45	0	0	77	0	63	3	0	66	166
6:15 PM	0	0	0	0	0	4	0	19	0	23	30	37	0	0	67	0	54	2	0	56	146
6:30 PM	0	0	0	0	0	5	0	24	0	29	25	34	0	0	59	0	50	2	0	52	140
6:45 PM	0	0	0	0	0	1	0	25	0	26	23	23	0	0	46	0	45	0	0	45	117
Hourly Total	0	0	0	0	0	10	0	91	0	101	110	139	0	0	249	0	212	7	0	219	569
7:00 PM	0	0	0	0	0	3	0	21	0	24	17	23	0	0	40	0	37	1	0	38	102
7:15 PM	0	0	0	0	0	0	0	17	0	17	18	3	0	0	21	0	47	2	0	49	87
7:30 PM	0	0	1	0	1	1	0	8	0	9	13	18	0	0	31	0	32	3	0	35	76
7:45 PM	0	0	0	0	0	1	0	7	0	8	16	23	0	0	39	0	24	4	0	28	75
Hourly Total	0	0	1	0	1	5	0	53	0	58	64	67	0	0	131	0	140	10	0	150	340
8:00 PM	0	0	0	0	0	1	0	8	0	9	11	34	0	0	45	0	20	1	0	21	75
8:15 PM	0	0	0	0	0	4	0	3	0	7	13	31	0	0	44	0	22	0	0	22	73
8:30 PM	0	0	0	0	0	0	0	10	0	10	20	24	0	0	44	0	26	0	0	26	80
8:45 PM	0	0	0	0	0	1	0	12	0	13	17	18	0	0	35	0	38	2	0	40	88
Hourly Total	0	0	0	0	0	6	0	33	0	39	61	107	0	0	168	0	106	3	0	109	316
9:00 PM	0	0	0	0	0	2	0	11	0	13	12	23	0	0	35	0	30	1	0	31	79
9:15 PM	0	0	0	0	0	0	0	4	0	4	8	21	0	0	29	0	19	1	0	20	53
9:30 PM	0	0	0	0	0	0	0	3	0	3	5	14	0	0	19	0	18	0	0	18	40
9:45 PM	0	0	0	0	0	1	0	2	0	3	5	22	0	0	27	0	9	2	0	11	41
Hourly Total	0	0	0	0	0	3	0	20	0	23	30	80	0	0	110	0	76	4	0	80	213
10:00 PM	0	0	0	0	0	1	0	2	0	3	6	16	0	0	22	0	13	0	0	13	38
10:15 PM	0	0	0	0	0	1	0	2	0	3	3	9	0	1	13	0	6	1	0	7	23
10:30 PM	0	0	0	0	0	1	0	5	0	6	2	8	0	0	10	0	9	0	0	9	25
10:45 PM	0	0	0	0	0	0	0	4	0	4	2	4	0	0	6	0	10	0	0	10	20
Hourly Total	0	0	0	0	0	3	0	13	0	16	13	37	0	1	51	0	38	1	0	39	106
11:00 PM	0	0	0	0	0	0	0	0	0	0	2	7	0	0	9	0	13	0	0	13	22
11:15 PM	0	0	0	0	0	1	0	2	0	3	1	3	0	0	4	0	5	0	0	5	12
11:30 PM	0	0	0	0	0	0	0	0	0	0	2	7	0	0	9	0	3	0	0	3	12
11:45 PM	0	0	0	0	0	0	0	2	0	2	1	11	0	0	12	0	6	0	0	6	20
Hourly Total	0	0	0	0	0	1	0	4	0	5	6	28	0	0	34	0	27	0	0	27	66
12:00 AM	0	0	0	0	0	0	0	1	0	1	0	3	0	0	3	0	6	0	0	6	10
12:15 AM	0	0	0	0	0	0	0	0	0	0	1	9	0	0	10	0	2	0	0	2	12
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	3	0	0	3	6
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	2	0	0	2	4
Hourly Total	0	0	0	0	0	0	0	1	0	1	1	17	0	0	18	0	13	0	0	13	32
1:00 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	3	0	0	3	4
1:15 AM	0	0	0	0	0	0	0	0	0	0	1	4	0	0	5	0	4	1	0	5	10
1:30 AM	0	0	0	0	0	0	0	1	0	1	0	2	0	0	2	0	1	0	0	1	4
1:45 AM	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	0	4	0	0	4	7
Hourly Total	0	0	0	0	0	0	0	2	0	2	2	8	0	0	10	0	12	1	0	13	25

2:00 AM	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3	0	0	0	0	0	3
2:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
2:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
2:45 AM	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	2
Hourly Total	0	0	0	0	0	0	0	1	0	1	2	4	0	0	6	0	0	0	0	0	7
3:00 AM	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	2	0	0	2	6
3:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
3:30 AM	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	2	0	0	2	4
3:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	4	0	0	4	5
Hourly Total	0	0	0	0	0	0	0	0	0	0	3	5	0	0	8	0	9	0	0	9	17
4:00 AM	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	4	0	0	4	6
4:15 AM	0	0	0	0	0	0	0	3	0	3	0	1	0	0	1	0	17	0	0	17	21
4:30 AM	0	0	0	0	0	0	0	1	0	1	0	11	0	0	11	0	5	0	0	5	17
4:45 AM	0	0	0	0	0	0	0	2	0	2	0	5	0	0	5	0	9	0	0	9	16
Hourly Total	0	0	0	0	0	0	0	7	0	7	0	18	0	0	18	0	35	0	0	35	60
5:00 AM	0	0	0	0	0	0	0	3	0	3	1	9	0	0	10	0	11	0	0	11	24
5:15 AM	0	0	0	0	0	0	0	6	0	6	1	14	0	0	15	0	10	0	0	10	31
5:30 AM	0	0	0	0	0	0	0	3	0	3	2	13	0	0	15	0	12	0	0	12	30
5:45 AM	0	0	0	0	0	2	0	13	0	15	2	21	0	0	23	0	10	0	0	10	48
Hourly Total	0	0	0	0	0	2	0	25	0	27	6	57	0	0	63	0	43	0	0	43	133
6:00 AM	0	0	0	0	0	1	0	12	0	13	3	28	0	0	31	0	20	0	0	20	64
6:15 AM	0	0	0	0	0	0	0	14	0	14	4	27	0	0	31	0	14	0	0	14	59
6:30 AM	0	0	0	0	0	0	0	19	0	19	8	44	0	0	52	0	19	0	0	19	90
6:45 AM	0	0	0	0	0	0	0	23	0	23	35	55	0	0	90	0	24	1	0	25	138
Hourly Total	0	0	0	0	0	1	0	68	0	69	50	154	0	0	204	0	77	1	0	78	351
7:00 AM	0	0	0	0	0	0	0	16	0	16	16	55	0	0	71	0	23	0	0	23	110
7:15 AM	0	0	0	0	0	1	0	21	0	22	21	65	0	0	86	0	41	2	0	43	151
7:30 AM	0	0	0	0	0	2	0	47	0	49	32	87	0	0	119	0	47	3	0	50	218
7:45 AM	0	0	0	0	0	2	0	35	0	37	29	76	0	0	105	0	66	0	0	66	208
Hourly Total	0	0	0	0	0	5	0	119	0	124	98	283	0	0	381	0	177	5	0	182	687
8:00 AM	0	0	0	0	0	1	0	26	0	27	22	57	0	0	79	0	33	1	0	34	140
8:15 AM	0	0	0	0	0	3	0	27	0	30	33	68	0	0	101	0	33	1	0	34	165
8:30 AM	0	0	0	0	0	5	0	20	0	25	16	65	0	1	82	0	30	1	1	32	139
8:45 AM	0	0	0	0	0	3	0	22	0	25	26	45	0	1	72	1	41	4	0	46	143
Hourly Total	0	0	0	0	0	12	0	95	0	107	97	235	0	2	334	1	137	7	1	146	587
9:00 AM	0	0	0	0	0	3	0	16	0	19	21	49	0	0	70	0	42	2	0	44	133
9:15 AM	0	0	0	0	0	1	0	25	0	26	14	39	0	0	53	0	39	6	0	45	124
9:30 AM	0	0	0	0	0	4	0	22	0	26	12	37	0	0	49	0	30	3	0	33	108
9:45 AM	0	0	0	0	0	1	0	17	0	18	19	37	0	0	56	0	36	2	0	38	112
Hourly Total	0	0	0	0	0	9	0	80	0	89	66	162	0	0	228	0	147	13	0	160	477
10:00 AM	0	0	0	0	0	2	0	14	0	16	22	41	0	0	63	0	46	1	0	47	126
10:15 AM	0	0	0	0	0	4	0	19	0	23	15	38	0	1	54	0	44	2	0	46	123
10:30 AM	0	0	0	0	0	5	0	21	0	26	14	36	0	0	50	0	58	0	0	58	134
10:45 AM	0	0	0	0	0	3	0	20	0	23	18	54	0	0	72	0	42	1	0	43	138
Hourly Total	0	0	0	0	0	14	0	74	0	88	69	169	0	1	239	0	190	4	0	194	521
11:00 AM	0	0	0	0	0	4	0	25	0	29	9	42	0	0	51	0	40	1	0	41	121
11:15 AM	0	0	0	0	0	3	0	32	0	35	16	59	0	0	75	0	53	0	0	53	163
11:30 AM	0	0	0	0	0	3	0	27	0	30	24	48	0	0	72	0	58	1	0	59	161
11:45 AM	0	0	0	0	0	2	0	18	0	20	18	41	0	0	59	0	49	1	0	50	129
Hourly Total	0	0	0	0	0	12	0	102	0	114	67	190	0	0	257	0	200	3	0	203	574
12:00 PM	0	0	0	0	0	6	0	27	0	33	31	48	0	1	80	0	47	2	0	49	162
12:15 PM	0	0	0	0	0	3	0	14	0	17	26	54	0	0	80	0	52	1	0	53	150
12:30 PM	0	0	0	0	0	3	0	25	0	28	24	56	0	0	80	0	60	1	0	61	169
12:45 PM	0	0	0	0	0	5	0	20	0	25	30	63	0	0	93	0	53	4	0	57	175
Hourly Total	0	0	0	0	0	17	0	86	0	103	111	221	0	1	333	0	212	8	0	220	656
Grand Total	0	0	1	0	1	151	0	1302	0	1453	1338	3024	1	6	4369	1	3127	121	2	3251	9074
Approach %	0.0	0.0	100.0	0.0	-	10.4	0.0	89.6	0.0	-	30.6	69.2	0.0	0.1	-	0.0	96.2	3.7	0.1	-	-
Total %	0.0	0.0	0.0	0.0	0.0	1.7	0.0	14.3	0.0	16.0	14.7	33.3	0.0	0.1	48.1	0.0	34.5	1.3	0.0	35.8	-
Motorcycles	0	0	0	0	0	0	0	12	0	12	8	24	0	0	32	0	34	1	0	35	79
% Motorcycles	-	-	0.0	-	0.0	0.0	-	0.9	-	0.8	0.6	0.8	0.0	0.0	0.7	0.0	1.1	0.8	0.0	1.1	0.9
Cars	0	0	1	0	1	95	0	724	0	819	750	2052	0	5	2807	1	2162	72	2	2237	5864
% Cars	-	-	100.0	-	100.0	62.9	-	55.6	-	56.4	56.1	67.9	0.0	83.3	64.2	100.0	69.1	59.5	100.0	68.8	64.6
Light Goods Vehicles	0	0	0	0	0	48	0	465	0	513	474	759	0	1	1234	0	754	44	0	798	2545
% Light Goods Vehicles	-	-	0.0	-	0.0	31.8	-	35.7	-	35.3	35.4	25.1	0.0	16.7	28.2	0.0	24.1	36.4	0.0	24.5	28.0
Buses	0	0	0	0	0	0	0	3	0	3	2	1	0	0	3	0	3	0	0	3	9
% Buses	-	-	0.0	-	0.0	0.0	-	0.2	-	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1
Single-Unit Trucks	0	0	0	0	0	7	0	71	0	78	75	118	0	0	193	0	96	4	0	100	371
% Single-Unit Trucks	-	-	0.0	-	0.0	4.6	-	5.5	-	5.4	5.6	3.9	0.0	0.0	4.4	0.0	3.1	3.3	0.0	3.1	4.1
Articulated Trucks	0	0	0	0	0	1	0	24	0	25	27	69	0	0	96	0	77	0	0	77	198
% Articulated Trucks	-	-	0.0	-	0.0	0.7	-	1.8	-	1.7	2.0	2.3	0.0	0.0	2.2	0.0	2.5	0.0	0.0	2.4	2.2
Bicycles on Road	0	0	0	0	0	0	0	3	0	3	2	1	1	0	4	0	1	0	0	1	8
% Bicycles on Road	-	-	0.0	-	0.0	0.0	-	0.2	-	0.2	0.1	0.0	100.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Count Name: Frontage Rd and Airport Rd
Site Code:
Start Date: 08/30/2016

Southbound Approach

Out	In	Total
9	12	21
822	819	1641
518	513	1031
2	3	5
108	106	214
1459	**1453**	**2912**

R	T	L	U
12	0	0	0
724	0	95	0
465	0	48	0
3	0	0	0
98	0	8	0
1302	**0**	**151**	**0**

Eastbound Approach [EB]

Out	In	Total
46	32	78
2891	2807	5698
1220	1234	2454
6	3	9
272	293	565
4435	**4369**	**8804**

U	L	T	R
0	8	24	0
5	750	2052	0
1	474	759	0
0	2	1	0
0	104	188	1
6	**1338**	**3024**	**1**

08/30/2016 1:00 PM
Ending At
08/31/2016 1:00 PM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

Westbound Approach [WB]

Out	In	Total
24	35	59
2150	2237	4387
807	798	1605
1	3	4
196	178	374
3178	**3251**	**6429**

R	T	L	U
1	34	0	0
72	2162	1	2
44	754	0	0
0	3	0	0
4	174	0	0
121	**3127**	**1**	**2**

U	L	T	R
0	0	0	0
0	0	0	1
0	0	0	0
0	0	0	0
0	0	0	0
0	**0**	**0**	**1**

Out	In	Total
0	0	0
1	1	2
0	0	0
0	0	0
1	0	1
2	**1**	**3**

Northbound Approach

Turning Movement Data Plot

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (4:30 PM)

	Northbound Approach					Southbound Approach					Eastbound Approach					Westbound Approach					
	Northbound					Southbound					Eastbound					Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
4:30 PM	0	0	0	0	0	2	0	28	0	30	32	48	0	0	80	0	78	3	0	81	191
4:45 PM	0	0	0	0	0	3	0	18	0	21	30	59	0	0	89	0	84	3	0	87	197
5:00 PM	0	0	0	0	0	3	0	28	0	31	42	55	0	0	97	0	87	3	0	90	218
5:15 PM	0	0	0	0	0	1	0	33	0	34	36	64	1	0	101	0	103	1	0	104	239
Total	0	0	0	0	0	9	0	107	0	116	140	226	1	0	367	0	352	10	0	362	845
Approach %	NaN	NaN	NaN	NaN	-	7.8	0.0	92.2	0.0	-	38.1	61.6	0.3	0.0	-	0.0	97.2	2.8	0.0	-	-
Total %	0.0	0.0	0.0	0.0	0.0	1.1	0.0	12.7	0.0	13.7	16.6	26.7	0.1	0.0	43.4	0.0	41.7	1.2	0.0	42.8	-
PHF	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.811	0.000	0.853	0.833	0.883	0.250	0.000	0.908	0.000	0.854	0.833	0.000	0.870	0.884
Motorcycles	0	0	0	0	0	0	0	2	0	2	1	2	0	0	3	0	1	0	0	1	6
% Motorcycles	-	-	-	-	-	0.0	-	1.9	-	1.7	0.7	0.9	0.0	-	0.8	-	0.3	0.0	-	0.3	0.7
Cars	0	0	0	0	0	8	0	55	0	63	83	152	0	0	235	0	221	5	0	226	524
% Cars	-	-	-	-	-	88.9	-	51.4	-	54.3	59.3	67.3	0.0	-	64.0	-	62.8	50.0	-	62.4	62.0
Light Goods Vehicles	0	0	0	0	0	1	0	45	0	46	50	62	0	0	112	0	113	5	0	118	276
% Light Goods Vehicles	-	-	-	-	-	11.1	-	42.1	-	39.7	35.7	27.4	0.0	-	30.5	-	32.1	50.0	-	32.6	32.7
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	-	-	-	-	-	0.0	-	0.0	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	0	0	0	0	0	0	4	0	4	5	6	0	0	11	0	10	0	0	10	25
% Single-Unit Trucks	-	-	-	-	-	0.0	-	3.7	-	3.4	3.6	2.7	0.0	-	3.0	-	2.8	0.0	-	2.8	3.0
Articulated Trucks	0	0	0	0	0	0	0	1	0	1	1	3	0	0	4	0	7	0	0	7	12
% Articulated Trucks	-	-	-	-	-	0.0	-	0.9	-	0.9	0.7	1.3	0.0	-	1.1	-	2.0	0.0	-	1.9	1.4
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
% Bicycles on Road	-	-	-	-	-	0.0	-	0.0	-	0.0	0.0	0.4	100.0	-	0.5	-	0.0	0.0	-	0.0	0.2

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (7:30 AM)

	Northbound Approach					Southbound Approach					Eastbound Approach					Westbound Approach					
	Northbound					Southbound					Eastbound					Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:30 AM	0	0	0	0	0	2	0	47	0	49	32	87	0	0	119	0	47	3	0	50	218
7:45 AM	0	0	0	0	0	2	0	35	0	37	29	76	0	0	105	0	66	0	0	66	208
8:00 AM	0	0	0	0	0	1	0	26	0	27	22	57	0	0	79	0	33	1	0	34	140
8:15 AM	0	0	0	0	0	3	0	27	0	30	33	68	0	0	101	0	33	1	0	34	165
Total	0	0	0	0	0	8	0	135	0	143	116	288	0	0	404	0	179	5	0	184	731
Approach %	NaN	NaN	NaN	NaN	-	5.6	0.0	94.4	0.0	-	28.7	71.3	0.0	0.0	-	0.0	97.3	2.7	0.0	-	-
Total %	0.0	0.0	0.0	0.0	0.0	1.1	0.0	18.5	0.0	19.6	15.9	39.4	0.0	0.0	55.3	0.0	24.5	0.7	0.0	25.2	-
PHF	0.000	0.000	0.000	0.000	0.000	0.667	0.000	0.718	0.000	0.730	0.879	0.828	0.000	0.000	0.849	0.000	0.678	0.417	0.000	0.697	0.838
Motorcycles	0	0	0	0	0	0	0	1	0	1	0	5	0	0	5	0	0	0	0	0	6
% Motorcycles	-	-	-	-	-	0.0	-	0.7	-	0.7	0.0	1.7	-	-	1.2	-	0.0	0.0	-	0.0	0.8
Cars	0	0	0	0	0	3	0	76	0	79	65	178	0	0	243	0	112	2	0	114	436
% Cars	-	-	-	-	-	37.5	-	56.3	-	55.2	56.0	61.8	-	-	60.1	-	62.6	40.0	-	62.0	59.6
Light Goods Vehicles	0	0	0	0	0	5	0	52	0	57	41	87	0	0	128	0	43	3	0	46	231
% Light Goods Vehicles	-	-	-	-	-	62.5	-	38.5	-	39.9	35.3	30.2	-	-	31.7	-	24.0	60.0	-	25.0	31.6
Buses	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	3	0	0	3	5
% Buses	-	-	-	-	-	0.0	-	1.5	-	1.4	0.0	0.0	-	-	0.0	-	1.7	0.0	-	1.6	0.7
Single-Unit Trucks	0	0	0	0	0	0	0	1	0	1	7	10	0	0	17	0	9	0	0	9	27
% Single-Unit Trucks	-	-	-	-	-	0.0	-	0.7	-	0.7	6.0	3.5	-	-	4.2	-	5.0	0.0	-	4.9	3.7
Articulated Trucks	0	0	0	0	0	0	0	2	0	2	3	8	0	0	11	0	12	0	0	12	25
% Articulated Trucks	-	-	-	-	-	0.0	-	1.5	-	1.4	2.6	2.8	-	-	2.7	-	6.7	0.0	-	6.5	3.4
Bicycles on Road	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	-	-	-	-	-	0.0	-	0.7	-	0.7	0.0	0.0	-	-	0.0	-	0.0	0.0	-	0.0	0.1

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Northbound Approach Northbound					Southbound Approach Southbound					Eastbound Approach Eastbound					Westbound Approach Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
12:00 PM	0	0	0	0	0	6	0	27	0	33	31	48	0	1	80	0	47	2	0	49	162
12:15 PM	0	0	0	0	0	3	0	14	0	17	26	54	0	0	80	0	52	1	0	53	150
12:30 PM	0	0	0	0	0	3	0	25	0	28	24	56	0	0	80	0	60	1	0	61	169
12:45 PM	0	0	0	0	0	5	0	20	0	25	30	63	0	0	93	0	53	4	0	57	175
Total	0	0	0	0	0	17	0	86	0	103	111	221	0	1	333	0	212	8	0	220	656
Approach %	NaN	NaN	NaN	NaN	-	16.5	0.0	83.5	0.0	-	33.3	66.4	0.0	0.3	-	0.0	96.4	3.6	0.0	-	-
Total %	0.0	0.0	0.0	0.0	0.0	2.6	0.0	13.1	0.0	15.7	16.9	33.7	0.0	0.2	50.8	0.0	32.3	1.2	0.0	33.5	-
PHF	0.000	0.000	0.000	0.000	0.000	0.708	0.000	0.796	0.000	0.780	0.895	0.877	0.000	0.250	0.895	0.000	0.883	0.500	0.000	0.902	0.937
Motorcycles	0	0	0	0	0	0	0	1	0	1	1	3	0	0	4	0	3	0	0	3	8
% Motorcycles	-	-	-	-	-	0.0	-	1.2	-	1.0	0.9	1.4	-	0.0	1.2	-	1.4	0.0	-	1.4	1.2
Cars	0	0	0	0	0	7	0	53	0	60	61	143	0	1	205	0	149	3	0	152	417
% Cars	-	-	-	-	-	41.2	-	61.6	-	58.3	55.0	64.7	-	100.0	61.6	-	70.3	37.5	-	69.1	63.6
Light Goods Vehicles	0	0	0	0	0	10	0	21	0	31	36	58	0	0	94	0	47	5	0	52	177
% Light Goods Vehicles	-	-	-	-	-	58.8	-	24.4	-	30.1	32.4	26.2	-	0.0	28.2	-	22.2	62.5	-	23.6	27.0
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	-	-	-	-	-	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	0	0	0	0	0	0	8	0	8	11	13	0	0	24	0	8	0	0	8	40
% Single-Unit Trucks	-	-	-	-	-	0.0	-	9.3	-	7.8	9.9	5.9	-	0.0	7.2	-	3.8	0.0	-	3.6	6.1
Articulated Trucks	0	0	0	0	0	0	0	3	0	3	2	4	0	0	6	0	5	0	0	5	14
% Articulated Trucks	-	-	-	-	-	0.0	-	3.5	-	2.9	1.8	1.8	-	0.0	1.8	-	2.4	0.0	-	2.3	2.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	-	-	-	-	-	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Location: 45.730509, -111.08963

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_Frontage_Valley Center Cutoff (Gallatin)
Site Code:
Start Date: 08/02/2016
Page No: 1

Turning Movement Data

Start Time	Valley Center Cutoff Northbound				16-3-032 Eastbound				16-3A-017 Westbound				
	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
6:00 AM	6	9	0	15	19	9	0	28	3	3	0	6	49
6:15 AM	6	14	0	20	19	9	0	28	3	7	0	10	58
6:30 AM	9	10	0	19	51	21	0	72	13	13	0	26	117
6:45 AM	14	27	0	41	48	20	0	68	15	13	0	28	137
Hourly Total	35	60	0	95	137	59	0	196	34	36	0	70	361
7:00 AM	10	27	0	37	55	24	0	79	8	18	0	26	142
7:15 AM	10	26	0	36	72	28	0	100	16	17	0	33	169
7:30 AM	15	28	0	43	102	37	0	139	16	17	0	33	215
7:45 AM	17	41	0	58	106	36	0	142	14	26	0	40	240
Hourly Total	52	122	0	174	335	125	0	460	54	78	0	132	766
8:00 AM	14	22	0	36	62	27	0	89	21	28	0	49	174
8:15 AM	10	25	0	35	63	30	0	93	17	26	0	43	171
8:30 AM	12	26	0	38	55	25	0	80	18	29	0	47	165
8:45 AM	15	34	0	49	44	22	0	66	18	16	0	34	149
Hourly Total	51	107	0	158	224	104	0	328	74	99	0	173	659
9:00 AM	6	18	0	24	44	13	0	57	12	35	0	47	128
9:15 AM	15	18	0	33	38	23	0	61	9	35	0	44	138
9:30 AM	14	22	0	36	45	23	0	68	14	27	0	41	145
9:45 AM	14	19	0	33	50	29	0	79	17	32	0	49	161
Hourly Total	49	77	0	126	177	88	0	265	52	129	0	181	572
10:00 AM	17	11	0	28	32	16	0	48	16	30	0	46	122
10:15 AM	20	13	0	33	39	21	0	60	15	40	0	55	148
10:30 AM	19	13	0	32	52	24	0	76	10	37	0	47	155
10:45 AM	18	17	0	35	43	18	0	61	17	34	0	51	147
Hourly Total	74	54	0	128	166	79	0	245	58	141	0	199	572
11:00 AM	12	9	0	21	33	20	0	53	13	53	0	66	140
11:15 AM	19	11	0	30	43	19	0	62	19	34	0	53	145
11:30 AM	16	12	0	28	40	23	0	63	20	42	0	62	153
11:45 AM	18	20	0	38	46	31	0	77	13	37	0	50	165
Hourly Total	65	52	0	117	162	93	0	255	65	166	0	231	603
12:00 PM	24	14	0	38	34	21	0	55	25	68	0	93	186
12:15 PM	21	12	0	33	46	30	0	76	25	38	0	63	172
12:30 PM	16	19	0	35	48	22	0	70	17	50	0	67	172
12:45 PM	32	20	0	52	37	24	0	61	20	58	0	78	191
Hourly Total	93	65	0	158	165	97	0	262	87	214	0	301	721
1:00 PM	18	18	0	36	57	26	0	83	12	44	0	56	175
1:15 PM	21	20	0	41	37	25	0	62	11	42	0	53	156
1:30 PM	17	10	0	27	43	32	0	75	20	45	0	65	167
1:45 PM	16	6	0	22	41	17	0	58	12	33	0	45	125
Hourly Total	72	54	0	126	178	100	0	278	55	164	0	219	623
2:00 PM	22	12	0	34	33	18	0	51	13	55	0	68	153
2:15 PM	21	16	0	37	31	20	0	51	13	35	0	48	136
2:30 PM	18	11	0	29	29	17	0	46	13	47	0	60	135
2:45 PM	16	22	0	38	33	23	0	56	18	31	0	49	143
Hourly Total	77	61	0	138	126	78	0	204	57	168	0	225	567
3:00 PM	16	10	0	26	37	21	0	58	14	56	0	70	154
3:15 PM	22	12	0	34	37	22	0	59	28	68	0	96	189
3:30 PM	27	20	0	47	31	17	0	48	24	57	0	81	176
3:45 PM	19	19	0	38	33	14	0	47	20	57	0	77	162
Hourly Total	84	61	0	145	138	74	0	212	86	238	0	324	681
4:00 PM	21	17	0	38	45	17	0	62	25	66	0	91	191
4:15 PM	14	25	0	39	33	22	0	55	21	58	0	79	173
4:30 PM	27	28	0	55	46	20	0	66	27	68	1	96	217
4:45 PM	34	16	0	50	49	27	0	76	27	76	0	103	229
Hourly Total	96	86	0	182	173	86	0	259	100	268	1	369	810
5:00 PM	25	21	0	46	48	34	0	82	57	98	0	155	283
5:15 PM	26	27	0	53	46	38	0	84	34	102	0	136	273
5:30 PM	29	28	0	57	48	19	0	67	34	81	0	115	239
5:45 PM	30	34	0	64	35	19	0	54	17	49	0	66	184
Hourly Total	110	110	0	220	177	110	0	287	142	330	0	472	979
6:00 PM	21	17	0	38	32	15	0	47	25	55	0	80	165
6:15 PM	17	14	0	31	20	28	0	48	15	55	0	70	149
6:30 PM	21	16	0	37	32	16	0	48	17	40	0	57	142
6:45 PM	21	19	0	40	28	20	0	48	23	33	0	56	144
Hourly Total	80	66	0	146	112	79	0	191	80	183	0	263	600

7:00 PM	17	9	0	26	18	23	0	41	21	27	0	48	115
7:15 PM	28	28	0	56	18	22	0	40	12	39	0	51	147
7:30 PM	16	6	0	22	9	12	0	21	22	26	0	48	91
7:45 PM	19	8	0	27	16	13	0	29	7	24	0	31	87
Hourly Total	80	51	0	131	61	70	0	131	62	116	0	178	440
8:00 PM	17	13	0	30	17	5	0	22	10	27	0	37	89
8:15 PM	15	15	0	30	20	10	0	30	16	20	0	36	96
8:30 PM	15	10	0	25	15	11	0	26	23	29	0	52	103
8:45 PM	14	4	0	18	19	17	0	36	13	26	0	39	93
Hourly Total	61	42	0	103	71	43	0	114	62	102	0	164	381
9:00 PM	13	8	0	21	16	11	0	27	9	21	0	30	78
9:15 PM	17	6	0	23	11	13	0	24	9	21	0	30	77
9:30 PM	8	6	0	14	11	11	0	22	12	15	0	27	63
9:45 PM	16	2	0	18	7	6	0	13	6	17	0	23	54
Hourly Total	54	22	0	76	45	41	0	86	36	74	0	110	272
10:00 PM	4	3	0	7	9	6	0	15	5	16	0	21	43
10:15 PM	3	8	0	11	13	10	0	23	11	9	0	20	54
10:30 PM	3	5	0	8	9	11	0	20	5	12	0	17	45
10:45 PM	3	0	0	3	3	7	0	10	3	7	0	10	23
Hourly Total	13	16	0	29	34	34	0	68	24	44	0	68	165
11:00 PM	5	2	0	7	1	2	0	3	4	9	0	13	23
11:15 PM	2	2	0	4	2	3	0	5	1	4	0	5	14
11:30 PM	8	0	0	8	2	3	0	5	6	7	0	13	26
11:45 PM	4	0	0	4	3	3	0	6	1	13	0	14	24
Hourly Total	19	4	0	23	8	11	0	19	12	33	0	45	87
12:00 AM	0	1	0	1	8	2	0	10	0	3	0	3	14
12:15 AM	1	0	0	1	10	8	0	18	1	5	0	6	25
12:30 AM	1	0	0	1	1	2	0	3	2	1	0	3	7
12:45 AM	0	0	0	0	5	0	0	5	1	3	0	4	9
Hourly Total	2	1	0	3	24	12	0	36	4	12	0	16	55
1:00 AM	5	0	0	5	0	1	0	1	0	5	0	5	11
1:15 AM	2	1	0	3	1	1	0	2	0	6	0	6	11
1:30 AM	3	1	0	4	3	0	0	3	2	1	0	3	10
1:45 AM	0	1	0	1	4	2	0	6	0	1	0	1	8
Hourly Total	10	3	0	13	8	4	0	12	2	13	0	15	40
2:00 AM	2	1	0	3	1	5	0	6	0	2	0	2	11
2:15 AM	1	0	0	1	6	9	0	15	1	2	0	3	19
2:30 AM	1	0	0	1	3	0	0	3	2	1	0	3	7
2:45 AM	0	0	0	0	1	0	0	1	0	2	0	2	3
Hourly Total	4	1	0	5	11	14	0	25	3	7	0	10	40
3:00 AM	0	1	0	1	2	0	0	2	0	2	0	2	5
3:15 AM	0	0	0	0	1	0	0	1	0	4	0	4	5
3:30 AM	4	2	0	6	0	0	0	0	0	1	0	1	7
3:45 AM	0	1	0	1	2	1	0	3	0	2	0	2	6
Hourly Total	4	4	0	8	5	1	0	6	0	9	0	9	23
4:00 AM	6	0	0	6	2	0	0	2	0	1	0	1	9
4:15 AM	6	1	0	7	4	1	0	5	0	3	0	3	15
4:30 AM	12	2	0	14	2	3	0	5	1	10	0	11	30
4:45 AM	6	0	0	6	10	8	0	18	0	8	0	8	32
Hourly Total	30	3	0	33	18	12	0	30	1	22	0	23	86
5:00 AM	3	1	0	4	10	3	0	13	4	1	0	5	22
5:15 AM	2	0	0	2	14	6	0	20	2	7	0	9	31
5:30 AM	5	6	0	11	14	2	0	16	1	4	0	5	32
5:45 AM	10	10	0	20	16	8	0	24	4	5	0	9	53
Hourly Total	20	17	0	37	54	19	0	73	11	17	0	28	138
Grand Total	1235	1139	0	2374	2609	1433	0	4042	1161	2663	1	3825	10241
Approach %	52.0	48.0	0.0	-	64.5	35.5	0.0	-	30.4	69.6	0.0	-	-
Total %	12.1	11.1	0.0	23.2	25.5	14.0	0.0	39.5	11.3	26.0	0.0	37.3	-
Motorcycles	11	0	0	11	26	8	0	34	4	38	0	42	87
% Motorcycles	0.9	0.0	-	0.5	1.0	0.6	-	0.8	0.3	1.4	0.0	1.1	0.8
Cars	905	731	0	1636	1770	1072	0	2842	746	1745	1	2492	6970
% Cars	73.3	64.2	-	68.9	67.8	74.8	-	70.3	64.3	65.5	100.0	65.2	68.1
Light Goods Vehicles	297	368	0	665	638	324	0	962	370	697	0	1067	2694
% Light Goods Vehicles	24.0	32.3	-	28.0	24.5	22.6	-	23.8	31.9	26.2	0.0	27.9	26.3
Buses	0	0	0	0	2	0	0	2	0	2	0	2	4
% Buses	0.0	0.0	-	0.0	0.1	0.0	-	0.0	0.0	0.1	0.0	0.1	0.0
Single-Unit Trucks	19	39	0	58	97	24	0	121	38	103	0	141	320
% Single-Unit Trucks	1.5	3.4	-	2.4	3.7	1.7	-	3.0	3.3	3.9	0.0	3.7	3.1
Articulated Trucks	3	1	0	4	76	5	0	81	3	78	0	81	166
% Articulated Trucks	0.2	0.1	-	0.2	2.9	0.3	-	2.0	0.3	2.9	0.0	2.1	1.6

Location: 45.730509, -111.08963

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_Frontage_Valley Center Cutoff (Gallatin)
Site Code:
Start Date: 08/02/2016
Page No: 3

08/02/2016 6:00 AM
Ending At
08/03/2016 6:00 AM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

16-3-032 [EB]

	Out	In	Total
Motorcycles	49	34	83
Cars	2650	2842	5492
Light Goods Vehicles	994	962	1956
Buses	2	2	4
Other	203	202	405
Total	**3898**	**4042**	**7940**

	U	T	R
Motorcycles	0	26	8
Cars	0	1770	1072
Light Goods Vehicles	0	638	324
Buses	0	2	0
Other	0	173	29
Total	**0**	**2609**	**1433**

16-3A-017 [WB]

	Out	In	Total
Motorcycles	26	42	68
Cars	2502	2492	4994
Light Goods Vehicles	1006	1067	2073
Buses	2	2	4
Other	213	222	435
Total	**3749**	**3825**	**7574**

	T	L	U
Motorcycles	38	4	0
Cars	1745	746	1
Light Goods Vehicles	697	370	0
Buses	2	0	0
Other	181	41	0
Total	**2663**	**1161**	**1**

U	L	R
0	11	0
0	905	731
0	297	368
0	0	0
0	22	40
0	**1235**	**1139**

12	11	23
1818	1636	3454
694	665	1359
0	0	0
70	62	132
2594	**2374**	**4968**
Out	In	Total

Valley Center Cutoff [NB]

Turning Movement Data Plot

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Valley Center Cutoff Northbound				16-3-032 Eastbound				16-3A-017 Westbound				
	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
7:30 AM	15	28	0	43	102	37	0	139	16	17	0	33	215
7:45 AM	17	41	0	58	106	36	0	142	14	26	0	40	240
8:00 AM	14	22	0	36	62	27	0	89	21	28	0	49	174
8:15 AM	10	25	0	35	63	30	0	93	17	26	0	43	171
Total	56	116	0	172	333	130	0	463	68	97	0	165	800
Approach %	32.6	67.4	0.0	-	71.9	28.1	0.0	-	41.2	58.8	0.0	-	-
Total %	7.0	14.5	0.0	21.5	41.6	16.3	0.0	57.9	8.5	12.1	0.0	20.6	-
PHF	0.824	0.707	0.000	0.741	0.785	0.878	0.000	0.815	0.810	0.866	0.000	0.842	0.833
Motorcycles	0	0	0	0	4	0	0	4	0	0	0	0	4
% Motorcycles	0.0	0.0	-	0.0	1.2	0.0	-	0.9	0.0	0.0	-	0.0	0.5
Cars	39	73	0	112	226	101	0	327	42	58	0	100	539
% Cars	69.6	62.9	-	65.1	67.9	77.7	-	70.6	61.8	59.8	-	60.6	67.4
Light Goods Vehicles	15	42	0	57	85	28	0	113	22	24	0	46	216
% Light Goods Vehicles	26.8	36.2	-	33.1	25.5	21.5	-	24.4	32.4	24.7	-	27.9	27.0
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	2	1	0	3	9	1	0	10	3	8	0	11	24
% Single-Unit Trucks	3.6	0.9	-	1.7	2.7	0.8	-	2.2	4.4	8.2	-	6.7	3.0
Articulated Trucks	0	0	0	0	9	0	0	9	1	7	0	8	17
% Articulated Trucks	0.0	0.0	-	0.0	2.7	0.0	-	1.9	1.5	7.2	-	4.8	2.1

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Valley Center Cutoff Northbound				16-3-032 Eastbound				16-3A-017 Westbound				
	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
12:00 PM	24	14	0	38	34	21	0	55	25	68	0	93	186
12:15 PM	21	12	0	33	46	30	0	76	25	38	0	63	172
12:30 PM	16	19	0	35	48	22	0	70	17	50	0	67	172
12:45 PM	32	20	0	52	37	24	0	61	20	58	0	78	191
Total	93	65	0	158	165	97	0	262	87	214	0	301	721
Approach %	58.9	41.1	0.0	-	63.0	37.0	0.0	-	28.9	71.1	0.0	-	-
Total %	12.9	9.0	0.0	21.9	22.9	13.5	0.0	36.3	12.1	29.7	0.0	41.7	-
PHF	0.727	0.813	0.000	0.760	0.859	0.808	0.000	0.862	0.870	0.787	0.000	0.809	0.944
Motorcycles	2	0	0	2	2	0	0	2	0	1	0	1	5
% Motorcycles	2.2	0.0	-	1.3	1.2	0.0	-	0.8	0.0	0.5	-	0.3	0.7
Cars	67	44	0	111	110	70	0	180	57	144	0	201	492
% Cars	72.0	67.7	-	70.3	66.7	72.2	-	68.7	65.5	67.3	-	66.8	68.2
Light Goods Vehicles	23	17	0	40	41	23	0	64	24	55	0	79	183
% Light Goods Vehicles	24.7	26.2	-	25.3	24.8	23.7	-	24.4	27.6	25.7	-	26.2	25.4
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	1	4	0	5	7	3	0	10	6	7	0	13	28
% Single-Unit Trucks	1.1	6.2	-	3.2	4.2	3.1	-	3.8	6.9	3.3	-	4.3	3.9
Articulated Trucks	0	0	0	0	5	1	0	6	0	7	0	7	13
% Articulated Trucks	0.0	0.0	-	0.0	3.0	1.0	-	2.3	0.0	3.3	-	2.3	1.8

Location: 45.730509, -
111.08963

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Turning Movement Peak Hour Data (4:45 PM)

Start Time	Valley Center Cutoff Northbound				16-3-032 Eastbound				16-3A-017 Westbound				
	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Int. Total
4:45 PM	34	16	0	50	49	27	0	76	27	76	0	103	229
5:00 PM	25	21	0	46	48	34	0	82	57	98	0	155	283
5:15 PM	26	27	0	53	46	38	0	84	34	102	0	136	273
5:30 PM	29	28	0	57	48	19	0	67	34	81	0	115	239
Total	114	92	0	206	191	118	0	309	152	357	0	509	1024
Approach %	55.3	44.7	0.0	-	61.8	38.2	0.0	-	29.9	70.1	0.0	-	-
Total %	11.1	9.0	0.0	20.1	18.7	11.5	0.0	30.2	14.8	34.9	0.0	49.7	-
PHF	0.838	0.821	0.000	0.904	0.974	0.776	0.000	0.920	0.667	0.875	0.000	0.821	0.905
Motorcycles	1	0	0	1	3	1	0	4	0	15	0	15	20
% Motorcycles	0.9	0.0	-	0.5	1.6	0.8	-	1.3	0.0	4.2	-	2.9	2.0
Cars	90	64	0	154	128	86	0	214	93	225	0	318	686
% Cars	78.9	69.6	-	74.8	67.0	72.9	-	69.3	61.2	63.0	-	62.5	67.0
Light Goods Vehicles	22	27	0	49	52	31	0	83	53	99	0	152	284
% Light Goods Vehicles	19.3	29.3	-	23.8	27.2	26.3	-	26.9	34.9	27.7	-	29.9	27.7
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	1	1	0	2	3	0	0	3	5	15	0	20	25
% Single-Unit Trucks	0.9	1.1	-	1.0	1.6	0.0	-	1.0	3.3	4.2	-	3.9	2.4
Articulated Trucks	0	0	0	0	5	0	0	5	1	3	0	4	9
% Articulated Trucks	0.0	0.0	-	0.0	2.6	0.0	-	1.6	0.7	0.8	-	0.8	0.9

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Count Name: Frontage Rd and Nelson Rd
Site Code:
Start Date: 08/30/2016

Turning Movement Data

Start Time	Southbound Approach Southbound				Eastbound Approach Eastbound				Westbound Approach Westbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
1:00 PM	10	8	0	18	8	38	0	46	49	3	0	52	116
1:15 PM	6	4	0	10	7	46	0	53	54	6	0	60	123
1:30 PM	4	3	0	7	10	38	0	48	38	5	0	43	98
1:45 PM	12	2	0	14	1	60	1	62	61	8	0	69	145
Hourly Total	32	17	0	49	26	182	1	209	202	22	0	224	482
2:00 PM	3	3	0	6	2	51	0	53	58	7	0	65	124
2:15 PM	4	1	0	5	2	49	0	51	39	10	0	49	105
2:30 PM	5	2	0	7	4	44	0	48	63	6	0	69	124
2:45 PM	2	2	0	4	2	54	0	56	42	10	0	52	112
Hourly Total	14	8	0	22	10	198	0	208	202	33	0	235	465
3:00 PM	9	2	0	11	5	42	0	47	67	6	0	73	131
3:15 PM	7	2	0	9	3	58	0	61	68	11	0	79	149
3:30 PM	14	12	0	26	6	66	0	72	69	11	0	80	178
3:45 PM	7	3	0	10	8	54	0	62	75	11	0	86	158
Hourly Total	37	19	0	56	22	220	0	242	279	39	0	318	616
4:00 PM	7	8	0	15	4	52	0	56	69	9	0	78	149
4:15 PM	6	3	0	9	6	45	0	51	86	6	0	92	152
4:30 PM	5	4	0	9	1	52	0	53	101	14	0	115	177
4:45 PM	3	1	0	4	3	69	0	72	87	7	0	94	170
Hourly Total	21	16	0	37	14	218	0	232	343	36	0	379	648
5:00 PM	11	3	0	14	6	51	0	57	126	11	0	137	208
5:15 PM	6	4	0	10	6	61	0	67	123	13	0	136	213
5:30 PM	4	3	0	7	6	60	0	66	104	19	0	123	196
5:45 PM	6	1	0	7	4	47	0	51	76	17	0	93	151
Hourly Total	27	11	0	38	22	219	0	241	429	60	0	489	768
6:00 PM	4	8	0	12	4	41	0	45	65	7	0	72	129
6:15 PM	3	6	0	9	4	36	0	40	63	8	0	71	120
6:30 PM	6	3	0	9	3	32	0	35	57	10	0	67	111
6:45 PM	1	1	0	2	4	28	0	32	49	3	0	52	86
Hourly Total	14	18	0	32	15	137	0	152	234	28	0	262	446
7:00 PM	5	2	0	7	2	30	0	32	44	3	0	47	86
7:15 PM	1	2	0	3	1	14	0	15	53	9	0	62	80
7:30 PM	3	3	0	6	5	16	1	22	35	3	0	38	66
7:45 PM	4	0	0	4	3	16	0	19	34	5	0	39	62
Hourly Total	13	7	0	20	11	76	1	88	166	20	0	186	294
8:00 PM	5	0	0	5	2	23	0	25	31	3	0	34	64
8:15 PM	3	0	0	3	2	23	0	25	21	2	0	23	51
8:30 PM	1	2	0	3	3	20	0	23	48	4	0	52	78
8:45 PM	5	3	0	8	0	20	0	20	35	6	0	41	69
Hourly Total	14	5	0	19	7	86	0	93	135	15	0	150	262
9:00 PM	2	0	0	2	1	16	0	17	42	4	0	46	65
9:15 PM	0	0	0	0	1	17	0	18	21	3	0	24	42
9:30 PM	3	0	0	3	2	7	0	9	27	3	0	30	42
9:45 PM	2	0	0	2	1	17	0	18	15	3	0	18	38
Hourly Total	7	0	0	7	5	57	0	62	105	13	0	118	187
10:00 PM	2	0	0	2	0	11	0	11	11	5	1	17	30
10:15 PM	0	3	0	3	0	5	0	5	11	2	0	13	21
10:30 PM	1	1	0	2	1	8	0	9	9	1	0	10	21
10:45 PM	0	0	0	0	0	7	0	7	11	1	0	12	19
Hourly Total	3	4	0	7	1	31	0	32	42	9	1	52	91
11:00 PM	0	0	0	0	0	9	0	9	8	0	0	8	17
11:15 PM	0	0	0	0	0	5	0	5	7	0	0	7	12
11:30 PM	0	0	0	0	0	4	0	4	2	0	0	2	6
11:45 PM	0	0	0	0	0	11	0	11	3	0	0	3	14
Hourly Total	0	0	0	0	0	29	0	29	20	0	0	20	49
12:00 AM	0	1	0	1	0	1	0	1	4	1	0	5	7
12:15 AM	0	0	0	0	0	7	0	7	3	0	0	3	10
12:30 AM	0	0	0	0	0	2	0	2	5	0	0	5	7
12:45 AM	0	0	0	0	0	1	0	1	3	0	0	3	4
Hourly Total	0	1	0	1	0	11	0	11	15	1	0	16	28
1:00 AM	0	0	0	0	0	1	0	1	3	0	0	3	4
1:15 AM	0	0	0	0	0	0	0	0	3	0	0	3	3
1:30 AM	0	0	0	0	0	2	0	2	2	0	0	2	4
1:45 AM	0	0	0	0	0	0	0	0	0	1	0	1	1
Hourly Total	0	0	0	0	0	3	0	3	8	1	0	9	12

2:00 AM	0	1	0	1	0	1	0	1	2	0	0	2	4
2:15 AM	0	1	0	1	0	0	0	0	0	0	0	0	1
2:30 AM	0	0	0	0	0	2	0	2	0	0	0	0	2
2:45 AM	0	0	0	0	0	4	0	4	1	1	0	2	6
Hourly Total	0	2	0	2	0	7	0	7	3	1	0	4	13
3:00 AM	0	1	0	1	0	1	0	1	2	0	0	2	4
3:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
3:30 AM	0	0	0	0	1	1	0	2	2	1	0	3	5
3:45 AM	2	0	0	2	0	1	0	1	3	0	0	3	6
Hourly Total	2	1	0	3	1	3	0	4	8	1	0	9	16
4:00 AM	1	0	0	1	0	0	0	0	1	0	0	1	2
4:15 AM	1	0	0	1	0	2	0	2	8	0	0	8	11
4:30 AM	0	0	0	0	0	4	0	4	1	1	0	2	6
4:45 AM	2	1	0	3	0	4	0	4	4	0	0	4	11
Hourly Total	4	1	0	5	0	10	0	10	14	1	0	15	30
5:00 AM	0	3	0	3	0	4	0	4	5	1	0	6	13
5:15 AM	0	1	0	1	0	13	0	13	3	0	0	3	17
5:30 AM	3	0	0	3	1	14	0	15	6	0	0	6	24
5:45 AM	2	1	0	3	0	24	0	24	7	1	0	8	35
Hourly Total	5	5	0	10	1	55	0	56	21	2	0	23	89
6:00 AM	1	0	0	1	2	16	0	18	14	1	0	15	34
6:15 AM	4	1	0	5	1	22	0	23	11	4	0	15	43
6:30 AM	4	1	0	5	3	42	0	45	21	5	0	26	76
6:45 AM	5	1	0	6	13	61	0	74	8	4	0	12	92
Hourly Total	14	3	0	17	19	141	0	160	54	14	0	68	245
7:00 AM	10	4	0	14	8	66	0	74	24	4	0	28	116
7:15 AM	13	3	0	16	2	84	0	86	27	1	0	28	130
7:30 AM	18	11	0	29	5	105	0	110	44	3	0	47	186
7:45 AM	15	9	0	24	3	106	0	109	39	7	0	46	179
Hourly Total	56	27	0	83	18	361	0	379	134	15	0	149	611
8:00 AM	11	9	0	20	1	79	0	80	37	6	0	43	143
8:15 AM	11	6	0	17	6	67	0	73	33	5	0	38	128
8:30 AM	9	6	1	16	4	82	0	86	36	2	0	38	140
8:45 AM	7	7	0	14	8	62	0	70	41	7	0	48	132
Hourly Total	38	28	1	67	19	290	0	309	147	20	0	167	543
9:00 AM	10	5	0	15	4	49	0	53	36	9	1	46	114
9:15 AM	11	6	0	17	5	40	0	45	44	8	0	52	114
9:30 AM	6	11	0	17	4	38	0	42	34	6	0	40	99
9:45 AM	8	4	0	12	4	47	0	51	39	3	0	42	105
Hourly Total	35	26	0	61	17	174	0	191	153	26	1	180	432
10:00 AM	3	4	0	7	6	40	0	46	39	3	0	42	95
10:15 AM	8	5	0	13	3	41	0	44	41	2	0	43	100
10:30 AM	8	3	0	11	3	53	0	56	45	4	0	49	116
10:45 AM	8	7	0	15	8	38	0	46	34	3	0	37	98
Hourly Total	27	19	0	46	20	172	0	192	159	12	0	171	409
11:00 AM	10	2	0	12	4	65	0	69	45	6	0	51	132
11:15 AM	5	4	0	9	8	43	0	51	47	4	0	51	111
11:30 AM	6	2	0	8	6	49	0	55	51	6	0	57	120
11:45 AM	7	5	0	12	4	39	0	43	64	6	0	70	125
Hourly Total	28	13	0	41	22	196	0	218	207	22	0	229	488
12:00 PM	9	5	0	14	3	49	0	52	64	12	0	76	142
12:15 PM	8	7	0	15	1	45	0	46	53	7	0	60	121
12:30 PM	5	5	0	10	6	48	0	54	44	7	0	51	115
12:45 PM	3	7	0	10	9	65	0	74	47	10	0	57	141
Hourly Total	25	24	0	49	19	207	0	226	208	36	0	244	519
Grand Total	416	255	1	672	269	3083	2	3354	3288	427	2	3717	7743
Approach %	61.9	37.9	0.1	-	8.0	91.9	0.1	-	88.5	11.5	0.1	-	-
Total %	5.4	3.3	0.0	8.7	3.5	39.8	0.0	43.3	42.5	5.5	0.0	48.0	-
Motorcycles	3	1	0	4	2	22	0	24	32	1	0	33	61
% Motorcycles	0.7	0.4	0.0	0.6	0.7	0.7	0.0	0.7	1.0	0.2	0.0	0.9	0.8
Cars	251	117	1	369	105	2036	2	2143	2156	263	0	2419	4931
% Cars	60.3	45.9	100.0	54.9	39.0	66.0	100.0	63.9	65.6	61.6	0.0	65.1	63.7
Light Goods Vehicles	135	77	0	212	94	869	0	963	940	142	2	1084	2259
% Light Goods Vehicles	32.5	30.2	0.0	31.5	34.9	28.2	0.0	28.7	28.6	33.3	100.0	29.2	29.2
Buses	0	1	0	1	0	0	0	0	0	0	0	0	1
% Buses	0.0	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Single-Unit Trucks	25	54	0	79	62	131	0	193	126	16	0	142	414
% Single-Unit Trucks	6.0	21.2	0.0	11.8	23.0	4.2	0.0	5.8	3.8	3.7	0.0	3.8	5.3
Articulated Trucks	1	4	0	5	5	22	0	27	31	2	0	33	65
% Articulated Trucks	0.2	1.6	0.0	0.7	1.9	0.7	0.0	0.8	0.9	0.5	0.0	0.9	0.8
Bicycles on Road	1	1	0	2	1	3	0	4	3	3	0	6	12
% Bicycles on Road	0.2	0.4	0.0	0.3	0.4	0.1	0.0	0.1	0.1	0.7	0.0	0.2	0.2

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Southbound Approach

Out	In	Total
3	4	7
369	369	738
236	212	448
0	1	1
89	86	175
697	**672**	**1369**

R	L	U
1	3	0
117	251	1
77	135	0
1	0	0
59	27	0
255	**416**	**1**

Eastbound Approach [EB]

Out	In	Total
33	24	57
2275	2143	4418
1017	963	1980
1	0	1
219	224	443
3545	**3354**	**6899**

U	L	T
0	2	22
2	105	2036
0	94	869
0	0	0
0	68	156
2	**269**	**3083**

Westbound Approach [WB]

Out	In	Total
25	33	58
2287	2419	4706
1006	1084	2090
0	0	0
183	181	364
3501	**3717**	**7218**

R	T	U
1	32	0
263	2156	0
142	940	2
0	0	0
21	160	0
427	**3288**	**2**

08/30/2016 1:00 PM
Ending At
08/31/2016 1:00 PM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

Turning Movement Data Plot

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (4:45 PM)

Start Time	Southbound Approach Southbound				Eastbound Approach Eastbound				Westbound Approach Westbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
4:45 PM	3	1	0	4	3	69	0	72	87	7	0	94	170
5:00 PM	11	3	0	14	6	51	0	57	126	11	0	137	208
5:15 PM	6	4	0	10	6	61	0	67	123	13	0	136	213
5:30 PM	4	3	0	7	6	60	0	66	104	19	0	123	196
Total	24	11	0	35	21	241	0	262	440	50	0	490	787
Approach %	68.6	31.4	0.0	-	8.0	92.0	0.0	-	89.8	10.2	0.0	-	-
Total %	3.0	1.4	0.0	4.4	2.7	30.6	0.0	33.3	55.9	6.4	0.0	62.3	-
PHF	0.545	0.688	0.000	0.625	0.875	0.873	0.000	0.910	0.873	0.658	0.000	0.894	0.924
Motorcycles	0	0	0	0	1	2	0	3	6	0	0	6	9
% Motorcycles	0.0	0.0	-	0.0	4.8	0.8	-	1.1	1.4	0.0	-	1.2	1.1
Cars	15	7	0	22	14	158	0	172	276	30	0	306	500
% Cars	62.5	63.6	-	62.9	66.7	65.6	-	65.6	62.7	60.0	-	62.4	63.5
Light Goods Vehicles	9	4	0	13	6	76	0	82	136	19	0	155	250
% Light Goods Vehicles	37.5	36.4	-	37.1	28.6	31.5	-	31.3	30.9	38.0	-	31.6	31.8
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	0	0	0	0	3	0	3	17	1	0	18	21
% Single-Unit Trucks	0.0	0.0	-	0.0	0.0	1.2	-	1.1	3.9	2.0	-	3.7	2.7
Articulated Trucks	0	0	0	0	0	1	0	1	4	0	0	4	5
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.4	-	0.4	0.9	0.0	-	0.8	0.6
Bicycles on Road	0	0	0	0	0	1	0	1	1	0	0	1	2
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.4	-	0.4	0.2	0.0	-	0.2	0.3

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Count Name: Frontage Rd and Nelson Rd
Site Code:
Start Date: 08/30/2016

Turning Movement Peak Hour Data (7:15 AM)

Start Time	Southbound Approach Southbound				Eastbound Approach Eastbound				Westbound Approach Westbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
7:15 AM	13	3	0	16	2	84	0	86	27	1	0	28	130
7:30 AM	18	11	0	29	5	105	0	110	44	3	0	47	186
7:45 AM	15	9	0	24	3	106	0	109	39	7	0	46	179
8:00 AM	11	9	0	20	1	79	0	80	37	6	0	43	143
Total	57	32	0	89	11	374	0	385	147	17	0	164	638
Approach %	64.0	36.0	0.0	-	2.9	97.1	0.0	-	89.6	10.4	0.0	-	-
Total %	8.9	5.0	0.0	13.9	1.7	58.6	0.0	60.3	23.0	2.7	0.0	25.7	-
PHF	0.792	0.727	0.000	0.767	0.550	0.882	0.000	0.875	0.835	0.607	0.000	0.872	0.858
Motorcycles	0	0	0	0	0	3	0	3	0	0	0	0	3
% Motorcycles	0.0	0.0	-	0.0	0.0	0.8	-	0.8	0.0	0.0	-	0.0	0.5
Cars	35	15	0	50	4	235	0	239	91	12	0	103	392
% Cars	61.4	46.9	-	56.2	36.4	62.8	-	62.1	61.9	70.6	-	62.8	61.4
Light Goods Vehicles	20	10	0	30	7	123	0	130	47	4	0	51	211
% Light Goods Vehicles	35.1	31.3	-	33.7	63.6	32.9	-	33.8	32.0	23.5	-	31.1	33.1
Buses	0	1	0	1	0	0	0	0	0	0	0	0	1
% Buses	0.0	3.1	-	1.1	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.2
Single-Unit Trucks	2	5	0	7	0	13	0	13	9	1	0	10	30
% Single-Unit Trucks	3.5	15.6	-	7.9	0.0	3.5	-	3.4	6.1	5.9	-	6.1	4.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	1	0	1	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0.0	3.1	-	1.1	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.2

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417 mdttdc@mt.gov

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Southbound Approach				Eastbound Approach				Westbound Approach				
	Southbound				Eastbound				Westbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
12:00 PM	9	5	0	14	3	49	0	52	64	12	0	76	142
12:15 PM	8	7	0	15	1	45	0	46	53	7	0	60	121
12:30 PM	5	5	0	10	6	48	0	54	44	7	0	51	115
12:45 PM	3	7	0	10	9	65	0	74	47	10	0	57	141
Total	25	24	0	49	19	207	0	226	208	36	0	244	519
Approach %	51.0	49.0	0.0	-	8.4	91.6	0.0	-	85.2	14.8	0.0	-	-
Total %	4.8	4.6	0.0	9.4	3.7	39.9	0.0	43.5	40.1	6.9	0.0	47.0	-
PHF	0.694	0.857	0.000	0.817	0.528	0.796	0.000	0.764	0.813	0.750	0.000	0.803	0.914
Motorcycles	0	0	0	0	0	2	0	2	3	0	0	3	5
% Motorcycles	0.0	0.0	-	0.0	0.0	1.0	-	0.9	1.4	0.0	-	1.2	1.0
Cars	16	10	0	26	6	122	0	128	138	23	0	161	315
% Cars	64.0	41.7	-	53.1	31.6	58.9	-	56.6	66.3	63.9	-	66.0	60.7
Light Goods Vehicles	7	8	0	15	8	67	0	75	60	11	0	71	161
% Light Goods Vehicles	28.0	33.3	-	30.6	42.1	32.4	-	33.2	28.8	30.6	-	29.1	31.0
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	2	6	0	8	5	13	0	18	5	1	0	6	32
% Single-Unit Trucks	8.0	25.0	-	16.3	26.3	6.3	-	8.0	2.4	2.8	-	2.5	6.2
Articulated Trucks	0	0	0	0	0	3	0	3	2	0	0	2	5
% Articulated Trucks	0.0	0.0	-	0.0	0.0	1.4	-	1.3	1.0	0.0	-	0.8	1.0
Bicycles on Road	0	0	0	0	0	0	0	0	0	1	0	1	1
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	2.8	-	0.4	0.2

Location: 45.718723, -111.06689

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_Frontage_Springhill (Gallatin)
Site Code:
Start Date: 07/26/2016
Page No: 1

Turning Movement Data

Start Time	16-3A-043 Southbound				16-3A-017 Eastbound				16-3A-016 Westbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
7:15 AM	21	11	0	32	24	58	0	82	18	9	0	27	141
7:30 AM	26	19	0	45	37	96	0	133	14	7	0	21	199
7:45 AM	30	24	0	54	39	86	0	125	23	15	1	39	218
Hourly Total	77	54	0	131	100	240	0	340	55	31	1	87	558
8:00 AM	28	24	0	52	29	70	0	99	13	15	0	28	179
8:15 AM	27	22	0	49	18	54	0	72	15	25	0	40	161
8:30 AM	24	25	0	49	28	55	0	83	25	18	0	43	175
8:45 AM	29	22	0	51	40	54	0	94	24	32	0	56	201
Hourly Total	108	93	0	201	115	233	0	348	77	90	0	167	716
9:00 AM	17	23	0	40	12	52	0	64	31	15	0	46	150
9:15 AM	15	23	0	38	11	33	0	44	24	15	0	39	121
9:30 AM	18	17	0	35	13	39	0	52	20	14	0	34	121
9:45 AM	24	31	0	55	37	42	0	79	34	13	0	47	181
Hourly Total	74	94	0	168	73	166	0	239	109	57	0	166	573
10:00 AM	21	22	0	43	23	26	0	49	22	18	0	40	132
10:15 AM	18	27	0	45	24	24	0	48	29	31	0	60	153
10:30 AM	18	27	0	45	19	28	0	47	35	16	0	51	143
10:45 AM	16	26	0	42	21	38	0	59	24	21	0	45	146
Hourly Total	73	102	0	175	87	116	0	203	110	86	0	196	574
11:00 AM	25	32	0	57	24	31	0	55	27	13	0	40	152
11:15 AM	20	20	0	40	29	33	0	62	34	13	0	47	149
11:30 AM	18	34	0	52	20	36	0	56	39	20	0	59	167
11:45 AM	16	24	0	40	20	34	0	54	31	20	0	51	145
Hourly Total	79	110	0	189	93	134	0	227	131	66	0	197	613
12:00 PM	21	35	0	56	19	32	0	51	36	22	0	58	165
12:15 PM	21	25	0	46	16	31	0	47	29	20	0	49	142
12:30 PM	8	31	0	39	16	41	0	57	44	16	0	60	156
12:45 PM	20	20	0	40	23	36	0	59	29	19	0	48	147
Hourly Total	70	111	0	181	74	140	0	214	138	77	0	215	610
1:00 PM	18	23	0	41	16	34	0	50	29	18	0	47	138
1:15 PM	13	24	0	37	28	39	0	67	32	23	0	55	159
1:30 PM	12	28	0	40	25	43	0	68	28	12	0	40	148
1:45 PM	20	29	0	49	20	46	0	66	29	25	0	54	169
Hourly Total	63	104	0	167	89	162	0	251	118	78	0	196	614
2:00 PM	13	31	0	44	24	41	0	65	42	23	0	65	174
2:15 PM	18	29	0	47	21	23	0	44	23	9	0	32	123
2:30 PM	16	26	0	42	22	33	0	55	34	27	0	61	158
2:45 PM	20	32	0	52	15	37	0	52	33	21	0	54	158
Hourly Total	67	118	0	185	82	134	0	216	132	80	0	212	613
3:00 PM	17	35	0	52	23	28	0	51	40	20	0	60	163
3:15 PM	18	33	0	51	12	37	0	49	49	22	0	71	171
3:30 PM	10	36	0	46	15	37	0	52	32	23	0	55	153
3:45 PM	13	33	0	46	30	36	0	66	51	22	0	73	185
Hourly Total	58	137	0	195	80	138	0	218	172	87	0	259	672
4:00 PM	12	31	0	43	25	29	0	54	48	25	0	73	170
4:15 PM	15	42	0	57	20	40	0	60	54	29	0	83	200
4:30 PM	16	44	0	60	36	39	0	75	62	30	0	92	227
4:45 PM	17	48	0	65	32	40	0	72	56	32	0	88	225
Hourly Total	60	165	0	225	113	148	0	261	220	116	0	336	822
5:00 PM	18	47	0	65	28	21	0	49	89	28	0	117	231
5:15 PM	16	53	0	69	29	28	0	57	87	33	0	120	246
5:30 PM	8	39	0	47	27	44	0	71	78	27	0	105	223
5:45 PM	17	45	0	62	26	30	0	56	53	33	0	86	204
Hourly Total	59	184	0	243	110	123	0	233	307	121	0	428	904
6:00 PM	14	30	0	44	21	26	0	47	36	18	0	54	145
6:15 PM	13	24	0	37	20	23	0	43	46	28	0	74	154
6:30 PM	8	25	0	33	18	23	0	41	33	21	0	54	128
6:45 PM	14	22	0	36	18	16	0	34	27	22	0	49	119
Hourly Total	49	101	0	150	77	88	0	165	142	89	0	231	546
7:00 PM	13	21	0	34	10	16	0	26	30	18	0	48	108
7:15 PM	9	23	0	32	18	23	0	41	26	15	0	41	114
7:30 PM	7	13	0	20	14	12	0	26	19	10	0	29	75
7:45 PM	7	15	0	22	20	14	0	34	26	16	0	42	98
Hourly Total	36	72	0	108	62	65	0	127	101	59	0	160	395
8:00 PM	5	21	0	26	9	12	0	21	26	6	0	32	79

8:15 PM	3	12	0	15	10	14	0	24	26	8	0	34	73
8:30 PM	5	13	0	18	11	13	0	24	23	10	0	33	75
8:45 PM	9	19	0	28	10	14	0	24	28	12	0	40	92
Hourly Total	22	65	0	87	40	53	0	93	103	36	0	139	319
9:00 PM	5	20	0	25	6	12	0	18	17	16	0	33	76
9:15 PM	11	15	0	26	7	9	0	16	12	7	0	19	61
9:30 PM	3	10	0	13	7	11	0	18	11	15	0	26	57
9:45 PM	3	11	0	14	5	8	0	13	13	4	0	17	44
Hourly Total	22	56	0	78	25	40	0	65	53	42	0	95	238
10:00 PM	3	16	0	19	4	7	0	11	9	9	0	18	48
10:15 PM	4	5	0	9	4	9	0	13	4	11	0	15	37
10:30 PM	1	9	0	10	6	3	0	9	13	6	0	19	38
10:45 PM	3	3	0	6	4	2	0	6	10	4	0	14	26
Hourly Total	11	33	0	44	18	21	0	39	36	30	0	66	149
11:00 PM	1	9	0	10	2	3	0	5	5	2	0	7	22
11:15 PM	0	0	0	0	2	5	0	7	4	2	0	6	13
11:30 PM	1	0	0	1	3	3	0	6	3	1	0	4	11
11:45 PM	0	1	0	1	2	6	0	8	5	4	0	9	18
Hourly Total	2	10	0	12	9	17	0	26	17	9	0	26	64
12:00 AM	1	2	0	3	0	3	0	3	2	2	0	4	10
12:15 AM	1	4	0	5	0	3	0	3	5	0	0	5	13
12:30 AM	0	1	0	1	3	4	0	7	6	1	0	7	15
12:45 AM	2	0	0	2	7	8	0	15	2	1	0	3	20
Hourly Total	4	7	0	11	10	18	0	28	15	4	0	19	58
1:00 AM	0	2	0	2	1	1	0	2	1	0	0	1	5
1:15 AM	0	0	0	0	0	1	0	1	0	0	0	0	1
1:30 AM	0	0	0	0	2	1	0	3	1	1	0	2	5
1:45 AM	1	0	0	1	2	1	0	3	4	1	0	5	9
Hourly Total	1	2	0	3	5	4	0	9	6	2	0	8	20
2:00 AM	0	0	0	0	0	5	0	5	1	0	0	1	6
2:15 AM	0	0	0	0	0	0	0	0	0	1	0	1	1
2:30 AM	1	0	0	1	0	1	0	1	2	0	0	2	4
2:45 AM	0	0	0	0	0	2	0	2	0	0	0	0	2
Hourly Total	1	0	0	1	0	8	0	8	3	1	0	4	13
3:00 AM	0	1	0	1	0	1	0	1	1	0	0	1	3
3:15 AM	0	1	0	1	0	1	0	1	1	0	0	1	3
3:30 AM	0	0	0	0	1	0	0	1	2	0	0	2	3
3:45 AM	0	2	0	2	1	2	0	3	1	0	0	1	6
Hourly Total	0	4	0	4	2	4	0	6	5	0	0	5	15
4:00 AM	0	3	0	3	1	0	0	1	4	0	0	4	8
4:15 AM	0	3	0	3	0	3	0	3	3	1	0	4	10
4:30 AM	0	6	0	6	2	5	0	7	7	0	0	7	20
4:45 AM	1	2	0	3	3	5	0	8	4	1	0	5	16
Hourly Total	1	14	0	15	6	13	0	19	18	2	0	20	54
5:00 AM	0	5	0	5	3	3	0	6	2	2	0	4	15
5:15 AM	5	4	0	9	5	6	0	11	6	1	0	7	27
5:30 AM	1	5	0	6	2	19	0	21	5	0	0	5	32
5:45 AM	5	6	0	11	8	22	0	30	3	3	0	6	47
Hourly Total	11	20	0	31	18	50	0	68	16	6	0	22	121
6:00 AM	5	7	0	12	5	12	0	17	0	2	0	2	31
6:15 AM	10	14	0	24	9	21	0	30	16	5	0	21	75
6:30 AM	13	20	0	33	15	33	0	48	6	3	0	9	90
6:45 AM	14	24	0	38	21	37	0	58	13	3	0	16	112
Hourly Total	42	65	0	107	50	103	0	153	35	13	0	48	308
7:00 AM	11	15	0	26	26	37	0	63	11	12	0	23	112
Grand Total	1001	1736	0	2737	1364	2255	0	3619	2130	1194	1	3325	9681
Approach %	36.6	63.4	0.0	-	37.7	62.3	0.0	-	64.1	35.9	0.0	-	-
Total %	10.3	17.9	0.0	28.3	14.1	23.3	0.0	37.4	22.0	12.3	0.0	34.3	-
Motorcycles	3	8	0	11	7	18	0	25	18	5	0	23	59
% Motorcycles	0.3	0.5	-	0.4	0.5	0.8	-	0.7	0.8	0.4	0.0	0.7	0.6
Cars	724	1224	0	1948	928	1605	0	2533	1609	886	0	2495	6976
% Cars	72.3	70.5	-	71.2	68.0	71.2	-	70.0	75.5	74.2	0.0	75.0	72.1
Light Goods Vehicles	256	444	0	700	378	561	0	939	407	289	1	697	2336
% Light Goods Vehicles	25.6	25.6	-	25.6	27.7	24.9	-	25.9	19.1	24.2	100.0	21.0	24.1
Buses	0	1	0	1	1	0	0	1	1	0	0	1	3
% Buses	0.0	0.1	-	0.0	0.1	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0
Single-Unit Trucks	16	48	0	64	37	58	0	95	63	14	0	77	236
% Single-Unit Trucks	1.6	2.8	-	2.3	2.7	2.6	-	2.6	3.0	1.2	0.0	2.3	2.4
Articulated Trucks	1	10	0	11	13	11	0	24	19	0	0	19	54
% Articulated Trucks	0.1	0.6	-	0.4	1.0	0.5	-	0.7	0.9	0.0	0.0	0.6	0.6
Bicycles on Road	1	1	0	2	0	2	0	2	13	0	0	13	17
% Bicycles on Road	0.1	0.1	-	0.1	0.0	0.1	-	0.1	0.6	0.0	0.0	0.4	0.2

Location: 45.718723, -111.06689

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_Frontage_Springhill (Gallatin)
Site Code:
Start Date: 07/26/2016

07/26/2016 7:15 AM
Ending At
07/27/2016 7:15 AM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

16-3A-043 [SB]

Out	In	Total
12	11	23
1814	1948	3762
667	700	1367
1	1	2
64	77	141
2558	**2737**	**5295**

R	L	U
8	3	0
1224	724	0
444	256	0
1	0	0
59	18	0
1736	**1001**	**0**

16-3A-017 [EB]

Out	In	Total
26	25	51
2833	2533	5366
851	939	1790
2	1	3
154	121	275
3866	**3619**	**7485**

U	L	T
0	7	18
0	928	1605
0	378	561
0	1	0
0	50	71
0	**1364**	**2255**

16-3A-016 [WB]

Out	In	Total
21	23	44
2329	2495	4824
818	697	1515
0	1	1
89	109	198
3257	**3325**	**6582**

R	T	U
5	18	0
886	1609	0
289	407	1
0	1	0
14	95	0
1194	**2130**	**1**

Turning Movement Data Plot

Turning Movement Peak Hour Data (7:30 AM)

Start Time	16-3A-043 Southbound				16-3A-017 Eastbound				16-3A-016 Westbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
7:30 AM	26	19	0	45	37	96	0	133	14	7	0	21	199
7:45 AM	30	24	0	54	39	86	0	125	23	15	1	39	218
8:00 AM	28	24	0	52	29	70	0	99	13	15	0	28	179
8:15 AM	27	22	0	49	18	54	0	72	15	25	0	40	161
Total	111	89	0	200	123	306	0	429	65	62	1	128	757
Approach %	55.5	44.5	0.0	-	28.7	71.3	0.0	-	50.8	48.4	0.8	-	-
Total %	14.7	11.8	0.0	26.4	16.2	40.4	0.0	56.7	8.6	8.2	0.1	16.9	-
PHF	0.925	0.927	0.000	0.926	0.788	0.797	0.000	0.806	0.707	0.620	0.250	0.800	0.868
Motorcycles	1	0	0	1	0	5	0	5	0	0	0	0	6
% Motorcycles	0.9	0.0	-	0.5	0.0	1.6	-	1.2	0.0	0.0	0.0	0.0	0.8
Cars	82	68	0	150	93	193	0	286	50	40	0	90	526
% Cars	73.9	76.4	-	75.0	75.6	63.1	-	66.7	76.9	64.5	0.0	70.3	69.5
Light Goods Vehicles	26	14	0	40	25	106	0	131	12	19	1	32	203
% Light Goods Vehicles	23.4	15.7	-	20.0	20.3	34.6	-	30.5	18.5	30.6	100.0	25.0	26.8
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0
Single-Unit Trucks	2	6	0	8	4	2	0	6	1	3	0	4	18
% Single-Unit Trucks	1.8	6.7	-	4.0	3.3	0.7	-	1.4	1.5	4.8	0.0	3.1	2.4
Articulated Trucks	0	1	0	1	1	0	0	1	2	0	0	2	4
% Articulated Trucks	0.0	1.1	-	0.5	0.8	0.0	-	0.2	3.1	0.0	0.0	1.6	0.5
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0

Turning Movement Peak Hour Data (11:15 AM)

Start Time	16-3A-043 Southbound				16-3A-017 Eastbound				16-3A-016 Westbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
11:15 AM	20	20	0	40	29	33	0	62	34	13	0	47	149
11:30 AM	18	34	0	52	20	36	0	56	39	20	0	59	167
11:45 AM	16	24	0	40	20	34	0	54	31	20	0	51	145
12:00 PM	21	35	0	56	19	32	0	51	36	22	0	58	165
Total	75	113	0	188	88	135	0	223	140	75	0	215	626
Approach %	39.9	60.1	0.0	-	39.5	60.5	0.0	-	65.1	34.9	0.0	-	-
Total %	12.0	18.1	0.0	30.0	14.1	21.6	0.0	35.6	22.4	12.0	0.0	34.3	-
PHF	0.893	0.807	0.000	0.839	0.759	0.938	0.000	0.899	0.897	0.852	0.000	0.911	0.937
Motorcycles	0	1	0	1	0	0	0	0	1	0	0	1	2
% Motorcycles	0.0	0.9	-	0.5	0.0	0.0	-	0.0	0.7	0.0	-	0.5	0.3
Cars	53	90	0	143	56	91	0	147	114	58	0	172	462
% Cars	70.7	79.6	-	76.1	63.6	67.4	-	65.9	81.4	77.3	-	80.0	73.8
Light Goods Vehicles	21	18	0	39	26	36	0	62	21	16	0	37	138
% Light Goods Vehicles	28.0	15.9	-	20.7	29.5	26.7	-	27.8	15.0	21.3	-	17.2	22.0
Buses	0	0	0	0	1	0	0	1	0	0	0	0	1
% Buses	0.0	0.0	-	0.0	1.1	0.0	-	0.4	0.0	0.0	-	0.0	0.2
Single-Unit Trucks	1	4	0	5	3	6	0	9	3	1	0	4	18
% Single-Unit Trucks	1.3	3.5	-	2.7	3.4	4.4	-	4.0	2.1	1.3	-	1.9	2.9
Articulated Trucks	0	0	0	0	2	1	0	3	1	0	0	1	4
% Articulated Trucks	0.0	0.0	-	0.0	2.3	0.7	-	1.3	0.7	0.0	-	0.5	0.6
Bicycles on Road	0	0	0	0	0	1	0	1	0	0	0	0	1
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.7	-	0.4	0.0	0.0	-	0.0	0.2

Location: 45.718723, -111.06689

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_Frontage_Springhill (Gallatin)
Site Code:
Start Date: 07/26/2016
Page No: 6

Turning Movement Peak Hour Data (4:30 PM)

Start Time	16-3A-043 Southbound				16-3A-017 Eastbound				16-3A-016 Westbound				
	Left	Right	U-Turn	App. Total	Left	Thru	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
4:30 PM	16	44	0	60	36	39	0	75	62	30	0	92	227
4:45 PM	17	48	0	65	32	40	0	72	56	32	0	88	225
5:00 PM	18	47	0	65	28	21	0	49	89	28	0	117	231
5:15 PM	16	53	0	69	29	28	0	57	87	33	0	120	246
Total	67	192	0	259	125	128	0	253	294	123	0	417	929
Approach %	25.9	74.1	0.0	-	49.4	50.6	0.0	-	70.5	29.5	0.0	-	-
Total %	7.2	20.7	0.0	27.9	13.5	13.8	0.0	27.2	31.6	13.2	0.0	44.9	-
PHF	0.931	0.906	0.000	0.938	0.868	0.800	0.000	0.843	0.826	0.932	0.000	0.869	0.944
Motorcycles	0	0	0	0	2	0	0	2	5	0	0	5	7
% Motorcycles	0.0	0.0	-	0.0	1.6	0.0	-	0.8	1.7	0.0	-	1.2	0.8
Cars	49	130	0	179	84	90	0	174	218	89	0	307	660
% Cars	73.1	67.7	-	69.1	67.2	70.3	-	68.8	74.1	72.4	-	73.6	71.0
Light Goods Vehicles	17	57	0	74	38	33	0	71	64	33	0	97	242
% Light Goods Vehicles	25.4	29.7	-	28.6	30.4	25.8	-	28.1	21.8	26.8	-	23.3	26.0
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	5	0	5	1	4	0	5	6	1	0	7	17
% Single-Unit Trucks	0.0	2.6	-	1.9	0.8	3.1	-	2.0	2.0	0.8	-	1.7	1.8
Articulated Trucks	1	0	0	1	0	1	0	1	1	0	0	1	3
% Articulated Trucks	1.5	0.0	-	0.4	0.0	0.8	-	0.4	0.3	0.0	-	0.2	0.3
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0

Location: 45.699994, -111.046264

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_7th_Griffin (Gallatin)
Site Code:
Start Date: 07/25/2016
Page No: 1

Turning Movement Data

	16-3B-020 Northbound					16-3B-019 Southbound					Mandeville Ln Eastbound					16-3B-021 Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
6:30 AM	0	20	30	0	50	15	21	0	0	36	0	1	6	0	7	16	0	0	0	16	109
6:45 AM	1	36	97	0	134	28	29	1	0	58	3	0	0	0	3	21	2	13	0	36	231
Hourly Total	1	56	127	0	184	43	50	1	0	94	3	1	6	0	10	37	2	13	0	52	340
7:00 AM	2	23	52	0	77	16	38	1	0	55	2	1	4	0	7	24	0	14	0	38	177
7:15 AM	0	24	65	0	89	30	57	3	0	90	0	3	2	0	5	34	0	9	0	43	227
7:30 AM	3	42	110	0	155	48	44	0	0	92	2	2	9	0	13	38	2	9	0	49	309
7:45 AM	2	57	150	0	209	38	58	3	0	99	2	5	3	0	10	53	2	15	0	70	388
Hourly Total	7	146	377	0	530	132	197	7	0	336	6	11	18	0	35	149	4	47	0	200	1101
8:00 AM	2	40	86	0	128	32	65	3	0	100	1	3	5	0	9	70	3	18	0	91	328
8:15 AM	3	45	78	0	126	24	45	1	0	70	2	5	3	0	10	71	1	19	0	91	297
8:30 AM	1	45	78	0	124	29	59	0	0	88	1	1	5	0	7	65	0	12	0	77	296
8:45 AM	4	55	66	0	125	31	61	3	0	95	0	6	7	0	13	57	2	20	0	79	312
Hourly Total	10	185	308	0	503	116	230	7	0	353	4	15	20	0	39	263	6	69	0	338	1233
9:00 AM	1	43	52	0	96	19	47	2	0	68	2	2	5	0	9	71	0	12	0	83	256
9:15 AM	4	58	58	0	120	24	39	0	0	63	1	3	4	0	8	60	2	19	0	81	272
9:30 AM	6	48	52	0	106	23	50	4	0	77	0	6	7	0	13	69	4	25	0	98	294
9:45 AM	6	44	61	0	111	23	57	1	0	81	4	0	12	0	16	74	6	23	0	103	311
Hourly Total	17	193	223	0	433	89	193	7	0	289	7	11	28	0	46	274	12	79	0	365	1133
10:00 AM	6	45	37	0	88	20	52	1	0	73	2	2	6	0	10	79	2	17	0	98	269
10:15 AM	4	38	50	0	92	17	40	1	0	58	1	1	10	0	12	62	1	22	0	85	247
10:30 AM	3	47	48	0	98	18	62	2	0	82	2	2	3	0	7	57	2	14	0	73	260
10:45 AM	5	47	65	0	117	24	56	1	0	81	0	2	11	0	13	53	2	15	0	70	281
Hourly Total	18	177	200	0	395	79	210	5	0	294	5	7	30	0	42	251	7	68	0	326	1057
11:00 AM	7	57	48	0	112	27	45	0	0	72	2	2	12	0	16	66	3	20	0	89	289
11:15 AM	4	52	49	0	105	15	59	2	0	76	3	4	6	0	13	87	2	26	0	115	309
11:30 AM	7	54	55	0	116	31	52	4	0	87	2	6	3	0	11	91	2	20	0	113	327
11:45 AM	4	55	62	1	122	26	69	1	0	96	2	6	7	0	15	92	4	22	0	118	351
Hourly Total	22	218	214	1	455	99	225	7	0	331	9	18	28	0	55	336	11	88	0	435	1276
12:00 PM	8	59	68	0	135	16	76	2	0	94	3	5	12	0	20	116	6	34	0	156	405
12:15 PM	3	60	74	0	137	28	60	2	0	90	7	9	17	0	33	100	2	38	0	140	400
12:30 PM	7	65	67	0	139	21	79	1	0	101	1	7	9	0	17	66	6	14	0	86	343
12:45 PM	4	68	75	0	147	18	65	2	0	85	3	3	10	0	16	88	5	24	0	117	365
Hourly Total	22	252	284	0	558	83	280	7	0	370	14	24	48	0	86	370	19	110	0	499	1513
1:00 PM	5	69	82	0	156	16	66	0	0	82	5	12	9	0	26	60	1	23	0	84	348
1:15 PM	4	65	70	0	139	24	49	6	1	80	0	4	8	0	12	74	5	17	0	96	327
1:30 PM	9	69	71	0	149	33	53	2	0	88	2	0	8	0	10	71	0	22	0	93	340
1:45 PM	5	52	77	0	134	10	66	1	0	77	2	0	8	0	10	75	2	21	0	98	319
Hourly Total	23	255	300	0	578	83	234	9	1	327	9	16	33	0	58	280	8	83	0	371	1334
2:00 PM	6	68	88	0	162	18	57	4	0	79	1	0	14	0	15	55	7	23	0	85	341
2:15 PM	3	53	78	0	134	17	49	4	0	70	7	0	6	0	13	53	3	18	0	74	291
2:30 PM	8	83	67	0	158	16	55	0	0	71	1	2	4	0	7	82	2	32	0	116	352
2:45 PM	5	72	59	0	136	12	66	2	0	80	0	3	6	0	9	71	1	25	0	97	322
Hourly Total	22	276	292	0	590	63	227	10	0	300	9	5	30	0	44	261	13	98	0	372	1306
3:00 PM	1	62	71	0	134	17	50	2	0	69	1	1	4	0	6	67	4	24	0	95	304
3:15 PM	5	54	74	0	133	29	44	0	0	73	3	3	9	0	15	82	1	33	0	116	337
3:30 PM	12	62	73	0	147	23	44	2	0	69	2	1	6	0	9	74	4	28	0	106	331
3:45 PM	8	63	76	0	147	25	78	4	0	107	1	8	8	0	17	107	3	31	0	141	412
Hourly Total	26	241	294	0	561	94	216	8	0	318	7	13	27	0	47	330	12	116	0	458	1384
4:00 PM	5	72	66	0	143	17	45	0	0	62	2	4	10	0	16	117	2	35	0	154	375
4:15 PM	5	101	58	0	164	21	68	2	0	91	1	1	7	0	9	97	4	42	0	143	407
4:30 PM	6	70	56	0	132	26	55	0	0	81	1	1	6	0	8	99	4	29	0	132	353
4:45 PM	9	94	56	0	159	31	53	2	0	86	3	0	6	0	9	119	3	40	0	162	416
Hourly Total	25	337	236	0	598	95	221	4	0	320	7	6	29	0	42	432	13	146	0	591	1551
5:00 PM	5	85	59	0	149	24	88	3	0	115	1	5	13	0	19	133	0	31	0	164	447
5:15 PM	8	108	58	0	174	12	63	2	0	77	1	2	6	0	9	146	1	40	0	187	447
5:30 PM	6	72	54	0	132	18	59	1	0	78	3	4	9	0	16	128	3	38	0	169	395
5:45 PM	3	69	62	0	134	19	52	2	0	73	2	2	16	0	20	79	1	35	0	115	342
Hourly Total	22	334	233	0	589	73	262	8	0	343	7	13	44	0	64	486	5	144	0	635	1631
6:00 PM	5	54	45	0	104	11	53	1	0	65	1	0	7	0	8	68	1	26	0	95	272
6:15 PM	6	44	34	0	84	11	36	0	0	47	1	0	5	0	6	66	0	15	0	81	218
6:30 PM	5	42	41	0	88	14	48	4	0	66	2	0	10	0	12	44	2	11	0	57	223
6:45 PM	6	49	47	0	102	17	41	0	0	58	2	0	9	0	11	36	2	17	0	55	226
Hourly Total	22	189	167	0	378	53	178	5	0	236	6	0	31	0	37	214	5	69	0	288	939
7:00 PM	5	34	27	0	66	8	48	0	0	56	3	2	9	0	14	56	0	15	0	71	207
7:15 PM	8	37	35	0	80	5	16	0	0	21	2	2	11	0	15	50	1	10	0	61	177

7:30 PM	4	20	24	0	48	13	14	2	0	29	0	2	3	0	5	32	2	19	0	53	135
7:45 PM	1	27	22	0	50	6	17	0	0	23	1	1	6	0	8	40	2	6	0	48	129
Hourly Total	18	118	108	0	244	32	95	2	0	129	6	7	29	0	42	178	5	50	0	233	648
8:00 PM	1	28	18	0	47	3	14	0	0	17	0	0	1	0	1	33	3	6	0	42	107
8:15 PM	4	19	22	0	45	6	12	0	0	18	0	2	4	0	6	29	2	7	0	38	107
8:30 PM	1	20	15	0	36	4	19	2	0	25	0	0	4	0	4	31	0	7	0	38	103
8:45 PM	4	22	15	0	41	5	13	1	0	19	1	1	2	0	4	33	4	5	0	42	106
Hourly Total	10	89	70	0	169	18	58	3	0	79	1	3	11	0	15	126	9	25	0	160	423
9:00 PM	1	22	10	0	33	0	9	1	0	10	0	0	2	0	2	26	2	8	0	36	81
9:15 PM	5	20	10	0	35	3	22	0	0	25	0	0	6	0	6	22	0	5	0	27	93
9:30 PM	3	16	15	1	35	2	7	0	0	9	0	1	3	0	4	25	0	2	0	27	75
9:45 PM	3	16	9	0	28	3	8	0	0	11	1	0	4	0	5	19	2	6	0	27	71
Hourly Total	12	74	44	1	131	8	46	1	0	55	1	1	15	0	17	92	4	21	0	117	320
10:00 PM	4	20	11	2	37	3	7	0	0	10	0	0	2	0	2	15	0	3	0	18	67
10:15 PM	2	8	9	0	19	4	6	1	0	11	0	0	3	0	3	6	0	2	0	8	41
10:30 PM	1	10	6	0	17	1	10	0	0	11	0	1	0	0	1	7	1	3	0	11	40
10:45 PM	1	12	9	0	22	1	4	1	0	6	0	0	1	0	1	7	0	1	0	8	37
Hourly Total	8	50	35	2	95	9	27	2	0	38	0	1	6	0	7	35	1	9	0	45	185
11:00 PM	0	5	5	0	10	1	3	0	0	4	0	0	0	0	0	2	0	2	0	4	18
11:15 PM	2	6	2	0	10	0	4	0	0	4	0	0	0	0	0	1	0	3	0	4	18
11:30 PM	2	5	4	1	12	2	2	0	0	4	0	0	2	0	2	4	0	0	0	4	22
11:45 PM	1	6	2	0	9	2	3	0	0	5	0	1	4	0	5	4	0	3	0	7	26
Hourly Total	5	22	13	1	41	5	12	0	0	17	0	1	6	0	7	11	0	8	0	19	84
12:00 AM	1	6	1	0	8	2	1	0	0	3	0	0	1	0	1	2	0	0	0	2	14
12:15 AM	1	4	2	0	7	2	3	0	0	5	0	0	1	0	1	2	0	0	0	2	15
12:30 AM	1	1	6	0	8	1	0	0	0	1	0	0	0	0	0	1	0	2	0	3	12
12:45 AM	0	1	1	0	2	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	4
Hourly Total	3	12	10	0	25	5	4	0	0	9	0	0	3	0	3	5	0	3	0	8	45
1:00 AM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	6
1:15 AM	0	0	3	0	3	0	1	0	0	1	0	0	0	0	0	3	0	0	0	3	7
1:30 AM	0	2	1	0	3	0	4	0	0	4	0	0	1	0	1	2	0	2	0	4	12
1:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
Hourly Total	0	5	5	0	10	0	5	0	0	5	0	0	1	0	1	6	0	5	0	11	27
2:00 AM	1	2	2	0	5	0	2	0	0	2	0	1	0	0	1	2	0	1	0	3	11
2:15 AM	2	1	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4
2:30 AM	0	2	1	0	3	2	1	0	0	3	0	0	0	0	0	3	0	0	0	3	9
2:45 AM	0	1	6	0	7	0	3	0	0	3	0	0	3	0	3	0	0	0	0	0	13
Hourly Total	3	6	9	0	18	2	6	0	0	8	0	1	3	0	4	6	0	1	0	7	37
3:00 AM	0	3	1	0	4	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	6
3:15 AM	0	1	1	0	2	1	1	0	0	2	0	0	1	0	1	2	0	0	0	2	7
3:30 AM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4
3:45 AM	0	4	1	0	5	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	8
Hourly Total	0	10	4	0	14	3	3	0	0	6	0	0	2	0	2	2	1	0	0	3	25
4:00 AM	0	1	1	0	2	0	2	0	0	2	0	0	0	0	0	2	0	3	0	5	9
4:15 AM	0	2	1	0	3	0	2	0	0	2	0	0	0	0	0	6	0	1	0	7	12
4:30 AM	0	3	1	0	4	0	0	0	0	0	0	0	0	0	0	8	0	0	0	8	12
4:45 AM	0	3	6	0	9	5	5	0	0	10	0	0	0	0	0	1	0	1	0	2	21
Hourly Total	0	9	9	0	18	5	9	0	0	14	0	0	0	0	0	17	0	5	0	22	54
5:00 AM	0	3	3	0	6	2	7	0	0	9	0	0	0	0	0	3	0	1	0	4	19
5:15 AM	0	4	5	0	9	5	7	0	0	12	0	0	0	0	0	2	0	1	0	3	24
5:30 AM	2	9	13	0	24	3	11	2	0	16	0	0	1	0	1	4	0	2	0	6	47
5:45 AM	3	21	26	0	50	11	9	3	0	23	0	0	1	0	1	7	0	5	0	12	86
Hourly Total	5	37	47	0	89	21	34	5	0	60	0	0	2	0	2	16	0	9	0	25	176
6:00 AM	1	3	23	0	27	11	12	1	0	24	0	1	3	0	4	14	3	5	0	22	77
6:15 AM	1	12	29	0	42	10	13	0	0	23	0	5	2	0	7	16	0	0	0	16	88
Grand Total	303	3306	3661	5	7275	1231	3047	99	1	4378	101	160	455	0	716	4207	140	1271	0	5618	17987
Approach %	4.2	45.4	50.3	0.1	-	28.1	69.6	2.3	0.0	-	14.1	22.3	63.5	0.0	-	74.9	2.5	22.6	0.0	-	-
Total %	1.7	18.4	20.4	0.0	40.4	6.8	16.9	0.6	0.0	24.3	0.6	0.9	2.5	0.0	4.0	23.4	0.8	7.1	0.0	31.2	-
Motorcycles	4	25	26	0	55	9	16	2	0	27	0	2	6	0	8	32	2	20	0	54	144
% Motorcycles	1.3	0.8	0.7	0.0	0.8	0.7	0.5	2.0	0.0	0.6	0.0	1.3	1.3	-	1.1	0.8	1.4	1.6	-	1.0	0.8
Cars	217	2222	2410	5	4854	693	2094	68	1	2856	74	102	318	0	494	2601	85	734	0	3420	11624
% Cars	71.6	67.2	65.8	100.0	66.7	56.3	68.7	68.7	100.0	65.2	73.3	63.8	69.9	-	69.0	61.8	60.7	57.7	-	60.9	64.6
Light Goods Vehicles	71	926	971	0	1968	461	836	25	0	1322	26	50	110	0	186	1307	49	453	0	1809	5285
% Light Goods Vehicles	23.4	28.0	26.5	0.0	27.1	37.4	27.4	25.3	0.0	30.2	25.7	31.3	24.2	-	26.0	31.1	35.0	35.6	-	32.2	29.4
Buses	3	4	11	0	18	8	2	0	0	10	0	0	1	0	1	15	0	2	0	17	46
% Buses	1.0	0.1	0.3	0.0	0.2	0.6	0.1	0.0	0.0	0.2	0.0	0.0	0.2	-	0.1	0.4	0.0	0.2	-	0.3	0.3
Single-Unit Trucks	8	112	148	0	268	49	86	2	0	137	1	5	19	0	25	166	3	54	0	223	653
% Single-Unit Trucks	2.6	3.4	4.0	0.0	3.7	4.0	2.8	2.0	0.0	3.1	1.0	3.1	4.2	-	3.5	3.9	2.1	4.2	-	4.0	3.6
Articulated Trucks	0	17	95	0	112	11	13	2	0	26	0	1	1	0	2	86	1	8	0	95	235
% Articulated Trucks	0.0	0.5	2.6	0.0	1.5	0.9	0.4	2.0	0.0	0.6	0.0	0.6	0.2	-	0.3	2.0	0.7	0.6	-	1.7	1.3

Location: 45.699994, -111.046264

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_7th_Griffin (Gallatin)
Site Code:
Start Date: 07/25/2016
Page No: 3

16-3B-019 [SB]

Out	In	Total
45	27	72
3031	2856	5887
1405	1322	2727
6	10	16
192	163	355
4679	**4378**	**9057**

R	T	L	U
2	16	9	0
68	2094	693	1
25	836	461	0
0	2	8	0
4	99	60	0
99	**3047**	**1231**	**1**

Mandeville Ln [EB]

Out	In	Total
8	8	16
370	494	864
145	186	331
3	1	4
16	27	43
542	**716**	**1258**

U	L	T	R
0	0	2	6
0	74	102	318
0	26	50	110
0	0	0	1
0	1	6	20
0	**101**	**160**	**455**

07/25/2016 6:30 AM
Ending At
07/26/2016 6:30 AM

Motorcycles
Cars
Light Goods Vehicles
Buses
Other

16-3B-021 [WB]

R	T	L	U
20	2	32	0
734	85	2601	0
453	49	1307	0
2	0	15	0
62	4	252	0
1271	**140**	**4207**	**0**

Out	In	Total
37	54	91
3205	3420	6625
1482	1809	3291
19	17	36
309	318	627
5052	**5618**	**10670**

U	L	T	R
0	4	25	26
5	217	2222	2410
0	71	926	971
0	3	4	11
0	8	129	243
5	**303**	**3306**	**3661**

Out	In	Total
54	55	109
5018	4854	9872
2253	1968	4221
18	18	36
371	380	751
7714	**7275**	**14989**

16-3B-020 [NB]

Turning Movement Data Plot

Location: 45.699994, -111.046264

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Count Name: Bozeman_7th_Griffin (Gallatin)
Site Code:
Start Date: 07/25/2016

Turning Movement Peak Hour Data (7:30 AM)

Start Time	16-3B-020 Northbound					16-3B-019 Southbound					Mandeville Ln Eastbound					16-3B-021 Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:30 AM	3	42	110	0	155	48	44	0	0	92	2	2	9	0	13	38	2	9	0	49	309
7:45 AM	2	57	150	0	209	38	58	3	0	99	2	5	3	0	10	53	2	15	0	70	388
8:00 AM	2	40	86	0	128	32	65	3	0	100	1	3	5	0	9	70	3	18	0	91	328
8:15 AM	3	45	78	0	126	24	45	1	0	70	2	5	3	0	10	71	1	19	0	91	297
Total	10	184	424	0	618	142	212	7	0	361	7	15	20	0	42	232	8	61	0	301	1322
Approach %	1.6	29.8	68.6	0.0	-	39.3	58.7	1.9	0.0	-	16.7	35.7	47.6	0.0	-	77.1	2.7	20.3	0.0	-	-
Total %	0.8	13.9	32.1	0.0	46.7	10.7	16.0	0.5	0.0	27.3	0.5	1.1	1.5	0.0	3.2	17.5	0.6	4.6	0.0	22.8	-
PHF	0.833	0.807	0.707	0.000	0.739	0.740	0.815	0.583	0.000	0.903	0.875	0.750	0.556	0.000	0.808	0.817	0.667	0.803	0.000	0.827	0.852
Motorcycles	0	0	6	0	6	1	1	0	0	2	0	0	0	0	0	1	0	0	0	1	9
% Motorcycles	0.0	0.0	1.4	-	1.0	0.7	0.5	0.0	-	0.6	0.0	0.0	0.0	-	0.0	0.4	0.0	0.0	-	0.3	0.7
Cars	5	127	347	0	479	98	150	5	0	253	4	10	17	0	31	121	5	35	0	161	924
% Cars	50.0	69.0	81.8	-	77.5	69.0	70.8	71.4	-	70.1	57.1	66.7	85.0	-	73.8	52.2	62.5	57.4	-	53.5	69.9
Light Goods Vehicles	4	49	48	0	101	38	50	2	0	90	3	5	3	0	11	82	2	24	0	108	310
% Light Goods Vehicles	40.0	26.6	11.3	-	16.3	26.8	23.6	28.6	-	24.9	42.9	33.3	15.0	-	26.2	35.3	25.0	39.3	-	35.9	23.4
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.4	0.0	0.0	-	0.3	0.1
Single-Unit Trucks	1	4	7	0	12	4	10	0	0	14	0	0	0	0	0	19	0	2	0	21	47
% Single-Unit Trucks	10.0	2.2	1.7	-	1.9	2.8	4.7	0.0	-	3.9	0.0	0.0	0.0	-	0.0	8.2	0.0	3.3	-	7.0	3.6
Articulated Trucks	0	4	16	0	20	1	1	0	0	2	0	0	0	0	0	8	1	0	0	9	31
% Articulated Trucks	0.0	2.2	3.8	-	3.2	0.7	0.5	0.0	-	0.6	0.0	0.0	0.0	-	0.0	3.4	12.5	0.0	-	3.0	2.3

Turning Movement Peak Hour Data (12:00 PM)

	16-3B-020 Northbound					16-3B-019 Southbound					Mandeville Ln Eastbound					16-3B-021 Westbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
12:00 PM	8	59	68	0	135	16	76	2	0	94	3	5	12	0	20	116	6	34	0	156	405
12:15 PM	3	60	74	0	137	28	60	2	0	90	7	9	17	0	33	100	2	38	0	140	400
12:30 PM	7	65	67	0	139	21	79	1	0	101	1	7	9	0	17	66	6	14	0	86	343
12:45 PM	4	68	75	0	147	18	65	2	0	85	3	3	10	0	16	88	5	24	0	117	365
Total	22	252	284	0	558	83	280	7	0	370	14	24	48	0	86	370	19	110	0	499	1513
Approach %	3.9	45.2	50.9	0.0	-	22.4	75.7	1.9	0.0	-	16.3	27.9	55.8	0.0	-	74.1	3.8	22.0	0.0	-	-
Total %	1.5	16.7	18.8	0.0	36.9	5.5	18.5	0.5	0.0	24.5	0.9	1.6	3.2	0.0	5.7	24.5	1.3	7.3	0.0	33.0	-
PHF	0.688	0.926	0.947	0.000	0.949	0.741	0.886	0.875	0.000	0.916	0.500	0.667	0.706	0.000	0.652	0.797	0.792	0.724	0.000	0.800	0.934
Motorcycles	0	1	2	0	3	0	1	0	0	1	0	0	0	0	0	2	0	0	0	2	6
% Motorcycles	0.0	0.4	0.7	-	0.5	0.0	0.4	0.0	-	0.3	0.0	0.0	0.0	-	0.0	0.5	0.0	0.0	-	0.4	0.4
Cars	17	171	187	0	375	41	198	4	0	243	11	16	31	0	58	256	9	61	0	326	1002
% Cars	77.3	67.9	65.8	-	67.2	49.4	70.7	57.1	-	65.7	78.6	66.7	64.6	-	67.4	69.2	47.4	55.5	-	65.3	66.2
Light Goods Vehicles	5	68	73	0	146	37	73	3	0	113	3	6	15	0	24	87	9	42	0	138	421
% Light Goods Vehicles	22.7	27.0	25.7	-	26.2	44.6	26.1	42.9	-	30.5	21.4	25.0	31.3	-	27.9	23.5	47.4	38.2	-	27.7	27.8
Buses	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.4	0.0	-	0.3	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.1
Single-Unit Trucks	0	10	12	0	22	5	7	0	0	12	0	2	1	0	3	18	1	4	0	23	60
% Single-Unit Trucks	0.0	4.0	4.2	-	3.9	6.0	2.5	0.0	-	3.2	0.0	8.3	2.1	-	3.5	4.9	5.3	3.6	-	4.6	4.0
Articulated Trucks	0	2	10	0	12	0	0	0	0	0	0	0	1	0	1	7	0	3	0	10	23
% Articulated Trucks	0.0	0.8	3.5	-	2.2	0.0	0.0	0.0	-	0.0	0.0	0.0	2.1	-	1.2	1.9	0.0	2.7	-	2.0	1.5

Montana Department of Transportation
2701 Prospect

Helena, Montana, United States 59620
406-444-9417

Location: 45.699994, -111.046264

Count Name: Bozeman_7th_Griffin (Gallatin)
Site Code:
Start Date: 07/25/2016

Turning Movement Peak Hour Data (4:45 PM)

Start Time	16-3B-020 Northbound					16-3B-019 Southbound					Mandeville Ln Eastbound					16-3B-021 Westbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
4:45 PM	9	94	56	0	159	31	53	2	0	86	3	0	6	0	9	119	3	40	0	162	416
5:00 PM	5	85	59	0	149	24	88	3	0	115	1	5	13	0	19	133	0	31	0	164	447
5:15 PM	8	108	58	0	174	12	63	2	0	77	1	2	6	0	9	146	1	40	0	187	447
5:30 PM	6	72	54	0	132	18	59	1	0	78	3	4	9	0	16	128	3	38	0	169	395
Total	28	359	227	0	614	85	263	8	0	356	8	11	34	0	53	526	7	149	0	682	1705
Approach %	4.6	58.5	37.0	0.0	-	23.9	73.9	2.2	0.0	-	15.1	20.8	64.2	0.0	-	77.1	1.0	21.8	0.0	-	-
Total %	1.6	21.1	13.3	0.0	36.0	5.0	15.4	0.5	0.0	20.9	0.5	0.6	2.0	0.0	3.1	30.9	0.4	8.7	0.0	40.0	-
PHF	0.778	0.831	0.962	0.000	0.882	0.685	0.747	0.667	0.000	0.774	0.667	0.550	0.654	0.000	0.697	0.901	0.583	0.931	0.000	0.912	0.954
Motorcycles	2	1	1	0	4	0	3	1	0	4	0	1	0	0	1	3	0	2	0	5	14
% Motorcycles	7.1	0.3	0.4	-	0.7	0.0	1.1	12.5	-	1.1	0.0	9.1	0.0	-	1.9	0.6	0.0	1.3	-	0.7	0.8
Cars	19	241	152	0	412	60	174	6	0	240	6	9	27	0	42	330	4	81	0	415	1109
% Cars	67.9	67.1	67.0	-	67.1	70.6	66.2	75.0	-	67.4	75.0	81.8	79.4	-	79.2	62.7	57.1	54.4	-	60.9	65.0
Light Goods Vehicles	7	108	66	0	181	21	83	1	0	105	2	1	6	0	9	178	3	61	0	242	537
% Light Goods Vehicles	25.0	30.1	29.1	-	29.5	24.7	31.6	12.5	-	29.5	25.0	9.1	17.6	-	17.0	33.8	42.9	40.9	-	35.5	31.5
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	8	8	0	16	4	3	0	0	7	0	0	1	0	1	9	0	4	0	13	37
% Single-Unit Trucks	0.0	2.2	3.5	-	2.6	4.7	1.1	0.0	-	2.0	0.0	0.0	2.9	-	1.9	1.7	0.0	2.7	-	1.9	2.2
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	6	0	1	0	7	8
% Articulated Trucks	0.0	0.3	0.0	-	0.2	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	1.1	0.0	0.7	-	1.0	0.5

Appendix B

EXISTING OPERATIONAL ANALYSIS

Intersection Level Of Service Report
Intersection 1: Jackrabbit Lane & Main Street

Control Type:	Signalized	Delay (sec / veh):	23.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.574

Intersection Setup

Name	Jackrabbit Lane			Jackrabbit Lane			Frontage Road			Main Street		
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	0	1	0	0	0	0	0
Pocket Length [ft]	200.00	100.00	100.00	250.00	100.00	100.00	300.00	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	Jackrabbit Lane			Jackrabbit Lane			Frontage Road			Main Street		
Base Volume Input [veh/h]	82	134	171	17	254	0	8	123	379	101	48	18
Base Volume Adjustment Factor	0.9200	0.9200	0.9200	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	2.40	1.50	5.20	0.00	0.80	0.00	0.00	0.00	0.50	3.00	2.10	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]	75	123	157	18	264	0	8	128	394	93	44	17
Peak Hour Factor	0.8620	0.8620	0.8620	0.8620	0.8620	0.8620	0.8620	0.8620	0.8620	0.8620	0.8620	0.8620
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]	22	36	46	5	77	0	2	37	114	27	13	5
Total Analysis Volume [veh/h]	87	143	182	21	306	0	9	148	457	108	51	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
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]	80
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	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	2	1	6	6	3	8	0	7	4	0
Auxiliary Signal Groups			2,7			3,6						
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	0
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	9	19	19	9	19	19	9	43	0	9	43	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	5	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	10	0	10	0	0	10	0
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No		No	No	
Maximum Recall	No	No	No	No	No	No	No	No		No	No	
Pedestrian Recall	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	L	C	R	L	C	R	L	C	R	L	C
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
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
l2, Clearance Lost Time [s]	0.00	2.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00	0.00	2.00
g_i, Effective Green Time [s]	35	29	38	35	27	32	37	28	28	37	32
g / C, Green / Cycle	0.44	0.37	0.48	0.44	0.34	0.40	0.46	0.35	0.35	0.46	0.40
(v / s)_i Volume / Saturation Flow Rate	0.08	0.08	0.13	0.02	0.18	0.00	0.01	0.09	0.32	0.09	0.04
s, saturation flow rate [veh/h]	1073	1685	1382	1194	1696	1454	1249	1710	1446	1193	1596
c, Capacity [veh/h]	458	615	661	587	568	578	668	594	502	608	635
d1, Uniform Delay [s]	14.30	17.68	12.57	12.90	21.64	0.00	11.78	18.72	25.00	12.71	15.23
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.11	0.11	0.11	0.20	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
d2, Incremental Delay [s]	0.92	0.89	1.03	0.02	3.63	0.00	0.01	0.22	11.50	0.14	0.08
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
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
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

Lane Group Results

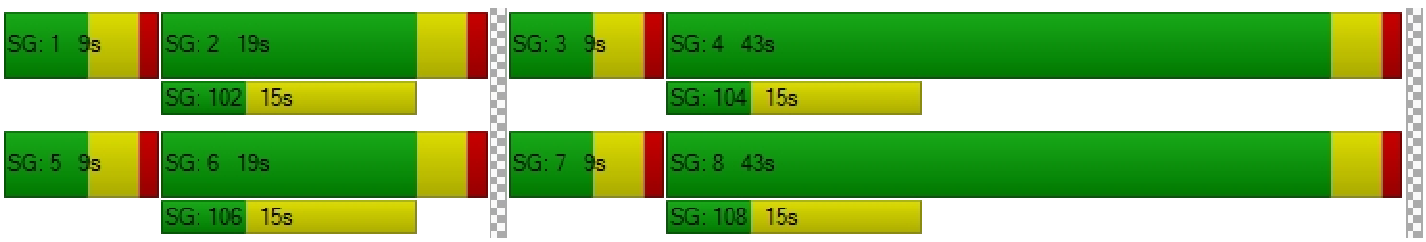
X, volume / capacity	0.19	0.23	0.28	0.04	0.54	0.00	0.01	0.25	0.91	0.18	0.11
d, Delay for Lane Group [s/veh]	15.21	18.56	13.60	12.93	25.27	0.00	11.78	18.93	36.50	12.85	15.30
Lane Group LOS	B	B	B	B	C	A	B	B	D	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh]	1.00	1.90	2.01	0.21	5.01	0.00	0.08	1.92	9.39	1.08	0.80
50th-Percentile Queue Length [ft]	24.92	47.58	50.31	5.19	125.21	0.00	2.11	48.12	234.81	27.08	19.89
95th-Percentile Queue Length [veh]	1.79	3.43	3.62	0.37	8.68	0.00	0.15	3.46	14.42	1.95	1.43
95th-Percentile Queue Length [ft]	44.86	85.64	90.57	9.34	216.97	0.00	3.79	86.61	360.47	48.75	35.81

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	15.21	18.56	13.60	12.93	25.27	0.00	11.78	18.93	36.50	12.85	15.30	15.30
Movement LOS	B	B	B	B	C	A	B	B	D	B	B	B
d_A, Approach Delay [s/veh]	15.66			24.48			31.90			13.82		
Approach LOS	B			C			C			B		
d_I, Intersection Delay [s/veh]	23.84											
Intersection LOS	C											
Intersection V/C	0.574											

Sequence

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



Intersection Level Of Service Report
Intersection 2: Broadway Street & Main Street

Control Type:	All-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes		

Intersection Setup

Name	Broadway Street			Broadway Street			Main Street			Main Street		
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	Broadway Street			Broadway Street			Main Street			Main Street		
Base Volume Input [veh/h]	27	63	60	23	45	11	10	167	13	71	82	17
Base Volume Adjustment Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.00	1.60	8.30	0.00	4.40	0.00	0.00	4.20	0.00	8.40	3.60	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]	28	66	62	24	47	11	9	154	12	65	75	16
Peak Hour Factor	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320
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]	8	18	17	6	13	3	2	41	3	17	20	4
Total Analysis Volume [veh/h]	30	71	67	26	50	12	10	165	13	70	80	17
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.85	0.42	0.99	0.87
95th-Percentile Queue Length [ft]	21.26	10.48	24.76	21.84
Approach Delay [s/veh]	9.14	8.75	9.40	9.35
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	9.22			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 3: Oregon Street & Main Street

Control Type:	Two-way stop	Delay (sec / veh):	16.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.098

Intersection Setup

Name	Oregon Street						Main Street			Main Street		
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	Oregon Street						Main Street			Main Street		
Base Volume Input [veh/h]	31	16	57	29	7	21	29	264	2	18	188	1
Base Volume Adjustment Factor	1.0400	1.0400	1.0400	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.00	6.30	1.80	0.00	0.00	4.80	4.90	0.00	5.60	5.60	3.80	100.00
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]	32	17	59	29	7	21	27	243	2	17	173	1
Peak Hour Factor	0.8460	0.8460	0.8460	0.8460	0.8460	0.8460	0.8460	0.8460	0.8460	0.8460	0.8460	0.8460
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]	9	5	17	9	2	6	8	72	1	5	51	0
Total Analysis Volume [veh/h]	38	20	70	34	8	25	32	287	2	20	204	1
Pedestrian Volume [ped/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	0.10	0.05	0.09	0.10	0.02	0.03	0.02	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	16.28	15.88	10.28	16.78	15.40	10.73	7.73	0.00	0.00	7.92	0.00	0.00
Movement LOS	C	C	B	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.53	0.53	0.31	0.52	0.52	0.52	0.93	0.93	0.93	0.65	0.65	0.65
95th-Percentile Queue Length [ft]	13.30	13.30	7.68	12.93	12.93	12.93	23.24	23.24	23.24	16.34	16.34	16.34
d_A, Approach Delay [s/veh]	12.94			14.36			0.77			0.70		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	4.08											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 4: Airway Boulevard & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	20.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.309

Intersection Setup

Name	Airway Boulevard			Airway Boulevard			Frontage Road			Frontage Road		
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	Airway Boulevard			Airway Boulevard			Frontage Road			Frontage Road		
Base Volume Input [veh/h]	54	125	99	70	160	2	12	203	119	77	105	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	5.60	4.00	14.20	22.80	6.90	0.00	0.00	4.90	5.10	10.40	8.60	31.30
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	125	99	70	160	2	11	187	109	71	97	44
Peak Hour Factor	0.8440	0.8440	0.8440	0.8440	0.8440	0.8440	0.8440	0.8440	0.8440	0.8440	0.8440	0.8440
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]	16	37	29	21	47	1	3	55	32	21	29	13
Total Analysis Volume [veh/h]	64	148	117	83	190	2	13	222	129	84	115	52
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]	70
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	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	0	5	5	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	21	0	11	21	0	11	27	0	11	27	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	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
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	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

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	R	L	C	R
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
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	4.00	4.00	0.00	4.00	4.00	0.00	4.00	4.00	0.00	4.00	4.00
g_i, Effective Green Time [s]	36	26	26	36	26	26	22	12	12	22	15	15
g / C, Green / Cycle	0.51	0.37	0.37	0.51	0.38	0.38	0.31	0.17	0.17	0.31	0.21	0.21
(v / s)_i Volume / Saturation Flow Rate	0.06	0.08	0.09	0.09	0.06	0.06	0.01	0.14	0.09	0.07	0.07	0.05
s, saturation flow rate [veh/h]	1140	1644	1414	942	1600	1594	1277	1630	1383	1150	1575	1107
c, Capacity [veh/h]	688	607	522	569	601	599	481	278	236	382	334	235
d1, Uniform Delay [s]	8.74	15.26	15.36	9.03	14.58	14.58	16.73	27.98	26.66	18.11	23.52	22.88
k, delay calibration	0.50	0.50	0.50	0.26	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]	0.27	0.87	1.10	0.28	0.57	0.57	0.02	5.21	1.97	0.29	0.61	0.47
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	0.23	0.24	0.15	0.16	0.16	0.03	0.80	0.55	0.22	0.34	0.22
d, Delay for Lane Group [s/veh]	9.01	16.14	16.46	9.31	15.15	15.15	16.75	33.19	28.62	18.40	24.13	23.35
Lane Group LOS	A	B	B	A	B	B	B	C	C	B	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh]	0.49	1.56	1.46	0.63	1.04	1.04	0.14	3.82	2.02	0.96	1.60	0.71
50th-Percentile Queue Length [ft]	12.25	39.05	36.59	15.63	26.01	25.97	3.51	95.45	50.48	24.10	40.11	17.79
95th-Percentile Queue Length [veh]	0.88	2.81	2.63	1.13	1.87	1.87	0.25	6.87	3.63	1.74	2.89	1.28
95th-Percentile Queue Length [ft]	22.04	70.28	65.86	28.13	46.81	46.75	6.32	171.81	90.87	43.38	72.20	32.02

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	9.01	16.16	16.46	9.31	15.15	15.15	16.75	33.19	28.62	18.40	24.13	23.35
Movement LOS	A	B	B	A	B	B	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	14.87			13.39			30.99			22.05		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	20.83											
Intersection LOS	C											
Intersection V/C	0.309											

Sequence

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

Intersection Level Of Service Report
Intersection 5: Airport Road & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	15.7
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.026

Intersection Setup

Name	Airport Road		Frontage Road		Frontage Road	
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	Airport Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	8	135	116	288	179	5
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	0.00	2.20	2.60	2.80	6.70	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 [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	135	94	233	145	4
Peak Hour Factor	0.8380	0.8380	0.8380	0.8380	0.8380	0.8380
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	40	28	70	43	1
Total Analysis Volume [veh/h]	10	161	112	278	173	5
Pedestrian Volume [ped/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	0.03	0.19	0.08	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	15.65	10.35	7.81	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.80	0.80	1.15	1.15	0.00	0.00
95th-Percentile Queue Length [ft]	19.97	19.97	28.86	28.86	0.00	0.00
d_A, Approach Delay [s/veh]	10.66		2.24		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	3.65					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 6: Valley Center Spur & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	15.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.145

Intersection Setup

Name	Valley Center Spur		Frontage Road		Frontage Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	250.00	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	Valley Center Spur		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	56	116	333	130	68	97
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	3.60	0.90	3.40	0.80	5.90	15.40
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]	56	116	270	105	55	79
Peak Hour Factor	0.8330	0.8330	0.8330	0.8330	0.8330	0.8330
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	35	81	32	17	24
Total Analysis Volume [veh/h]	67	139	324	126	66	95
Pedestrian Volume [ped/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	0.14	0.19	0.00	0.00	0.06	0.00
d_M, Delay for Movement [s/veh]	15.76	12.99	0.00	0.00	8.52	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	1.49	1.49	0.00	0.00	0.19	0.00
95th-Percentile Queue Length [ft]	37.18	37.18	0.00	0.00	4.83	0.00
d_A, Approach Delay [s/veh]	13.89		0.00		3.49	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	4.19					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 8: Nelson Road & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	13.2
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.128

Intersection Setup

Name	Nelson Road		Frontage Road		Frontage Road	
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	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	300.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Nelson Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	57	32	11	374	147	17
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	3.50	15.60	0.00	3.50	6.10	5.90
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]	57	32	9	303	119	14
Peak Hour Factor	0.8580	0.8580	0.8580	0.8580	0.8580	0.8580
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	17	9	3	88	35	4
Total Analysis Volume [veh/h]	66	37	10	353	139	16
Pedestrian Volume [ped/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	0.13	0.04	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.20	10.34	7.52	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.61	0.61	0.02	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	15.25	15.25	0.53	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.17		0.21		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	2.14					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 9: Springhill Road & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	11.7
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.302

Intersection Setup

Name	Springhill Road		Frontage Road		Frontage Road	
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	1	0	1	0	0	1
Pocket Length [ft]	150.00	100.00	200.00	100.00	100.00	300.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Springhill Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	111	89	123	306	65	62
Base Volume Adjustment Factor	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500
Heavy Vehicles Percentage [%]	1.80	7.80	4.10	0.70	4.60	4.80
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 [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	117	93	129	321	68	65
Peak Hour Factor	0.8680	0.8680	0.8680	0.8680	0.8680	0.8680
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	27	37	92	20	19
Total Analysis Volume [veh/h]	135	107	149	370	78	75
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	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	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtectedPermissi	Permissive	Permissive	Permissive
Signal group	1	0	3	8	4	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	4.0	0.0	4.0	4.0	4.0	0.0
All red [s]	2.0	0.0	2.0	2.0	2.0	0.0
Split [s]	28	0	11	32	21	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	10	0	0	10	10	0
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	0.0	4.0	4.0	4.0	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
Detector Length [ft]	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

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	L	R	L	C	C	R
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	0.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	7	7	41	41	30	30
g / C, Green / Cycle	0.12	0.12	0.68	0.68	0.50	0.50
(v / s)_i Volume / Saturation Flow Rate	0.08	0.08	0.12	0.22	0.05	0.05
s, saturation flow rate [veh/h]	1600	1348	1246	1698	1635	1387
c, Capacity [veh/h]	196	165	985	1152	818	694
d1, Uniform Delay [s]	25.31	25.17	3.47	3.99	7.88	7.93
k, delay calibration	0.11	0.11	0.11	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.27	4.22	0.07	0.74	0.23	0.31
d3, Initial Queue Delay [s]	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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

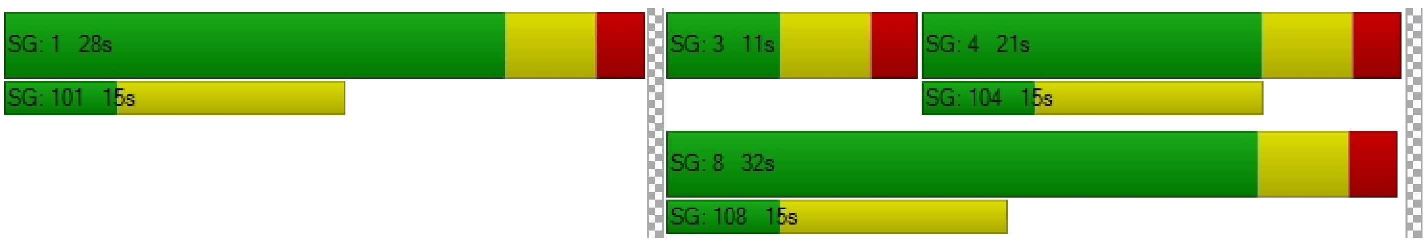
X, volume / capacity	0.69	0.65	0.15	0.32	0.10	0.11
d, Delay for Lane Group [s/veh]	29.58	29.40	3.54	4.72	8.11	8.25
Lane Group LOS	C	C	A	A	A	A
Critical Lane Group	Yes	No	No	Yes	No	No
50th-Percentile Queue Length [veh]	1.97	1.56	0.43	1.41	0.50	0.49
50th-Percentile Queue Length [ft]	49.23	39.07	10.68	35.21	12.44	12.28
95th-Percentile Queue Length [veh]	3.54	2.81	0.77	2.53	0.90	0.88
95th-Percentile Queue Length [ft]	88.61	70.33	19.23	63.37	22.39	22.10

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	29.58	29.40	3.54	4.72	8.11	8.25
Movement LOS	C	C	A	A	A	A
d_A, Approach Delay [s/veh]	29.50		4.38		8.18	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	11.67					
Intersection LOS	B					
Intersection V/C	0.302					

Sequence

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



Intersection Level Of Service Report

Intersection 10: 7th Avenue & Griffin Drive

Control Type:	Signalized	Delay (sec / veh):	30.9
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.707

Intersection Setup

Name	7th Avenue			7th Avenue			Mandeville Lane			Griffin Drive		
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	7th Avenue			7th Avenue			Mandeville Lane			Griffin Drive		
Base Volume Input [veh/h]	10	184	424	142	212	7	7	15	20	232	8	61
Base Volume Adjustment Factor	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500	1.0000	1.0000	1.0000	1.0500	1.0500	1.0500
Heavy Vehicles Percentage [%]	10.00	4.40	5.50	3.50	5.20	0.00	0.00	0.00	0.00	11.60	12.50	3.30
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	193	445	149	223	7	7	15	20	244	8	64
Peak Hour Factor	0.8520	0.8520	0.8520	0.8520	0.8520	0.8520	0.8520	0.8520	0.8520	0.8520	0.8520	0.8520
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	57	131	44	65	2	2	4	6	72	2	19
Total Analysis Volume [veh/h]	13	227	522	175	262	8	8	18	23	286	9	75
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]	120
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	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	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	63	0	0	63	0	0	57	0	0	57	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
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	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	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	C	R	C	C	C	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	57	57	57	57	51	51
g / C, Green / Cycle	0.48	0.48	0.48	0.48	0.43	0.43
(v / s)_i Volume / Saturation Flow Rate	0.15	0.38	0.23	0.18	0.03	0.33
s, saturation flow rate [veh/h]	1608	1378	777	1471	1578	1129
c, Capacity [veh/h]	795	654	429	699	706	533
d1, Uniform Delay [s]	19.38	26.63	29.01	20.25	20.47	30.02
k, delay calibration	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
d2, Incremental Delay [s]	0.98	9.79	2.86	1.61	0.19	7.28
d3, Initial Queue Delay [s]	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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

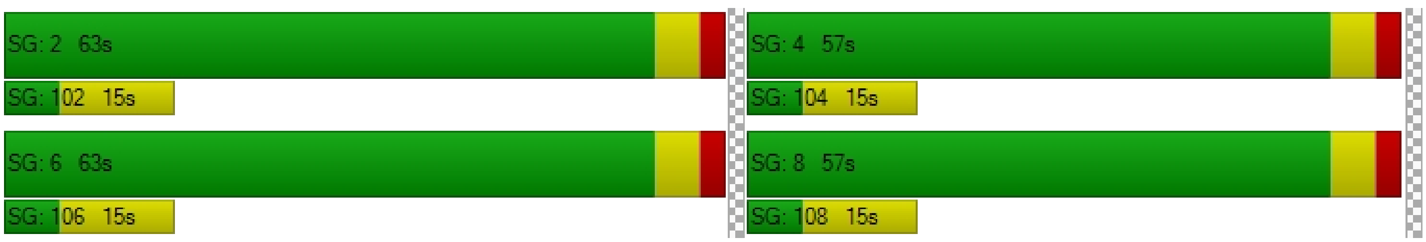
X, volume / capacity	0.30	0.80	0.41	0.39	0.07	0.69
d, Delay for Lane Group [s/veh]	20.35	36.42	31.87	21.87	20.66	37.30
Lane Group LOS	C	D	C	C	C	D
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	4.33	14.06	4.19	5.15	0.86	10.10
50th-Percentile Queue Length [ft]	108.14	351.58	104.85	128.65	21.52	252.57
95th-Percentile Queue Length [veh]	7.74	20.21	7.55	8.87	1.55	15.32
95th-Percentile Queue Length [ft]	193.41	505.33	188.73	221.66	38.73	382.89

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.35	20.35	36.42	31.87	21.87	21.87	20.66	20.66	20.66	37.30	37.30	37.30
Movement LOS	C	C	D	C	C	C	C	C	C	D	D	D
d_A, Approach Delay [s/veh]	31.36			25.80			20.66			37.30		
Approach LOS	C			C			C			D		
d_I, Intersection Delay [s/veh]	30.87											
Intersection LOS	C											
Intersection V/C	0.707											

Sequence

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



Intersection Level Of Service Report
Intersection 1: Jackrabbit Lane & Main Street

Control Type:	Signalized	Delay (sec / veh):	21.1
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.398

Intersection Setup

Name	Jackrabbit Lane			Jackrabbit Lane			Frontage Road			Main Street		
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	0	1	0	0	0	0	0
Pocket Length [ft]	200.00	100.00	100.00	250.00	100.00	100.00	300.00	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	Jackrabbit Lane			Jackrabbit Lane			Frontage Road			Main Street		
Base Volume Input [veh/h]	346	350	162	22	159	0	47	101	179	160	184	50
Base Volume Adjustment Factor	0.9200	0.9200	0.9200	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.60	0.90	1.20	0.00	1.30	0.00	0.00	0.00	2.80	1.30	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]	318	322	149	23	165	0	49	105	186	147	169	46
Peak Hour Factor	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210
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]	86	87	40	6	45	0	13	29	50	40	46	12
Total Analysis Volume [veh/h]	345	350	162	25	179	0	53	114	202	160	183	50
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]	80
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	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	2	1	6	6	3	8	0	7	4	0
Auxiliary Signal Groups			2,7			3,6						
Lead / Lag	Lead	-	-	Lag	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	0
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	0
Amber [s]	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	0.0	3.0	4.0	0.0
All red [s]	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	0.0	1.0	2.0	0.0
Split [s]	20	34	34	20	34	34	10	26	0	16	26	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	5	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	10	0	10	0	0	10	0
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0	0.0	2.0	4.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No		No	No	
Maximum Recall	No	No	No	No	No	No	No	No		No	No	
Pedestrian Recall	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	L	C	R	L	C	R	L	C	R	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	2.00	0.00	0.00	2.00	0.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	0.00	4.00	4.00	0.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	41	41	41	30	30	30	19	19	19	19	19
g / C, Green / Cycle	0.51	0.51	0.51	0.38	0.38	0.38	0.24	0.24	0.24	0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.26	0.21	0.11	0.02	0.11	0.00	0.05	0.07	0.14	0.14	0.14
s, saturation flow rate [veh/h]	1311	1695	1436	1174	1688	1454	1049	1710	1414	1154	1648
c, Capacity [veh/h]	715	867	734	345	638	550	179	404	334	271	389
d1, Uniform Delay [s]	12.51	12.04	10.77	24.96	17.32	0.00	35.28	25.01	27.23	33.05	27.19
k, delay calibration	0.50	0.44	0.50	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
d2, Incremental Delay [s]	2.33	1.22	0.69	0.41	1.10	0.00	0.91	0.38	1.76	2.05	1.48
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
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
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

Lane Group Results

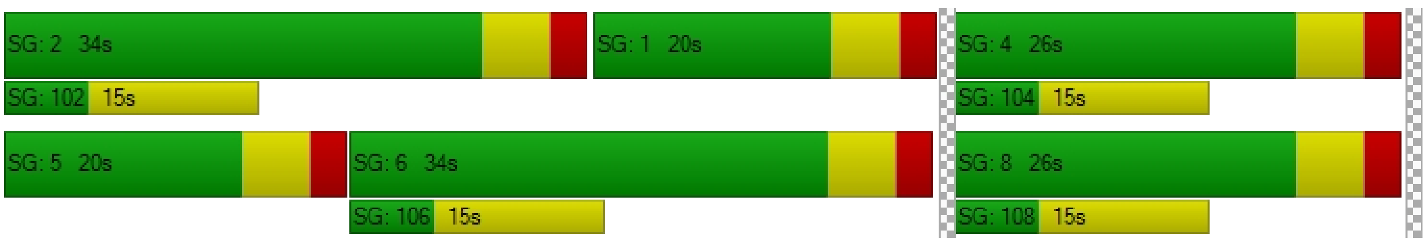
X, volume / capacity	0.48	0.40	0.22	0.07	0.28	0.00	0.30	0.28	0.60	0.59	0.60
d, Delay for Lane Group [s/veh]	14.83	13.27	11.46	25.37	18.42	0.00	36.18	25.39	28.99	35.10	28.66
Lane Group LOS	B	B	B	C	B	A	D	C	C	D	C
Critical Lane Group	Yes	No	No	No	Yes	No	No	No	Yes	No	No
50th-Percentile Queue Length [veh]	3.96	3.81	1.60	0.32	2.38	0.00	1.02	1.76	3.48	3.10	3.98
50th-Percentile Queue Length [ft]	98.93	95.27	39.92	7.91	59.56	0.00	25.48	44.08	87.10	77.52	99.58
95th-Percentile Queue Length [veh]	7.12	6.86	2.87	0.57	4.29	0.00	1.83	3.17	6.27	5.58	7.17
95th-Percentile Queue Length [ft]	178.08	171.49	71.86	14.24	107.20	0.00	45.87	79.35	156.78	139.53	179.24

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	14.83	13.27	11.46	25.37	18.42	0.00	36.18	25.39	28.99	35.10	28.66	28.66
Movement LOS	B	B	B	C	B	A	D	C	C	D	C	C
d_A, Approach Delay [s/veh]	13.56			19.27			28.91			31.28		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	21.12											
Intersection LOS	C											
Intersection V/C	0.398											

Sequence

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



Intersection Level Of Service Report
Intersection 2: Broadway Street & Main Street

Control Type:	All-way stop	Delay (sec / veh):	15.5
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes		

Intersection Setup

Name	Broadway Street			Broadway Street			Main Street			Main Street		
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	Broadway Street			Broadway Street			Main Street			Main Street		
Base Volume Input [veh/h]	58	91	112	45	77	19	10	187	55	111	293	17
Base Volume Adjustment Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.00	2.20	1.80	2.20	3.90	5.30	0.00	1.10	0.00	2.70	4.40	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]	60	95	116	47	80	20	9	172	51	102	270	16
Peak Hour Factor	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630
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]	16	25	30	12	21	5	2	45	13	26	70	4
Total Analysis Volume [veh/h]	62	99	120	49	83	21	9	179	53	106	280	17
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	2.49	1.13	1.92	4.83
95th-Percentile Queue Length [ft]	62.18	28.16	47.97	120.65
Approach Delay [s/veh]	14.17	12.01	12.90	19.29
Approach LOS	B	B	B	C
Intersection Delay [s/veh]	15.49			
Intersection LOS	C			

Intersection Level Of Service Report
Intersection 3: Oregon Street & Main Street

Control Type:	Two-way stop	Delay (sec / veh):	27.1
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.316

Intersection Setup

Name	Oregon Street						Main Street			Main Street		
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	Oregon Street						Main Street			Main Street		
Base Volume Input [veh/h]	68	4	59	27	10	49	28	220	37	59	405	5
Base Volume Adjustment Factor	1.0400	1.0400	1.0400	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.00	0.00	3.40	0.00	0.00	2.00	3.60	3.20	0.00	3.40	1.20	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]	71	4	61	27	10	49	26	202	34	54	373	5
Peak Hour Factor	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370
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]	19	1	16	7	3	13	7	54	9	14	100	1
Total Analysis Volume [veh/h]	76	4	65	29	11	52	28	216	36	58	398	5
Pedestrian Volume [ped/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	0.32	0.01	0.08	0.11	0.04	0.08	0.02	0.00	0.00	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	27.11	24.57	9.89	21.77	20.41	13.26	8.22	0.00	0.00	7.89	0.00	0.00
Movement LOS	D	C	A	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	1.38	1.38	0.26	0.89	0.89	0.89	0.96	0.96	0.96	1.61	1.61	1.61
95th-Percentile Queue Length [ft]	34.57	34.57	6.60	22.14	22.14	22.14	24.01	24.01	24.01	40.34	40.34	40.34
d_A, Approach Delay [s/veh]	19.32			16.80			0.82			0.99		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	5.15											
Intersection LOS	D											

Intersection Level Of Service Report
Intersection 4: Airway Boulevard & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	21.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.315

Intersection Setup

Name	Airway Boulevard			Airway Boulevard			Frontage Road			Frontage Road		
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	Airway Boulevard			Airway Boulevard			Frontage Road			Frontage Road		
Base Volume Input [veh/h]	140	215	74	81	207	14	34	209	116	116	269	89
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	1.40	1.40	12.20	4.90	3.40	0.00	0.00	3.40	2.60	7.80	3.70	3.40
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]	140	215	74	81	207	14	31	192	107	107	247	82
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]	37	57	20	22	55	4	8	51	29	29	66	22
Total Analysis Volume [veh/h]	149	229	79	86	221	15	33	205	114	114	263	87
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]	70
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	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	0	5	5	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	21	0	11	21	0	11	27	0	11	27	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	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
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	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

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	R	L	C	R
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
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	4.00	4.00	0.00	4.00	4.00	0.00	4.00	4.00	0.00	4.00	4.00
g_i, Effective Green Time [s]	36	26	26	36	25	25	22	11	11	22	14	14
g / C, Green / Cycle	0.51	0.37	0.37	0.51	0.36	0.36	0.31	0.16	0.16	0.31	0.19	0.19
(v / s)_i Volume / Saturation Flow Rate	0.13	0.09	0.10	0.08	0.07	0.07	0.03	0.12	0.08	0.09	0.16	0.06
s, saturation flow rate [veh/h]	1176	1686	1542	1074	1654	1617	1198	1654	1417	1208	1649	1406
c, Capacity [veh/h]	699	622	569	633	589	576	371	261	224	409	322	274
d1, Uniform Delay [s]	9.26	15.42	15.46	8.98	15.67	15.68	17.62	28.39	27.04	18.33	27.04	24.23
k, delay calibration	0.50	0.50	0.50	0.21	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]	0.70	0.99	1.12	0.18	0.77	0.80	0.10	5.16	1.79	0.37	5.11	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	0.21	0.26	0.26	0.14	0.20	0.20	0.09	0.78	0.51	0.28	0.82	0.32
d, Delay for Lane Group [s/veh]	9.96	16.41	16.58	9.16	16.44	16.48	17.72	33.54	28.84	18.69	32.15	24.89
Lane Group LOS	A	B	B	A	B	B	B	C	C	B	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh]	1.21	1.82	1.72	0.63	1.36	1.35	0.36	3.54	1.79	1.33	4.46	1.24
50th-Percentile Queue Length [ft]	30.37	45.45	43.09	15.77	33.97	33.65	9.07	88.43	44.68	33.27	111.48	30.91
95th-Percentile Queue Length [veh]	2.19	3.27	3.10	1.14	2.45	2.42	0.65	6.37	3.22	2.40	7.92	2.23
95th-Percentile Queue Length [ft]	54.67	81.80	77.57	28.39	61.14	60.57	16.32	159.18	80.42	59.89	198.06	55.64

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	9.96	16.46	16.58	9.16	16.46	16.48	17.72	33.54	28.84	18.69	32.15	24.89
Movement LOS	A	B	B	A	B	B	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	14.36			14.51			30.54			27.48		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	21.78											
Intersection LOS	C											
Intersection V/C	0.315											

Sequence

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

Intersection Level Of Service Report
Intersection 5: Airport Road & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	17.6
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.031

Intersection Setup

Name	Airport Road		Frontage Road		Frontage Road	
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	Airport Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	9	107	140	226	352	10
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	0.00	0.90	0.70	1.70	2.00	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 [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	107	113	183	285	8
Peak Hour Factor	0.8840	0.8840	0.8840	0.8840	0.8840	0.8840
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	30	32	52	81	2
Total Analysis Volume [veh/h]	10	121	128	207	322	9
Pedestrian Volume [ped/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	0.03	0.17	0.10	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	17.64	11.39	8.25	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.74	0.74	1.10	1.10	0.00	0.00
95th-Percentile Queue Length [ft]	18.54	18.54	27.62	27.62	0.00	0.00
d_A, Approach Delay [s/veh]	11.87		3.15		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	3.28					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 6: Valley Center Spur & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	23.1
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.377

Intersection Setup

Name	Valley Center Spur		Frontage Road		Frontage Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	250.00	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	Valley Center Spur		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	114	92	191	118	152	357
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	0.90	1.10	3.20	0.00	4.00	5.00
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]	114	92	155	96	123	289
Peak Hour Factor	0.9050	0.9050	0.9050	0.9050	0.9050	0.9050
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	31	25	43	27	34	80
Total Analysis Volume [veh/h]	126	102	171	106	136	319
Pedestrian Volume [ped/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	0.12	0.00	0.00	0.11	0.00
d_M, Delay for Movement [s/veh]	23.11	16.46	0.00	0.00	8.16	0.00
Movement LOS	C	C	A	A	A	A
95th-Percentile Queue Length [veh]	2.68	2.68	0.00	0.00	0.36	0.00
95th-Percentile Queue Length [ft]	66.89	66.89	0.00	0.00	8.94	0.00
d_A, Approach Delay [s/veh]	20.13		0.00		2.44	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	5.94					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 8: Nelson Road & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	13.8
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.059

Intersection Setup

Name	Nelson Road		Frontage Road		Frontage Road	
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	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	300.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Nelson Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	24	11	21	241	440	50
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	1.60	4.80	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]	24	11	17	195	356	41
Peak Hour Factor	0.9240	0.9240	0.9240	0.9240	0.9240	0.9240
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	3	5	53	96	11
Total Analysis Volume [veh/h]	26	12	18	211	385	44
Pedestrian Volume [ped/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	0.06	0.02	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.78	11.00	8.21	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.25	0.25	0.05	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	6.23	6.23	1.20	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.90		0.64		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.92					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 9: Springhill Road & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	14.9
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.392

Intersection Setup

Name	Springhill Road		Frontage Road		Frontage Road	
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	1	0	1	0	0	1
Pocket Length [ft]	150.00	100.00	200.00	100.00	100.00	300.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Springhill Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	67	192	125	128	294	123
Base Volume Adjustment Factor	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500
Heavy Vehicles Percentage [%]	1.50	2.60	0.80	3.90	2.30	0.80
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 [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	70	202	131	134	309	129
Peak Hour Factor	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	53	35	35	82	34
Total Analysis Volume [veh/h]	74	214	139	142	327	137
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	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	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtectedPermissi	Permissive	Permissive	Permissive
Signal group	1	0	3	8	4	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	4.0	0.0	4.0	4.0	4.0	0.0
All red [s]	2.0	0.0	2.0	2.0	2.0	0.0
Split [s]	28	0	11	32	21	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	10	0	0	10	10	0
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	0.0	4.0	4.0	4.0	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
Detector Length [ft]	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

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	L	R	L	C	C	R
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	0.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	11	11	37	37	26	26
g / C, Green / Cycle	0.19	0.19	0.61	0.61	0.44	0.44
(v / s)_i Volume / Saturation Flow Rate	0.05	0.15	0.13	0.09	0.20	0.10
s, saturation flow rate [veh/h]	1605	1417	1109	1646	1672	1442
c, Capacity [veh/h]	302	267	716	1008	729	629
d1, Uniform Delay [s]	20.79	23.36	5.67	4.95	11.90	10.57
k, delay calibration	0.11	0.11	0.11	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.42	5.58	0.13	0.29	1.99	0.80
d3, Initial Queue Delay [s]	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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

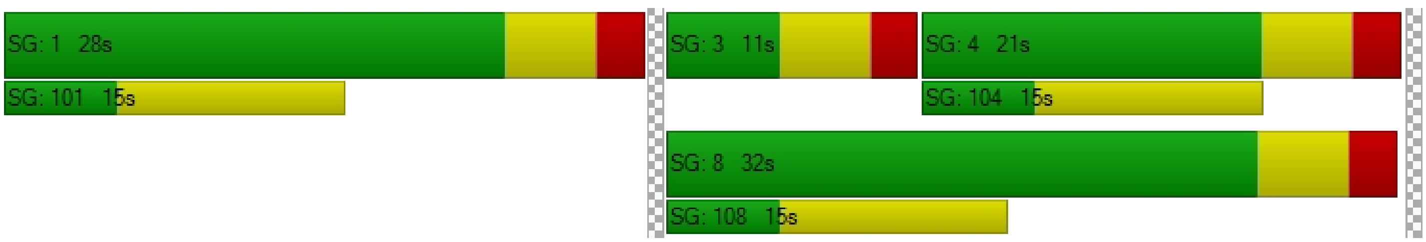
X, volume / capacity	0.25	0.80	0.19	0.14	0.45	0.22
d, Delay for Lane Group [s/veh]	21.21	28.94	5.80	5.24	13.89	11.37
Lane Group LOS	C	C	A	A	B	B
Critical Lane Group	No	Yes	Yes	No	Yes	No
50th-Percentile Queue Length [veh]	0.86	3.11	0.57	0.64	3.05	1.12
50th-Percentile Queue Length [ft]	21.60	77.66	14.24	15.94	76.23	28.10
95th-Percentile Queue Length [veh]	1.55	5.59	1.03	1.15	5.49	2.02
95th-Percentile Queue Length [ft]	38.87	139.78	25.63	28.68	137.21	50.59

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	21.21	28.94	5.80	5.24	13.89	11.37
Movement LOS	C	C	A	A	B	B
d_A, Approach Delay [s/veh]	26.95		5.52		13.15	
Approach LOS	C		A		B	
d_I, Intersection Delay [s/veh]	14.92					
Intersection LOS	B					
Intersection V/C	0.392					

Sequence

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



Intersection Level Of Service Report
Intersection 10: 7th Avenue & Griffin Drive

Control Type:	Signalized	Delay (sec / veh):	54.3
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.031

Intersection Setup

Name	7th Avenue			7th Avenue			Mandeville Lane			Griffin Drive		
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	7th Avenue			7th Avenue			Mandeville Lane			Griffin Drive		
Base Volume Input [veh/h]	28	359	227	85	263	8	8	11	34	526	7	149
Base Volume Adjustment Factor	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500	1.0000	1.0000	1.0000	1.0500	1.0500	1.0500
Heavy Vehicles Percentage [%]	0.00	2.50	3.50	4.70	1.10	0.00	0.00	0.00	2.90	2.80	0.00	3.40
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]	29	377	238	89	276	8	8	11	34	552	7	156
Peak Hour Factor	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540
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]	8	99	62	23	72	2	2	3	9	145	2	41
Total Analysis Volume [veh/h]	30	395	249	93	289	8	8	12	36	579	7	164
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]	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	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	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	54	0	0	54	0	0	76	0	0	76	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
l1, 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
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	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	C	R	C	C	C	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	48	48	48	48	70	70
g / C, Green / Cycle	0.37	0.37	0.37	0.37	0.54	0.54
(v / s)_i Volume / Saturation Flow Rate	0.29	0.18	0.44	0.19	0.03	0.59
s, saturation flow rate [veh/h]	1474	1404	212	1532	1623	1267
c, Capacity [veh/h]	574	519	134	566	905	731
d1, Uniform Delay [s]	36.29	31.44	60.22	32.08	14.37	32.80
k, delay calibration	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
d2, Incremental Delay [s]	8.34	3.16	25.96	3.46	0.13	39.99
d3, Initial Queue Delay [s]	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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

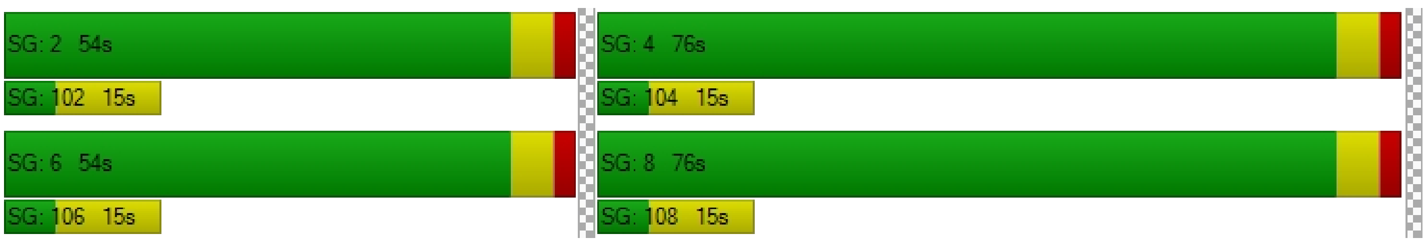
X, volume / capacity	0.74	0.48	0.70	0.53	0.06	1.03
d, Delay for Lane Group [s/veh]	44.63	34.60	86.18	35.54	14.50	72.79
Lane Group LOS	D	C	F	D	B	F
Critical Lane Group	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	13.43	6.48	4.05	7.87	0.83	31.97
50th-Percentile Queue Length [ft]	335.65	161.92	101.33	196.84	20.85	799.33
95th-Percentile Queue Length [veh]	19.44	10.65	7.30	12.48	1.50	42.13
95th-Percentile Queue Length [ft]	485.88	266.26	182.39	311.88	37.53	1053.26

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	44.63	44.63	34.60	86.18	35.54	35.54	14.50	14.50	14.50	72.79	72.79	72.79
Movement LOS	D	D	C	F	D	D	B	B	B	E	E	E
d_A, Approach Delay [s/veh]		40.92			47.62			14.50			72.79	
Approach LOS		D			D			B			E	
d_I, Intersection Delay [s/veh]						54.31						
Intersection LOS						D						
Intersection V/C						1.031						

Sequence

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

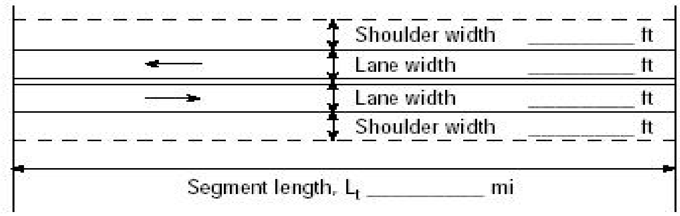


DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airport to Spur EB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*57%*
% Trucks and Buses , P_T	*4* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9*/mi

Analysis direction vol., V_d	*308*veh/h
Opposing direction vol., V_o	*143*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*3.7*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.984*	*0.973*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*340*	*160*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*42.2 mi/h*
		Percent free flow speed, PFFS	*86.9 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.996*	*0.996*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*336*	*156*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*33.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*45.5*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*64.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.20*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1654*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1693*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*86.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*334.8*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.93*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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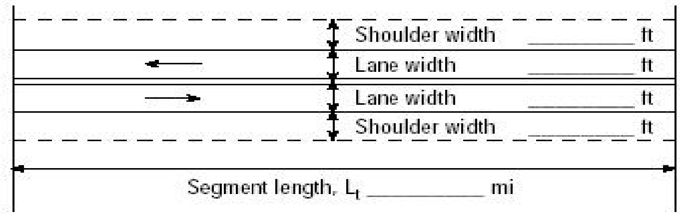
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airport to Spur EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*57%*
% Trucks and Buses , P_T	*2 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9*/mi

Analysis direction vol., V_d	*222*veh/h
Opposing direction vol., V_o	*348*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*3.7*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.990*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*244*	*381*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.1 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.6 mi/h*
		Percent free flow speed, PFFS	*85.7 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*242*	*379*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*29.0*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*48.0*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*47.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.14*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1690*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1697*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*85.7*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*241.3*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.24*
Bicycle level of service (Exhibit 15-4)	*D*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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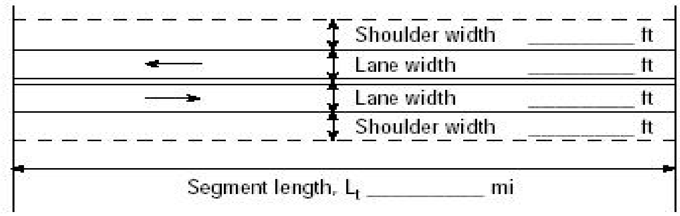
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airport to Spur WB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*143*veh/h
Opposing direction vol., V_o	*308*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*3.7*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*60%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9/mi*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.7*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.929*	*0.958*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*167*	*349*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*42.1 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.4 mi/h*	Percent free flow speed, PFFS	*86.8 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*157*	*338*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*20.5*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*46.6*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*35.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.10*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1629*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1682*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*86.8*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*155.4*
Effective width, Wv (Eq. 15-29) ft	*16.06*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*6.50*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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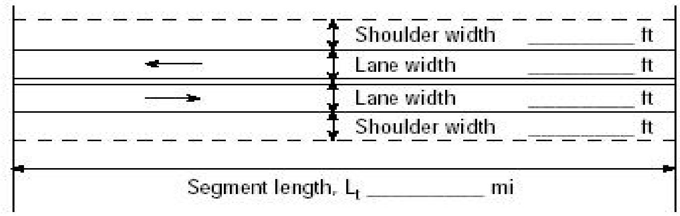
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		*Site Information*	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airport to Spur WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF	*0.92*
No-passing zone	*60%*
% Trucks and Buses , P_T	*4 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9*/mi

Analysis direction vol., V_d	*248*veh/h
Opposing direction vol., V_o	*222*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*3.7*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.984*	*0.980*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*274*	*246*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.0 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.5 mi/h*
		Percent free flow speed, PFFS	*85.5 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.996*	*0.996*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*271*	*242*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{a v_d^b}$)	*29.6*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*55.5*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*58.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.16*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1666*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1693*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*85.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*269.6*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.82*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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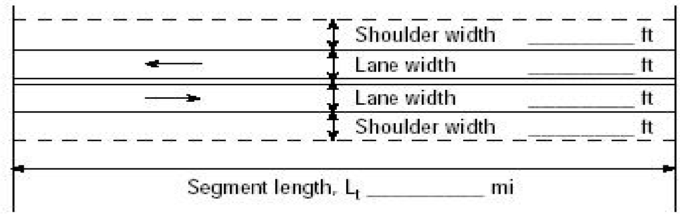
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airway to Airport EB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.92*

No-passing zone *59%*

% Trucks and Buses , P_T *9* %

% Recreational vehicles, P_R *0%*

Access points *mi* *0*/mi

Analysis direction vol., V_d *342*veh/h

Opposing direction vol., V_o *246*veh/h

Shoulder width ft *0.5*

Lane Width ft *12.0*

Segment Length mi *0.8*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.974*	*0.965*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*382*	*277*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*0.0 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.8 mi/h*
Free-flow speed, FFS=$S_{FM}+0.00776(v/f_{HV,ATS})$		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*42.8 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.9 mi/h*	Percent free flow speed, PFFS	*84.3 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.991*	*0.991*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*375*	*270*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*38.8*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*48.5*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*67.0*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.22*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1641*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1685*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*84.3*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*371.7*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*6.65*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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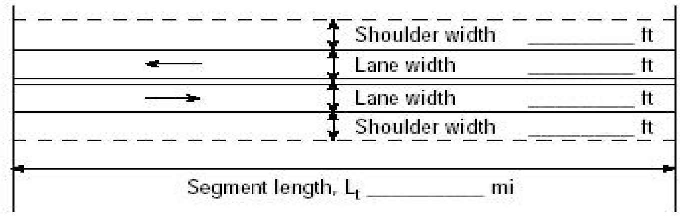
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airway to Airport EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*322*veh/h
Opposing direction vol., V_o	*414*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.8*
Grade Length mi Up/down	
Peak-hour factor, PHF	*0.92*
No-passing zone	*59%*
% Trucks and Buses , P_T	*5* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*0*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/\ (1+ P_T(E_T-1)+P_R(E_R-1))$	*0.985*	*0.985*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i\ /\ (PHF^*\ f_{g,ATS}\ ^*\ f_{HV,ATS})$	*355*	*457*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/\ f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*0.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.0 mi/h*	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	*50.8 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*42.5 mi/h*
		Percent free flow speed, PFFS	*83.7 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/\ (1+ P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}\ ^*\ f_{g,PTSF})$	*352*	*450*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*40.5*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*40.3*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}\ ^*(v_{d,PTSF}\ /\ v_{d,PTSF}+v_{o,PTSF})$	*58.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.21*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1675*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*83.7*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*350.0*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.24*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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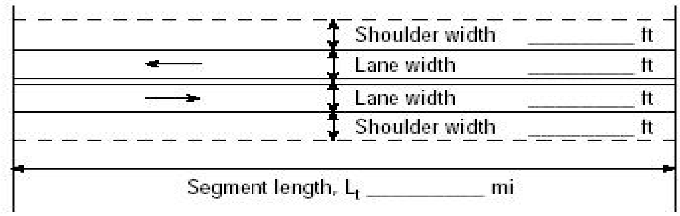
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		**Site Information**	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airway to Airport EB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Analysis direction vol., V_d	*246*veh/h
Opposing direction vol., V_o	*342*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.8*
Peak-hour factor, PHF	*0.92*
No-passing zone	*84%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*0*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/\ (1+ P_T(E_T-1)+P_R(E_R-1)\ )$	*0.958*	*0.968*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i\ /\ (PHF^*\ f_{g,ATS}\ ^*\ f_{HV,ATS})$	*279*	*384*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/\ f_{HV,ATS}\ )$		Adj. for access points[4], f_A (Exhibit 15-8)	*0.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.7 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.8 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*42.9 mi/h*
		Percent free flow speed, PFFS	*84.5 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/\ (1+ P_T(E_T-1)+P_R(E_R-1)\ )$	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^*\ f_{g,PTSF})$	*270*	*376*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^{\ b}})$	*31.7*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*50.7*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}\ ^*(v_{d,PTSF}\ /\ v_{d,PTSF}+v_{o,PTSF})$	*52.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.16*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1646*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1682*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*84.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*267.4*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.29*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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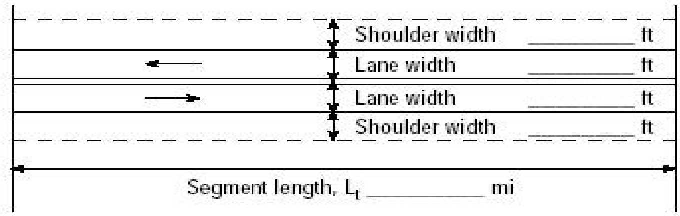
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		**Site Information**	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airway to Airport WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*84%*
% Trucks and Buses , P_T	*5 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9/mi*

Analysis direction vol., V_d	*414*veh/h
Opposing direction vol., V_o	*322*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.8*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.985*	*0.985*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*457*	*355*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
Free-flow speed, FFS=$S_{FM}+0.00776(v/f_{HV,ATS})$		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*39.4 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.9 mi/h*	Percent free flow speed, PFFS	*81.1 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.995*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*450*	*352*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*45.4*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*42.0*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}{}^*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*69.0*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.27*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1675*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1692*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.1*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*450.0*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.37*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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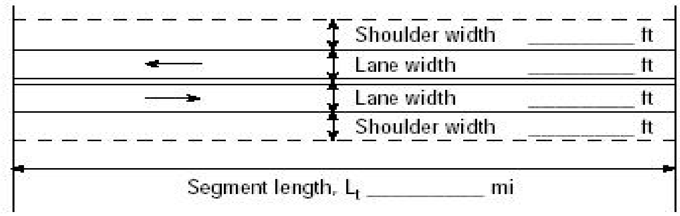
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Nelson to Springhill WB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*405*veh/h
Opposing direction vol., V_o	*147*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.9*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*95%*
% Trucks and Buses , P_T	*3* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*6*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.991*	*0.979*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*444*	*163*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0* *mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2* *mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5* *mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.4* *mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.3* *mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*41.2* *mi/h*
		Percent free flow speed, PFFS	*83.5* *%*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.997*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*440*	*160*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*40.7*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*44.3*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*73.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.26*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1664*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1695*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*83.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*440.2*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.79*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

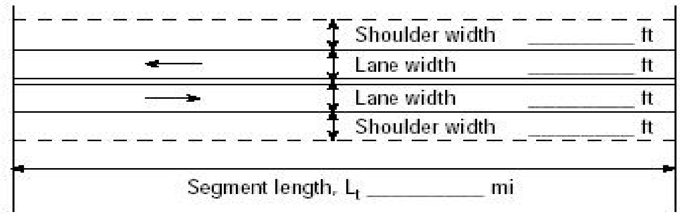
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Nelson to Springhill EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*242*veh/h
Opposing direction vol., V_o	*454*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.9*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*95%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*6*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.992*	*0.996*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*265*	*495*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.3 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.3 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*41.1 mi/h*
		Percent free flow speed, PFFS	*83.4 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}^* f_{g,PTSF})$	*264*	*493*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*33.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*40.6*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*47.4*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.16*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1693*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*83.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*263.0*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.28*
Bicycle level of service (Exhibit 15-4)	*D*

Notes

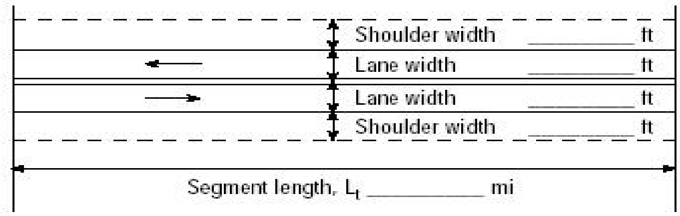
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Nelson to Springhill WB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Analysis direction vol., V_d	*147*veh/h
Opposing direction vol., V_o	*405*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.9*
Peak-hour factor, PHF	*0.92*
No-passing zone	*81%*
% Trucks and Buses , P_T	*6* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*6*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.7*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.960*	*0.982*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*166*	*448*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.3 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*42.2 mi/h*
		Percent free flow speed, PFFS	*85.5 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.994*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*161*	*440*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*21.9*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*43.3*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*33.5*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.10*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1669*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*85.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*159.8*
Effective width, Wv (Eq. 15-29) ft	*15.81*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.69*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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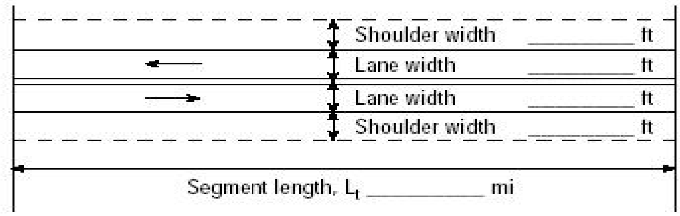
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Nelson to Springhill WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*454* veh/h
Opposing direction vol., V_o	*242* veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.9*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*81%*
% Trucks and Buses , P_T	*4* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*6*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.992*	*0.984*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*497*	*267*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.3 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*39.9 mi/h*
		Percent free flow speed, PFFS	*81.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*1.000*	*0.996*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*493*	*264*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*47.4*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*39.7*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*73.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.29*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1673*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1693*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*493.5*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.12*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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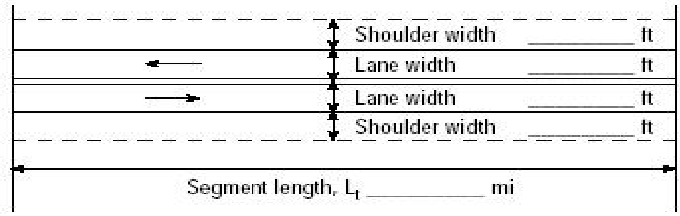
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Springhill to Viaduct WB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*438*veh/h
Opposing direction vol., V_o	*133*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*1.4*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*73%*
% Trucks and Buses , P_T	*1* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*7/mi*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.993*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*477*	*146*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*1.8 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.0 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.9 mi/h*	Percent free flow speed, PFFS	*84.3 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.999*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*476*	*145*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*43.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*39.7*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*73.5*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.28*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1688*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1698*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*84.3*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*476.1*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.35*
Bicycle level of service (Exhibit 15-4)	*D*

Notes

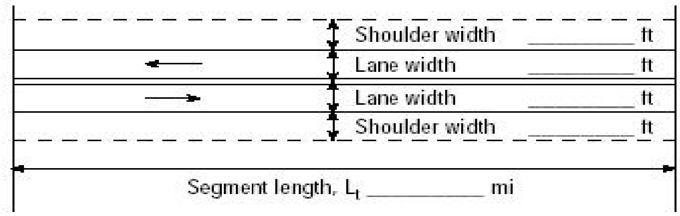
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Springhill to Viaduct EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



Analysis direction vol., V_d *204*veh/h
Opposing direction vol., V_o *438*veh/h
Shoulder width ft *0.5*
Lane Width ft *12.0*
Segment Length mi *1.4*

☐ Class I highway ☐ Class II highway ☑ Class III highway
Terrain ☑ Level ☐ Rolling
Grade Length mi Up/down
Peak-hour factor, PHF *0.92*
No-passing zone *73%*
% Trucks and Buses , P_T *3* %
% Recreational vehicles, P_R *0%*
Access points *mi* *7*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.985*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*225*	*479*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.8 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.1 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.0 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*41.5 mi/h*
		Percent free flow speed, PFFS	*84.6 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.997*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*222*	*476*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*28.9*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*40.7*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF} *(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*41.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.13*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1690*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*84.6*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*221.7*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.45*
Bicycle level of service (Exhibit 15-4)	*D*

Notes

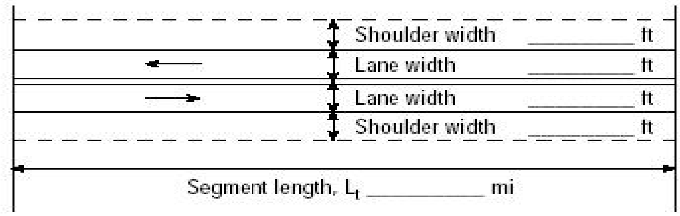
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Springhill to Viaduct WB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



Analysis direction vol., V_d *133*veh/h

Opposing direction vol., V_o *438*veh/h

Shoulder width ft *0.5*

Lane Width ft *12.0*

Segment Length mi *1.4*

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.92*

No-passing zone *93%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *0%*

Access points *mi* *7/mi*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.7*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.966*	*0.990*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*150*	*481*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, v		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.8 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.3 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.0 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.8 mi/h*
		Percent free flow speed, PFFS	*85.3 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*145*	*476*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*20.8*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*40.8*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*30.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.09*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1683*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*85.3*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*144.6*
Effective width, Wv (Eq. 15-29) ft	*16.69*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.18*
Bicycle level of service (Exhibit 15-4)	*D*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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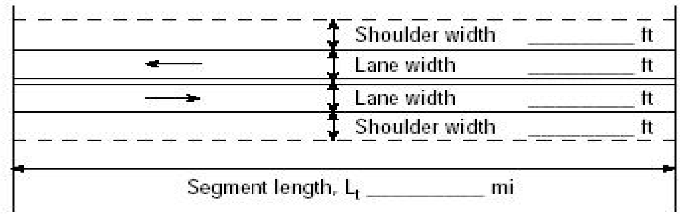
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Springhill to Viaduct WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*438*veh/h
Opposing direction vol., V_o	*204*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*1.4*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*93%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*7*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.996*	*0.990*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*478*	*224*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.8 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.8 mi/h*	Free-flow speed, FFS ($FSS=BFFS-f_{LS}-f_A$)	*49.0 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*39.8 mi/h*
		Percent free flow speed, PFFS	*81.1 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*476*	*222*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*44.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*42.1*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*72.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.28*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1683*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1697*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.1*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*476.1*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.58*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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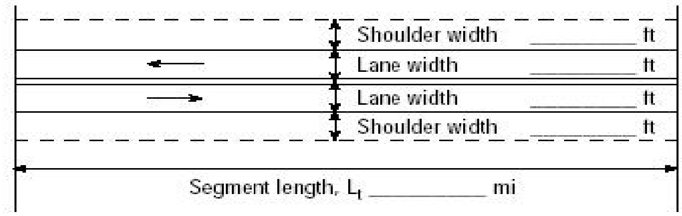
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Spur to Nelson EB*
Date Performed	*9/29/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*349*veh/h
Opposing direction vol., V_o	*143*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.4*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*100%*
% Trucks and Buses , P_T	*4 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*2/mi*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.988*	*0.973*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*384*	*160*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*0.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.3 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*42.7 mi/h*
		Percent free flow speed, PFFS	*84.8 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.996*	*0.996*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*381*	*156*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*36.5*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*47.0*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}{}^*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*69.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.23*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1654*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1693*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*84.8*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*379.3*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.99*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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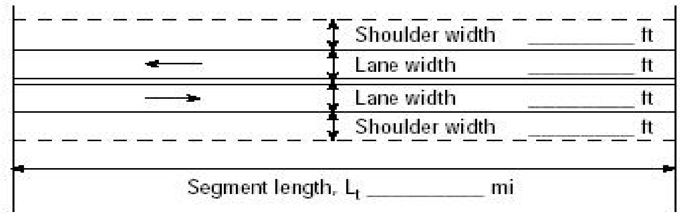
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Spur to Nelson EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.92*

No-passing zone *100%*

% Trucks and Buses , P_T *2* %

% Recreational vehicles, P_R *0%*

Access points *mi* *2/mi*

Analysis direction vol., V_d *230*veh/h

Opposing direction vol., V_o *390*veh/h

Shoulder width ft *0.5*

Lane Width ft *12.0*

Segment Length mi *0.4*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.992*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*252*	*426*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*0.5 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*42.4 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.6 mi/h*	Percent free flow speed, PFFS	*84.4 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.998*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*250*	*424*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*30.5*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*47.7*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*48.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.15*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1690*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*84.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*250.0*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.26*
Bicycle level of service (Exhibit 15-4)	*D*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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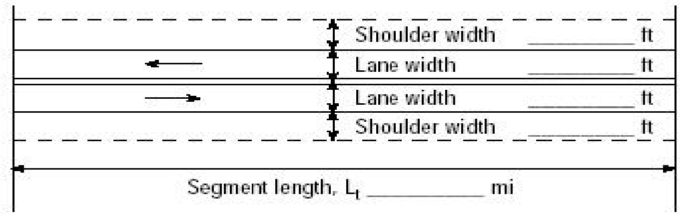
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	RPA	Highway / Direction of Travel	Frontage Road
Agency or Company		From/To	Spur to Nelson WB
Date Performed	9/29/2016	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2016

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	143veh/h
Opposing direction vol., V_o	349veh/h
Shoulder width ft	0.5
Lane Width ft	12.0
Segment Length mi	0.4
Grade Length mi	Up/down
Peak-hour factor, PHF	0.92
No-passing zone	100%
% Trucks and Buses , P_T	10 %
% Recreational vehicles, P_R	0%
Access points *mi*	2/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	1.7	1.3
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.935	0.971
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	1.00	1.00
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	166	391

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	55.0 mi/h
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	4.2 mi/h
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	0.5 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	2.8 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	50.3 mi/h
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	43.2 mi/h
		Percent free flow speed, PFFS	85.9 %

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.990	0.990
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	157	383
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	20.4	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	47.0	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}{}^*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	34.1	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	B
Volume to capacity ratio, *v/c*	0.10

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1651*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1683*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*85.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*155.4*
Effective width, Wv (Eq. 15-29) ft	*16.06*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*6.09*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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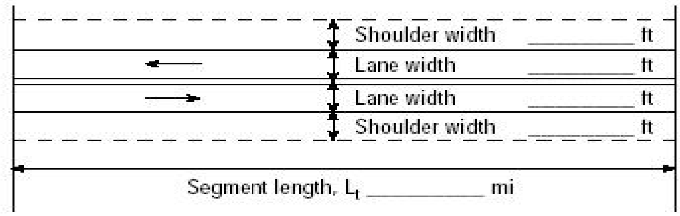
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Spur to Nelson WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*PM*	Analysis Year	*2016*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*390*veh/h
Opposing direction vol., V_o	*230*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.4*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*100%*
% Trucks and Buses , P_T	*5* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*2*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.985*	*0.980*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*430*	*255*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*0.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.6 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.3 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.3 mi/h*
		Percent free flow speed, PFFS	*82.2 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.995*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*424*	*251*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*41.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*47.6*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*71.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.25*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1666*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1692*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*82.2*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*423.9*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.34*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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Appendix C

PROJECTED OPERATION ANALYSIS

Intersection Level Of Service Report
Intersection 1: Jackrabbit Lane & Main Street

Control Type:	Signalized	Delay (sec / veh):	31.4
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.726

Intersection Setup

Name	Jackrabbit Lane			Jackrabbit Lane			Frontage Road			Main Street		
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	0	1	0	0	0	0	0
Pocket Length [ft]	200.00	100.00	100.00	250.00	100.00	100.00	300.00	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	Jackrabbit Lane			Jackrabbit Lane			Frontage Road			Main Street		
Base Volume Input [veh/h]	82	134	171	17	254	0	8	123	379	101	48	18
Base Volume Adjustment Factor	0.9200	0.9200	0.9200	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	2.40	1.50	5.20	0.00	0.80	0.00	0.00	0.00	0.50	3.00	2.10	0.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	102	167	214	24	359	0	11	174	536	126	60	23
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	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]	28	45	58	7	98	0	3	47	146	34	16	6
Total Analysis Volume [veh/h]	111	182	233	26	390	0	12	189	583	137	65	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
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	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	2	1	6	6	3	8	0	7	4	0
Auxiliary Signal Groups			2,7			3,6						
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	0
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	9	19	19	9	19	19	9	73	0	9	73	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	5	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	10	0	10	0	0	10	0
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No		No	No	
Maximum Recall	No	No	No	No	No	No	No	No		No	No	
Pedestrian Recall	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	L	C	R	L	C	R	L	C	R	L	C
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
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
l2, Clearance Lost Time [s]	0.00	2.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00	0.00	2.00
g_i, Effective Green Time [s]	46	39	48	46	37	43	56	47	47	56	50
g / C, Green / Cycle	0.42	0.36	0.44	0.42	0.34	0.39	0.51	0.43	0.43	0.51	0.46
(v / s)_i Volume / Saturation Flow Rate	0.11	0.11	0.17	0.02	0.23	0.00	0.01	0.11	0.40	0.12	0.06
s, saturation flow rate [veh/h]	994	1685	1382	1154	1696	1454	1222	1710	1446	1126	1597
c, Capacity [veh/h]	344	602	607	501	572	563	668	729	617	581	731
d1, Uniform Delay [s]	22.20	25.46	20.79	19.15	31.40	0.00	13.49	20.36	30.34	14.97	17.14
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.11	0.11	0.11	0.21	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
d2, Incremental Delay [s]	2.48	1.29	1.83	0.04	6.47	0.00	0.01	0.19	13.49	0.21	0.07
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
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
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

Lane Group Results

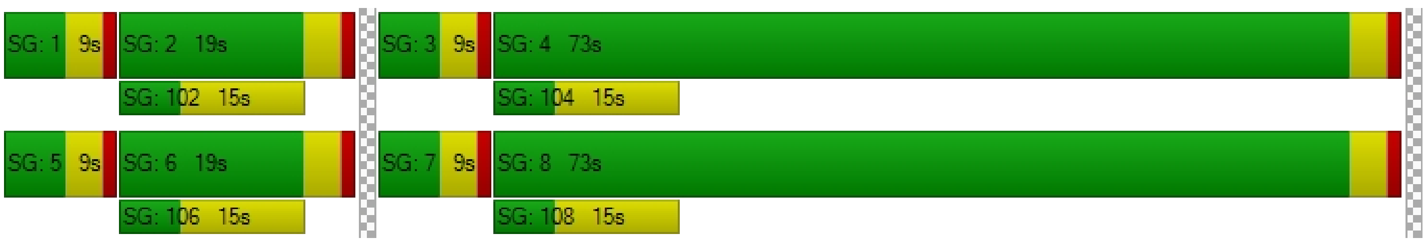
X, volume / capacity	0.32	0.30	0.38	0.05	0.68	0.00	0.02	0.26	0.95	0.24	0.12
d, Delay for Lane Group [s/veh]	24.68	26.75	22.63	19.20	37.87	0.00	13.50	20.54	43.83	15.18	17.22
Lane Group LOS	C	C	C	B	D	A	B	C	D	B	B
Critical Lane Group	Yes	No	No	No	Yes	No	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh]	2.01	3.63	4.30	0.40	9.83	0.00	0.15	3.15	16.61	1.85	1.32
50th-Percentile Queue Length [ft]	50.28	90.83	107.55	9.97	245.67	0.00	3.72	78.73	415.32	46.36	33.00
95th-Percentile Queue Length [veh]	3.62	6.54	7.70	0.72	14.97	0.00	0.27	5.67	23.30	3.34	2.38
95th-Percentile Queue Length [ft]	90.51	163.50	192.59	17.95	374.20	0.00	6.69	141.72	582.43	83.44	59.40

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	24.68	26.75	22.63	19.20	37.87	0.00	13.50	20.54	43.83	15.18	17.22	17.22
Movement LOS	C	C	C	B	D	A	B	C	D	B	B	B
d_A, Approach Delay [s/veh]		24.49			36.71			37.75			15.99	
Approach LOS		C			D			D			B	
d_I, Intersection Delay [s/veh]	31.43											
Intersection LOS	C											
Intersection V/C	0.726											

Sequence

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



Intersection Level Of Service Report
Intersection 2: Broadway Street & Main Street

Control Type:	All-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes		

Intersection Setup

Name	Broadway Street			Broadway Street			Main Street			Main Street		
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	Broadway Street			Broadway Street			Main Street			Main Street		
Base Volume Input [veh/h]	27	63	60	23	45	11	10	167	13	71	82	17
Base Volume Adjustment Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.00	1.60	8.30	0.00	4.40	0.00	0.00	4.20	0.00	8.40	3.60	0.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	38	90	84	33	64	15	12	209	16	88	102	22
Peak Hour Factor	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320	0.9320
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]	10	24	23	9	17	4	3	56	4	24	27	6
Total Analysis Volume [veh/h]	41	97	90	35	69	16	13	224	17	94	109	24
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	1.47	0.69	1.72	1.50
95th-Percentile Queue Length [ft]	36.82	17.15	43.09	37.57
Approach Delay [s/veh]	10.93	9.93	11.37	11.14
Approach LOS	B	A	B	B
Intersection Delay [s/veh]	10.98			
Intersection LOS	B			

Intersection Level Of Service Report
Intersection 3: Oregon Street & Main Street

Control Type:	Two-way stop	Delay (sec / veh):	22.3
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.165

Intersection Setup

Name	Oregon Street						Main Street			Main Street		
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	Oregon Street						Main Street			Main Street		
Base Volume Input [veh/h]	31	16	57	29	7	21	29	264	2	18	188	1
Base Volume Adjustment Factor	1.0400	1.0400	1.0400	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.00	6.30	1.80	0.00	0.00	4.80	0.00	4.90	0.00	5.60	3.80	100.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	44	23	80	39	10	29	37	330	3	23	235	1
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	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	6	22	11	3	8	10	90	1	6	64	0
Total Analysis Volume [veh/h]	48	25	87	42	11	32	40	359	3	25	255	1
Pedestrian Volume [ped/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	0.17	0.08	0.13	0.17	0.03	0.04	0.03	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	21.56	20.37	11.02	22.34	19.37	12.83	7.81	0.00	0.00	8.13	0.00	0.00
Movement LOS	C	C	B	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.95	0.95	0.43	0.92	0.92	0.92	1.30	1.30	1.30	0.93	0.93	0.93
95th-Percentile Queue Length [ft]	23.82	23.82	10.86	23.10	23.10	23.10	32.45	32.45	32.45	23.33	23.33	23.33
d_A, Approach Delay [s/veh]	15.64			18.37			0.78			0.72		
Approach LOS	C			C			A			A		
d_I, Intersection Delay [s/veh]	4.94											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 4: Airway Boulevard & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	21.7
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.386

Intersection Setup

Name	Airway Boulevard			Airway Boulevard			Frontage Road			Frontage Road		
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	Airway Boulevard			Airway Boulevard			Frontage Road			Frontage Road		
Base Volume Input [veh/h]	54	125	99	70	160	2	12	203	119	77	105	48
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	5.60	4.00	14.20	22.80	6.90	0.00	0.00	4.90	5.10	10.40	8.60	31.30
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	73	170	135	95	218	3	15	254	148	97	132	60
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	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	46	37	26	59	1	4	69	40	26	36	16
Total Analysis Volume [veh/h]	79	185	147	103	237	3	16	276	161	105	143	65
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]	70
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	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	0	5	5	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	21	0	11	21	0	11	27	0	11	27	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	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
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	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

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	R	L	C	R
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
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	4.00	4.00	0.00	4.00	4.00	0.00	4.00	4.00	0.00	4.00	4.00
g_i, Effective Green Time [s]	33	23	23	33	23	23	25	14	14	25	18	18
g / C, Green / Cycle	0.47	0.32	0.32	0.47	0.33	0.33	0.36	0.20	0.20	0.36	0.25	0.25
(v / s)_i Volume / Saturation Flow Rate	0.07	0.11	0.11	0.11	0.08	0.08	0.01	0.17	0.12	0.09	0.09	0.06
s, saturation flow rate [veh/h]	1122	1644	1412	923	1600	1593	1245	1630	1383	1112	1575	1107
c, Capacity [veh/h]	621	526	451	507	524	522	507	331	281	392	397	279
d1, Uniform Delay [s]	10.49	18.20	18.30	10.97	17.18	17.18	14.82	26.86	25.25	16.65	21.63	20.89
k, delay calibration	0.50	0.50	0.50	0.40	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]	0.42	1.69	2.12	0.72	1.02	1.03	0.02	5.46	1.84	0.36	0.55	0.42
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

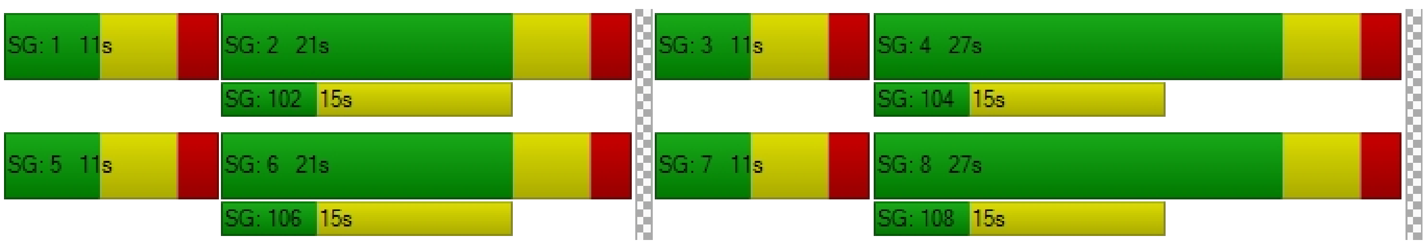
X, volume / capacity	0.13	0.33	0.35	0.20	0.23	0.23	0.03	0.83	0.57	0.27	0.36	0.23
d, Delay for Lane Group [s/veh]	10.91	19.89	20.42	11.69	18.20	18.21	14.85	32.31	27.09	17.01	22.18	21.31
Lane Group LOS	B	B	C	B	B	B	B	C	C	B	C	C
Critical Lane Group	No	No	Yes	Yes	No	No	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh]	0.69	2.27	2.10	0.93	1.47	1.47	0.16	4.70	2.45	1.13	1.90	0.84
50th-Percentile Queue Length [ft]	17.24	56.67	52.40	23.22	36.79	36.72	3.98	117.62	61.21	28.23	47.52	21.02
95th-Percentile Queue Length [veh]	1.24	4.08	3.77	1.67	2.65	2.64	0.29	8.26	4.41	2.03	3.42	1.51
95th-Percentile Queue Length [ft]	31.04	102.00	94.32	41.80	66.22	66.10	7.17	206.55	110.17	50.82	85.54	37.83

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	10.91	19.92	20.42	11.69	18.20	18.21	14.85	32.31	27.09	17.01	22.18	21.31
Movement LOS	B	B	C	B	B	B	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	18.37			16.25			29.84			20.27		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	21.70											
Intersection LOS	C											
Intersection V/C	0.386											

Sequence

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



Intersection Level Of Service Report
Intersection 5: Airport Road & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	19.1
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.041

Intersection Setup

Name	Airport Road		Frontage Road		Frontage Road	
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	Airport Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	8	135	116	288	179	5
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	0.00	2.20	2.60	2.80	6.70	0.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36
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]	11	184	128	317	197	5
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	50	35	86	54	1
Total Analysis Volume [veh/h]	12	200	139	345	214	5
Pedestrian Volume [ped/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	0.04	0.24	0.10	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	19.12	11.27	7.98	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	1.17	1.17	1.66	1.66	0.00	0.00
95th-Percentile Queue Length [ft]	29.21	29.21	41.43	41.43	0.00	0.00
d_A, Approach Delay [s/veh]	11.72		2.29		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	3.93					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 6: Valley Center Spur & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	12.8
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.412

Intersection Setup

Name	Valley Center Spur		Frontage Road		Frontage Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	250.00	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	Valley Center Spur		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	56	116	333	130	68	97
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	3.60	0.90	3.40	0.80	5.90	15.40
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36
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
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	76	158	367	143	75	107
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	43	100	39	20	29
Total Analysis Volume [veh/h]	83	172	399	155	82	116
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	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	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	0	8	0	7	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	5	0	0	5
Maximum Green [s]	30	0	30	0	0	30
Amber [s]	4.0	0.0	4.0	0.0	0.0	4.0
All red [s]	2.0	0.0	2.0	0.0	0.0	2.0
Split [s]	39	0	21	0	0	21
Vehicle Extension [s]	3.0	0.0	3.0	0.0	0.0	3.0
Walk [s]	5	0	5	0	0	5
Pedestrian Clearance [s]	10	0	10	0	0	10
l1, Start-Up Lost Time [s]	2.0	0.0	2.0	0.0	0.0	2.0
l2, Clearance Lost Time [s]	4.0	0.0	4.0	0.0	0.0	4.0
Minimum Recall	No		No			No
Maximum Recall	No		No			No
Pedestrian Recall	No		No			No
Detector Location [ft]	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
I, Upstream Filtering Factor	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
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	12	36	36	36	36
g / C, Green / Cycle	0.21	0.59	0.59	0.59	0.59
(v / s)_i Volume / Saturation Flow Rate	0.17	0.24	0.11	0.10	0.08
s, saturation flow rate [veh/h]	1493	1654	1442	851	1482
c, Capacity [veh/h]	307	983	857	481	881
d1, Uniform Delay [s]	22.85	6.52	5.54	11.00	5.36
k, delay calibration	0.11	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.73	1.25	0.46	0.77	0.31
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

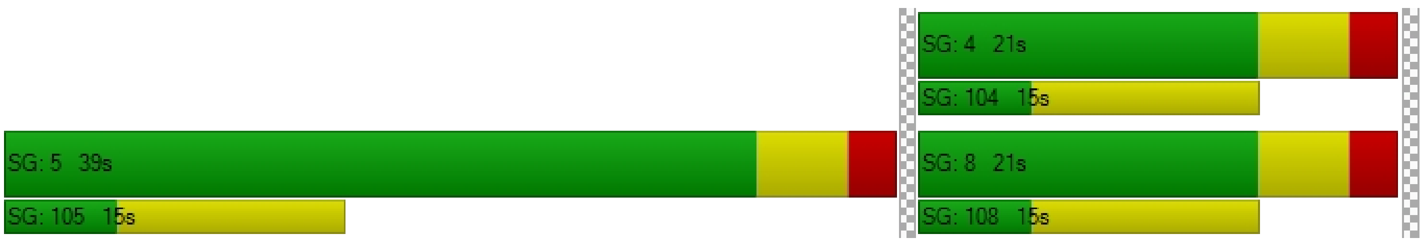
X, volume / capacity	0.83	0.41	0.18	0.17	0.13
d, Delay for Lane Group [s/veh]	28.57	7.76	6.00	11.77	5.67
Lane Group LOS	C	A	A	B	A
Critical Lane Group	Yes	Yes	No	No	No
50th-Percentile Queue Length [veh]	3.68	2.38	0.78	0.71	0.56
50th-Percentile Queue Length [ft]	91.97	59.42	19.57	17.77	14.08
95th-Percentile Queue Length [veh]	6.62	4.28	1.41	1.28	1.01
95th-Percentile Queue Length [ft]	165.54	106.95	35.23	31.99	25.34

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	28.57	28.57	7.76	6.00	11.77	5.67
Movement LOS	C	C	A	A	B	A
d_A, Approach Delay [s/veh]	28.57		7.27		8.20	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	12.85					
Intersection LOS	B					
Intersection V/C	0.412					

Sequence

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



Intersection Level Of Service Report
Intersection 8: Nelson Road & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	15.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.199

Intersection Setup

Name	Nelson Road		Frontage Road		Frontage Road	
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	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	300.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Nelson Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	57	32	11	374	147	17
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	3.50	15.60	0.00	3.50	6.10	5.90
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36
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]	78	44	12	412	162	19
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	12	3	112	44	5
Total Analysis Volume [veh/h]	85	48	13	448	176	21
Pedestrian Volume [ped/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	0.06	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	15.80	11.70	7.62	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	1.01	1.01	0.03	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	25.34	25.34	0.71	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	14.32		0.21		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	2.53					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 9: Springhill Road & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	12.4
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.388

Intersection Setup

Name	Springhill Road		Frontage Road		Frontage Road	
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	1	0	1	0	0	1
Pocket Length [ft]	150.00	100.00	200.00	100.00	100.00	300.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Springhill Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	111	89	123	306	65	62
Base Volume Adjustment Factor	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500
Heavy Vehicles Percentage [%]	1.80	7.80	4.10	0.70	4.60	4.80
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36
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
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	159	126	175	437	92	88
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	34	48	119	25	24
Total Analysis Volume [veh/h]	173	137	190	475	100	96
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	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	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtectedPermissi	Permissive	Permissive	Permissive
Signal group	1	0	3	8	4	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	4.0	0.0	4.0	4.0	4.0	0.0
All red [s]	2.0	0.0	2.0	2.0	2.0	0.0
Split [s]	28	0	11	32	21	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	10	0	0	10	10	0
l1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	4.0	0.0	4.0	4.0	4.0	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
Detector Length [ft]	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

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	L	R	L	C	C	R
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	0.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	9	9	39	39	28	28
g / C, Green / Cycle	0.15	0.15	0.65	0.65	0.47	0.47
(v / s)_i Volume / Saturation Flow Rate	0.11	0.10	0.15	0.28	0.06	0.07
s, saturation flow rate [veh/h]	1600	1348	1237	1698	1635	1387
c, Capacity [veh/h]	238	200	935	1107	762	647
d1, Uniform Delay [s]	24.46	24.28	4.20	5.06	9.13	9.21
k, delay calibration	0.11	0.11	0.11	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.22	4.07	0.11	1.22	0.36	0.48
d3, Initial Queue Delay [s]	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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

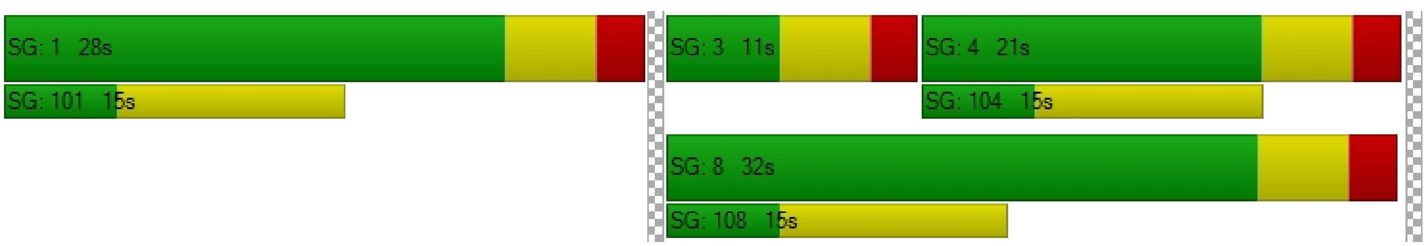
X, volume / capacity	0.73	0.68	0.20	0.43	0.13	0.15
d, Delay for Lane Group [s/veh]	28.67	28.35	4.31	6.28	9.49	9.69
Lane Group LOS	C	C	A	A	A	A
Critical Lane Group	Yes	No	No	Yes	No	No
50th-Percentile Queue Length [veh]	2.48	1.96	0.66	2.30	0.71	0.71
50th-Percentile Queue Length [ft]	61.97	48.91	16.45	57.42	17.85	17.64
95th-Percentile Queue Length [veh]	4.46	3.52	1.18	4.13	1.29	1.27
95th-Percentile Queue Length [ft]	111.54	88.04	29.61	103.35	32.13	31.75

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	28.67	28.35	4.31	6.28	9.49	9.69
Movement LOS	C	C	A	A	A	A
d_A, Approach Delay [s/veh]	28.53		5.71		9.59	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	12.40					
Intersection LOS	B					
Intersection V/C	0.388					

Sequence

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



Intersection Level Of Service Report
Intersection 10: 7th Avenue & Griffin Drive

Control Type:	Signalized	Delay (sec / veh):	45.2
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.899

Intersection Setup

Name	7th Avenue			7th Avenue			Mandeville Lane			Griffin Drive		
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	7th Avenue			7th Avenue			Mandeville Lane			Griffin Drive		
Base Volume Input [veh/h]	10	184	424	142	212	7	7	15	20	232	8	61
Base Volume Adjustment Factor	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500	1.0000	1.0000	1.0000	1.0500	1.0500	1.0500
Heavy Vehicles Percentage [%]	10.00	4.40	5.50	3.50	5.20	0.00	0.00	0.00	0.00	11.60	12.50	3.30
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	15	262	605	203	303	10	10	20	27	332	11	87
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	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	71	164	55	82	3	3	5	7	90	3	24
Total Analysis Volume [veh/h]	16	285	658	221	329	11	11	22	29	361	12	95
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]	120
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	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	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	64	0	0	64	0	0	56	0	0	56	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
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	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	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	C	R	C	C	C	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	58	58	58	58	50	50
g / C, Green / Cycle	0.48	0.48	0.48	0.48	0.42	0.42
(v / s)_i Volume / Saturation Flow Rate	0.19	0.48	0.32	0.23	0.04	0.42
s, saturation flow rate [veh/h]	1604	1378	689	1471	1616	1111
c, Capacity [veh/h]	807	666	393	711	709	516
d1, Uniform Delay [s]	19.62	30.66	32.99	20.83	21.25	35.93
k, delay calibration	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
d2, Incremental Delay [s]	1.32	32.10	5.71	2.30	0.24	22.26
d3, Initial Queue Delay [s]	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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

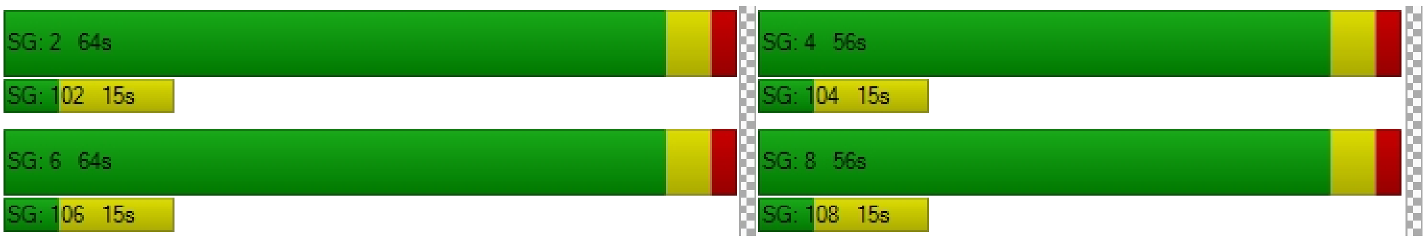
X, volume / capacity	0.37	0.99	0.56	0.48	0.09	0.91
d, Delay for Lane Group [s/veh]	20.94	62.76	38.70	23.13	21.49	58.18
Lane Group LOS	C	E	D	C	C	E
Critical Lane Group	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	5.58	24.00	6.03	6.79	1.12	16.62
50th-Percentile Queue Length [ft]	139.59	599.95	150.71	169.87	27.91	415.62
95th-Percentile Queue Length [veh]	9.46	32.03	10.05	11.07	2.01	23.31
95th-Percentile Queue Length [ft]	236.47	800.79	251.37	276.74	50.25	582.80

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.94	20.94	62.76	38.70	23.13	23.13	21.49	21.49	21.49	58.18	58.18	58.18
Movement LOS	C	C	E	D	C	C	C	C	C	E	E	E
d_A, Approach Delay [s/veh]		49.64			29.27			21.49			58.18	
Approach LOS		D			C			C			E	
d_I, Intersection Delay [s/veh]	45.16											
Intersection LOS	D											
Intersection V/C	0.899											

Sequence

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



Intersection Level Of Service Report
Intersection 1: Jackrabbit Lane & Main Street

Control Type:	Signalized	Delay (sec / veh):	24.2
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.601

Intersection Setup

Name	Jackrabbit Lane			Jackrabbit Lane			Frontage Road			Main Street		
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	0	1	0	0	0	0	0
Pocket Length [ft]	200.00	100.00	100.00	250.00	100.00	100.00	300.00	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	Jackrabbit Lane			Jackrabbit Lane			Frontage Road			Main Street		
Base Volume Input [veh/h]	346	350	162	22	159	0	47	101	179	160	184	50
Base Volume Adjustment Factor	0.9200	0.9200	0.9200	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.60	0.90	1.20	0.00	1.30	0.00	0.00	0.00	2.80	1.30	0.00	0.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	432	438	203	31	224	0	67	143	253	200	230	63
Peak Hour Factor	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210	0.9210
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]	117	119	55	8	61	0	18	39	69	54	62	17
Total Analysis Volume [veh/h]	469	476	220	34	243	0	73	155	275	217	250	68
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]	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	Overlap	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	2	1	6	6	3	8	0	7	4	0
Auxiliary Signal Groups			2,7			3,6						
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	5	5	5	5	5	5	0	5	5	0
Maximum Green [s]	30	30	30	30	30	30	30	30	0	30	30	0
Amber [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
All red [s]	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	9	19	19	9	19	19	14	53	0	9	48	0
Vehicle Extension [s]	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	0.0	3.0	3.0	0.0
Walk [s]	0	5	5	0	5	5	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	10	0	10	0	0	10	0
I1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	0.0
Minimum Recall	No	No	No	No	No	No	No	No		No	No	
Maximum Recall	No	No	No	No	No	No	No	No		No	No	
Pedestrian Recall	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	L	C	R	L	C	R	L	C	R	L	C
L, Total Lost Time per Cycle [s]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
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
l2, Clearance Lost Time [s]	0.00	2.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00	0.00	2.00
g_i, Effective Green Time [s]	53	46	55	53	44	52	29	20	20	29	21
g / C, Green / Cycle	0.59	0.51	0.61	0.59	0.49	0.58	0.32	0.22	0.22	0.32	0.23
(v / s)_i Volume / Saturation Flow Rate	0.42	0.28	0.15	0.04	0.14	0.00	0.07	0.09	0.19	0.18	0.19
s, saturation flow rate [veh/h]	1112	1695	1436	914	1688	1454	1112	1710	1414	1232	1648
c, Capacity [veh/h]	669	861	874	479	818	838	303	385	318	434	385
d1, Uniform Delay [s]	16.06	15.19	8.15	9.89	14.00	0.00	23.05	29.78	33.62	25.52	32.81
k, delay calibration	0.50	0.50	0.50	0.11	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
d2, Incremental Delay [s]	6.04	2.56	0.69	0.06	0.93	0.00	0.41	0.68	6.98	0.89	4.52
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
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
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

Lane Group Results

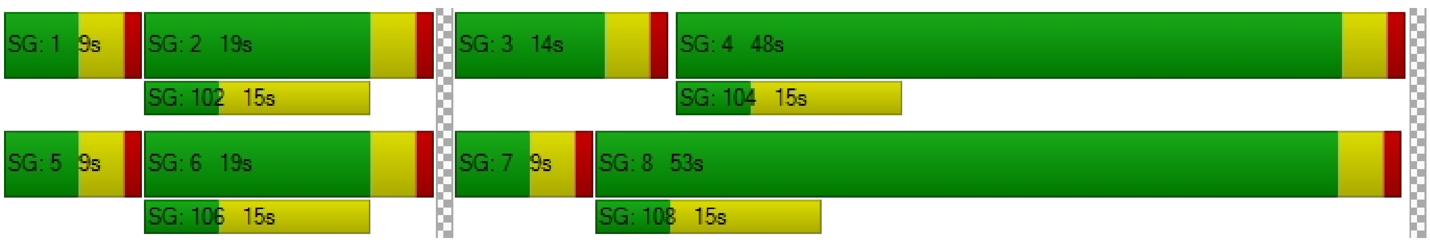
X, volume / capacity	0.70	0.55	0.25	0.07	0.30	0.00	0.24	0.40	0.86	0.50	0.83
d, Delay for Lane Group [s/veh]	22.10	17.75	8.84	9.95	14.93	0.00	23.46	30.46	40.60	26.42	37.33
Lane Group LOS	C	B	A	A	B	A	C	C	D	C	D
Critical Lane Group	Yes	No	No	Yes	No	No	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh]	6.05	6.83	1.96	0.27	3.04	0.00	1.11	2.89	6.26	3.62	6.91
50th-Percentile Queue Length [ft]	151.36	170.72	48.88	6.69	76.11	0.00	27.63	72.23	156.46	90.56	172.71
95th-Percentile Queue Length [veh]	10.09	11.11	3.52	0.48	5.48	0.00	1.99	5.20	10.36	6.52	11.22
95th-Percentile Queue Length [ft]	252.24	277.86	87.98	12.04	136.99	0.00	49.73	130.01	259.03	163.00	280.47

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	22.10	17.75	8.84	9.95	14.93	0.00	23.46	30.46	40.60	26.42	37.33	37.33
Movement LOS	C	B	A	A	B	A	C	C	D	C	D	D
d_A, Approach Delay [s/veh]	17.82			14.32			34.99			32.90		
Approach LOS	B			B			C			C		
d_I, Intersection Delay [s/veh]	24.16											
Intersection LOS	C											
Intersection V/C	0.601											

Sequence

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



Intersection Level Of Service Report
Intersection 2: Broadway Street & Main Street

Control Type:	All-way stop	Delay (sec / veh):	57.7
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes		

Intersection Setup

Name	Broadway Street			Broadway Street			Main Street			Main Street		
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	Broadway Street			Broadway Street			Main Street			Main Street		
Base Volume Input [veh/h]	58	91	112	45	77	19	10	187	55	111	293	17
Base Volume Adjustment Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.00	2.20	1.80	2.20	3.90	5.30	0.00	1.10	0.00	2.70	4.40	0.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	82	129	158	64	109	27	12	234	69	139	367	22
Peak Hour Factor	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630	0.9630
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]	21	33	41	17	28	7	3	61	18	36	95	6
Total Analysis Volume [veh/h]	85	134	164	66	113	28	12	243	72	144	381	23
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	7.28	2.55	5.25	18.84
95th-Percentile Queue Length [ft]	182.12	63.75	131.28	470.91
Approach Delay [s/veh]	33.49	18.89	26.12	108.05
Approach LOS	D	C	D	F
Intersection Delay [s/veh]	57.67			
Intersection LOS	F			

Intersection Level Of Service Report
Intersection 3: Oregon Street & Main Street

Control Type:	Two-way stop	Delay (sec / veh):	98.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.790

Intersection Setup

Name	Oregon Street						Main Street			Main Street		
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	Oregon Street						Main Street			Main Street		
Base Volume Input [veh/h]	68	4	59	27	10	49	28	220	37	59	405	5
Base Volume Adjustment Factor	1.0400	1.0400	1.0400	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	0.00	0.00	3.40	0.00	0.00	2.00	3.60	3.20	0.00	3.40	1.20	0.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	97	5	83	37	14	67	35	275	46	73	507	7
Peak Hour Factor	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370	0.9370
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]	26	1	22	10	4	18	9	73	12	19	135	2
Total Analysis Volume [veh/h]	104	5	89	39	15	72	37	293	49	78	541	7
Pedestrian Volume [ped/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	0.79	0.03	0.12	0.26	0.08	0.13	0.04	0.00	0.00	0.06	0.01	0.00
d_M, Delay for Movement [s/veh]	98.95	90.96	10.71	41.27	36.93	23.69	8.69	0.00	0.00	8.18	0.00	0.00
Movement LOS	F	F	B	E	E	C	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	5.05	5.05	0.42	2.42	2.42	2.42	1.75	1.75	1.75	3.09	3.09	3.09
95th-Percentile Queue Length [ft]	126.17	126.17	10.53	60.53	60.53	60.53	43.83	43.83	43.83	77.22	77.22	77.22
d_A, Approach Delay [s/veh]	59.08			30.71			0.85			1.02		
Approach LOS	F			D			A			A		
d_I, Intersection Delay [s/veh]	12.44											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 4: Airway Boulevard & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	23.6
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.431

Intersection Setup

Name	Airway Boulevard			Airway Boulevard			Frontage Road			Frontage Road		
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	Airway Boulevard			Airway Boulevard			Frontage Road			Frontage Road		
Base Volume Input [veh/h]	140	215	74	81	207	14	34	209	116	116	269	89
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Heavy Vehicles Percentage [%]	1.40	1.40	12.20	4.90	3.40	0.00	0.00	3.40	2.60	7.80	3.70	3.40
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	190	292	101	110	282	19	42	261	146	146	336	112
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]	51	78	27	29	75	5	11	70	39	39	90	30
Total Analysis Volume [veh/h]	203	311	108	117	301	20	45	278	156	156	358	119
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]	70
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	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	0	5	5	0
Maximum Green [s]	30	30	0	30	30	0	30	30	0	30	30	0
Amber [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0
All red [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Split [s]	11	21	0	11	21	0	11	26	0	12	27	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	3.0	3.0	0.0	3.0	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
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	4.0	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

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	R	L	C	R
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
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	4.00	4.00	0.00	4.00	4.00	0.00	4.00	4.00	0.00	4.00	4.00
g_i, Effective Green Time [s]	32	21	21	32	20	20	27	15	15	27	18	18
g / C, Green / Cycle	0.45	0.30	0.30	0.45	0.29	0.29	0.38	0.21	0.21	0.38	0.25	0.25
(v / s)_i Volume / Saturation Flow Rate	0.18	0.13	0.13	0.11	0.10	0.10	0.04	0.17	0.11	0.14	0.22	0.08
s, saturation flow rate [veh/h]	1143	1686	1540	1041	1654	1618	1119	1654	1417	1152	1649	1406
c, Capacity [veh/h]	589	498	455	525	481	470	376	345	295	431	415	354
d1, Uniform Delay [s]	12.48	20.05	20.08	12.00	19.59	19.61	15.53	26.46	24.74	16.16	25.15	21.51
k, delay calibration	0.50	0.50	0.50	0.40	0.50	0.50	0.11	0.11	0.11	0.11	0.16	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]	1.60	2.78	3.10	0.79	1.88	1.95	0.14	4.46	1.46	0.51	7.89	0.56
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	0.34	0.44	0.44	0.22	0.34	0.34	0.12	0.81	0.53	0.36	0.86	0.34
d, Delay for Lane Group [s/veh]	14.08	22.83	23.19	12.79	21.48	21.55	15.67	30.92	26.20	16.67	33.03	22.06
Lane Group LOS	B	C	C	B	C	C	B	C	C	B	C	C
Critical Lane Group	Yes	No	No	No	No	Yes	No	Yes	No	Yes	No	No
50th-Percentile Queue Length [veh]	2.08	3.09	2.90	1.11	2.21	2.18	0.44	4.62	2.32	1.66	6.26	1.58
50th-Percentile Queue Length [ft]	52.11	77.26	72.40	27.70	55.20	54.55	11.02	115.54	58.01	41.56	156.52	39.41
95th-Percentile Queue Length [veh]	3.75	5.56	5.21	1.99	3.97	3.93	0.79	8.15	4.18	2.99	10.36	2.84
95th-Percentile Queue Length [ft]	93.79	139.07	130.32	49.87	99.37	98.20	19.83	203.68	104.42	74.81	259.11	70.94

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	14.08	22.94	23.19	12.79	21.51	21.55	15.67	30.92	26.20	16.67	33.03	22.06
Movement LOS	B	C	C	B	C	C	B	C	C	B	C	C
d_A, Approach Delay [s/veh]	20.09			19.19			27.95			26.94		
Approach LOS	C			B			C			C		
d_I, Intersection Delay [s/veh]	23.64											
Intersection LOS	C											
Intersection V/C	0.431											

Sequence

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

Intersection Level Of Service Report
Intersection 5: Airport Road & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	24.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.061

Intersection Setup

Name	Airport Road		Frontage Road		Frontage Road	
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	Airport Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	9	107	140	226	352	10
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	0.00	0.90	0.70	1.70	2.00	0.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36
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]	12	146	154	249	388	11
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	40	42	68	105	3
Total Analysis Volume [veh/h]	13	159	167	271	422	12
Pedestrian Volume [ped/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	0.06	0.25	0.15	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	24.77	13.69	8.73	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	1.33	1.33	1.85	1.85	0.00	0.00
95th-Percentile Queue Length [ft]	33.29	33.29	46.30	46.30	0.00	0.00
d_A, Approach Delay [s/veh]	14.53		3.33		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	3.79					
Intersection LOS	C					

Intersection Level Of Service Report

Intersection 6: Valley Center Spur & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	13.4
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.461

Intersection Setup

Name	Valley Center Spur		Frontage Road		Frontage Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	250.00	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	Valley Center Spur		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	114	92	191	118	152	357
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	0.90	1.10	3.20	0.00	4.00	5.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36
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
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	155	125	211	131	167	393
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	42	34	57	36	45	107
Total Analysis Volume [veh/h]	168	136	229	142	182	427
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	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	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	Permissive	Permissive	Permissive	Permissive
Signal group	5	0	8	0	7	4
Auxiliary Signal Groups						
Lead / Lag	Lead	-	-	-	-	-
Minimum Green [s]	5	0	5	0	0	5
Maximum Green [s]	30	0	30	0	0	30
Amber [s]	4.0	0.0	4.0	0.0	0.0	4.0
All red [s]	2.0	0.0	2.0	0.0	0.0	2.0
Split [s]	39	0	21	0	0	21
Vehicle Extension [s]	3.0	0.0	3.0	0.0	0.0	3.0
Walk [s]	5	0	5	0	0	5
Pedestrian Clearance [s]	10	0	10	0	0	10
l1, Start-Up Lost Time [s]	2.0	0.0	2.0	0.0	0.0	2.0
l2, Clearance Lost Time [s]	4.0	0.0	4.0	0.0	0.0	4.0
Minimum Recall	No		No			No
Maximum Recall	No		No			No
Pedestrian Recall	No		No			No
Detector Location [ft]	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
I, Upstream Filtering Factor	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
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	14	34	34	34	34
g / C, Green / Cycle	0.24	0.57	0.57	0.57	0.57
(v / s)_i Volume / Saturation Flow Rate	0.20	0.14	0.10	0.18	0.26
s, saturation flow rate [veh/h]	1528	1657	1454	1012	1629
c, Capacity [veh/h]	361	935	820	578	919
d1, Uniform Delay [s]	21.90	6.63	6.34	10.99	7.75
k, delay calibration	0.11	0.50	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	5.30	0.62	0.46	1.42	1.69
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00

Lane Group Results

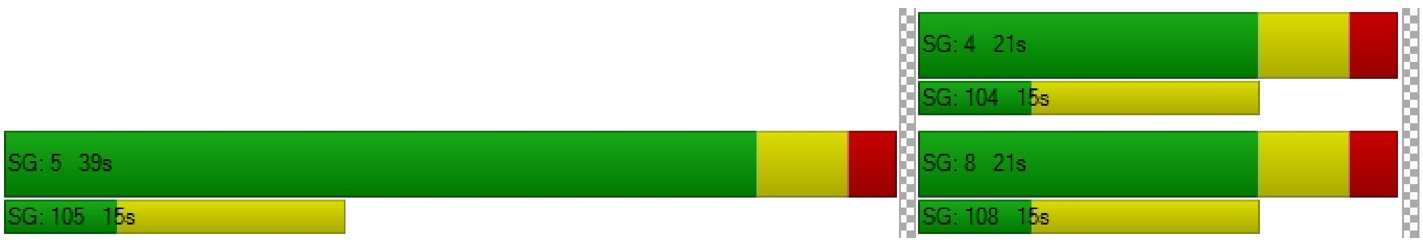
X, volume / capacity	0.84	0.24	0.17	0.31	0.46
d, Delay for Lane Group [s/veh]	27.20	7.26	6.80	12.41	9.44
Lane Group LOS	C	A	A	B	A
Critical Lane Group	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	4.28	1.33	0.79	1.61	2.96
50th-Percentile Queue Length [ft]	107.04	33.13	19.84	40.33	74.11
95th-Percentile Queue Length [veh]	7.67	2.39	1.43	2.90	5.34
95th-Percentile Queue Length [ft]	191.87	59.63	35.70	72.59	133.39

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.20	27.20	7.26	6.80	12.41	9.44
Movement LOS	C	C	A	A	B	A
d_A, Approach Delay [s/veh]	27.20		7.08		10.33	
Approach LOS	C		A		B	
d_I, Intersection Delay [s/veh]	13.38					
Intersection LOS	B					
Intersection V/C	0.461					

Sequence

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



Intersection Level Of Service Report
Intersection 8: Nelson Road & Frontage Road

Control Type:	Two-way stop	Delay (sec / veh):	17.8
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.112

Intersection Setup

Name	Nelson Road		Frontage Road		Frontage Road	
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	1
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	300.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Nelson Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	24	11	21	241	440	50
Base Volume Adjustment Factor	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	1.60	4.80	2.00
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36
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]	33	15	23	265	484	56
Peak Hour Factor	0.9240	0.9240	0.9240	0.9240	0.9240	0.9240
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	4	6	72	131	15
Total Analysis Volume [veh/h]	36	16	25	287	524	61
Pedestrian Volume [ped/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	0.11	0.03	0.03	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	17.84	13.06	8.69	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.49	0.49	0.08	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	12.17	12.17	1.92	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	16.37		0.70		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	1.13					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 9: Springhill Road & Frontage Road

Control Type:	Signalized	Delay (sec / veh):	19.1
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.542

Intersection Setup

Name	Springhill Road		Frontage Road		Frontage Road	
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	1	0	1	0	0	1
Pocket Length [ft]	150.00	100.00	200.00	100.00	100.00	300.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name	Springhill Road		Frontage Road		Frontage Road	
Base Volume Input [veh/h]	67	192	125	128	294	123
Base Volume Adjustment Factor	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500
Heavy Vehicles Percentage [%]	1.50	2.60	0.80	3.90	2.30	0.80
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36
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
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	95	275	178	182	420	175
Peak Hour Factor	0.9440	0.9440	0.9440	0.9440	0.9440	0.9440
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	25	73	47	48	111	46
Total Analysis Volume [veh/h]	101	291	189	193	445	185
Presence of On-Street Parking	No	No	No	No	No	No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	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	Fully actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permissive	Permissive	ProtectedPermissi	Permissive	Permissive	Permissive
Signal group	1	0	3	8	4	0
Auxiliary Signal Groups						
Lead / Lag	Lead	-	Lead	-	-	-
Minimum Green [s]	5	0	5	5	5	0
Maximum Green [s]	30	0	30	30	30	0
Amber [s]	4.0	0.0	4.0	4.0	4.0	0.0
All red [s]	2.0	0.0	2.0	2.0	2.0	0.0
Split [s]	28	0	11	32	21	0
Vehicle Extension [s]	3.0	0.0	3.0	3.0	3.0	0.0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	10	0	0	10	10	0
I1, Start-Up Lost Time [s]	2.0	0.0	2.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	4.0	0.0	4.0	4.0	4.0	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
Detector Length [ft]	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

Exclusive Pedestrian Phase

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

Lane Group Calculations

Lane Group	L	R	L	C	C	R
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	0.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	15	15	34	34	22	22
g / C, Green / Cycle	0.24	0.24	0.56	0.56	0.37	0.37
(v / s)_i Volume / Saturation Flow Rate	0.06	0.21	0.18	0.12	0.27	0.13
s, saturation flow rate [veh/h]	1605	1417	1075	1646	1672	1442
c, Capacity [veh/h]	390	345	567	917	608	525
d1, Uniform Delay [s]	18.39	21.69	8.90	6.68	16.60	13.97
k, delay calibration	0.11	0.11	0.23	0.50	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.35	5.68	0.72	0.52	7.60	1.86
d3, Initial Queue Delay [s]	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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

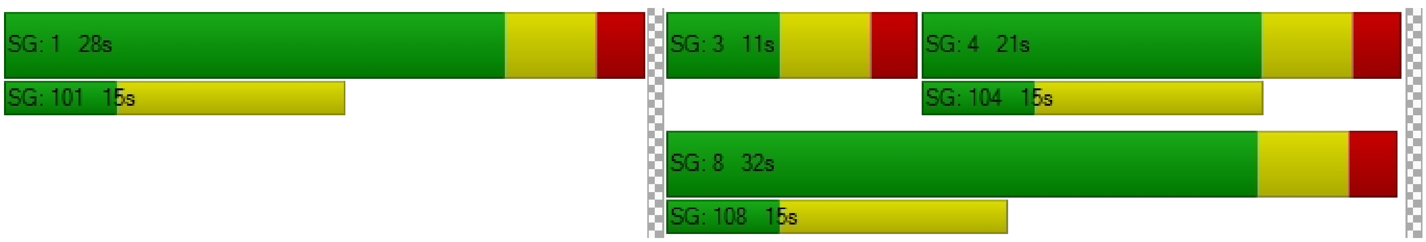
X, volume / capacity	0.26	0.84	0.33	0.21	0.73	0.35
d, Delay for Lane Group [s/veh]	18.74	27.37	9.62	7.20	24.20	15.83
Lane Group LOS	B	C	A	A	C	B
Critical Lane Group	No	Yes	Yes	No	Yes	No
50th-Percentile Queue Length [veh]	1.09	4.12	1.08	1.12	5.96	1.91
50th-Percentile Queue Length [ft]	27.26	103.00	26.88	27.88	148.96	47.67
95th-Percentile Queue Length [veh]	1.96	7.42	1.94	2.01	9.96	3.43
95th-Percentile Queue Length [ft]	49.06	185.39	48.38	50.18	249.04	85.80

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	18.74	27.37	9.62	7.20	24.20	15.83
Movement LOS	B	C	A	A	C	B
d_A, Approach Delay [s/veh]	25.15		8.40		21.74	
Approach LOS	C		A		C	
d_I, Intersection Delay [s/veh]	19.06					
Intersection LOS	B					
Intersection V/C	0.542					

Sequence

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



Intersection Level Of Service Report
Intersection 10: 7th Avenue & Griffin Drive

Control Type:	Signalized	Delay (sec / veh):	184.3
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.259

Intersection Setup

Name	7th Avenue			7th Avenue			Mandeville Lane			Griffin Drive		
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	7th Avenue			7th Avenue			Mandeville Lane			Griffin Drive		
Base Volume Input [veh/h]	28	359	227	85	263	8	8	11	34	526	7	149
Base Volume Adjustment Factor	1.0500	1.0500	1.0500	1.0500	1.0500	1.0500	1.0000	1.0000	1.0000	1.0500	1.0500	1.0500
Heavy Vehicles Percentage [%]	0.00	2.50	3.50	4.70	1.10	0.00	0.00	0.00	2.90	2.80	0.00	3.40
Growth Rate	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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]	39	513	324	121	375	11	11	15	46	751	10	212
Peak Hour Factor	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540	0.9540
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]	10	134	85	32	98	3	3	4	12	197	3	56
Total Analysis Volume [veh/h]	41	538	340	127	393	12	12	16	48	787	10	222
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]	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	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	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	67	0	0	67	0	0	63	0	0	63	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
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	4.0	0.0	0.0	4.0	0.0	0.0	4.0	0.0	0.0	4.0	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	C	R	C	C	C	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	6.00	6.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	2.00	2.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	4.00	4.00	4.00
g_i, Effective Green Time [s]	61	61	61	61	57	57
g / C, Green / Cycle	0.47	0.47	0.47	0.47	0.44	0.44
(v / s)_i Volume / Saturation Flow Rate	0.42	0.24	1.43	0.26	0.05	0.83
s, saturation flow rate [veh/h]	1379	1404	89	1531	1616	1222
c, Capacity [veh/h]	677	659	97	718	741	585
d1, Uniform Delay [s]	32.33	24.16	63.51	24.90	21.56	39.81
k, delay calibration	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
d2, Incremental Delay [s]	13.13	2.87	194.12	3.19	0.28	340.83
d3, Initial Queue Delay [s]	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
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

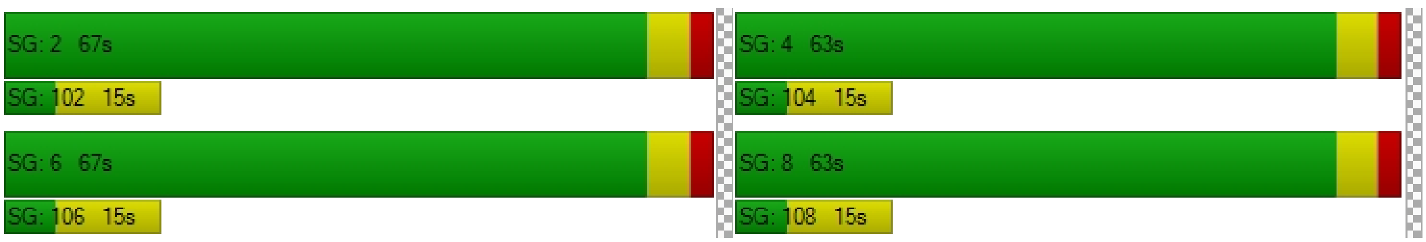
X, volume / capacity	0.86	0.52	1.31	0.56	0.10	1.74
d, Delay for Lane Group [s/veh]	45.47	27.03	257.63	28.08	21.84	380.65
Lane Group LOS	D	C	F	C	C	F
Critical Lane Group	No	No	Yes	No	No	Yes
50th-Percentile Queue Length [veh]	19.29	7.83	8.47	9.60	1.45	74.83
50th-Percentile Queue Length [ft]	482.29	195.76	211.75	240.04	36.19	1870.79
95th-Percentile Queue Length [veh]	26.50	12.42	15.25	14.68	2.61	118.80
95th-Percentile Queue Length [ft]	662.38	310.49	381.15	367.09	65.15	2969.90

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	45.47	45.47	27.03	257.63	28.08	28.08	21.84	21.84	21.84	380.65	380.65	380.65
Movement LOS	D	D	C	F	C	C	C	C	C	F	F	F
d_A, Approach Delay [s/veh]	38.65			82.88			21.84			380.65		
Approach LOS	D			F			C			F		
d_I, Intersection Delay [s/veh]	184.27											
Intersection LOS	F											
Intersection V/C	2.259											

Sequence

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

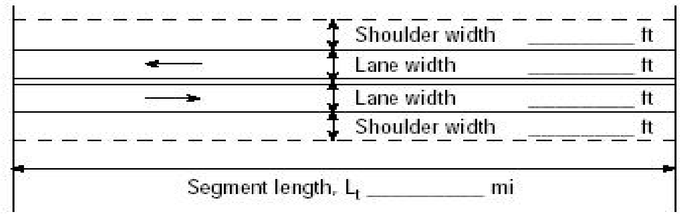


DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airport to Spur EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



Class I highway ☐ Class II highway ☐ Class III highway ☑

Terrain: Level ☑ Rolling ☐

Analysis direction vol., V_d	*419* veh/h
Opposing direction vol., V_o	*193* veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*3.7*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*57%*
% Trucks and Buses , P_T	*5* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.990*	*0.976*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*460*	*215*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.0 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*40.4 mi/h*
		Percent free flow speed, PFFS	*83.1 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.995*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*455*	*211*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*41.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*40.5*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*68.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.27*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1659*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1692*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*83.1*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*455.4*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.37*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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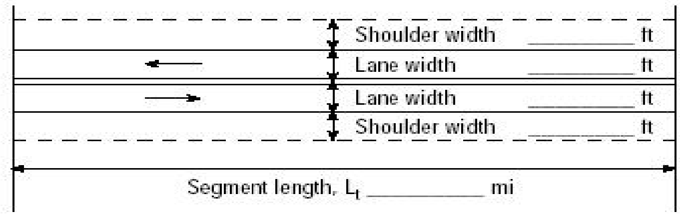
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		**Site Information**	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airport to Spur EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*301*veh/h
Opposing direction vol., V_o	*473*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*3.7*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*57%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.992*	*0.996*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*330*	*516*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.6 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*40.4 mi/h*
		Percent free flow speed, PFFS	*83.2 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.998*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*328*	*514*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*39.0*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*36.3*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*53.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.19*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1693*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*83.2*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*327.2*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.39*
Bicycle level of service (Exhibit 15-4)	*D*
Notes	
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain. 2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10. 6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.	

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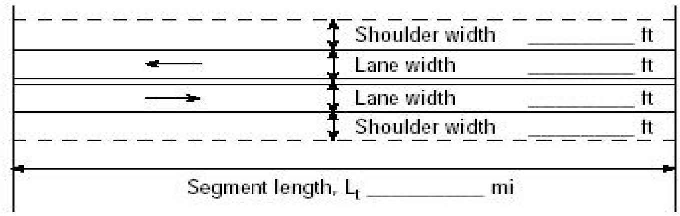
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airway to Airport WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*193*veh/h
Opposing direction vol., V_o	*419*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*3.7*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*60%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/\ (1+ P_T(E_T-1)+P_R(E_R-1))$	*0.948*	*0.978*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i\ /\ (PHF^* f_{g,ATS} * f_{HV,ATS})$	*221*	*466*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.9 mi/h*	Percent free flow speed, PFFS	*85.1 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/\ (1+ P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*212*	*455*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*27.7*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*41.4*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF} *(v_{d,PTSF}\ /\ v_{d,PTSF} + v_{o,PTSF})$	*40.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.13*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1663*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*85.1*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*209.8*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.17*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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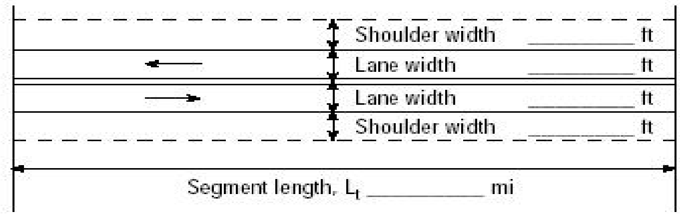
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airport to Spur WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*437*veh/h
Opposing direction vol., V_o	*301*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*3.7*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*60%*
% Trucks and Buses , P_T	*4* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*9*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/ (1+ P_T (E_T -1)+P_R (E_R -1))$	*0.992*	*0.984*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*479*	*332*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*2.3 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.5 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*39.7 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.5 mi/h*	Percent free flow speed, PFFS	*81.9 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.996*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*475*	*328*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*46.6*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*39.0*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{o,PTSF})$	*69.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.28*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1673*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1693*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*475.0*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.10*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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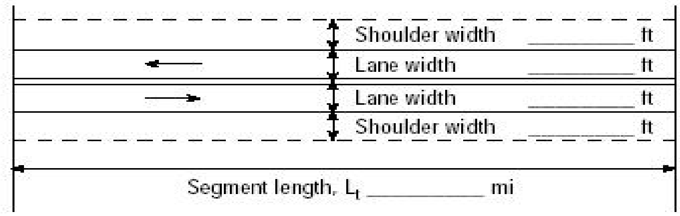
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airway to Airport EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF	*0.92*
No-passing zone	*59%*
% Trucks and Buses , P_T	*9* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*0*/mi

Analysis direction vol., V_d	*464*veh/h
Opposing direction vol., V_o	*335*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.8*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.982*	*0.974*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*514*	*374*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Total demand flow rate, both directions, *v*		Adj. for access points[4], f_A (Exhibit 15-8)	*0.0 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.8 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.3 mi/h*	Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.6 mi/h*
		Percent free flow speed, PFFS	*81.8 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*1.000*	*0.991*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*504*	*367*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*49.8*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*37.7*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*71.6*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.30*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1656*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1685*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.8*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*504.3*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*6.80*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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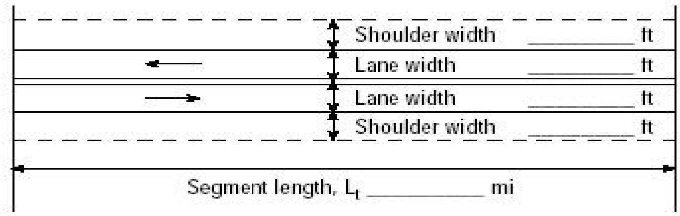
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airway to Airport EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*59%*
% Trucks and Buses , P_T	*5* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*0*/mi
Analysis direction vol., V_d	*437*veh/h
Opposing direction vol., V_o	*563*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.8*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.990*	*0.995*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*480*	*615*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*0.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.4 mi/h*	Free-flow speed, FFS ($FSS=BFFS-f_{LS}-f_A$)	*50.8 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*40.9 mi/h*
		Percent free flow speed, PFFS	*80.6 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*475*	*612*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*51.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*33.3*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*65.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.28*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1692*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*80.6*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*475.0*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.40*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

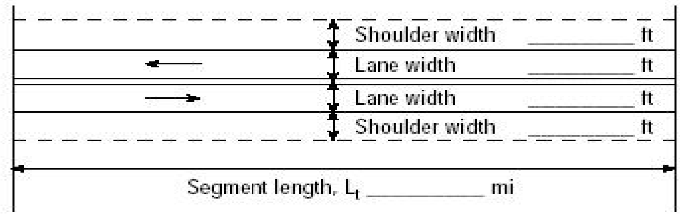
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Airway to Airport WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



Analysis direction vol., V_d	*335*veh/h
Opposing direction vol., V_o	*464*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.8*

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*84%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*0*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.968*	*0.978*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*376*	*516*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*0.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.1 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.8 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.8 mi/h*
		Percent free flow speed, PFFS	*82.2 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.989*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*368*	*504*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*42.5*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*39.4*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*59.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.22*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1663*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*82.2*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*364.1*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.44*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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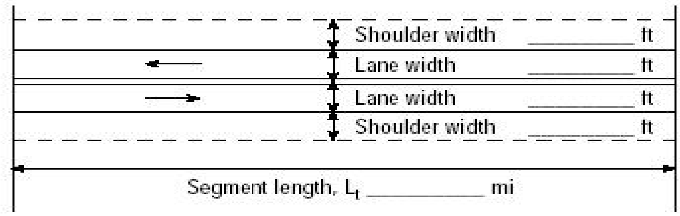
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	RPA	Highway / Direction of Travel	Frontage Road
Agency or Company		From/To	Airway to Airport WB
Date Performed	9/30/2016	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040

Project Description:

Input Data



Analysis direction vol., V_d 563veh/h

Opposing direction vol., V_o 437veh/h

Shoulder width ft 0.5

Lane Width ft 12.0

Segment Length mi 0.8

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF 0.92

No-passing zone 84%

% Trucks and Buses , P_T 5 %

% Recreational vehicles, P_R 0%

Access points *mi* 0/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	1.1	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	0.995	0.990
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	1.00	1.00
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	615	480

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	55.0 mi/h
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	4.2 mi/h
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	0.0 mi/h
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	50.8 mi/h
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	40.0 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	2.3 mi/h	Percent free flow speed, PFFS	78.8 %

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	1.000	1.000
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	612	475
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	57.4	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	34.8	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	77.0	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	C
Volume to capacity ratio, *v/c*	0.36

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1683*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*78.8*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*612.0*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.52*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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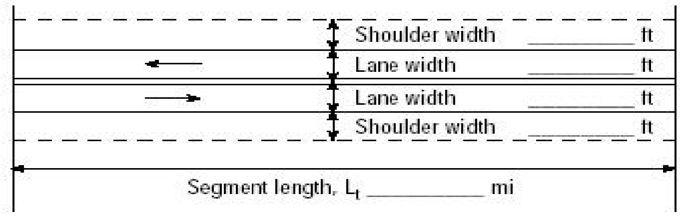
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Nelson to Springhill EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



Analysis direction vol., V_d	*551*veh/h
Opposing direction vol., V_o	*200*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.9*

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*95%*
% Trucks and Buses , P_T	*3* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*6*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.1*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/ (1+ P_T (E_T -1)+P_R (E_R -1))$	*0.997*	*0.985*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*601*	*221*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*39.1 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.8 mi/h*	Percent free flow speed, PFFS	*79.3 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*1.000*	*0.997*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*599*	*218*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*52.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*33.1*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*76.4*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.35*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1675*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1695*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*79.3*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*598.9*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.95*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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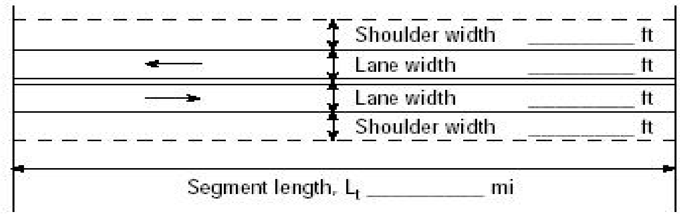
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Nelson to Springhill EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*95%*
% Trucks and Buses , P_T	*2* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*6*/mi
Analysis direction vol., V_d	*329*veh/h
Opposing direction vol., V_o	*617*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.9*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.994*	*0.998*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*360*	*672*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, v		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.6 mi/h*	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	*49.3 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*39.7 mi/h*
		Percent free flow speed, PFFS	*80.4 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}* f_{g,PTSF})$	*358*	*671*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*43.5*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*32.8*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*54.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.21*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1697*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*80.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*357.6*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.44*
Bicycle level of service (Exhibit 15-4)	*D*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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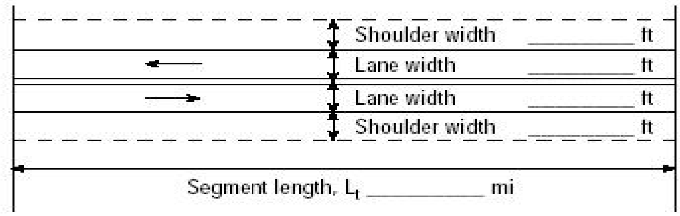
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Nelson to Springhill WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*200*veh/h
Opposing direction vol., V_o	*551*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.9*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*81%*
% Trucks and Buses , P_T	*6* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*6*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.971*	*0.994*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*224*	*603*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.7 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.3 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.2 mi/h*
		Percent free flow speed, PFFS	*83.5 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.994*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*219*	*599*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*30.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*32.4*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*38.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.13*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1690*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*83.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*217.4*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.31*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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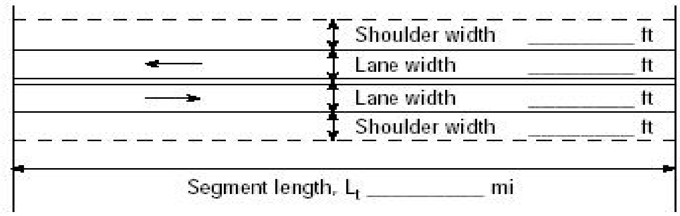
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		*Site Information*	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Nelson to Springhill WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



Analysis direction vol., V_d	*617*veh/h
Opposing direction vol., V_o	*329*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.9*

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain	☑ Level	☐ Rolling
Grade Length	mi	Up/down
Peak-hour factor, PHF		*0.92*
No-passing zone		*81%*
% Trucks and Buses , P_T		*4 %*
% Recreational vehicles, P_R		*0%*
Access points *mi*		*6*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.1*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.996*	*0.988*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*673*	*362*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.8 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.3 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*38.4 mi/h*
		Percent free flow speed, PFFS	*78.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*1.000*	*0.996*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*671*	*359*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*58.0*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*32.1*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*78.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.40*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1680*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1693*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*78.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*670.7*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.28*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

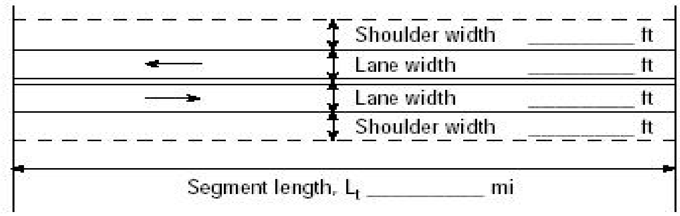
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Springhill to Viaduct EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*596*veh/h
Opposing direction vol., V_o	*181*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*1.4*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*73%*
% Trucks and Buses , P_T	*1 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*7/mi*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.1*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.999*	*0.995*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*648*	*198*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.8 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.6 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.0 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*38.9 mi/h*
		Percent free flow speed, PFFS	*79.2 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.999*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*648*	*197*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*53.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*29.6*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*76.0*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.38*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1692*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1698*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*79.2*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*647.8*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.51*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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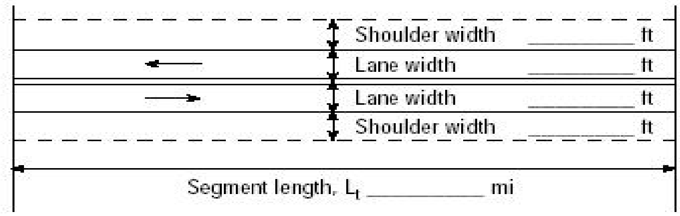
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Springhill to Viaduct EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Analysis direction vol., V_d	*277*veh/h
Opposing direction vol., V_o	*596*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*1.4*
Peak-hour factor, PHF	*0.92*
No-passing zone	*73%*
% Trucks and Buses , P_T	*3 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*7/mi*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.988*	*0.997*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*305*	*650*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.8 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.0 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*40.2 mi/h*
		Percent free flow speed, PFFS	*81.9 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.997*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*302*	*648*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*38.8*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*31.8*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{o,PTSF})$	*48.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.18*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1695*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*301.1*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.60*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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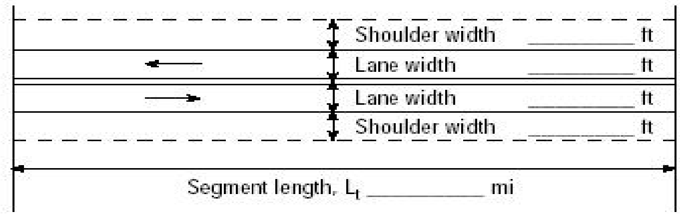
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Springhill to Viaduct WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



Analysis direction vol., V_d *181*veh/h

Opposing direction vol., V_o *596*veh/h

Shoulder width ft *0.5*

Lane Width ft *12.0*

Segment Length mi *1.4*

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.92*

No-passing zone *93%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *0%*

Access points *mi* *7/mi*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.976*	*0.995*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*202*	*651*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*1.8 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.0 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*40.8 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.7 mi/h*	Percent free flow speed, PFFS	*83.1 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*198*	*648*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*28.9*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*30.9*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}{}^*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*36.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.12*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1692*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*83.1*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*196.7*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.95*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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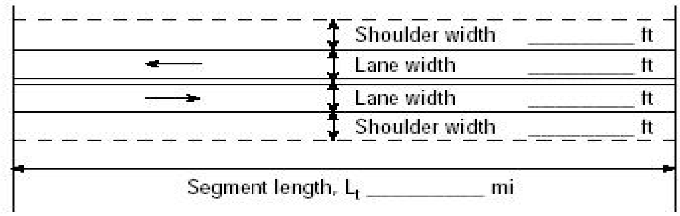
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Springhill to Viaduct WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*93%*
% Trucks and Buses , P_T	*2 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*7/mi*
Analysis direction vol., V_d	*596*veh/h
Opposing direction vol., V_o	*277*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*1.4*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.1*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.998*	*0.992*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*649*	*304*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*1.8 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*49.0 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*38.4 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.3 mi/h*	Percent free flow speed, PFFS	*78.2 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.998*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*648*	*302*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*56.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*32.8*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*78.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.38*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1686*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1697*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*78.2*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*647.8*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.74*
Bicycle level of service (Exhibit 15-4)	*E*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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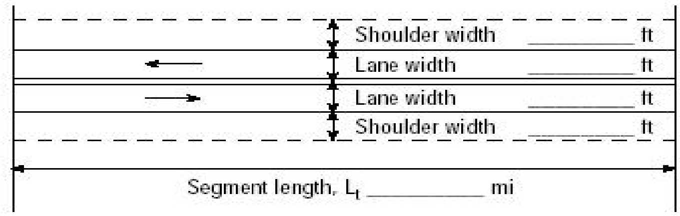
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Spur to Nelson EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF	*0.92*
No-passing zone	*100%*
% Trucks and Buses , P_T	*4* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*2*/mi

Analysis direction vol., V_d	*475*veh/h
Opposing direction vol., V_o	*194*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.4*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.992*	*0.980*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*520*	*215*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0* *mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2* *mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*0.5* *mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.9* *mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.3* *mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*40.7* *mi/h*
		Percent free flow speed, PFFS	*80.9* *%*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.996*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*516*	*212*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*45.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*39.0*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{o,PTSF})$	*72.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.31*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1666*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1693*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*80.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*516.3*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.15*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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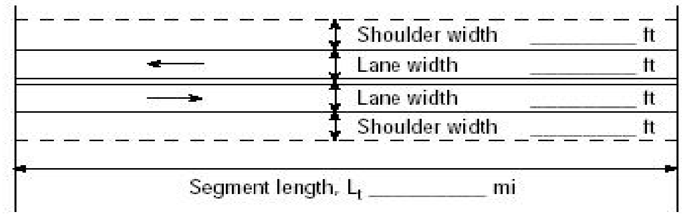
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Spur to Nelson EB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.92*

No-passing zone *100%*

% Trucks and Buses , P_T *2* %

% Recreational vehicles, P_R *0%*

Access points *mi* *2*/mi

Analysis direction vol., V_d *312*veh/h

Opposing direction vol., V_o *530*veh/h

Shoulder width ft *0.5*

Lane Width ft *12.0*

Segment Length mi *0.4*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.992*	*0.998*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) v_i=V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*342*	*577*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*0.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.0 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.3 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*41.2 mi/h*
		Percent free flow speed, PFFS	*81.9 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.998*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) v_i=V_i/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*340*	*576*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*41.0*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*36.9*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*54.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.20*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1697*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*81.9*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*339.1*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*4.41*
Bicycle level of service (Exhibit 15-4)	*D*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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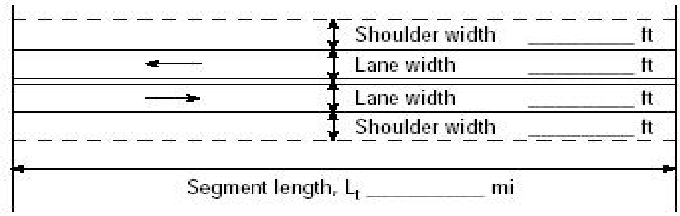
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Spur to Nelson WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*100%*
% Trucks and Buses , P_T	*10 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*2*/mi

Analysis direction vol., V_d	*194*veh/h
Opposing direction vol., V_o	*475*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.4*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.952*	*0.980*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*222*	*527*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*55.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*0.5 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*42.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.2 mi/h*	Percent free flow speed, PFFS	*84.1 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.990*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*213*	*516*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*28.4*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*39.0*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*39.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.13*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1666*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*84.1*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*210.9*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*6.75*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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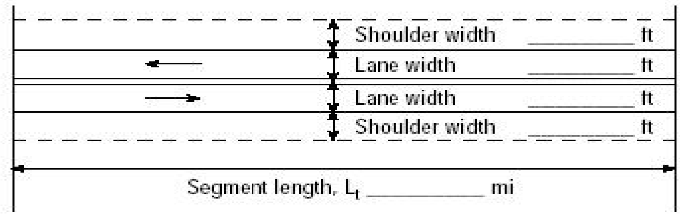
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RPA*	Highway / Direction of Travel	*Frontage Road*
Agency or Company		From/To	*Spur to Nelson WB*
Date Performed	*9/30/2016*	Jurisdiction	
Analysis Time Period	*AM*	Analysis Year	*2040*

Project Description:

Input Data



Analysis direction vol., V_d	*530*veh/h
Opposing direction vol., V_o	*312*veh/h
Shoulder width ft	*0.5*
Lane Width ft	*12.0*
Segment Length mi	*0.4*

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*100%*
% Trucks and Buses , P_T	*5* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*2*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.1*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/\ (1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.980*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*579*	*346*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*4.2 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*0.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.1 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*50.3 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*40.1 mi/h*
		Percent free flow speed, PFFS	*79.7 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/\ (1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.995*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*576*	*341*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*54.0*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*36.9*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}\ /\ v_{d,PTSF}+v_{o,PTSF})$	*77.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*0.34*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1666*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1692*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*79.7*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*576.1*
Effective width, Wv (Eq. 15-29) ft	*12.50*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*5.49*
Bicycle level of service (Exhibit 15-4)	*E*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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Appendix D

PHOTO LOG

Photo 1: Looking east at Jackrabbit Lane (RP 19.7)

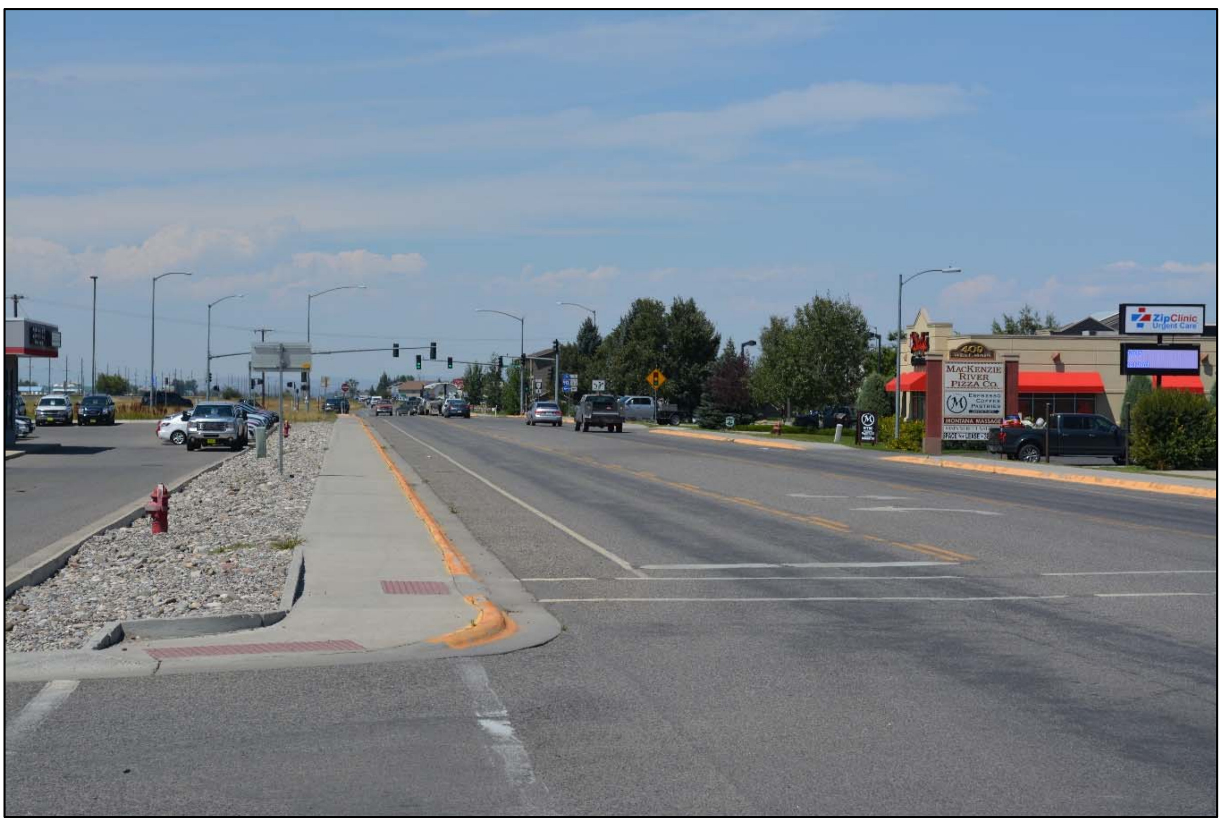

Photo 2: Looking west at Grogan Street (RP 19.9)

Photo 3: Looking east at Grogan Street (RP 19.9)

Photo 4: Looking west at Grogan Street after school (RP 19.9)

Photo 5: Looking east near Quaws Boulevard (RP 20.0)

Photo 6: Looking east at Weaver Street (RP 20.1)

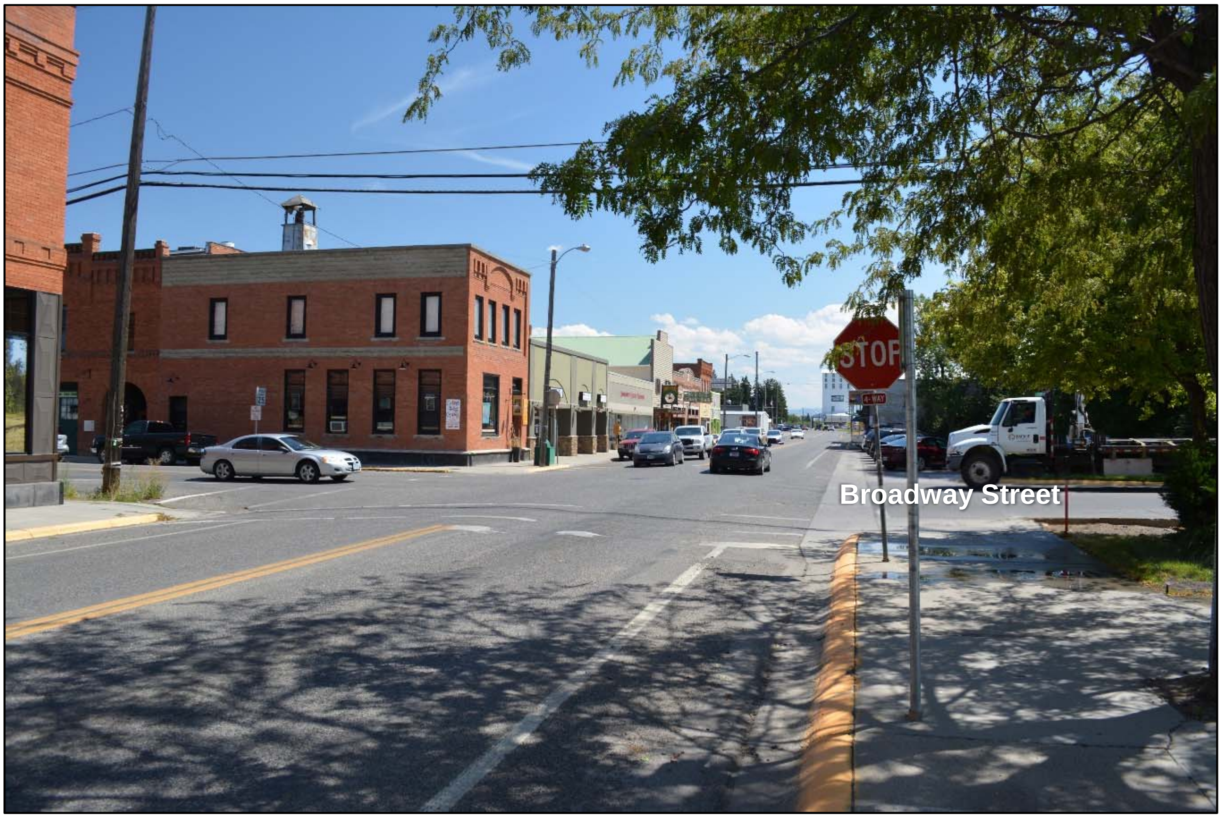

Photo 7: Looking east near Broadway Street (RP 20.2)

Photo 8: Looking east near Broadway Street (RP 20.2)

Photo 9: Looking east near Kennedy Street (RP 20.3)

Photo 10: Looking east near Davis Street (RP 20.4)

Photo 11: Pedestrian crossing near Oregon Street (RP 20.4)

Photo 12: Looking east near Birch Lane (RP 20.5)

Photo 13: Looking east near Birch Lane (RP 20.5)

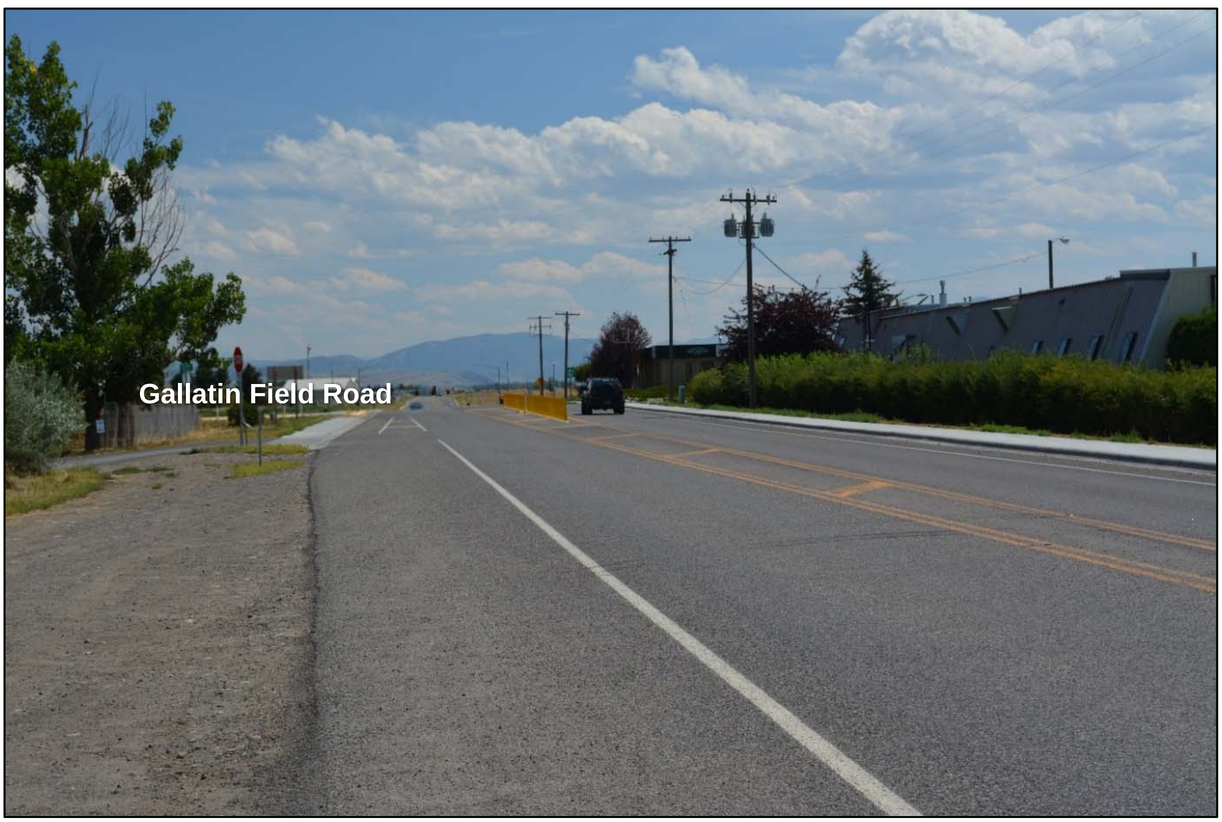

Photo 14: looking east near Voegeles Trailer Park Turnpike (RP 20.9)

Photo 15: Looking east near Gallatin Field Road (RP 21.1)

Photo 16: Looking east between Airway Boulevard and Airport Road (RP 21.4)

Photo 17: Looking east at Airport Road (RP 21.8)

Photo 18: Looking east near Dollar Drive (RP 22.5)

Photo 19: Looking east near Hyalite Creek (RP 22.9)

Photo 20: Looking east at Arete Drive (RP 24.5)

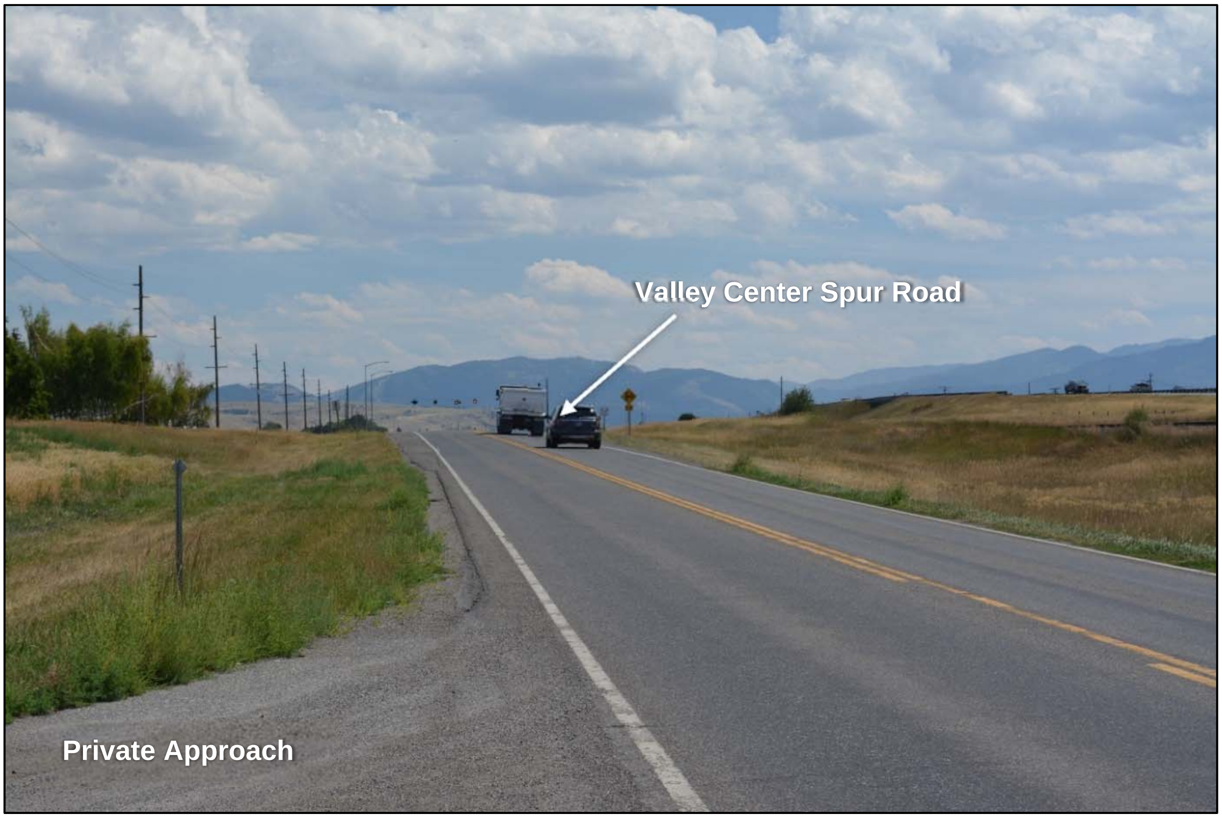

Photo 21: Looking east near RP 24.7

Photo 22: Looking east near Valley Center Spur Road (RP 25.4)

Photo 23: Looking east near Valley Center Spur Road (RP 25.6)

Photo 24: Looking east at Nelson Road (RP 25.9)

Photo 25: Looking east at RP 26.5

Photo 26: Looking west from Reeves Road (RP 3.1)

Photo 27: Looking east at Reeves Road (RP 3.1)

Photo 28: Looking east at Red Wing Road (RP 2.8)

Photo 29: Looking east near Cherry River Fishing Access (RP 2.1)

Photo 30: Looking south near Red Wing Road (RP 1.7)

Photo 31: Looking south near Griffin Drive (RP 1.5)

Photo 32: Looking south near Griffin Drive (RP 1.4)