



# Glacier National Park

## *Going-to-the-Sun Road Corridor Management Plan - Existing Conditions of the Transportation System*



Going-to-the-Sun Road  
Source: Volpe Center photographs (August 2013)

June 27, 2014





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## Report notes

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## List of Acronyms

The following terms are used in this report:

ATC	Apgar Transit Center
GLAC	Glacier National Park
GTSR	Going-to-the-Sun Road
JGO	Jackson Glacier Overlook
MDOT	Montana Department of Transportation
NPS	National Park Service
PUSO	Public Use Statistics Office
SMVC	Saint Mary Visitor Center
VMT	Vehicle miles traveled
UMT	University of Montana



## Executive Summary

The Going-to-the-Sun Road (GTSR) Corridor has been undergoing major shifts in use due to ongoing construction, implementation of a shuttle system, and changes in visitor use patterns. Glacier National Park (GLAC) is developing the Going-to-the-Sun Road Transportation and Visitor Use Corridor Management Plan to deal with these changes and their impacts on the park's resources. During the August 2012 kickoff meeting for the management plan, participants categorized various hot spots along the corridor as poor or worse. The designations were based on individual experiences with the area as well as some park data. The majority of the hot spots identified are associated with parking areas and shuttle stops.

This report compiles available data and reviews the existing conditions of the road to document and quantify the identified issues and provide a baseline for thinking about alternative management strategies as part of the corridor management plan. Initial recommendations and gaps identified in the data are documented in Appendices A and B respectively.

### *Visitation and Visitor Use Categories*

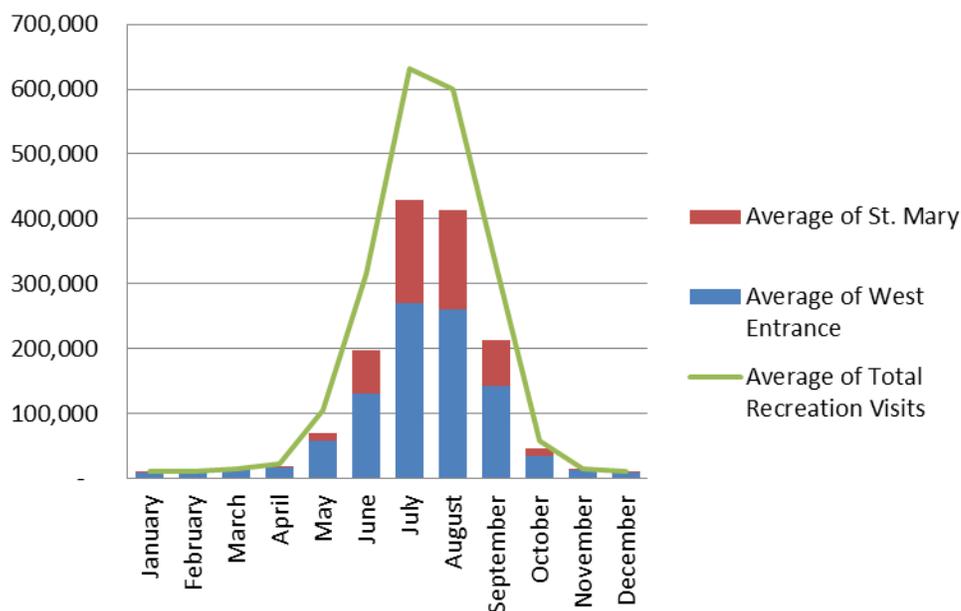
Visitation has had some peaks and dips over the last ten years but has overall stayed relatively stable at just over 2 million visitors a year. The GTSR corridor averages 1.3 million visitors annually, approximately 68 percent of all GLAC visitors (NPS PUSO, 2010-2013). Visitation to GLAC is highly seasonal with almost 60 percent of visitors arriving in July and August. 45 percent of all visitors enter through West Glacier, resulting in regular congestion there during the summer.

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#### ES Figure 1

#### Average Monthly Visitation through GTSR Entrance Stations Relative to GLAC Visitation

Source: NPS Public Use Statistics YTD reports (May 2010 to Aug 2013)



Twenty percent of park visitors come from Montana; 70 percent come from the rest of the United States. Canadians represent 7 percent of visitors; 3 percent are from other countries. While visitation peaks seasonally, because Glacier is a remote park and visitors spend an average of four days there, there is relatively little variation in visitation by day of week. During the off season,

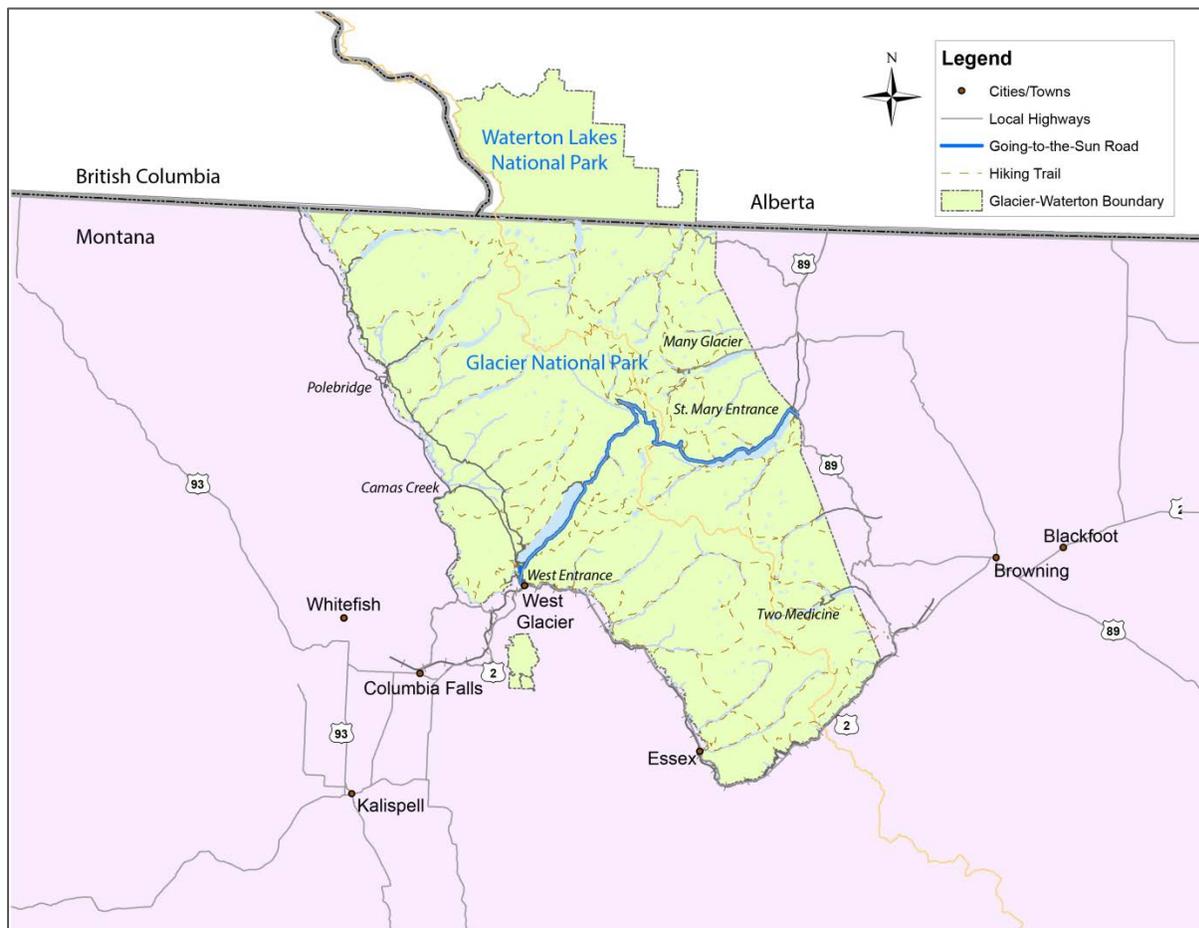
when more visitors are locals, there is noticeably higher use on the weekends. Based on a number of surveys, more visitors are staying for three to five days, while fewer are making single day trips.

### Transportation Network

This study focuses on the Going-to-the-Sun Road corridor through GLAC. GTSR is a 50-mile national historic landmark park road that provides vehicular access to the heart of GLAC and the Continental Divide and serves as an integral piece of the regional economy. Visitors access GTSR through either the West Glacier Entrance, located near the communities of Kalispell, Whitefish, and Columbia Falls, the Camas Road Entrance near Columbia Falls, or through the St. Mary Entrance, which is close to the town of Browning.

**ES Figure 2**  
**Glacier National Park and Surrounding Areas**

Source: Volpe Center, with data from NPS and Glacier National Park



GTSR is one lane in each direction with 10- to 11-foot lane widths throughout. The posted speed limit between Apgar Transit Center and the Loop, and Siyeh Bend to St. Mary Visitors Center, is generally 40 miles per hour, with a few sections posted with a lower speed limit. The Alpine section of the road from the Loop to Siyeh Bend has grades as high as 6 percent and areas with hairpin turns, warranting a lower posted speed limit of 25 miles per hour. GTSR has 20 parking areas that range in size from twenty spaces to Logan Pass with 254 spaces. There are numerous smaller

informal pull outs with fewer than twenty spaces as well as the large formal lots at Apgar Visitor Center, Avalanche, Logan Pass, Rising Sun, St. Mary Visitor Center. There is a combined total of more than 2,000 parking spaces along the entire corridor. The road also features 23 trailheads, 5 campgrounds, and numerous other visitor attractions.

### **Multimodal Transportation Options**

Aside from driving a personal vehicle along the road, there are a variety of tours and a shuttle system available, including the Red Buses, Sun Tours, and Glacier's shuttle system. The Red Buses or "Jammers" have been in service within the park since the mid-1930s. Sun Tours along GTSR provides riders with narrative and information related to the Blackfoot Nation's culture and life in and around GLAC. Both fee-based interpretive services provide different length tours from various points along the corridor.

GLAC operates a free shuttle along the GTSR between the Apgar Transit Center and St. Mary Visitor Center from July 1 and generally through the first Monday in September (Labor Day). The GLAC shuttle has 15 stops spread across the length of the GTSR corridor and was initiated in 2007 to address the anticipated congestion and delays from rehabilitation of the road.

The primary bike path in GLAC is the McDonald Creek Bike Path, which runs from park headquarters in West Glacier to Apgar. Flathead County has proposed the Gateway to Glacier Trail (located outside the park) that would eventually connect Columbia Falls to the park. Funds have been raised to allow the Montana Department of Transportation to begin construction in 2015. The trail will end on Route 2, near the entrance to the park.

Biking along GTSR is popular, although there is not a separate bike lane. Therefore eastbound cycling along GTSR is prohibited from 11:00 AM to 4:00 PM, from June 15 to Labor Day between Apgar and Sprague Creek, and from Logan Creek to Logan Pass to reduce congestion and bicycle/vehicle conflicts.

GLAC offers more than 700 miles of recreational trails with exceptional opportunities for short hikes and multiple-day backpacking trips. There are 23 trailheads that are accessible from GTSR. The three most popular destinations are Hidden Lake (Logan Pass), Avalanche Lake (West Side), and the Highline Trail (Logan Pass). Recreational hikers can have a significant impact on the availability of parking as they are likely to stay longer than visitors taking in the view. The Highline Trail on the west side and the trail network between Siyeh Bend and Sun Point on the east side are considered transportation trails, since they allow hikers to traverse along the GTSR corridor. The shuttle service has greatly enhanced visitors' ability to do these hikes.

### *Traffic Volumes and Patterns*

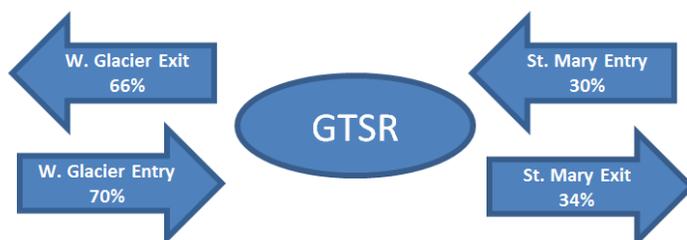
This study looked at available traffic data to try to better understand visitor patterns through the park – whether visitors enter from the west or east side and if they travel through the park (through travelers) or exit through the same location they entered (return travelers) – and to understand how far return travelers go on the GTSR before turning around. This type of information is useful in determining which visitors may be most willing and able to consider transportation alternatives that could reduce congestion and/or the demand for parking.

Data from the West Glacier and St. Mary Entrances from 2011-2013 was analyzed for macro movements of visitors through the GTSR corridor. Approximately 70 percent of visitor entries occurred at West Glacier, compared to 30 percent at St. Mary. A slightly larger proportion of visitors exit via St. Mary (34 percent) compared to those entering via St. Mary (30 percent). This illustrates a slightly higher visitor trend traveling eastbound than westbound, although a significant

proportion of traffic remains on the west side. This is a change from data collected as part of the GNP *Going-to-the-Sun Road Overview* Socioeconomic Impact Study, 2001, which showed a higher percent of use of the East side and more through traffic heading westbound.

**ES Figure 3**  
**Proportion of Entries and Exits at West Glacier and St. Mary**

Source: 2011-2013 Public Use Statistics Office (PUSO) Data



Hourly traffic counts collected at eight points along the GTSR corridor, primarily west of Logan Pass, were analyzed. While there were some challenges associated with these data, a number of patterns were identified, including:

- Many visitors stop at Apgar and Avalanche. Both of these sites provide access to both the shuttle system and other visitor attractions.
- Visitation at the sites closest to the entrances peak first as people head into the park and then toward the end of the day as people exit. These patterns are more pronounced on the west side of GTSR than on the east.
- Higher traffic levels approaching Logan Pass relative to those heading east beyond the Pass highlight that Logan Pass is a key park destination, with many visitors setting it as the apex of their trip.
- Visitation to Logan Pass peaks between noon and 2:00 PM.
- Overall higher eastbound traffic validates the idea that more visitors are traveling through GLAC eastbound than westbound.

### *Congestion and Parking Conditions*

Congestion is an issue at the park entrances, particularly West Glacier and in parking areas. Construction has created temporary congestion throughout the corridor as various sections of the road have been rehabilitated but this is expected to be eliminated once rehabilitation is complete. Cautious drivers, the occasional accident and the presence of wildlife can create temporary congestion, but these are not tied to specific locations along the corridor. Analysis of the available data supported the hot spots identified during the August 2012 kickoff meeting and updated in February 2014. All of the hot spots other than the West Glacier Entrance are shuttle stops. In most cases transit has been provided to try and solve problems; in a few, it's caused additional issues. ES Table 1 summarizes the challenges faced at each of the hot spots.

**ES Table 1**  
**Summary of Congestion and Parking Issues at Hot Spots**

Source: 2012 Kickoff Meeting and Volpe Analysis

Hot Spot	Condition	Description of challenges
West Glacier Entrance	Poor	Long wait times requiring some visitors to be waved through. Minimal real time information about parking conditions upstream.
Apgar Transit Center	Poor	Adequate parking. Inadequate transit capacity especially in morning.
Avalanche	Worse	Multi-use area. Congested, limited parking, pedestrian conflicts, transit transfer area, turnaround for transit and other large vehicles. Site of the most popular trail in the park.
The Loop	Worse	Limited parking, tight shuttle circulation and need for visitors to cross road, increased use for one-way hikes. Visitors not fully utilizing parallel parking spaces along walls of upper lot. Visitors parking in eastbound transit stop.
Logan Pass	Worse	Inadequate parking to meet demand. Regular closures due to lack of parking. Visitors increasing length of stay exacerbates congestion. Construction has caused waves of visitors making congestion worse.
Siyeh Bend	Poor	Limited parking. Hairpin turn and parking on both sides can cause vehicle-pedestrian conflicts.
Gunsight Pass/Jackson Glacier	Poor	Vehicle-pedestrian conflicts reported. Visitors stay for a very short time. Reconstructed during 2013-2015 construction season.
St. Mary Falls	Worse	Parked cars block travel lanes and park in shuttle stop. Vehicle pedestrian conflicts. Used by one-way and round trip hikers. Redesigned during 2013-2014 off-season.
Sunrft Gorge	Worse	Vehicles parked in shuttle stop, vehicle pedestrian conflicts. Park here for one-way hikes and use the shuttle to return; increasing length of stay exacerbates congestion.
St. Mary Visitor Center	Poor	Long wait times to enter park. Adequate parking.

### *Traffic Safety*

With 130 crashes per 100 vehicle miles traveled, GLAC's crash rate is similar to that of Grand Canyon National Park, Grand Teton National Park and Yellowstone National Park (NPS 2008). From 2004 to 2012 there were 372 reported crashes along GTSR. There were more crashes on the west side by a 55 percent to 45 percent margin, though the west side carries much more than 55 percent of traffic. There is no distinct annual pattern for crashes on GTSR and crashes remained relatively level over the study period overall.

As can be seen in ES Table 2 some areas on GTSR are more prone to crashes than others. From 2004-2012, 52 percent of crashes occurred at only 10 of 69 total sites.

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**ES Table 2**  
**Crash Numbers at Top 10 Sites (2004-2012)**

Source: NPS Vehicle Incident Reports 2004-2012

Site	Total
West Entrance Station	31
Avalanche Campground/GTSR junction	25
Logan Pass, West Entrance	24
Logan Pass, East Entrance	20
Sprague Creek Campground	17
Lake McDonald/GTSR upper junction	17
Apgar Loop Road/GTSR junction	17
St. Mary Visitor Center/GTSR junction	16
Sun Point Road/GTSR junction	14
Jackson Glacier Overlook	14

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### *Glacier Shuttle System*

Glacier instituted a shuttle system in 2007 in part as mitigation to rehabilitation of the GTSR. The shuttle runs daily from approximately 7:00 AM until 8:00 PM MDT between July 1 and around the first Monday in September (Labor Day). Midday service is provided every half-hour from Apgar to Avalanche and every 40 minutes on the east side, although exact operation of the shuttle varies from year to year. Ridership has averaged 144,000 rides per season and is used by approximately 8-12 percent of visitors to the corridor. It is estimated that nearly 170,000 vehicle round trips have been removed from the road by the shuttle service since it started in 2007, which is about 5 percent of total vehicle trips traveling GTSR in that time.

The shuttle service's 15 stops are served by three routes:

- (1) between Apgar Transit Center and Avalanche Creek (with some express Sprinters to Logan Pass at the start of the day),
- (2) between Avalanche Creek and Logan Pass, and
- (3) between St. Mary Visitor Center and Logan Pass.

There is a range of activity levels across the 15 shuttle stops, due in part to their location and the attractions at each. Avalanche, Logan Pass, and Apgar Transit Center are the top three shuttle stops for boardings (see ES Table 3). They are also in the top three for alightings. The Loop is ranked fourth for boarding, but seventh for alightings. These results support the theory that people are using the shuttle to facilitate one-way hikes, especially from Logan Pass to the Loop. It is believed that visitors park at either Logan Pass or the Loop and combine a hike on the Highline Trail from Logan Pass to the Loop with a shuttle ride from the Loop to Logan Pass at the beginning or end of their hike.

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**ES Table 3**  
**Shuttle Stop Rankings by Boarding and Alighting**

Source: Glacier National Park Boardings and Alightings, July-August 2012

Shuttle Stop	Boardings		Alightings	
	Rank	Total	Rank	Total
Avalanche	1	22,827	2	21,655
Logan Pass	2	21,091	1	24,567
Apgar TC	3	11,309	3	7,623
The Loop	4	7,505	7	2,788
St Mary VC	5	6,785	4	5,463

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Larger Optima buses, which can carry 43 sitting and standing passengers, operate on the east side and between Apgar and Avalanche Creek. Smaller 12 to 15 passenger Sprinters are used between Avalanche and Logan Pass to take advantage of their small size and tight turning radius. As the fleet ages, maintenance costs continue to rise and take a larger proportion of the available funding. Shuttle operations are funded through a \$7.50 transportation set aside of the entrance fees collected at the gates from all visitors and does not collect a user fee from riders. Based on projected increasing maintenance, fuel and labor costs and steady visitation which were analyzed through 2017, the transportation fee is expected to continue to cover operating costs but will leave less carryover each year. The transportation fee set-aside is not adequate to cover fleet recapitalization costs. The park will look to the Federal Lands Access Program, the Federal Lands Transportation Program, and other financial resources to pay for replacement buses.

The qualitative data from park staff indicate that the shuttle system is operating at or close to capacity. According to their observations, early morning shuttle riders at Apgar form long lines to wait for shuttles to take them east along GTSR. It is estimated that shuttle occupancy is at approximately 50%, with a use rate of 57% between Apgar and Avalanche. Considering the buses are likely running empty one way on the first and last trips of the day, this utilization rate is fairly high and supports the idea that not all demand can be met at peak times. Increasing ridership of the shuttle service will require an expansion of the transit fleet, which will require additional funding.

### *Local Transportation Connections*

Most visitors arrive at GLAC by private vehicle, either driving to GLAC or renting a car from nearby. There are ways for visitors to arrive at and visit GLAC without a car, although this is not necessarily easy. By improving connectivity and making the availability of these services more prominent, GLAC could somewhat reduce reliance on private vehicles - this modal shift is likely to be quite small (less than 5% and possibly negligible).

Since visitors to GLAC come from all over the United States and the rest of the world, air travel provides key access to GLAC. The Glacier Park International Airport in Kalispell is just over 28 miles from the west entrance of the park. Car rentals and privately operated shuttles are available to access the park. Some visitors may use other larger but more distant airports to arrive such as Calgary, Seattle, Great Falls or Spokane. Amtrak's "Empire Builder" route connects Chicago and Seattle and stops near the west entrance of the park and about 40 minutes from the St. Mary entrance of GTSR. Private transportation is available to nearby accommodations including Lake McDonald Lodge and Apgar Village Inn on the west side of the park.

Once at GLAC, in addition to the park-managed shuttle service, Red Bus Tours, Sun Tours, the GPI shuttle, and bike trips operated by concessionaires provide alternative mobility for visitors without need for a car. Both tour companies provide multiple lengths of tours of GTSR from both sides of the corridor. The GPI shuttle allows visitors to travel along the east side of the park car-free, making stops between Glacier Park Lodge near the East Glacier train station and to Prince of Whales Lodge in Waterton Lakes National Park in Canada.

### *Traveler Information*

Much of the information available to visitors to GLAC is static and available for pre-trip planning. Visitors can call GLAC to get general information on general trends and give information about specific sites within the park. NPS has a great deal of information about activities and transportation on the park's website. Private websites and software applications are also available to visitors. GLAC staff can work with the companies that maintain the websites and applications to ensure those tools include information for visitors that park staff want visitors to know.

Internet access at GLAC is limited and so use of real time applications and communications along GTSR is a challenge. When cell phone service is available, visitors can receive toll-free updates on road condition and rehabilitation by dialing the Montana Department of Transportation Traveler Information System at 511. Visitors may also receive updates on park conditions from staff at the park entrances and visitor centers. Park staff communicate via radio along the GTSR corridor and continue to improve the number of places that have good reception. The park has set up a system to display real-time campground occupancy information online and at St. Mary; information is radioed in to provide status updates.

Signage can play a key role in informing visitors. Where official parking is and where visitors should not park, where the shuttle stops are and information about the service as well as designated pedestrian crossing in parking areas and across the road can all help to ensure that visitors have a safe and positive experience.

Understanding how GLAC currently operates provides insight on specific issues and acts as a baseline for developing management strategies that can be used to improve how visitors experience the GTSR corridor while protecting the parks natural resources. Both site specific and global strategies will need to be considered as well as staff availability and funding availability. Creativity and care will need to be taken as the park seeks solutions to better manage transportation along the GTSR corridor. There is no single solution that would resolve all the issues that the park is attempting to manage throughout the Going-to-the-Sun Road corridor.

## Background

Glacier National Park's (GLAC) 1999 General Management Plan called for a visitor management plan for the Going-to-the-Sun Road (GTSR) corridor, including a visitor shuttle system along the GTSR. The park launched a shuttle service in 2007 to mitigate the impacts of delays from corridor rehabilitation, reduce congestion on the road and attraction points, and provide an alternative means for visitors to travel across the GTSR. Preliminary estimates from the 2001 GTSR *Transportation and Visitor Use Study* indicated that shuttle service could remove approximately 10 percent of traffic volumes from the road (GNP, 2001). The success and impacts of the shuttle system are key components of the Going-to-the-Sun Road Corridor Management Plan and Environmental Impact Statement (management plan) that will guide transportation and visitor use management for the next 20 years. The management plan process involves evaluating existing conditions, developing and analyzing potential alternatives, and recommending a set of strategies to ensure the long-term sustainability of a world-class visitor experience and the preservation of natural and cultural resources within the corridor.

This document summarizes the existing transportation conditions from the late 1990s through 2013 to better understand whether and how the park is currently meeting the goals established for the management plan. During this period, shuttle service had become well established and rehabilitation on the GTSR was ongoing. Rehabilitation is expected to be completed in 2017. It should be noted that existing conditions described in this report reflect ongoing rehabilitation activities. As such, these existing conditions will change once the road rehabilitation is completed. These changes must be considered in the development of corridor management alternatives as the management plan process but by assessing the existing conditions during rehabilitation activity, the impacts of the shuttle system on corridor congestion and operations can be incorporated. An understanding of the shuttle system will help inform the future scenarios as traffic returns to more typical patterns.

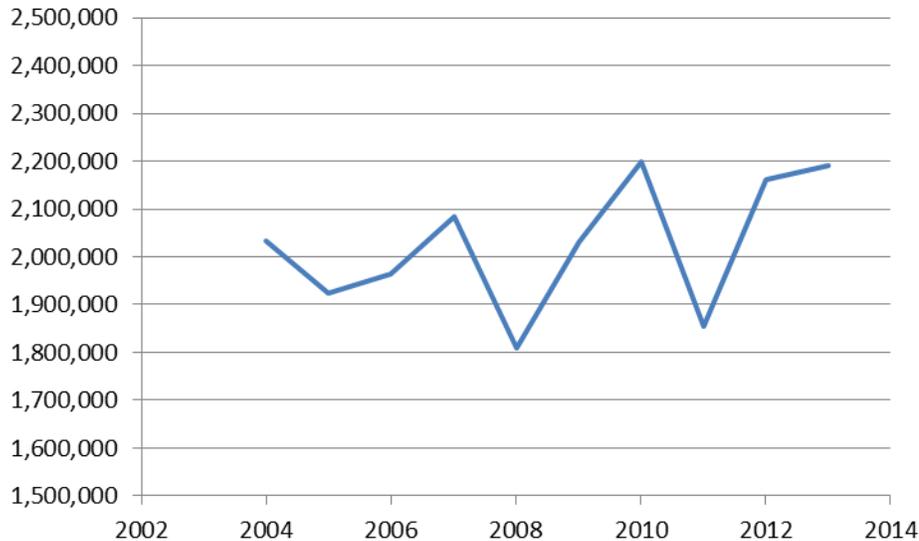
The quantitative data and qualitative information used in this existing conditions report draws from a number of sources. Previous studies were completed by GLAC in the late-1990s and early-2000s to support the development of the GMP and GTSR rehabilitation planning. The National Park Service (NPS) Public Use Statistics Office (PUSO) provided visitation and safety data. Glacier National Park provided site designs, geospatial data, recent entrance traffic counts, shuttle ridership data, and vehicle incident records. The University of Montana (UMT) conducted annual surveys and observations from 2005-2013 to document changing visitor travel behaviors. UMT also collected traffic count data along interior portions of GTSR. Qualitative information from park staff has also been incorporated into the report when quantitative data is not available. With such a wealth of information from a wide range of sources, the data did not always align. Situations of data conflicts are discussed and appropriate conclusions are drawn when possible.

## Visitation

Figure 1 shows that visitation at GLAC has remained relatively stable over the last decade with a peak visitation in 2010 at 2.2 million visitors and a low in 2008 with 1.8 million visitors. While visitation has been stable, staff have noted more frequent instances of congestion and activity within the park. Some of the recent concern may be related to reconstruction of GTSR bunching visitors together and affecting their travel patterns.

**Figure 1**  
**Glacier Historic Visitation**

Source: NPS Public Use Statistics Annual Park Visitation (2004 to 2013)

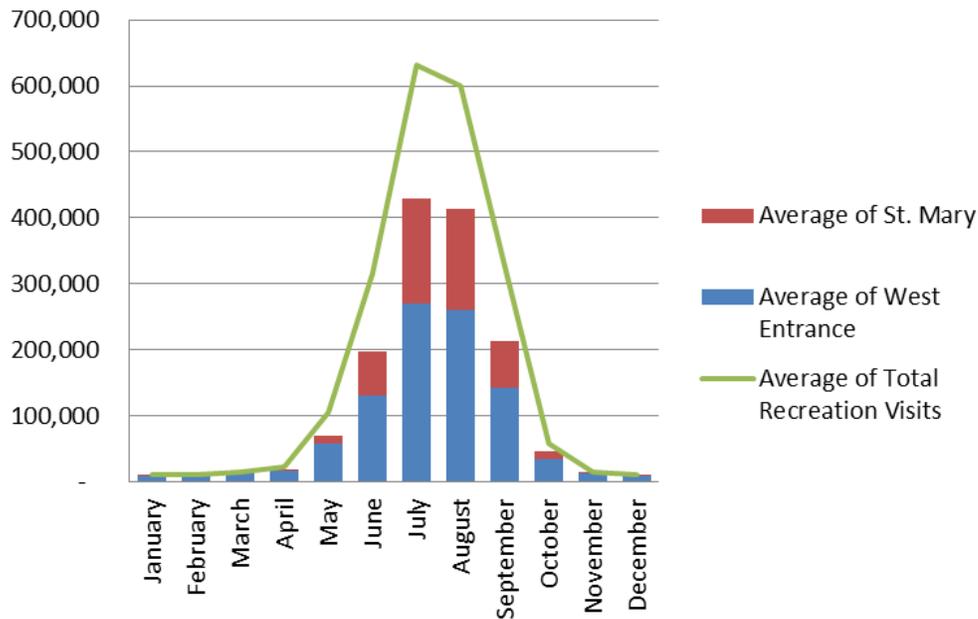


The GTSR corridor averages 1.3 million visitors annually, approximately 68 percent of all GLAC visitors (NPS PUSO, 2010-2013). While the GTSR corridor contains by far the most popular points of interest, the proportion of total recreational visitors who only visit the corridor is less during summer months as other areas of the park become accessible. This can be seen in Figure 2. During the winter months (December to March), almost 95 percent of visits to the park are to the GTSR corridor and of those, over 90 percent are through the West Glacier Entrance. As the peak season approaches, vehicle access through St. Mary increases to 37 percent of the entries to the GTSR corridor.

**Figure 2**

**Average Monthly Visitation through GTSR Entrance Stations relative to GLAC Visitation**

Source: NPS Public Use Statistics YTD reports (May 2010 to Aug 2013)



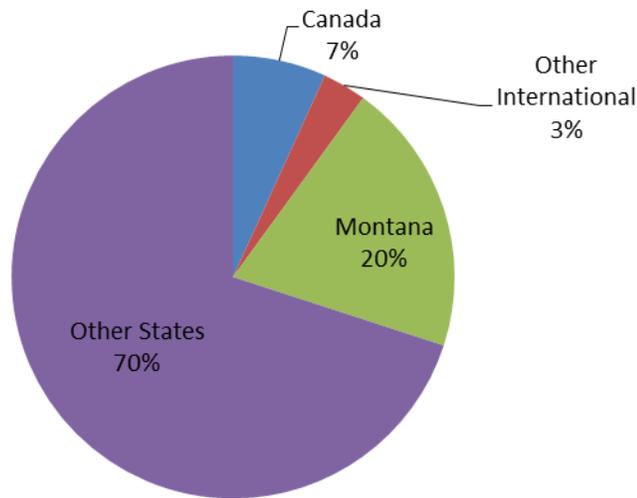
*Visitor Use*

Guided day hikes, boat tours, camping, horseback riding, and multiple-day backpacking trips are all popular recreational activities. A 2007 study (Baker and Freimund) reported that the three most popular visitor activities are driving/auto-touring, watching wildlife, and stopping at the park’s various visitor centers. According to a 1991 visitor use survey, approximately 11 percent of visitors to the corridor are passing through on their way to another destination without stopping (Littlejohn, 1991). PUSO data from 2006 -2013 shows less than 1.5 percent of park visits are considered non-recreational.

According to a visitor use survey conducted in 2001, 90 percent of visitors to GLAC are from the United States (GNP, 2001). Montana accounts for 20 percent of all GLAC visitors. California, Washington, Minnesota, Wisconsin, Oregon, Texas, Michigan, Pennsylvania, and Florida make up the largest remaining proportions of visitors to the park from individual states in descending order. Canadian visitors also represent a significant proportion of total visitation (6.8 percent). This data indicates that about one-fifth of visitors live within a day’s drive from the park. The majority of visitors are traveling longer distances by car, plane or train to reach GLAC. Additionally, the 2001 survey found that 44 percent of people coming to the park were first-time visitors; a slight downturn from 59 percent and 62 percent for similar studies performed in 1991 and 1996, respectively (Littlejohn, 1991, Miller, Freimund, McCool, 1997). This may show that visitors are familiar with the park, understand the traffic issues, and may be willing to adjust their trip based on reported traffic conditions.

**Figure 3**  
**Visitors from U.S. States and Visitor Location of Residence**

Source: *Going-to-the-Sun Overview*. Socioeconomic Study, August 2001



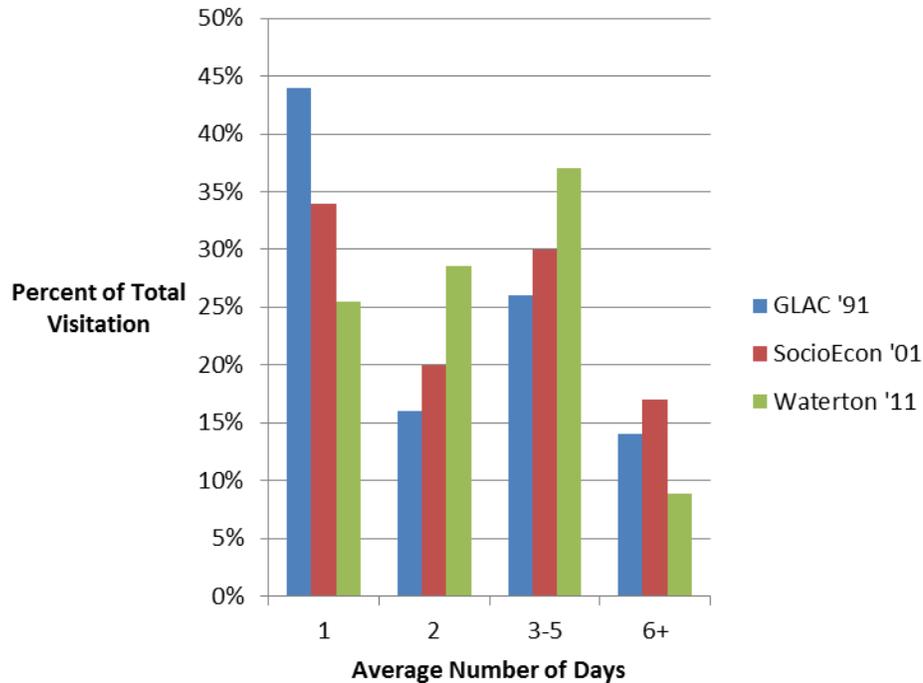
### Length of Stay

Data on length of stay has been pieced together from a variety of data sources. Since the studies have been conducted over a long time horizon, the data shows potential changes in visitor-stay behavior. Visitors are spending about four days on average in GLAC. In 2001, the average visitor spent four days within the park viewing scenic areas, enjoying wildlife, and taking advantage of the park's numerous recreation activities. This is down slightly from four and a half days reported in a 1996 study by UMT, but up from an average of less than three days reported in the 1991 visitor use survey (Littlejohn, 2001, Miller, Freimund, McCool, 1997). A 2011 Visitor Survey for Waterton Lakes National Park (WLNP), the Canadian park immediately north of GLAC and part of the Glacier-Waterton International Peace Park, found that about 75 percent of visitors spent three days or less in WLNP (Parks Canada, 2012). Figure 4 shows the average number of days visitors spend within the park.

When spending more than one night in GLAC, visitors reported they planned to stay at a campground within the park (29.5 percent), acquire lodging at a local motel/hotel, cabin, cottage, or resort outside of the park (27.5 percent), or stay at a lodge or motel within GLAC (19.3 percent). For visitors who are going to and coming from the same location on multiple days, the park's shuttle system may become more viable as they become more familiar with it and the park. The longer stays attributed to multiple days spent hiking and backpacking can have a significant impact on parking capacity since those spaces don't turn over multiple times while the party is on their extended hike.

**Figure 4**  
**Average Visitor Length of Stay**

Sources: *Visitor Services Project: Glacier National Park*. M. Littlejohn, March, 1991; *Going-to-the-Sun Overview*. Socioeconomic Study, August 2001; *Waterton Lakes National Park: 2011 Visitor Information Program*, Western and Northern Service Centre, Social Science Unit, March 2012.



**Travel Patterns**

Visitation during the peak season is fairly balanced across the days of the week. Weekend visitation is slightly higher than weekdays only by one or two percent as shown in Figure 5, which illustrates peak and non-peak visitation to the park for weekdays and weekends. The non-peak season has greater variation across the week. Table 1 shows weekday and weekend visitation to the park numbers start to rise in the spring and then peak during July and August. The time of day that visitors arrive at the park also varies by weekend and weekday.

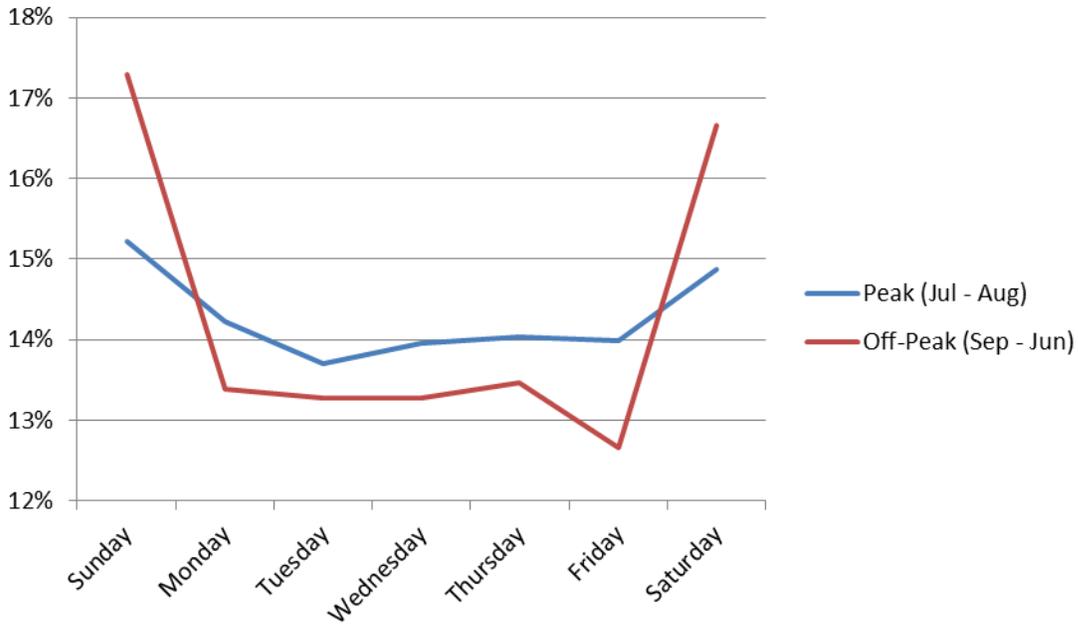
**Table 1**  
**Weekday/Weekend Visitation to Glacier**

Source: National Park Service; hourly traffic count data by lane at West Glacier and St. Mary entrance. 2012

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Monthly Average	% Of Annual
January	72	58	50	56	56	49	75	60	1%
February	89	62	58	53	55	54	91	66	1%
March	107	62	69	62	65	65	107	77	1%
April	156	110	114	117	108	99	132	119	2%
May	525	385	367	362	345	364	420	394	5%
June	1,238	1,023	1,067	1,039	1,125	1,051	1,201	1,109	14%
July	2,401	2,323	2,212	2,340	2,301	2,267	2,329	2,310	29%
August	2,392	2,158	2,104	2,062	2,120	2,142	2,350	2,185	28%
September	1,485	1,255	1,077	1,109	1,080	1,174	1,484	1,240	16%
October	273	231	234	228	240	220	263	242	3%
November	70	65	78	82	81	69	74	74	1%
December	57	51	49	50	54	45	56	52	1%
<b>Annual Average</b>	<b>762</b>	<b>676</b>	<b>655</b>	<b>665</b>	<b>659</b>	<b>666</b>	<b>736</b>	<b>689</b>	
<b>Annual % of Week</b>	<b>16%</b>	<b>14%</b>	<b>14%</b>	<b>14%</b>	<b>14%</b>	<b>14%</b>	<b>15%</b>		
Peak Average (Jul - Aug)	2,397	2,241	2,158	2,201	2,211	2,204	2,340	2,248	
Peak % (July - Aug)	15%	14%	14%	14%	14%	14%	15%		
Off-Peak Average (Sep - Jun)	407	330	316	316	321	319	390	343	
Off-Peak % (Sep - Jun)	17%	13%	13%	13%	13%	13%	17%		

**Figure 5**  
**Average Peak and Non-Peak Visitation by Weekend and Weekday**

Source: National Park Service; hourly traffic count data by lane at West Glacier and St. Mary entrance. 2012

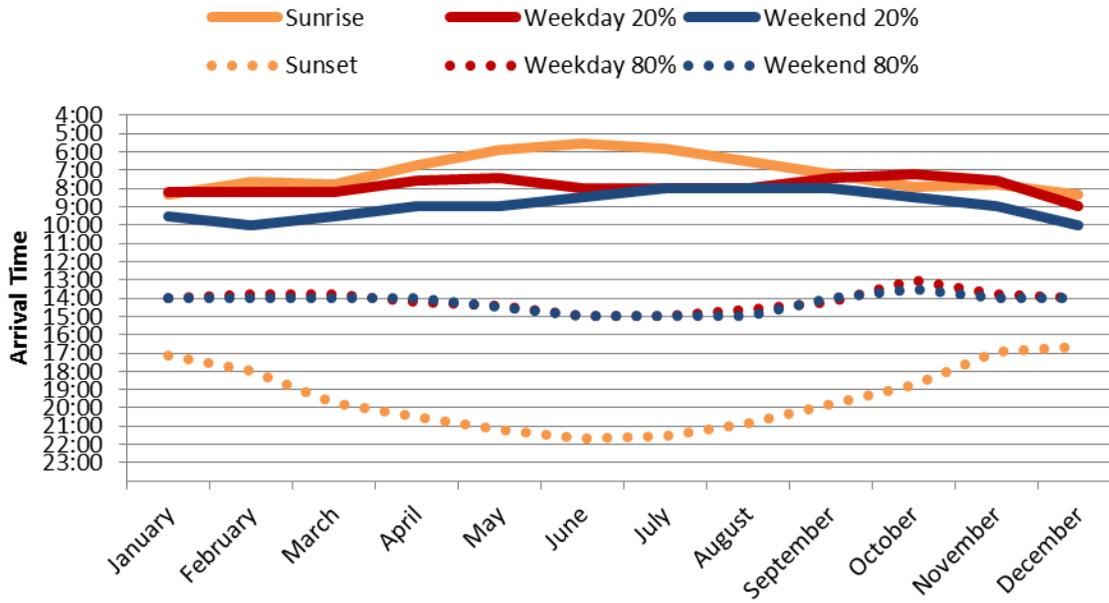


In terms of general traffic patterns along GTSR, eastbound traffic has more spikes in volume than westbound traffic. The data show that the West Glacier Entrance peaks at 10:00 AM, and steadily increases at other points throughout the day. A number of eastbound visitors stop at Apgar Transit Center (ATC) where they may take a shuttle to other parts of the park, or they simply remain there for the duration of their visit. Some portion of West Glacier visitors enter the park through the West Entrance and travel to St. Mary, and then return to the West Entrance later in the day. St. Mary visitor entries are more spread out throughout the day. Figure 6 illustrates the West Glacier Entrance arrival times for 20 percent and 80 percent of park visitors on weekdays and weekends. Visitors tend to arrive slightly later on weekends than weekdays, although this difference is less pronounced during the peak season. Visitors also tend to stay slightly longer into the evening during summer months when sunset is later.

**Figure 6**

**Visitor Use and Park Arrival Patterns at West Glacier – Weekday vs. Weekend**

Source: 2012 Traffic Counts by University of Montana



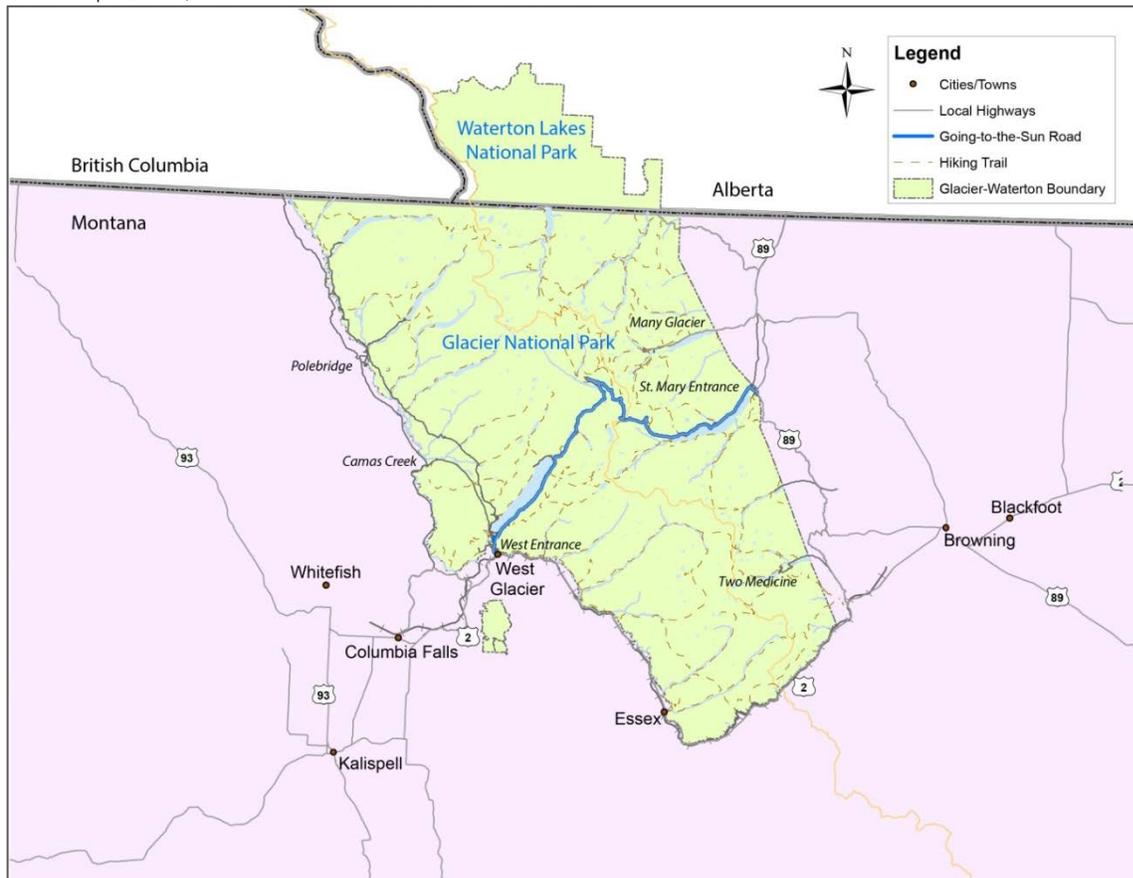
# Transportation Network

## Description of the Road

GTSR is a 50-mile historic park road that provides access to the heart of GLAC and the Continental Divide and serves as an integral piece of the regional economy. Originally completed in 1932, GTSR is listed on the National Register of Historic Places and has been designated a Civil Engineering Landmark as well as a National Historic Landmark. Significant historic features of the road include bridges, tunnels, culverts, retaining walls, and stone guardwalls. The character of the road is unparalleled, giving visitors access to some of the most spectacular vistas in North America. Visitors access GTSR through either the West Glacier Entrance, located near the communities of Kalispell, Whitefish, and Columbia Falls, or through the St. Mary Entrance, which is close to the town of Browning. Visitors may also access GLAC through entrances at Two Medicine and Many Glacier on the east side of the park and Camas Creek and Polebridge on the west side of the park; however, only the Camas Creek entrance provides access to the GTSR (see Figure 7). In 2013, nearly 2.2 million people visited GLAC, with the majority of visitors entering through the West Glacier Entrance. Figure 8 shows the West Glacier and St. Mary entrances/exits, as well as key transportation sites along GTSR. Entrance at West Glacier and St. Mary are via staffed booths. GLAC staff collect fees or check passes, provide visitors with a map and park newsletter, answer any questions and share any time-sensitive announcements.

**Figure 7**  
**Glacier National Park and Surrounding Areas**

Source: Volpe Center, with data from NPS and Glacier National Park.



GTSR is one lane in each direction with 10 to 11-foot lane widths throughout. The posted speed limit between Apgar Transit Center and the Loop, and Siyeh Bend to St. Mary Visitors Center, is 40 miles per hour. The Alpine section of the road from the Loop to Siyeh Bend has grades as high as 6 percent and areas with hairpin turns, warranting a lower posted speed limit of 25 miles per hour. There are intermittent passing opportunities (dashed center line) and slow vehicle pullouts to facilitate travel along the road. GTSR has 20 parking lots with at least 20 parking spaces each along the road, as well as approximately 170 pullouts,<sup>1</sup> combining for a total of more than 2,000 parking spaces along the entire corridor. The road also features 23 trailheads, 5 campgrounds, and numerous other visitor attractions.

### *Transportation Options*

Aside from driving a personal vehicle along the road, there are a variety of tours and a shuttle system available, including the Red Buses, Sun Tours, and Glacier's shuttle system. The Red Buses or "Jammers" have been in service within the park since the mid-1930s, and were the first authorized mode of transport in any National Park (see Figure 9). The current buses were retrofitted in 2002 to run on gasoline and propane, which is 93 percent cleaner and more efficient than the original gasoline buses (Filiss, 2014). Starting in 2014, Xanterra Parks and Resorts will operate the historic Red Bus Tours in the West Glacier portion of the park, as well as a reservation/fee-based fleet of vans that will carry passengers between Many Glacier and St. Mary.

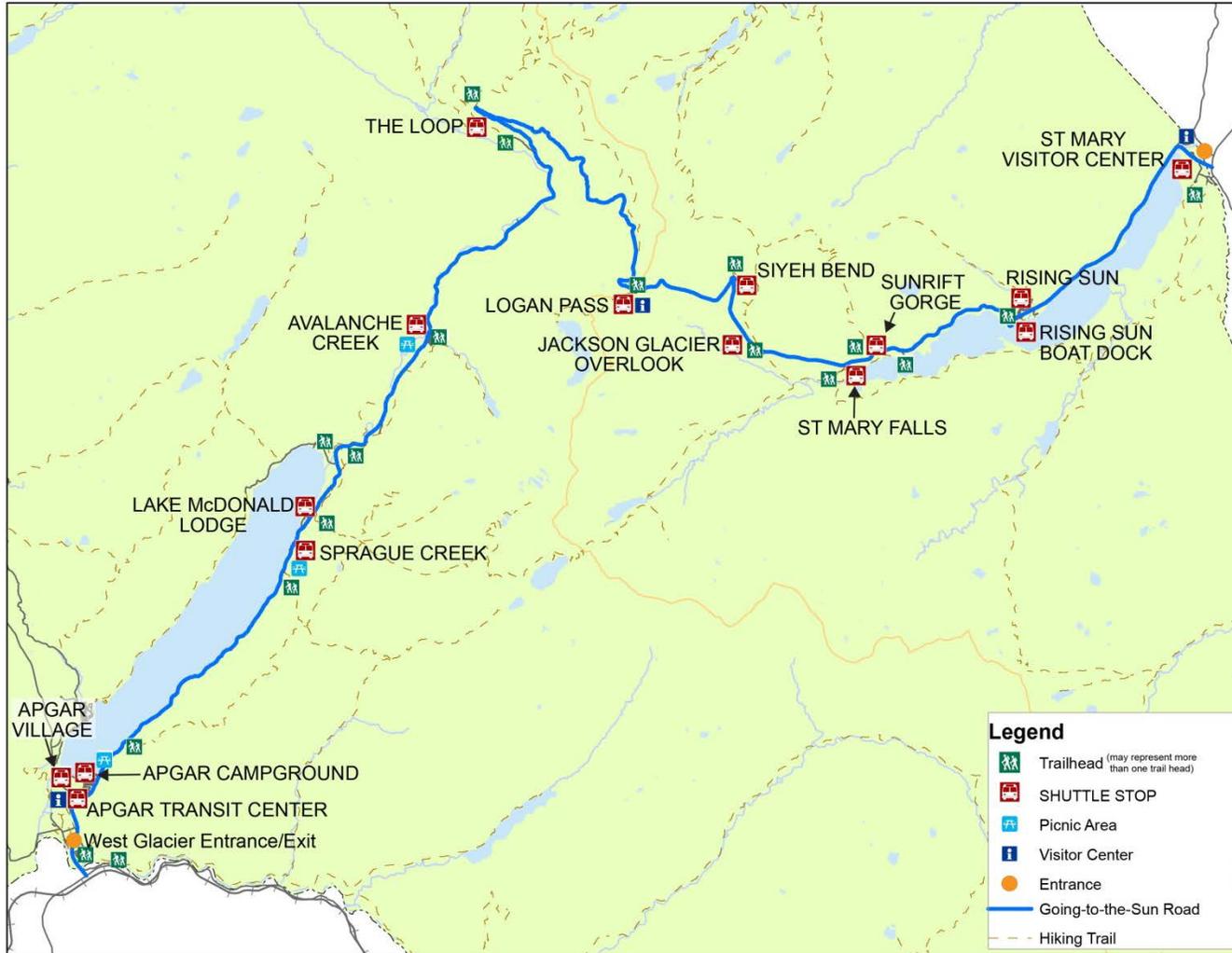
The Sun Tours along GTSR provides riders with narrative and information related to the Blackfoot Nation's culture and life in and around GLAC. Sun Tours operate 25-passenger vans that depart daily from East Glacier, Browning, St. Mary, and West Glacier.

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<sup>1</sup> A pullout is defined as an area with fewer than 20 parking spaces whereas a parking lot has 20 or more spaces.

**Figure 8**  
**GTSR Key Transportation Sites**

Source: Volpe Center, with data from NPS and Glacier National Park.



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**Figure 9**  
**Historic Red Bus**

Source: John Filiss, 2014.



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GLAC operates a free shuttle along the GTSR between the Apgar Transit Center and St. Mary Visitor Center from July 1 through the first Monday in September (Labor Day). The service is operated by Flathead County Eagle Transit through a cooperative agreement with GLAC. The GLAC shuttle has 15 stops spread across the length of the GTSR corridor and was initiated in 2007 to address the anticipated congestion and delays from rehabilitation of the road.

### *Trails and Bike Paths*

GLAC offers more than 700 miles of recreational trails with exceptional opportunities for short hikes and multiple-day backpacking trips. There are 33 trails accessible from GTSR by 30 trailheads; fifteen on each side of Logan Pass. For hikers, the three most popular destinations are Hidden Lake (Logan Pass), Avalanche Lake (West Side), and the Highline Trail (Logan Pass). The peak season for trail use is generally from mid-July to mid-August. Many higher-elevation trails do not open until June or July when the snow cover melts. Lower-elevation trails become accessible to hikers in late April or early May. Recreational hikers can have a significant impact on the availability of parking as they are likely to stay longer than visitors taking in the view.

The Highline Trail on the west side and the trail network between Siyeh Bend and Sun Point on the east side are considered transportation trails as they allow a hiker to traverse along the GTSR corridor. The shuttle service has greatly enhanced visitors' ability to do these hikes.

A number of trails including those at Avalanche, the Loop, and Logan Pass require visitors to cross GTSR to access the trailhead from either the parking area or transit stop. These areas increase the potential of pedestrian-vehicle conflicts.

Trails Accessible from GTSR (west to east):

1. South Boundary
2. Apgar Bike Trail
3. Apgar Flats Horse
4. Apgar Transit Center Bike Path
5. Snyder Ridge
6. Lincoln Lake
7. Sperry Loading Ramp
8. McDonald RS Horse
9. McDonald Horse Trail
10. Upper McDonald Creek
11. Johns Lake
12. McDonald Creek Cutoff
13. Avalanche Cutoff
14. Avalanche Campground
15. Avalanche Lake
16. Trail of the Cedars
17. Flattop Mountain
18. Granite Park
19. Hidden Lake
20. Highline
21. Logan Pass Visitor Ctr Trails
22. Siyeh Bend
23. Gunsight Pass
24. Piegan Pass
25. Gunsight Horse Trail Cutoff
26. St Mary Lake
27. St Mary Falls Cutoff
28. Siyeh Pass/Baring Falls
29. Rose Creek
30. Rising Sun (Boat Ramp & Picnic Area)
31. Red Eagle
32. St Mary Corral Cutoff
33. Beaver Pond Trail (St Mary)

There are two bike paths in the park—the primary path is the McDonald Creek Bike Path, which runs from park headquarters in West Glacier to Apgar and doubles as a ski trail during cold months. This trail skirts the West Gate entry point, which could be an issue if it is used by cyclists to enter the park. Flathead County has proposed the Gateway to Glacier Trail that would eventually connect Columbia Falls to the park. A local support group has raised the funds to extend the existing trail between Hungry Horse and Coram to West Glacier. The Montana Department of Transportation plans to begin construction in 2015. The trail will end on Route 2, near the beginning of the GTSR. There are sidewalks through West Glacier across the Middle Fork of the Flathead River, after which bikers will need to share the road with cars at least until they reach park headquarters and the McDonald Creek Bike Path.

Biking along GTSR is popular although eastbound cycling along GTSR is restricted from 11:00 AM to 4:00 PM, from June 15 to Labor Day between Apgar and Sprague Creek, and from Logan Creek to Logan Pass. It is roughly a 45-minute bike ride from Sprague Creek to Logan Creek, and about three hours from Logan Creek to Logan Pass.

## Traffic Volumes and Patterns

Traffic patterns provide insight into how visitors use the park and can help identify opportunities to mitigate undesirable transportation conditions, such as congestion. Understanding whether visitors enter from the west or east side and if they travel through the park (through travelers) or exit through the same location they entered (return travelers) can provide opportunities to alter their travel mode. It was hoped that by analyzing traffic counts, park planners could determine how many visitors are through travelers relative to return travelers, and to understand how far return travelers go on the GTSR before turning around. Unfortunately, the type and quality of the data have limited the conclusions that can be made.

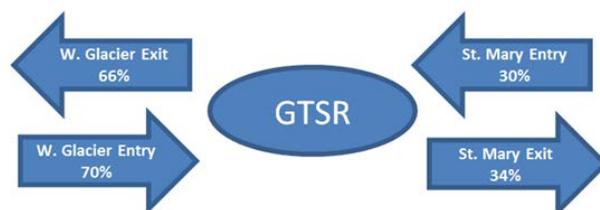
It is important to acknowledge that the traffic volumes documented and analyzed in this section were collected during active rehabilitation on the corridor. The hourly counts of data may be impacted due to delays and strong pulses as vehicles pass through the construction zone; however, overall volume of the road should not be significantly affected, since GLAC has managed rehabilitation activity to allow continued use of the road. Visitation along the corridor as a percentage of total park visitation has remained at approximately the same level during rehabilitation as it was before.

Data from the West Glacier and St. Mary Entrances from 2011-2013 was analyzed for macro movements of visitors through the GTSR corridor. Approximately 70 percent of visitor entries occurred at West Glacier compared to 30 percent at St. Mary. A slightly larger proportion of visitors exit via St. Mary (34 percent) compared to those entering via St. Mary (30 percent, see Figure 10).<sup>[1]</sup> This illustrates a slightly higher visitor trend traveling eastbound than westbound, although a significant proportion of traffic remains on the west side. Data from a survey completed for the 2001 *Going-to-the-Sun Road Overview Socioeconomic Impact Study* showed a more even distribution between the east and west sides as well as more through traffic moving from east to west (see Figure 11) (GNP, 2001). The comparison of the two data sets from 2001 and 2011-13 show that the west side of the corridor has significantly increased relative traffic volume while east side relative volumes have declined. It also shows that eastbound through traffic has become more dominant whereas the flow of through traffic westbound used to be more dominant.

While the data cannot specify exact movements of individual vehicles, the general trends of the 2011-2013 data show that a majority of visitors enter and exit through a single point. This assumes that multi-day visitors return to the same lodgings as the previous day and that many people start and end their trips from the same location (a single airport or place of residence). It also considers that Route 2, which runs along the southern boundary of the park, is not a popular alternative to GTSR for visitors making day trips through the park.

**Figure 10**  
**Proportion of Entries and Exits at West Glacier and St. Mary**

Source: 2011-2013 Public Use Statistics Office (PUSO) Data



<sup>[1]</sup> Based on total entries and exits from PUSO data from January 2011 – August 2013.

**Figure 11**  
**Proportion of Entries and Exits at West Glacier and St. Mary**

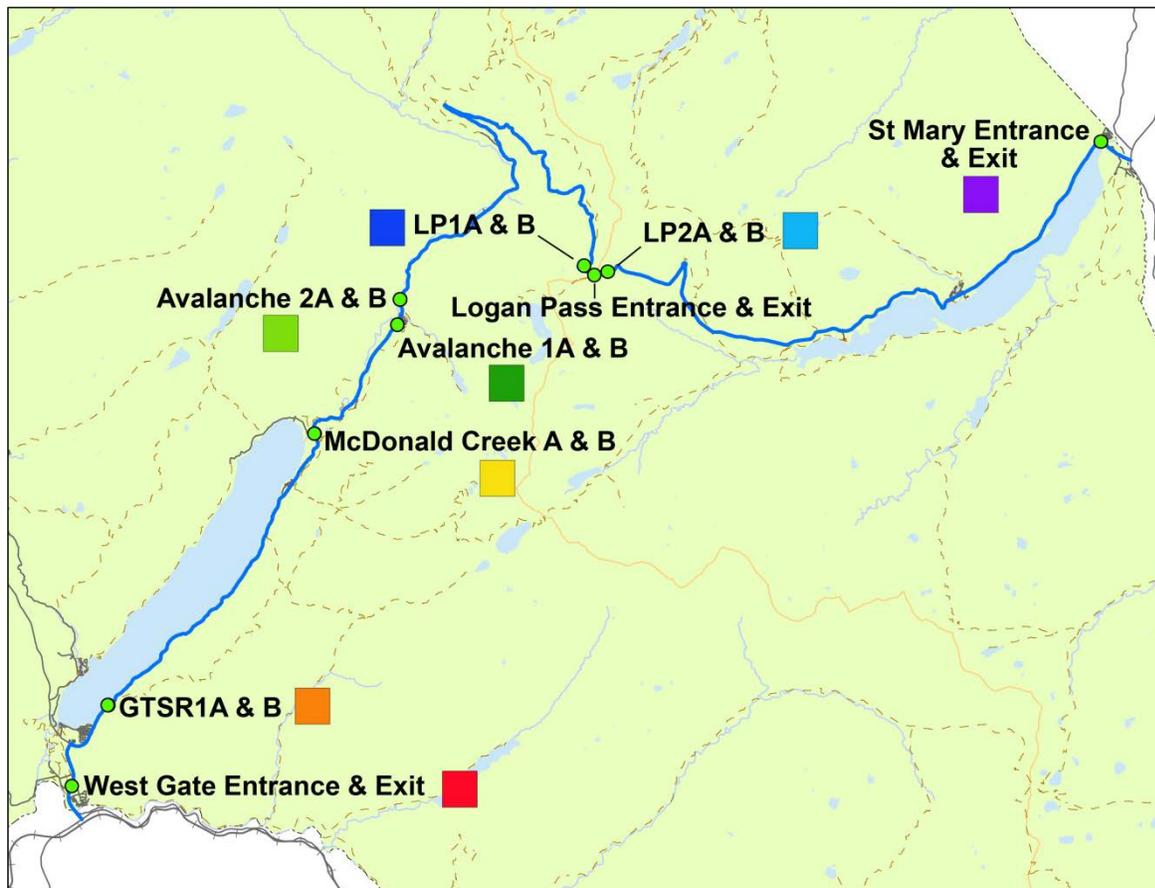
Source: GNP *Going-to-the-Sun Road Overview* "Socioeconomic Impact Study, 2001



An effort was made to analyze data from the internal UMT traffic counters, which were set up to capture traffic on both sides of key sites on the west side. Traffic data at these locations was collected hourly to illustrate visitor travel patterns within the park. Figure 12 shows traffic counter locations and the color-coding associated with each.

**Figure 12**  
**Location of Traffic Counters**

Sources: Volpe Center map using locations provided by UMT



Note: Eastbound counters are labeled with an "A"; westbound have a "B" suffix.  
 NPS counters are at West Gate and St. Mary. All other counters were placed by UMT.

Table 2 provides average daily traffic counts, the proportion of traffic that drives through a counter relative to the West Glacier counter, and the proportion relative to the counter immediately to the west. Figure 13 and Figure 14 illustrate the hourly traffic rate at each counter as well as the total traffic at each counter.

Figure 14 validates the concept that most visitors enter the corridor at West Glacier and make their way eastbound, stopping at one or more places before turning around and returning to West Glacier. This is illustrated in Figure 13 by the peak visitation moving later and later as one travels east.

The traffic count data illustrates that many visitors stop at Apgar (west of gtsr1a), where they are able to take a shuttle to other areas of the park, or they simply remain there. It is expected that counts will diminish as one heads up the corridor until a larger percent of visitors entering from St. Mary become incorporated into the traffic pattern. Figure 13 highlights some inconsistencies in this assumption as the counts at Avalanche (av1a) show higher volumes than the counters east of ATC (gtsr1) and east of McDonald Creek (mcca). Presuming accuracy of the relative counts before and after Avalanche, another sharp drop occurs in traffic at the second Avalanche counter (av2a).

The inconsistent counts around Avalanche may be tied to visitors focusing their time on activities at Avalanche, including camping, hiking the Trail of the Cedars, viewing Avalanche Lake, and picnicking. It is also believed that some visitors may use Avalanche as a staging area for riding the shuttle further up the GTSR to eliminate the need to transfer from one bus to another since Avalanche is the farthest point that large vehicles (trucks, campers, RVs, etc.) are allowed to travel up GTSR from the west. In Figure 13, the traffic peak shifts later by an hour at Avalanche, possibly due to the activities visitors participate in there. The slightly higher counts west of Logan Pass than to the east support the theory that the primary focus of visitors is to reach Logan Pass and then turn around without continuing. Visitors that travel east and pass the counter east of Logan Pass (lp2a) may represent those who originated from St. Mary and are returning. Finally, the St. Mary traffic count shows visitors leaving in a typical afternoon pattern between the hours of 2:00 and 6:00 PM

**Table 2**  
**Average Daily Eastbound Traffic Counts, August 2012**

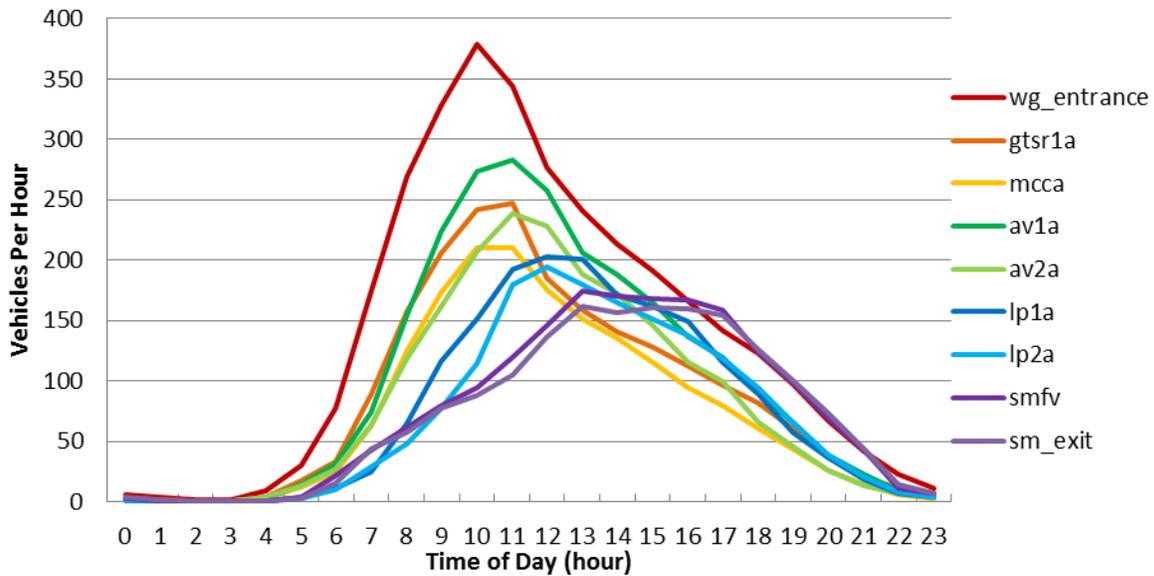
Source: 2012 Traffic Counts by University of Montana and NPS

	Counter/ Key Site(s) Between Counters	Vehicles	% of West Gate	% of Previous Counter
1	wg_entrance*	3,219		
	Apgar Village, ATC			
2	gtsr1a	2,041	63%	
	Sprague Creek, Lake McDonald			
3	mcca	1,732	54%	85%
4	av1a	2,365	73%	137%
	Avalanche			
5	av2a	1,949	61%	82%
	The Loop			
6	lp1a	1,784	55%	92%
	Logan Pass			
7	lp2a	1,645	51%	92%
	Jackson Glacier Overlook, St. Mary Falls, etc.			
8	smfv	1,769	55%	108%
9	sm_exit*	1,691	53%	96%

\*NPS traffic counters. All others placed by UMT

**Figure 13**  
**Average Hourly Eastbound Traffic along GTSR, August 2012**

Source: 2012 Traffic Counts by University of Montana and NPS



**Figure 14**  
**Cumulative Eastbound Traffic along GTSR, August 2012**

Source: 2012 Traffic Counts by University of Montana and NPS

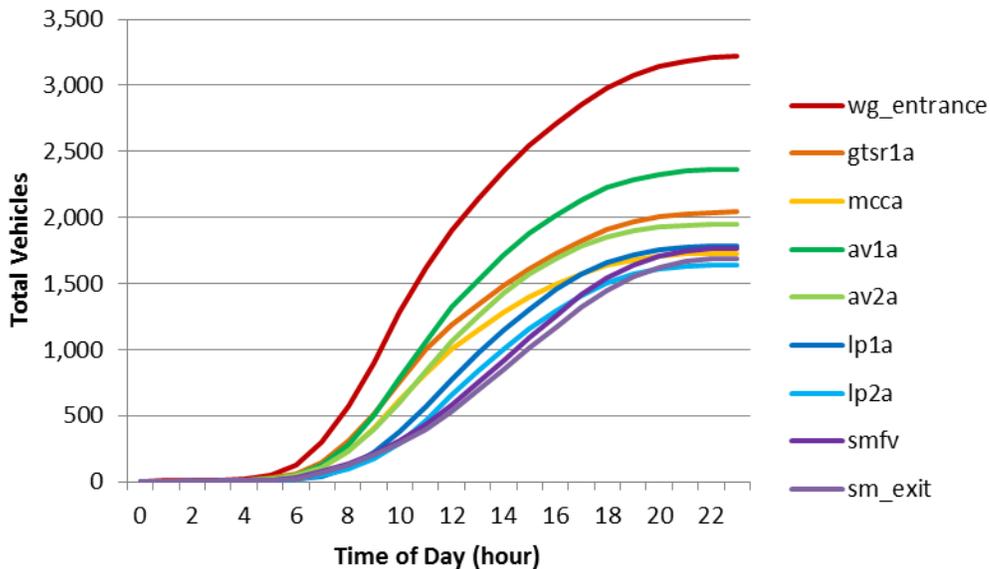


Table 3, Figure 15, and Figure 16 summarize the westbound transportation characteristics. Since most of the traffic counts are on the west side of GTSR, the westbound traffic counts primarily provide information on vehicles as they exit the park. Figure 15 illustrates this with peak travel

occurring later and later as one heads west. The lag between peaks is less spread out in the westbound direction relative to the east. This is interpreted as visitors making multiple stops as they travel into the park and not stopping as they exit the park. One exception to this is the gap in peak counts between Logan Pass (lp1b) and just east of Avalanche (av2b), which peak at noon and 6:00 PM, respectively. This could be due to visitors having to turn around at Logan Pass because of lack of parking and then finding something to do lower along the corridor, or it could be caused by other visitors participating in activities such as hiking between these two locations such as the Loop.

Table 3 lists not only the number of vehicles but the volume of traffic relative to both St. Mary and West Gate, as well as the preceding counter (% of Previous Counter) and following counter (Relative to Eastbound) moving westbound. This data along with Figure 16 illustrates the expected higher traffic volumes as one gets closer to the entrance with no peak in values at Avalanche (av1b and av2b). The one exception to this is the counter west of Logan Pass (lp1b) which has a slightly lower count than either stop next to it. The traffic count east of Avalanche (av2b) is slightly higher than would be anticipated seeing that it is larger than at the counter to the west of Avalanche. It is possible that this high number represents visitors turning around before reaching the Loop, or it may be capturing visitors from the east travelling over the summit to Avalanche before turning around.

**Table 3**  
**Average Daily Westbound Traffic Counts, August 2012**

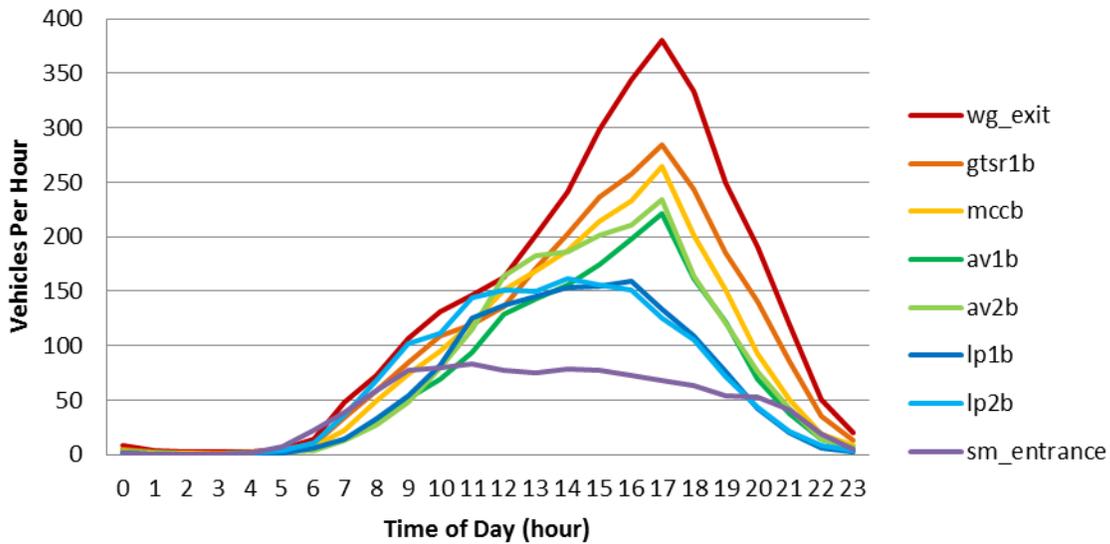
Source: 2012 Traffic Counts by University of Montana and NPS

	Counter/ Key Site(s) Between Counters	Vehicles	% of SM	% of Previous Counter	Relative to Eastbound	% of WG Entrance
8	wg_exit*	3,135	298%	129%	97%	97%
	Apgar					
7	gtsr1b	2,422	230%	114%	119%	75%
	Sprague Creek, Lake McDonald					
6	mccb	2,119	201%	124%	122%	66%
5	av1b	1,705	162%	90%	72%	53%
	Avalanche					
4	av2b	1,894	180%	130%	97%	59%
	The Loop					
3	lp1b	1,456	138%	89%	82%	45%
	Logan Pass					
2	lp2b	1,626	154%	154%	99%	51%
	Siyeh Pass, St Mary Falls, etc.					
1	sm_entrance*	1,053			62%	33%

\*NPS traffic counters. All others placed by UMT

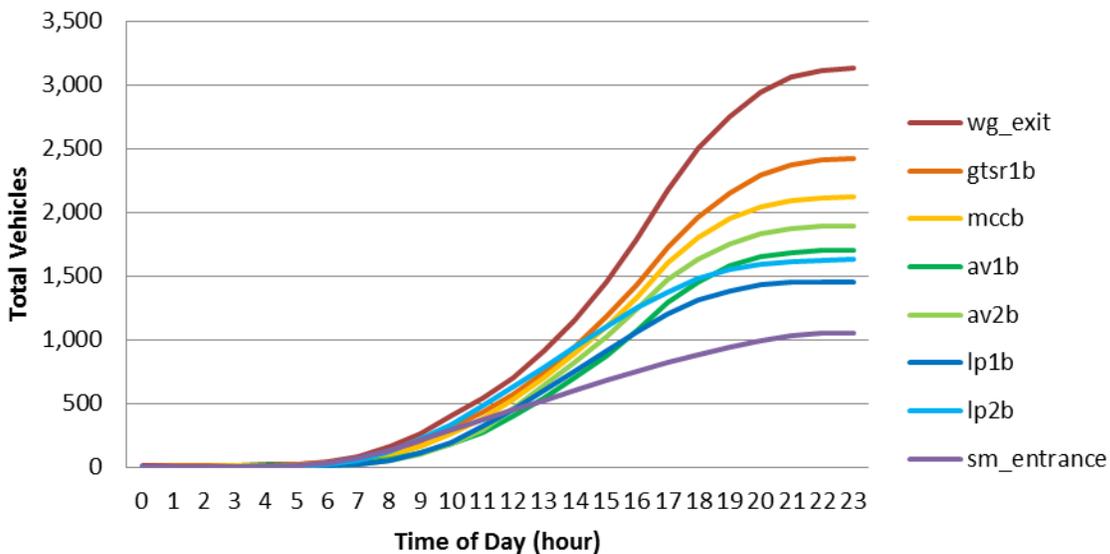
**Figure 15**  
**Average Hourly Westbound Traffic along GTSR, August 2012**

Source: 2012 Traffic Counts by University of Montana and NPS



**Figure 16**  
**Cumulative Westbound Traffic along GTSR, August 2012**

Source: 2012 Traffic Counts by University of Montana and NPS



## Congestion and Parking Conditions

Congestion on GTSR is significantly impacted by ongoing rehabilitation along the corridor. Visitors experience average delays of around 30 minutes during the peak season. Delays can be up to two hours in September and October (GNP, 2014).

Congestion also occurs at GLAC park entrances, particularly at West Glacier, where some visitors are waved through to relieve congestion. The St. Mary entrance also experiences delays but not as severely. It is very rare for vehicles to be waved through on the east side.

Congestion points along the GTSR beyond the entrances are directly related to the parking areas. Congested parking areas lead to congestion on the road. As shown in Figure 17, the parking areas and pullouts are spread throughout the corridor, with capacity for more than 2,000 parked vehicles overall. However, parking capacity does not always match demand. Conditions vary by parking area, with some locations having greater activity than others. Lack of parking availability or heavy congestion in certain areas may cause visitors to change their intended plans. The demand for parking, which is finite across the corridor, leads to vehicles circling to wait for spaces, especially at Logan Pass, where peak wait times can reach an excess of 40 minutes, or parking in shuttle vehicle stops. The latter situation causes shuttles to load and unload from the travel lane, causing further backups on the road.

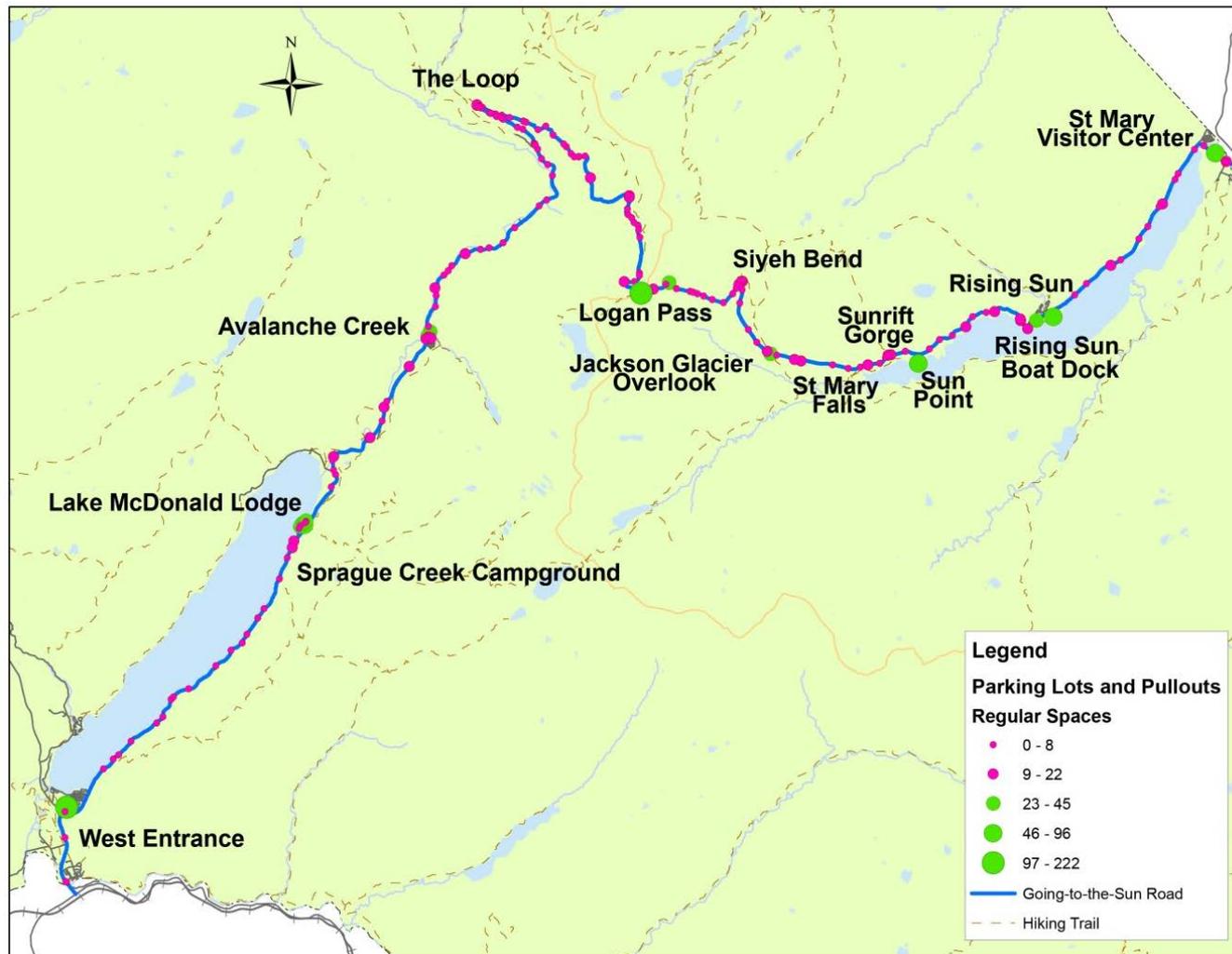
Congestion is also caused when wildlife is seen along the road. Vehicles slow down or stop to look at the animals. Congestion caused by viewing wildlife is difficult to predict or mitigate.

During the August 2012 kickoff meeting for the management plan, participants categorized various hot spots along the corridor as poor or worse; this listing was updated in February 2014 (see Figure 18) (GNP 2014e). The designations were based on individual experiences with the area as well as some park data. The majority of the hot spots identified are associated with parking areas and shuttle stops.

This next section will provide details on congestion and parking behaviors for the hot spots moving from west to east and confirm whether the data analyzed as part of the existing conditions analysis supports the designations.

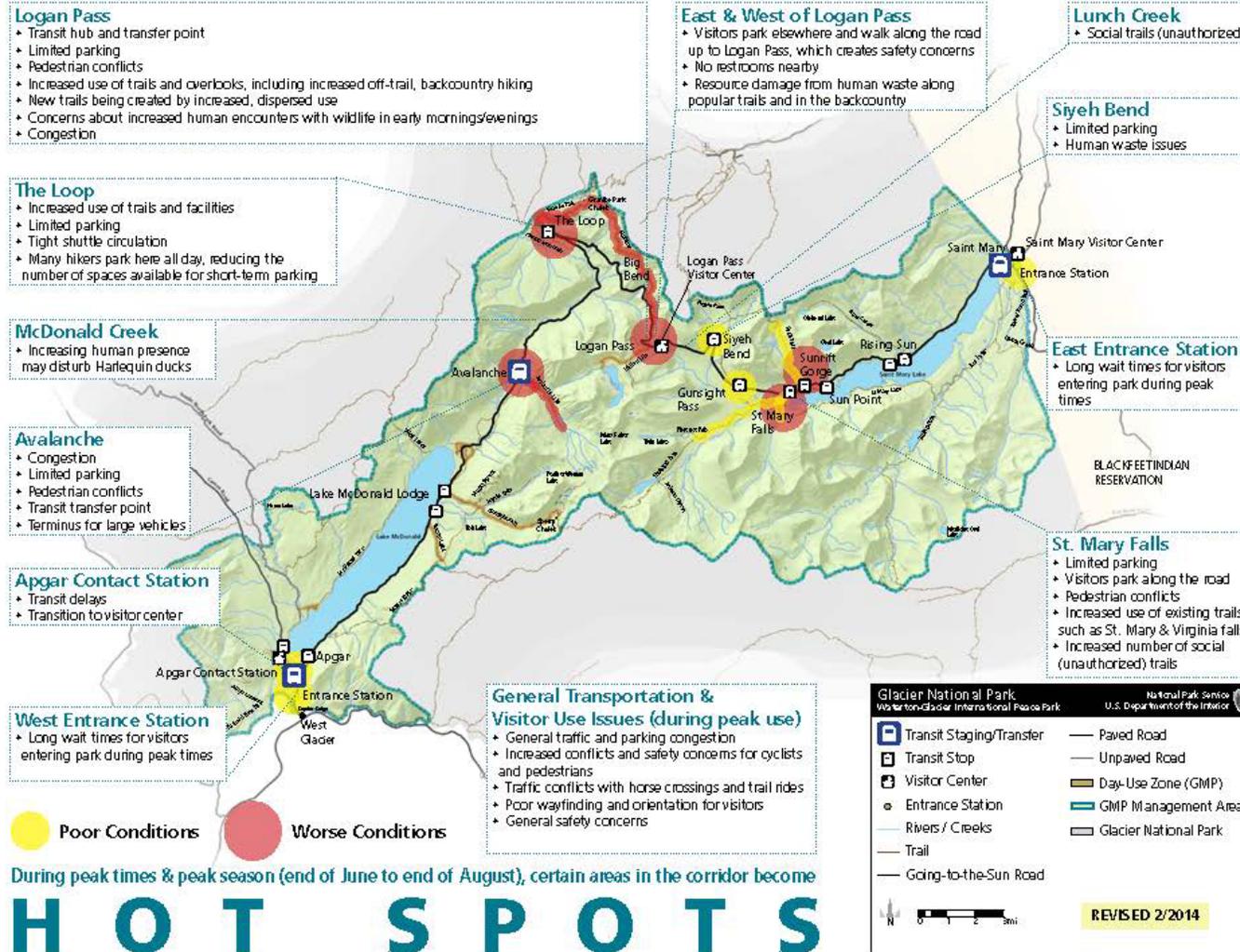
**Figure 17**  
**Parking areas and pullouts along Going-to-the-Sun Road**

Source: Volpe Center using data from Glacier National Park



**Figure 18**  
**Hot Spot Analysis from kickoff meeting**

Source: Glacier National Park 2012



## West Glacier Entrance

### ● Poor Hot Spot

The West Glacier Entrance is approximately one mile from State Highway 2. There are three entrance lanes and one exit lane. Almost 50 percent of all park visitors enter through West Glacier. Park employees have stated that at least once per day between mid-July and mid-August, vehicles at the West Glacier entrance are waved through without paying due to traffic backing up all the way to State Highway 2 (GNP Existing Conditions Workshop, 2013). Data is not collected on the number of visitors who are waved through or the revenue lost by waving through visitors. While it is not feasible to estimate the revenue lost to wave-throughs, it is expected to be low since a potentially large proportion of the vehicles waved through have already purchased a multi-day pass or will be required to on their next entry into the park. Revenue would only be lost for vehicles that have not already purchased a pass and would not enter again when they would be required to purchase a pass.

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### Figure 19

#### West Glacier Entrance Area

Source: Google satellite 7/2013



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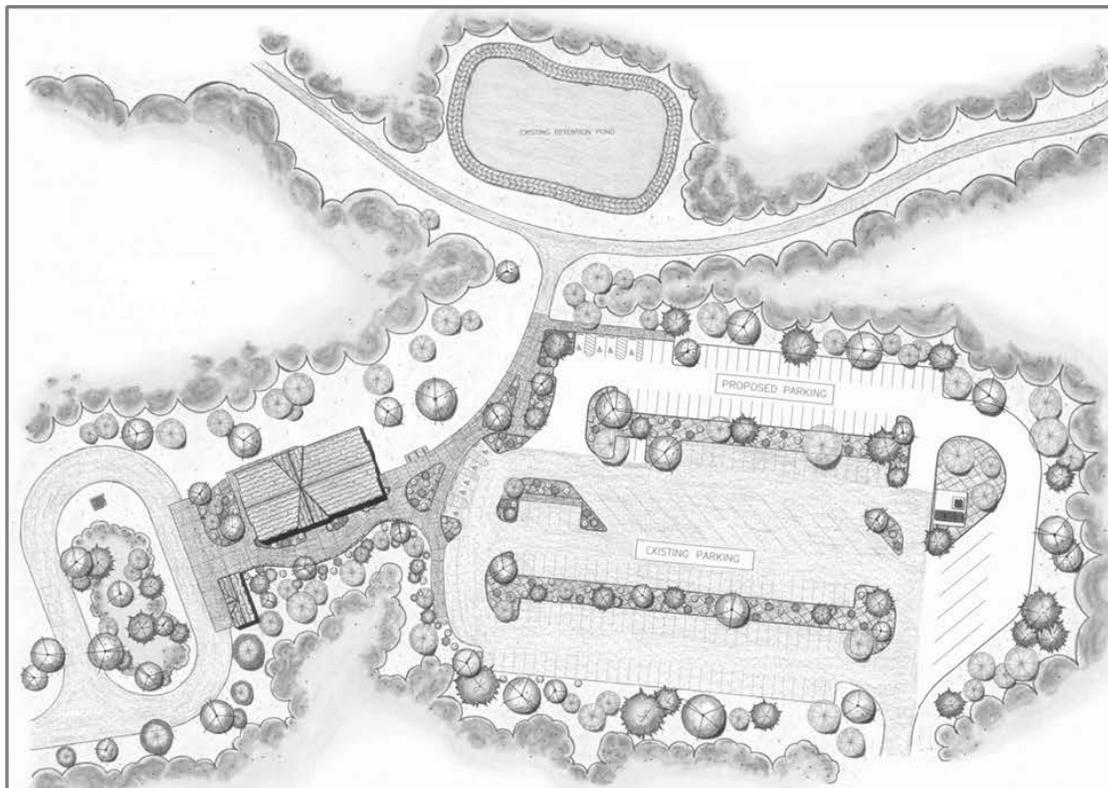
## Apgar Transit Center (ATC)

### ● Poor Hot Spot

The ATC serves as the starting point for the shuttle service on the west side of the park. In spring 2014, the west side visitor center was moved from Apgar Village to the existing transit center to consolidate NPS activity in the area and improve experience for visitors. The new location features a newly expanded parking area with 191 regular parking spaces (including nine accessible spaces) and 21 oversized spaces for RVs (see Figure 20, GNP, 2013). The transit shuttle stop is located adjacent to the parking lot.

**Figure 20**  
**Apgar Transit Center Expanded Parking Completed in 2014**

Source: Glacier National Park, Environmental Assessment Report



Prior to the 2014 expansion, the parking lot at ATC began to fill up around 7:00 AM in July and August with visitors waiting to get on the first buses of the day, which leave at 7:30 AM. The parking lot remained busy throughout the day until around 5:30 PM as shuttle riders return from various activities along the corridor (GNP, 2013). It is anticipated that the increase in spaces will be adequate to handle the additional demand created by the visitor center. At the time of writing, there were no observations on parking conditions since the relocation of the visitor center and parking expansion was recently completed. The ATC has been designated as a poor hot spot primarily due to transit delays. The qualitative data collected in the existing conditions analysis confirms there are lines in the morning waiting for shuttles to take passengers to points east. The lines subside as the day progresses and most visitors begun exploring the park.

### *Avalanche*

● Worse Hot Spot

There are many activities occurring at Avalanche, which hosts a campground, picnic area, restroom, the Trail of the Cedars hiking path, and another hiking trail down to Johns Lake. Avalanche is also the transfer point for the west side shuttle service. It is possibly the most complex attraction point in the park, with parking areas for the different activities as well as parking and a turnaround for oversized vehicles. Due to the complexities of the site, the park is creating a Development Concept Plan (DCP) for Avalanche in conjunction with the corridor management

plan. The DCP will address detailed issues and site design at Avalanche, including issues described below as well as those relating to safety, resource protection, visitor experience, social trails and universal accessibility.

Avalanche is considered a terminus for oversized vehicles, including the larger Optima buses that are not able to navigate the Alpine section of GTSR. Shuttle riders transfer to smaller Sprinter buses at Avalanche to continue on the shuttle toward Logan Pass. There are 98 regular parking spaces from the combined count of all Avalanche parking areas (GNP, 2013). There are four accessible spaces and room for three shuttle buses at the shuttle stop.

The UMT researchers observed parking behaviors at Avalanche in 2006, 2008 and 2011. Nearly 30 percent of vehicles observed in 2011 were parked longer than six hours, possibly indicating that a significant number of visitors are using the area as a base location for activities here or elsewhere in the park.<sup>2</sup> For shorter observed parking behavior, visitors parking at Avalanche stayed an average of 77 minutes in 2011 with a median 50 minute length of stay (Bedoya and Freimund, 2012a). The average duration is down from 84 minutes and 79 minutes observed in 2008 and 2006, respectively (Dimond and Freimund, 2008; Freimund et al, 2006b). These shorter duration visitors could be hiking a portion of the Avalanche Lake trail, or the Trail of the Cedars, which is one mile long. However, the relatively short duration of observed parking behavior combined with the 30 percent of vehicles parked longer than 6 hours makes it difficult to draw concise conclusions about how Avalanche is functioning.

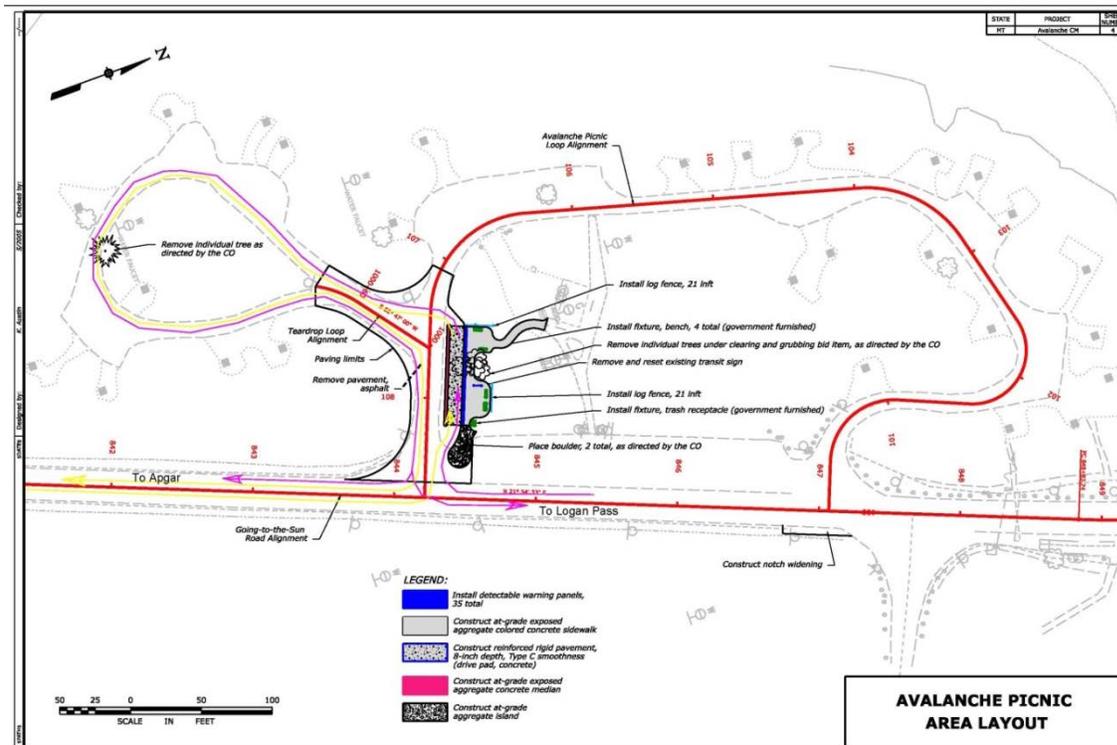
As noted in the DCP, congestion at Avalanche results in a significant amount of roadside parking. This has led to the creation of social trails and visitors walking along the road to access key points of interest around the Avalanche developed area, which are safety and resource concerns. Additionally, private vehicles are known to block the shuttle turnaround, which requires the shuttle vehicles to circulate through the general parking areas to return to the GTSR; occurrences such as this exacerbate the circulation and safety issues at Avalanche.

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<sup>2</sup> The data from the 30 percent of vehicles parked longer than the 6 hour observation period were not included in the average and median calculations, which underestimates the average and median times vehicles are parked.

**Figure 21**  
**Avalanche Transit Stop and Picnic Loop Design**

Source: Glacier National Park



Avalanche is designated as a worse hot spot for a variety of reasons, including congestion, limited parking, pedestrian conflicts, and complexities from being a turnaround point for the shuttle and a terminus for large vehicles. The qualitative and quantitative data collected and analyzed confirms that Avalanche is heavily used as a destination in itself and as the transfer point for shuttle vehicles.

### The Loop

● **Worse Hot Spot**

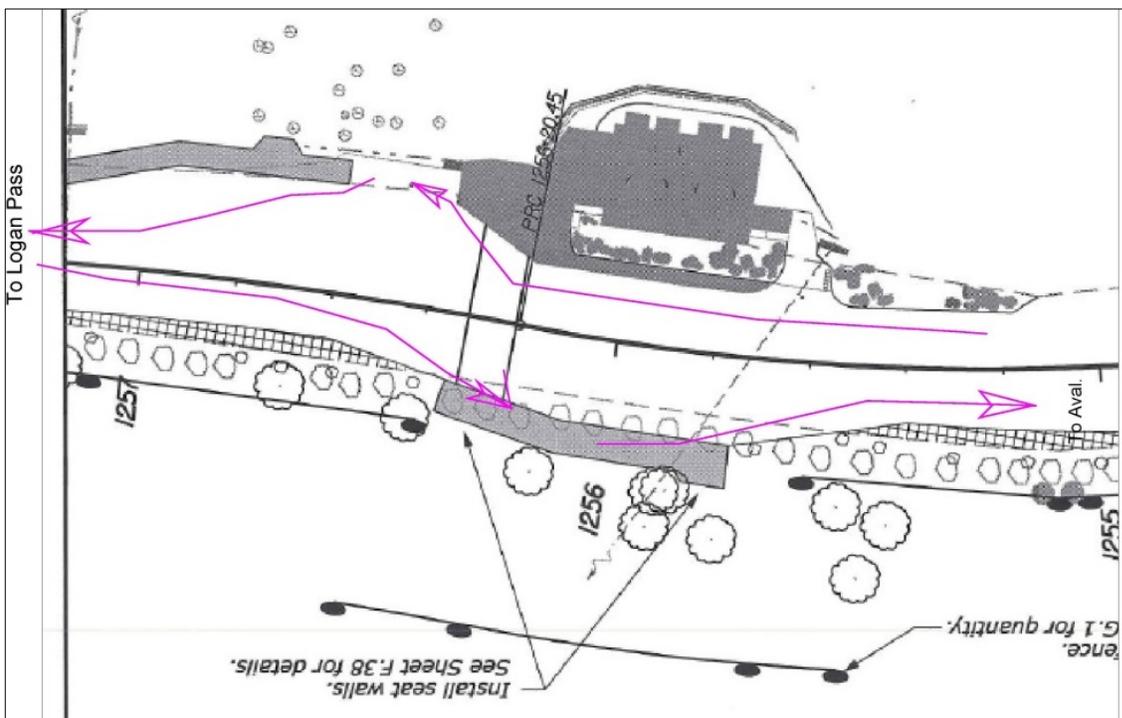
The Loop is a popular location for GTSR visitors to stop and take photos of the vistas or use the restroom facilities. There are a total of 29 regular and two accessible spaces between the upper and lower lots. The average length of stay observed for parking vehicles in 2009 was nine minutes, with a median length of six minutes. The lots start to fill around 9:00 AM and are constantly being filled until around 3:30 PM.

University of Montana observations in 2009 showed that the parking lots at the Loop were only full 18 percent of the time. However, the definition of “full” included occupancy of unmarked parallel parking spaces along the walls of the upper lot. Researchers often observed visitors pulling into the lot and leaving without parking, or slowing down to pull into the lot but continuing on, seemingly because they were not aware there was available parking even when the lot was not technically full. Park staff report there is always congestion at the Loop during peak hours and the lots there are full nearly all of that time. There are also pedestrian circulation challenges at the Loop since the trailheads and the east- and westbound shuttle stops are on the opposite side of the road from the parking lots and facilities as illustrated in Figure 22.

The introduction of the shuttle in 2007 facilitated one-way hikes between the Highline Trail and the Loop, as confirmed by trail counts, surveys and observations. The average length of stay observed by UMT researchers was relatively short; however, 20 percent of vehicles observed in 2009 were parked longer than six hours and not included in the average and median calculations. These findings show that there is some use of the Loop as a park-and-ride location for one-way hikes. This is further confirmed by park employees who observe hikers parking at the Loop early in the morning and either starting the Loop Trail from the Loop or taking a shuttle up to Logan Pass to hike the Highline Trail. With limited parking capacity at the Loop, long term parking by visitors for one-way hikes contributes significantly to parking congestion at this location. The designation as a worse hot spot due to limited parking, tight shuttle circulation and increased use of trails and facilities, including one-way hikes, is confirmed by data reviewed for this analysis.

**Figure 22**  
**The Loop Shuttle Stop Design**

Source: Glacier National Park



## Logan Pass

- Worse Hot Spot

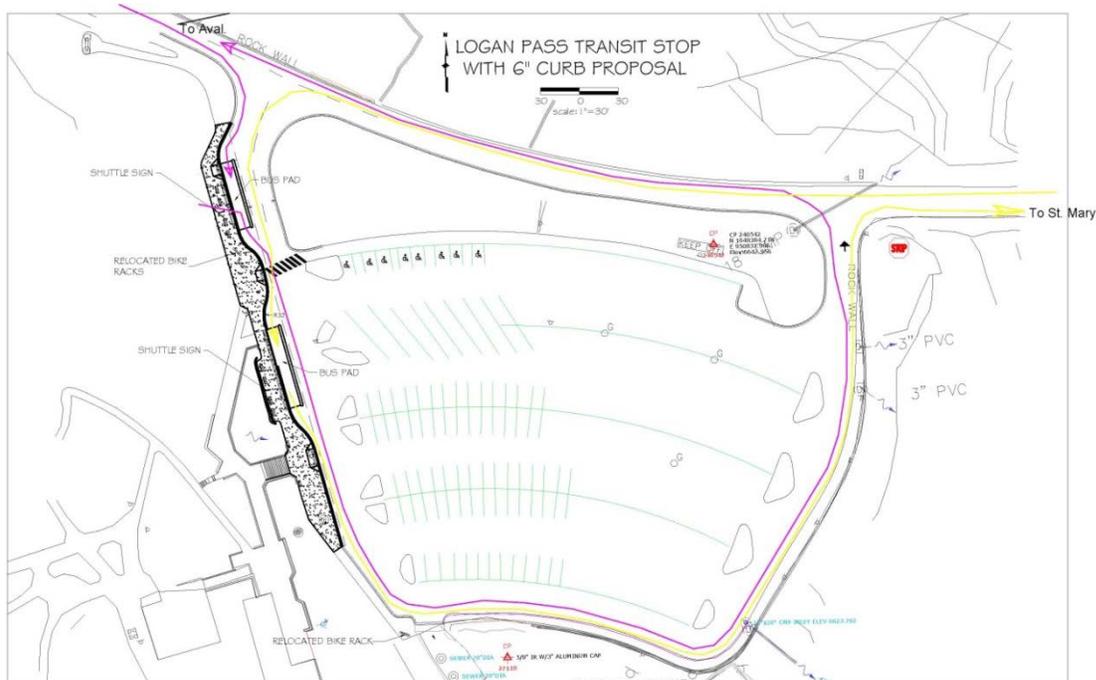
Logan Pass is a major stopping point for most visitors to the GTSR. It is located 32 miles from the west entrance and 18 miles from the east entrance. The parking area and visitor center sit at the Continental Divide, with sweeping views providing access to several trailheads, including the extremely popular Highline and Hidden Lake trails, which serve approximately 680 and 1,000 people per day respectively during the peak season (Freimund, 2013). Logan Pass is a transfer point for shuttle passengers between the east and west shuttle routes and receives an average of 650 shuttle passengers per day (Freimund, 2013). There are 234 visitor parking spaces, nine accessible spaces, and 20 park administration parking spaces in the Logan Pass lot (see Figure 23). There is also space designated for five shuttle vehicles and six historic Red Buses.

Based on 2012 vehicle counter data, Logan Pass is busiest from 10:00 AM to 5:00 PM. Entrance activity at Logan Pass peaks between 11:00 AM and noon, with about 200 vehicles arriving at the lot. Exit activity peaks around noon and remains high until 2:00 PM. Based on University of Montana observations from 2012, on a typical day during the peak season visitors can wait an average of 13 minutes for a parking space between the hours of 10:00 AM and 2:00 PM (Freimund, 2014). The average length of stay for parking vehicles was observed to be 136 minutes in 2012. This is up significantly from 62 minutes in 2006. Park staff cited a number of possibilities for the increase in length of stay, including more one-way hikes using the shuttle, more hiking to Hidden Lake, improvements to the visitor center and interpretive displays, and more picnicking activity, even though there is no designated picnic location. Survey data from UMT collected in 2007 and 2012 confirms that nearly one-third of shuttle riders are using the service to facilitate one-way hikes, very often along the Highline Trail between Logan Pass and the Loop (Baker and Freimund, 2007, Bedoya and Freimund, 2012b).

The Logan Pass parking area is staffed by a group of Visitor Service Assistants (VSAs), who monitor parking availability and manage traffic flows, and assist visitors as needed. According to VSAs, the Logan Pass parking area reaches capacity and is closed for a short period of time almost daily in the peak season. The closures usually occur in the late morning and early afternoon, and are sometimes reported to the entrance gate employees by radio, who then inform incoming visitors. Park staff also commented that Logan Pass congestion has been exacerbated by ongoing rehabilitation because vehicles come in waves due to the 30-minute traffic management delays. The groupings of vehicles entering the area were smaller and more similar in size prior to rehabilitation. They noted that the shuttle service has ameliorated some congestion at Logan Pass. Logan Pass is clearly operating as one of the premiere attractions on the GTSR and has significant congestion issues that warrant its designations as a worse hot spot.

**Figure 23**  
**Logan Pass Shuttle Stop and Visitor Center**

Source: Glacier National Park



## *Siyeh Bend*

### ● Poor Hot Spot

Siyeh Bend is at a hairpin turn in the road and has five parking pullouts in proximity to the Siyeh Bend trailhead, which connects to Piegan Pass trail and down to Sunrift Gorge. There are a total of 33 parking spaces in the five pullouts. Siyeh Bend hosts the first trailhead on GTSR east of Logan Pass as well as a shuttle stop. Hikers can take trails to Jackson Glacier Overlook or Sunrift Gorge and use the Siyeh Bend to start point-to-point hikes, facilitated by the shuttle. A 2012 survey of hikers at Sunrift Gorge reports that 47 percent of hikers interviewed left their vehicles at Siyeh Bend and hiked to the gorge.

Observations at Siyeh Bend were conducted by the University of Montana in 2005, prior to the introduction of the shuttle service. At that time, the average length of stay for vehicles was about 6 minutes with a median of 17 minutes. The mean is understated, however, since more than half of the vehicles parked during the observations were present longer than the six hour observation period and were not included in the average and median calculations. Park employees have noted that Siyeh Bend is a very busy location with significant congestion and pedestrian circulation challenges. Siyeh Bend is designated as a poor hot spot due to limited parking. Qualitative data from park staff confirm the label; however, quantitative data was collected prior to introduction of the shuttle and does not represent current conditions.

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**Figure 24**  
**Siyeh Bend Shuttle Stop**

Source: Google satellite 7/2013



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## *Gunsight Pass/Jackson Glacier Overlook*

### ● Poor Hot Spot

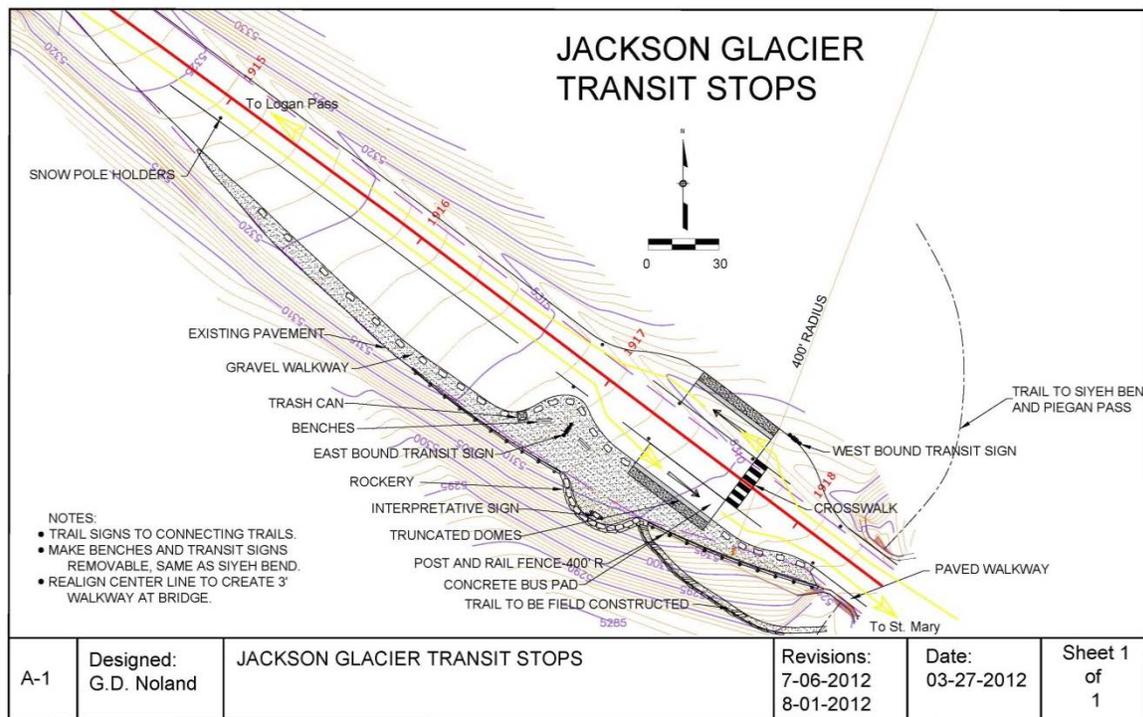
Jackson Glacier Overlook (JGO) was reorganized during the off season between 2013 and 2014 to include the shuttle stops that were previously at Gunsight Pass. Approximately one-third of the

parking spaces at JGO were removed to make room for the stops. As shown in Figure 25, the eastbound and westbound shuttle stops are on opposite sides of the road and each has capacity for a single shuttle vehicle. Gunsight Pass is the overflow parking area for JGO, which will redistribute activity between the two locations. The reorganization places 15 informal spaces at JGO and maintains 30 formal spaces at Gunsight Pass. The changes to JGO formalize pedestrian, shuttle, and parking areas to facilitate circulation. Additional research and observations are needed to better understand how JGO and Gunsight Overpass will operate under the new arrangement.

The hotspot designation ranked JGO as “poor” and park employees commented during the 2013 existing conditions workshop that there are significant vehicle and pedestrian conflicts here as well as congestion. Observations at JGO were conducted by the University of Montana in 2005, prior to the introduction of the shuttle service. At that time, the average length of stay for vehicles was about 5 minutes with a median of 4 minutes. Unlike Siyeh Bend, only 7 percent of the observations were present longer than the six hour observation period, indicating that the average is not understated, although this data is from before the shuttle service facilitated one-way hikes. The location is clearly a quick stop for the majority of visitors to take a picture and enjoy the view.

**Figure 25**  
**Jackson Glacier Overlook Shuttle Stops and Parking Area**

Source: Glacier National Park



### St. Mary Falls

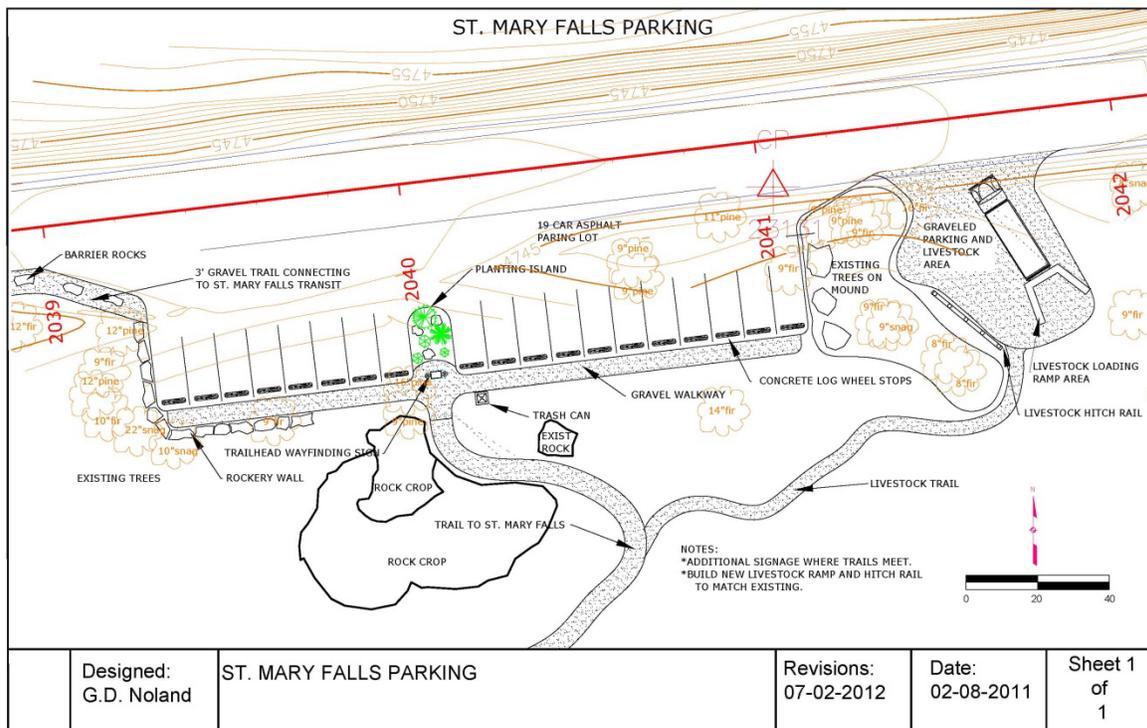
● Worse Hot Spot

Park staff identified St. Mary Falls as the most congested location east of Logan Pass, which is in agreement with being ranked as a worse hot spot. The peak period of activity starts around 10:00 AM and continues until 4:00 PM. Vehicles often block portions of travel lanes and through traffic cannot pass. Vehicles also often park in the shuttle stops, which causes congestion and delays since

the shuttle vehicles are forced to load and unload from the travel lane. Rehabilitation of the parking and shuttle areas in 2014 resulted in the reorganization of circulation for the location (see Figure 26 and Figure 27 below). There are now 19 formal parking spaces at the trailhead to St. Mary Falls. The shuttle stops have been consolidated to one area on the eastbound side of the road, just west of the St. Mary Falls parking lot and trailhead. There is a designated footpath between the two areas to facilitate pedestrian circulation. An improved overflow parking lot with eight spaces is also located just east of the larger formalized parking area.

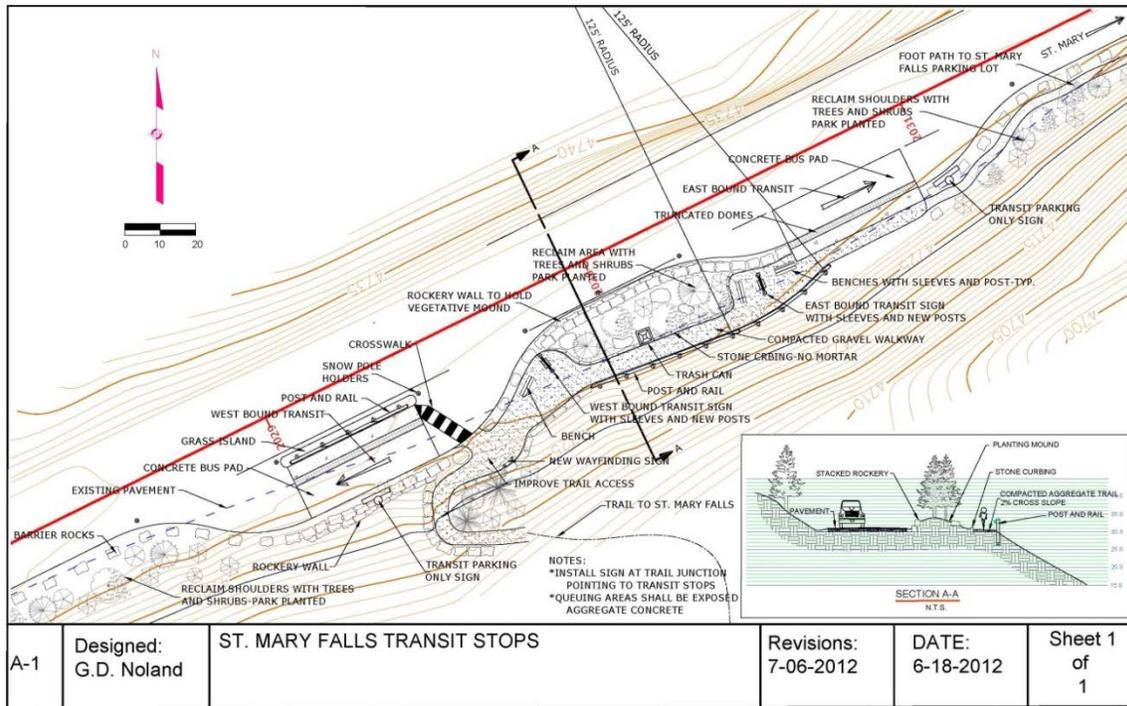
**Figure 26**  
**St. Mary Falls Parking Area**

Source: Glacier National Park



**Figure 27**  
**St. Mary Falls Shuttle Stop**

Source: Glacier National Park



Observations at St. Mary Falls were conducted by the University of Montana in 2005, prior to the introduction of the shuttle service. The average length of stay observed was 43 minutes while the median length of stay was about 22 minutes. As with Siyeh Bend, more than half of the vehicles observed were parked longer than the six hour observation period and were not included in the average and median calculations, which means the stated average length of stay is significantly lower than the actual. Qualitative data from park staff confirm the worse hot spot designation; however, quantifiable data was collected prior to introduction of the shuttle and does not represent current conditions, making it difficult to verify the ranking quantitatively.

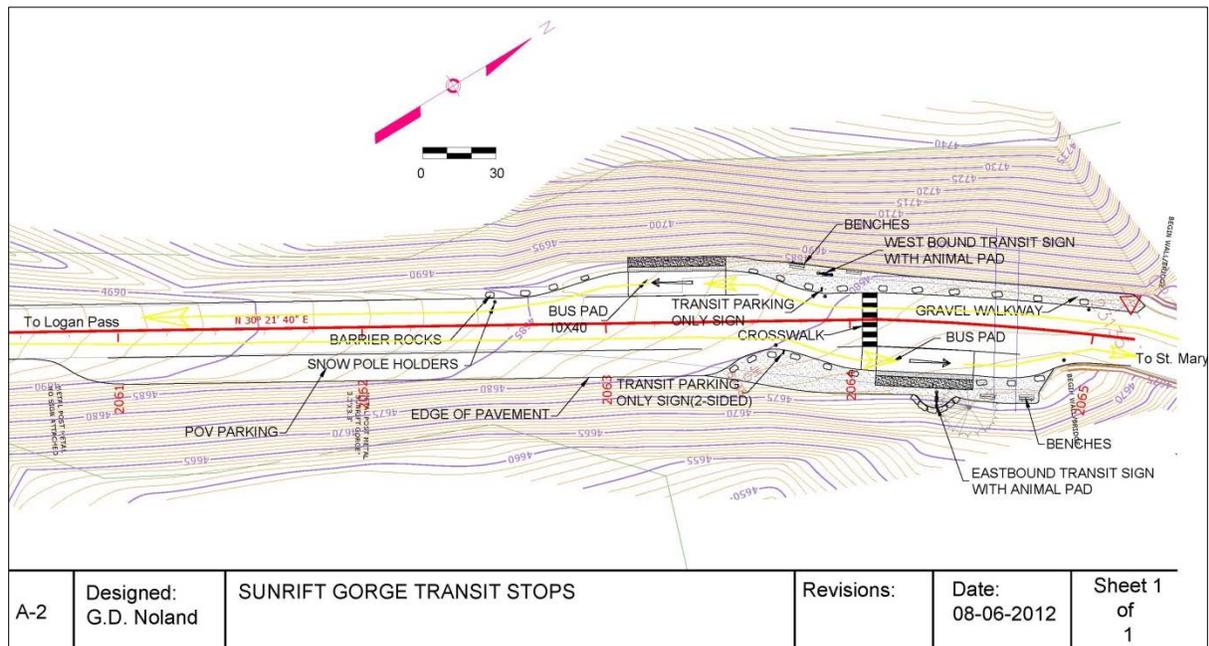
### Sunrift Gorge

● Worse Hot Spot

Sunrift Gorge provides convenient access to trails for Baring Falls and Piegan Pass. There is a main parking lot as well as parking near the shuttle stop (see Figure 28). The parking areas have a combined total of 33 regular spaces. The lots are busy from 10:00 AM to 4:00 PM daily. Park staff noted that vehicles often park in the shuttle stop, which requires the shuttle to stop in the traveling lane for boarding and unloading. They also noted that the area has pedestrian and vehicle conflicts, safety and parking issues, which was confirmed by observations done in 2008 (Dimond, 2008).

**Figure 28**  
**Sunrift Gorge Shuttle Stop**

Source: Glacier National Park



UMT researchers observed parking activities at Sunrift Gorge in 2005, 2008, and 2011. Over the course of that time, the average length of stay increased from 13 minutes to 26 minutes, while the median remained relatively consistent between 13 and 14 minutes (Freimund et al 2006a, Dimond and Freimund 2008, Bedoya and Freimund 2012a). The increase appears to be due to a rise in hiking activity. The 2005 observations noted that 55 percent of visitors stopped to take a picture and 13 percent went hiking. In 2011, these activities were 55 percent and 32 percent, respectively. It is unclear the degree to which the shuttle service has contributed to the increase in hiking. However, Sunrift Gorge is often an end point for hikers on the Siyeh Pass trail. Nearly 50 percent of hikers surveyed at Sunrift Gorge in 2012 commented that they left their car at Siyeh Bend and hiked to Sunrift Gorge, while only 18 percent left their vehicle at Sunrift Gorge (Bedoya and Freimund 2012b). These results are consistent with the parking observations by the University of Montana. The location was designated a worse hot spot, which is in agreement with feedback from the staff and the UMT data showing increasing use of this area for hiking, which reduces vehicle turnover.

### *St. Mary Visitor Center*

● Poor Hot Spot (Entrance Gate)

The St. Mary Visitor Center (SMVC) is immediately adjacent to the east entrance gate and is the first shuttle stop on the east side of the park. The visitor center and parking lot were updated in 2008 to accommodate the new shuttle service. The parking lot was expanded to a total of 83 regular and five accessible spaces and space was made for ten RVs. Shuttle stops were also added in front of the visitor center building. Approximately 13 percent of shuttle riders boarded the shuttle at SMVC as their initial start to their trip (Baker and Freimund 2007).

Park staff noted that while the parking area fills up, there are generally spaces available throughout the day and conditions have improved significantly since the expansion. Starting in 2014, some Red Bus tours may start from the SMVC, which will increase parking demand and congestion. The St. Mary entrance gate was ranked as a poor hot spot due to congestion and long waits for vehicles to enter the park. The quantitative and qualitative data reviewed support this designation for the entrance gate; however the data does not indicate the visitor center has issues of significant congestion.

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**Figure 29**  
**St. Mary Falls Visitor Center and Shuttle Stop**

Source: Google satellite, July 21, 2013



## Traffic Safety

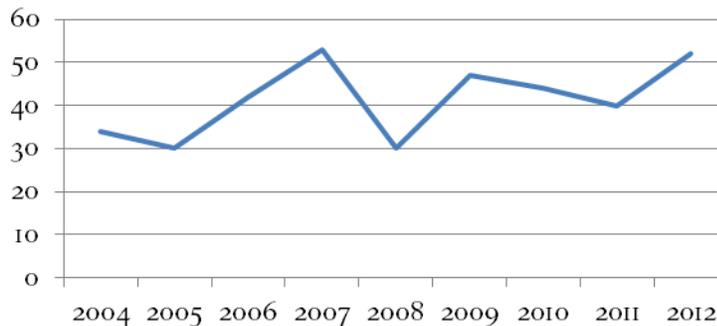
Glacier National Park law enforcement provided vehicle incident records for 2004-2012. These data represent a starting point for analyzing traffic safety along GTSR. While these data illustrate GTSR traffic safety in broad strokes, they do not provide enough detail to identify specific infrastructure or traffic management improvements. The data do pinpoint questions that future data collection efforts can focus on, including why there are particularly high numbers of crashes at some sites for some years, and how more detail for individual crashes can be recorded.

### Overall Corridor Conditions

From 2004 to 2012 there were 372 reported crashes along GTSR. There were more crashes on the west side by a 55 percent to 45 percent margin, though the west side carries much more than 55 percent of traffic. As shown in Figure 30, there is no distinct annual pattern for crashes on GTSR. Crashes remained relatively level over the study period overall.

**Figure 30**  
**Crashes per year, entire corridor (2004-2012)**

Source: NPS Vehicle Incident Reports 2004-2012



The National Park Service conducted a study in 2008 that looked at traffic safety across the service, including crash rates. The crash rates were calculated based on the NPS Service-wide Traffic Accident Reporting System (STARS) using five years of crash data (2001-2005) and vehicle miles traveled. Table 4 is derived from this report and shows how Glacier National Park compares to other parks in the Intermountain Region that have vehicle miles traveled (VMT) data available. GLAC has a crash rate similar to that of Grand Canyon National Park, Grand Teton National Park, and Yellowstone National Park (NPS 2008).

**Table 4**  
**Crash Rates for Individual Parks, 2001-2005**

Sources: NPS Draft NPS Traffic Safety Overview, April 2008

National Park	Crash Rate (per 100 million vehicle miles traveled)
Saguaro National Monument	370
Zion National Park	320
Big Bend National Park	240
Yellowstone National Park	150
Grand Teton National Park	140
Glacier National Park	130
Grand Canyon National Park	130
Glen Canyon National Recreation Area	40

## Specific Site Conditions

Some areas on GTSR are clearly more prone to crashes than others. From 2004-2012, 52 percent of reported crashes occurred at only 10 of 69 total sites (see Table 5).<sup>3</sup> There is little detail regarding the most common types of crashes—whether they involve vehicles, pedestrians, bikes, or wildlife—which can make it difficult to identify specific safety issues. The hot spot analysis conducted in 2012 identified Avalanche, Logan Pass, and St. Mary Falls as having pedestrian conflicts. Park staff also pointed out that Jackson Glacier Overlook and Sunrift Gorge/Baring Creek experience conflicts with pedestrian crossings; however, not all of these are within the top ten locations for crashes.

The data also do not show whether years with a high number of crashes are outliers, due to specific activities during a particular season, or some other explanation. For example, as highlighted in Table 5 below, the West Entrance saw 9 crashes in 2011 compared to an average of three for other years. Similarly, Apgar Loop Road saw 6 crashes in 2007 and otherwise had an average of less than 1.5. Apgar Loop Road's spike may have been due to visitors being potentially confused about the new Transit Center.

**Table 5**  
**Crash Numbers at Top 10 Sites (2004-2012)**

Source: NPS Vehicle Incident Reports 2004-2012

Site	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
West Entrance Station	3	4	6	1	0	5	1	9	2	31
Avalanche Campground/GTSR junction	2	3	4	3	3	3	1	3	3	25
Logan Pass, West Entrance	3	2	0	5	3	5	0	1	5	24
Logan Pass, East Entrance	1	2	3	1	2	1	4	1	5	20
Sprague Creek Campground	2	2	0	3	1	1	2	2	4	17
Lake McDonald/GTSR upper junction	1	1	2	2	1	4	3	1	2	17
Apgar Loop Road/GTSR junction	1	1	3	6	1	2	1	1	1	17
St. Mary Visitor Center/GTSR junction	2	1	1	2	2	1	1	1	5*	16
Sun Point Road/GTSR junction	5	1	0	1	0	2	2	1	2	14
Jackson Glacier Overlook	2	1	1	2	2	1	1	1	3	14

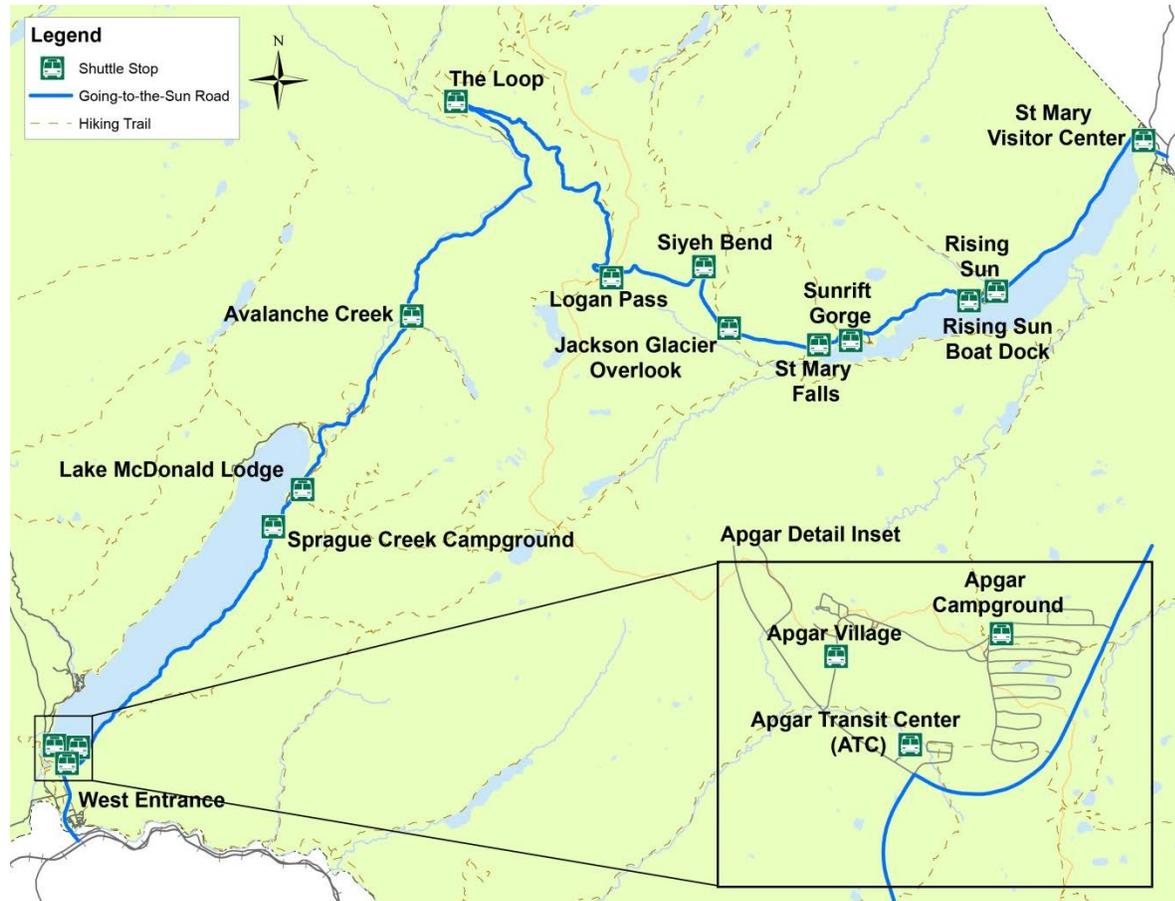
<sup>3</sup> It should also be noted that the rehabilitation construction has been ongoing since 2007 and may have some impact on crash occurrences in that period. However, the lack of detail regarding crash types makes it difficult to understand how construction activity has affected crashes at various sites.

## Glacier Shuttle System

The shuttle system has provided an alternative to driving private vehicles since it began in 2007. Operation of the shuttle has been adapted to ridership trends and needs over the last seven years. New bus shelters and crosswalks have been added as part of rehabilitation activity to improve the comfort and safety of shuttle riders. The section below describes the system as of the 2013 operating season except where noted.

**Figure 31**  
**Glacier Shuttle Stops Along GTSR**

Source: Volpe Center, with data from NPS and Glacier National Park.



Shuttle Stops (west to east):

- |                         |   |                             |
|-------------------------|---|-----------------------------|
| 1. Apgar Transit Center | 7. The Loop   | 11. St. Mary Falls          |
| 2. Apgar Village        | 8. Logan Pass   | 12. Sunrift Gorge           |
| 3. Apgar Campground     | 9. Siyeh Bend   | 13. Rising Sun Boat Dock    |
| 4. Sprague Creek        | 10. Gunsight Pass (changed to Jackson Glacier Overlook in 2014) | 14. Rising Sun              |
| 5. Lake McDonald Lodge  |   | 15. St. Mary Transit Center |
| 6. Avalanche            |   |                             |

## *Fleet*

A fleet of eight Optima buses with a capacity of 23 seated plus 20 standing passengers is used for lower elevation portions of the GTSR between the Apgar Transit Center and Avalanche on the west side, and between St. Mary Transit Center and Logan Pass on the east side. A fleet of 23 smaller Sprinter vehicles with varying capacities is used for the Alpine section of GTSR between Avalanche and Logan Pass. The smaller vehicles are needed for this section because of the tight turns and significant road gradient. GLAC also has two International buses that can carry 22 passengers and one Ford bus with a capacity of 14. These vehicles are only used for backup to the Optima and Sprinter fleets. All Optima and Sprinter vehicles as well as the shuttle stops are accessible.

All shuttle vehicles use diesel fuel because their engines are not able to process biofuel. Using biofuel or propane would void the vehicles' warranties. Other non-shuttle vehicles within GLAC are capable of running biofuels.

## *Shuttle Operations*

The shuttle service has three routes:

- (1) between Apgar Transit Center and Avalanche Creek (with some express Sprinters to Logan Pass at the start of the day),
- (2) between Avalanche Creek and Logan Pass, and
- (3) between St. Mary Visitor Center and Logan Pass.

The Glacier shuttle runs daily from 7:00 AM until 8:00 PM MDT between July 1 and Labor Day. On the west side, the Sprinters are dispatched approximately every 15 minutes from Apgar Transit Center with the first passengers of the day. The first three Sprinters from ATC run express to Logan Pass. Sprinter service from ATC making all stops starts around 7:45 AM and continues until 9:00 AM when the Optimas start running. The west side Optima buses begin operations at 9:00 AM with 30-minute headways once the majority of Sprinters have been dispatched. East side service starts at 7:30 AM with hourly headways until late morning when a second vehicle is added and buses run every 40 minutes. The last Optimas leaving Apgar Transit Center and St. Mary Transit Center for Logan Pass depart at 5:45 PM and 6:00 PM, respectively. The last shuttles depart Logan Pass for the east and west entrances at 7:00 PM. When shuttle supervisors observe fewer passengers returning to Avalanche and Apgar in the afternoon than normal, they will add additional trips to assure adequate capacity to bring all visitors back to the transit centers.

Avalanche and Logan Pass are major transfer points for the shuttle service. Passengers from Apgar traveling to the Loop and points further east switch from the Optima buses to Sprinters at Avalanche. Logan Pass serves as the only common stop for shuttles originating east and west and allows passengers to transfer to vehicles continuing further in either direction. Sprinters operate on a shorter headway than the Optimas, partly because of their lower capacity, which makes coordination of transfers challenging, depending on the direction of travel.

## *Maintenance*

Maintenance and repair work has increased as the shuttle fleet has aged. Maintaining the shuttle fleet has been challenging, especially for the larger Optima buses. Most minor repairs for the Optimas can be handled in auto shops that are in Kalispell, Whitefish and Cut Bank. As of 2014, more major repairs will also be completed in Kalispell, instead of the park needing to take the vehicles to Missoula, 140 miles from West Glacier, which is has historically been doing. This was expensive and a major time commitment. When the shuttle service was initially proposed, GLAC entered into a maintenance agreement with the Blackfoot Reservation that included some grant funding. There were challenges with setting up the maintenance shop on the Reservation in

Browning and the agreement ultimately fell through. Maintenance for the Sprinter buses is contracted out to local vendors, although park staff is able to do some minor maintenance functions.

Fleet maintenance is administered by Eagle Transit and included in the service agreement budget. As maintenance costs have risen in recent years, there has been some reduction in service since the operating budget has not increased to keep pace with these costs. One vehicle was replaced in 2012, and GLAC plans to replace ten others between 2014 and 2017. Through these replacements, the park is in the process of changing to an all-Sprinter fleet. Moving to an all-Sprinter fleet could provide opportunities for improving fuel efficiency, communication, and potentially to automate ridership data; however, it would also change system scheduling and staffing requirements since the capacity is less than half that of the Optimas.

## *Communications*

Communications is a critical part of shuttle operations. Drivers use radio reports to inform shuttle dispatch and other drivers of road conditions, as well as waiting passengers and other details of service. Radio service in a mountainous area like GLAC, however, can be difficult since reception is not consistent. The shuttle operations management team maintains contact with shuttle drivers using a specific schedule of five reports that are based on the time and location of the vehicles where radio frequency is available. The reports are given at key locations including Avalanche, the Loop, and Logan Pass with information as to passengers waiting to transfer, number of passengers in the vehicle, and those waiting to go east or west. This system enables shuttle operations to maintain good communications despite challenges with radio frequency availability. Installation of a trench for future fiber optic cable communications was considered during the planning stages of the GTSR rehabilitation project, but the costs and cumulative effects were deemed to be prohibitive and it was not included in the rehabilitation plans.

## *Finance*

Operation of the GLAC shuttle service is funded through a portion of the entrance fees collected at the gates. The transportation fee was set at \$7.50 when the service was established and has not been raised. Because the total park entrance fee cannot exceed its current rate, raising the transportation fee would require lowering other fees to compensate, and would involve a public engagement process.

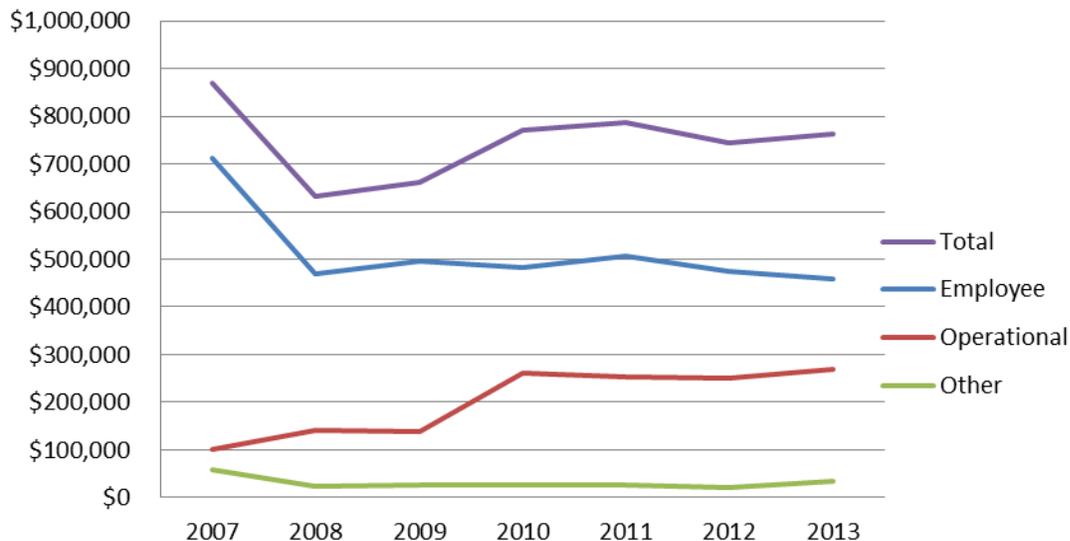
Since the transportation fee is collected with park entrance fees, revenue to support the ongoing operation and maintenance of the system is directly tied to park visitation levels – as visitation increases, revenues increase; as visitation decreases, revenues decrease. Overall, GLAC has managed to keep costs per rider at an average of \$5.26 over seven years of operations (GNP 2014f) despite fluctuations in revenue and ridership. By keeping operating costs of the system below the transportation fee revenues collected at the gate, GLAC has been able to carry over operational funds from year to year to cover unexpected maintenance fees and other volatile fuel prices. However, the carryover total diminishes each year as operating expenses rise. While the majority of the operating expenses come from labor costs, the operational portion has been rising as the fleet ages and requires additional maintenance (see Figure 32).

The transportation fee revenue is used only to pay for operations and maintenance of the system, not capital improvements, which are funded through other mechanisms. Shuttle stop improvements that have been made through rehabilitation of the corridor were paid for with capital funds for the GTSR rehabilitation. The initial purchase of the Optima vehicles was through a cooperative agreement between the NPS and the Montana Department of Transportation (MDOT), using an Alternative Transportation in the Parks and Public Lands (ATPPL) grant. The Sprinter fleet was purchased through a separate ATPPL grant. A Federal Lands Transportation

Program/Category III (FLTP/Cat III) grant was used to replace one vehicle in 2012. The Transit in Parks Program (TRIP) will provide grant funds in FY14 for the replacement of one east side Optima with two Sprinters. GLAC plans to apply for additional grants through programs such as the Federal Lands Access Program (FLAP) and FLTP/Cat III for continued vehicle replacements through 2017, although these programs are highly competitive. If the requested FLTP/Cat III and FLAP funding is not received (and an alternative funding source is not found), the shuttle service will suffer significant deficits from 2014-2017 due to the anticipated need for fleet recapitalization.

**Figure 32**  
**Shuttle Expense by Category**

Source: Glacier National Park Transit Summary Report (2007-2013)



A separate financial analysis was performed using a proforma tool originally developed for GLAC in 2010. The updated proforma analysis projects system revenues and costs through 2017. The analysis holds visitation steady at 2013 levels while escalating operating costs based on average inflation rates for labor, fuel, and the consumer price index. The analysis assumes that capital costs will continue to be funded through grant programs and not rely on the transportation fee revenues. Based on these assumptions about visitation, inflation, and capital costs, the proforma estimates a breakeven fee per pass of \$7.50 annually through 2017. The analysis confirms the diminishing carry over balance; however, the forecast shows the system remaining solvent through 2017. The proforma forecast was not carried beyond 2017 to determine when the carryover would cease and operations costs would not be covered by transportation fee revenues.

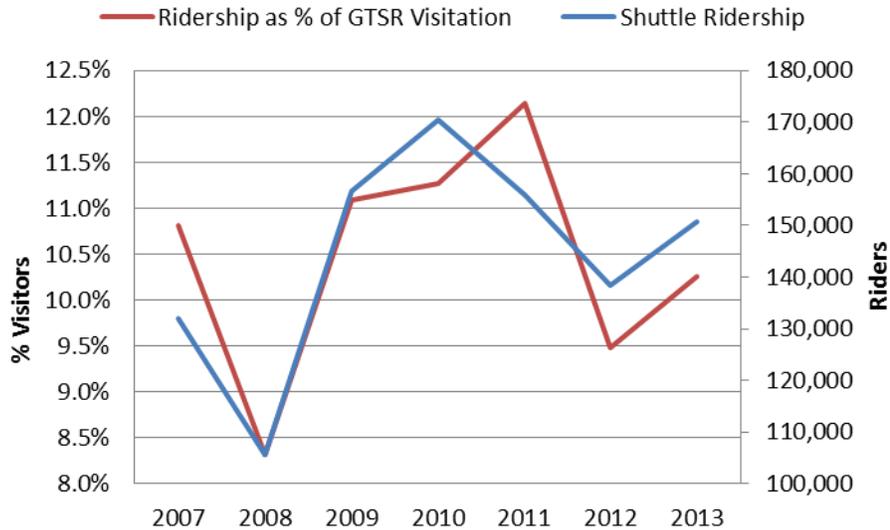
### *Ridership Trends*

Shuttle ridership has exceeded the expectations of park staff. Since its inception, the service has surpassed one million rides (Glacier National Park Transit Summary Report 2007-2013). The eight-year average of ridership is 144,000 per year for an operating season that lasts approximately 10 weeks. As shown in Figure 33, ridership has remained between approximately 8 percent and 12 percent of total visitation to the GTSR. There has been variation in how shuttle ridership on the east and west tracks with vehicle entries on each side. From 2010 to 2013, GTSR vehicle entries from the east and west gates averaged about 36 percent and 64 percent of visitors respectively between July and September. Shuttle ridership for the same periods averaged about 26 percent on the east side and 74 percent on the west side, indicating a higher likelihood for visitors entering from the

west side to take the shuttle than those entering from the east side (Figure 34). This could be due to higher vehicle volumes and congestion on the west side or more frequent service encouraging visitors to use the shuttle service.

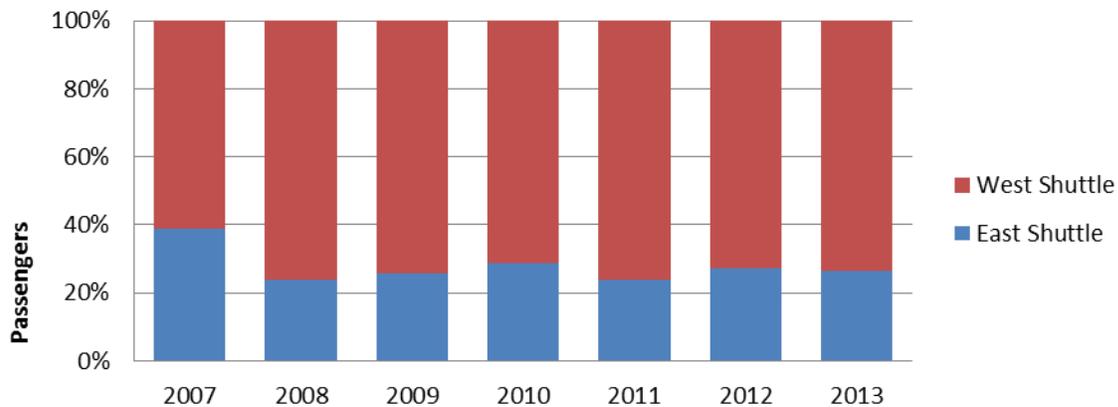
**Figure 33**  
**Shuttle Ridership Relative to GTSR Visitation**

Sources: Glacier National Park Transit Summary Report 2007-2013 and PUSO Glacier Year-to-Date Visitation Consolidated Report.



**Figure 34**  
**East-West Shuttle Ridership Distribution**

Sources: Glacier National Park Transit Summary Report 2007-2013 and GLAC Annual Visitation 1911-2013.

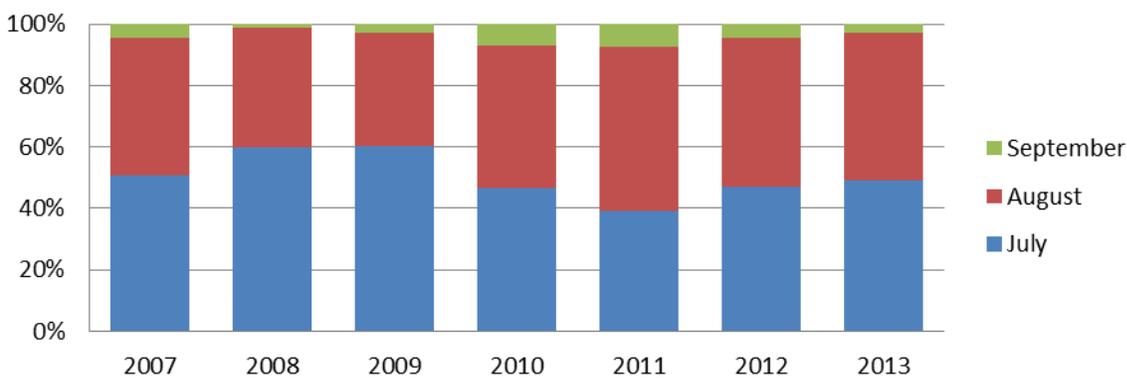


In general, shuttle ridership is evenly spread between July and August, with each month carrying approximately 47 percent of total ridership. September ridership only accounts for a small portion of ridership since the final day of service is within the first few days of the month (see Figure 35). Despite very few days of service, daily ridership in September is comparable to the daily average of the full season. In 2013, ridership on September 1<sup>st</sup> and 2<sup>nd</sup> was 2,332 and 1,930, respectively, while the daily average for the season was 2,353. Ridership is also fairly balanced across the days of the week.

Based on average boardings at the top five shuttle stops, there are slightly more riders on Saturdays (16 percent) and fewer on Sunday (13 percent). See Table 6.

**Figure 35**  
**Distribution of Shuttle Ridership by Month**

Source: Glacier National Park Transit Summary Report (2007-2013)



**Table 6**  
**Distribution of Shuttle Ridership by Day**

Source: Glacier National Park Boardings and Alightings (July – August 2012)

Weekday	ATC	Avalanche	Logan Pass	The Loop	St. Mary	Top 5 Combined
Sunday	13%	13%	13%	13%	13%	13%
Monday	15%	14%	14%	16%	14%	15%
Tuesday	14%	13%	13%	14%	13%	14%
Wednesday	14%	14%	14%	14%	15%	14%
Thursday	15%	15%	13%	14%	15%	14%
Friday	14%	15%	16%	11%	15%	14%
Saturday	16%	16%	17%	17%	15%	16%

There is a range of activity levels across the 15 shuttle stops, due in part to their location and the attractions at each. Avalanche, Logan Pass, and Apgar Transit Center are the top three shuttle stops for boardings (see Table 7). They are also in the top three for alightings. The Loop is ranked fourth for boarding, but seventh for alightings. These results are further evidence that people are using the shuttle to facilitate one-way hikes, especially from Logan Pass to the Loop. It is believed that visitors park at either Logan Pass or the Loop and combine a hike on the Highline Trail from Logan Pass to the Loop with a shuttle ride from the Loop to Logan Pass at the beginning or end of their hike.

**Table 7**

**Shuttle Stop Rankings by Boarding and Alighting**

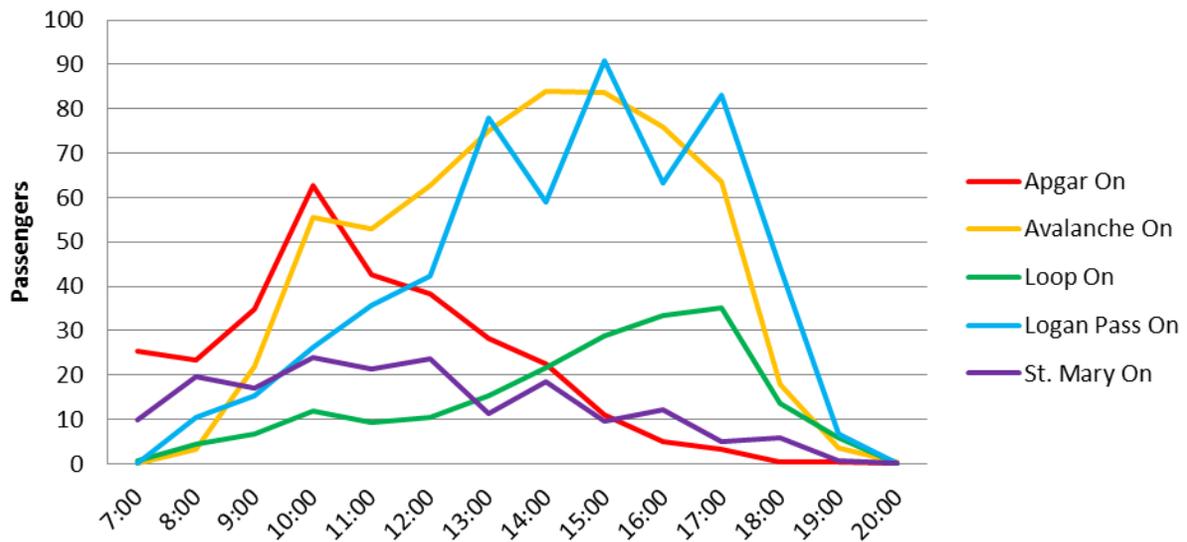
Source: Glacier National Park Boardings and Alightings, July-August 2012

Shuttle Stop	Boardings		Alightings	
	Rank	Total	Rank	Total
Avalanche	1	22,827	2	21,655
Logan Pass	2	21,091	1	24,567
Apgar TC	3	11,309	3	7,623
The Loop	4	7,505	7	2,788
St Mary VC	5	6,785	4	5,463

**Figure 36**

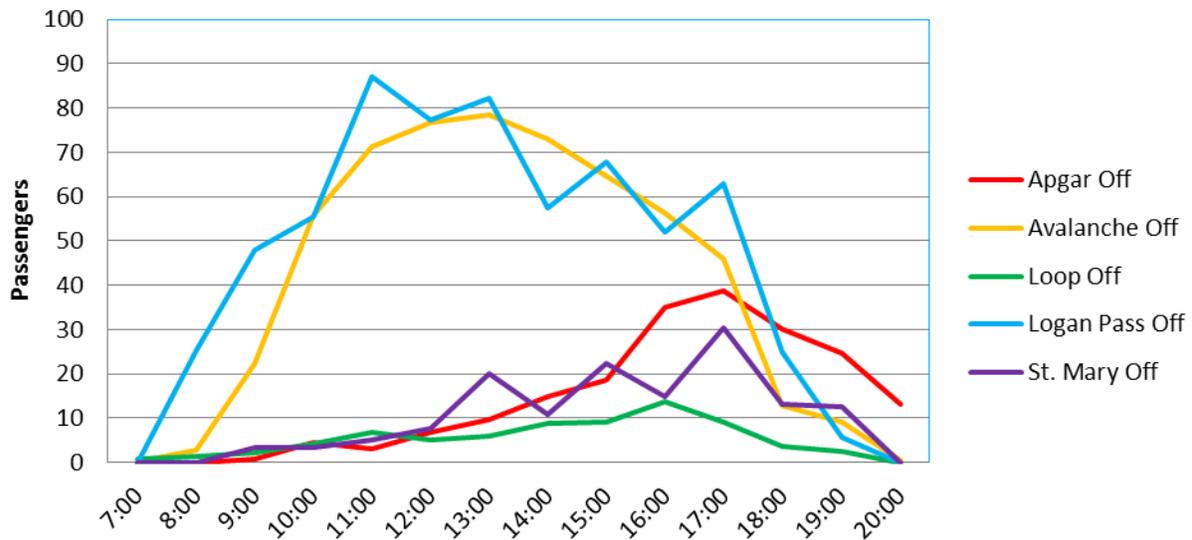
**Shuttle Stop Boarding Trends – Top 5 Stops**

Source: Glacier National Park Boardings and Alightings (July-August 2012)



**Figure 37**  
**Shuttle Stop Alighting Trends – Top 5 Stops**

Source: Glacier National Park Boardings and Alightings (July-August 2012)



As shown in Figure 36 and Figure 37, the use of shuttle stops across the day varies by location along the corridor. Apgar and the St. Mary Transit Center experience heavy boardings in the mornings and alightings in the evenings, which is expected consistent with their location at park entrances. Avalanche and Logan Pass remain busy throughout the day as they receive transferring passengers from both directions of travel. Both locations are also in proximity to attractions, including popular trails. The Loop has a more unusual pattern of activity. In addition to boardings exceeding alightings, activity in both directions is highest in the afternoon, peaking at 5:00 PM and 4:00 PM, respectively. The high number of boardings at the Loop relative to alighting supports the UMT survey result that the Loop is a major end point for one-way hikes. While the parking area is small at the Loop, some hikers will leave a car there and take the shuttle to Logan Pass to start the one-way hike down along the Highline Trail (Bedoya and Freimund, 2012b).

### West Side Transit Patterns

Analysis of a subset of six days of west side shuttle service provides some additional detail about ridership patterns.<sup>4</sup> Figure 38 shows that many more people board at the Loop than alight. This highlights the fact that it is a popular hike end-point. This is particularly true of visitors boarding at the Loop to travel to Logan Pass, which has an average of 49 passengers per day — five times as many movements as any other boarding or alighting at the Loop. 39 percent of these riders travel between 8:00 AM and 1:00 PM with another 39 percent riding between 4:00 PM and 8:00 PM. It is likely that some of the morning riders have parked at the Loop and are taking the shuttle to start their one-way hike at Logan Pass. Some traffic may also be due to capacity constraints at Logan

<sup>4</sup> Data was analyzed for Monday 7/8/13, Friday 7/12/13, Saturday 7/13/13, Friday 7/26/13, Saturday 8/3/13, and Saturday 8/10/13. These dates were chosen because they had the most complete records of trips that seemed to accurately count visitors. Many runs had negative numbers of passenger or passengers remaining on board as the bus turned around. Runs that included those trips were eliminated.

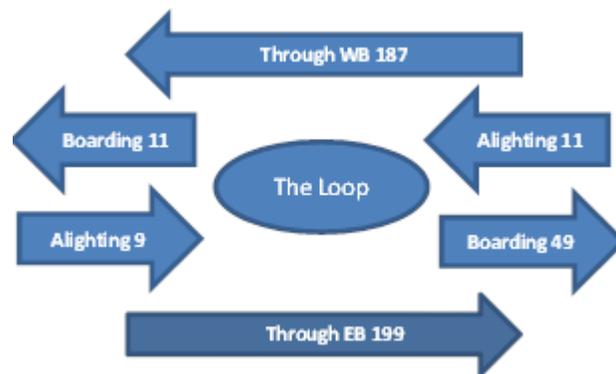
Pass as midday approaches. Those boarding are more likely to have taken an east side shuttle to do their hike or parked at Logan Pass and are taking the shuttle back to their car.

Of people taking the shuttle to reach the Loop, daily approximately 9 visitors alight coming from the west, with 83 percent arriving before noon. Visitors arriving from the west are most likely relying on the shuttle as their primary transportation through the park. An average of 11 passengers per day alight coming from Logan Pass. 66 percent of these visitors arrive at the Loop between 9:00 AM and 2:00 PM. They continue to trickle there through the afternoon with a larger spike between 5:00 PM and 6:00 PM. Some of these visitors may have parked at the Loop, hiked up the Highline trail and are returning to their car. Others may have taken the shuttle from the east side.

Most riders don't stop at the Loop at all, but continue to Logan Pass. Approximately 200 passengers board and alight at Logan Pass daily, although approximately 50 additional people alight at Logan Pass compared to boardings. It is believed that this is tied to the through hikers on the Highline Trail and the excess boardings from the Loop to Logan Pass. Figure 39 shows the patterns of boardings and alightings at Logan Pass throughout the day. It is important to note that this figure only shows the activity associated with west side buses and does not account for activity headed to the east side. Alightings at Logan Pass peak between 1:00 PM and 2:00 PM. With travel times approximately 30 minutes between the ATC, Avalanche, the Loop and Logan Pass, at the latest these passengers would have boarded at the ATC 11:30 PM to 12:30 to arrive in this window. With the need to transfer, it is likely that they left earlier and may have even stopped for some significant time at some of the sites on their way up. As noted in Figure 36, peak departures from Apgar are at 10:00 AM. Passengers boardings headed west peak between 2:00 PM and 7:00 PM.

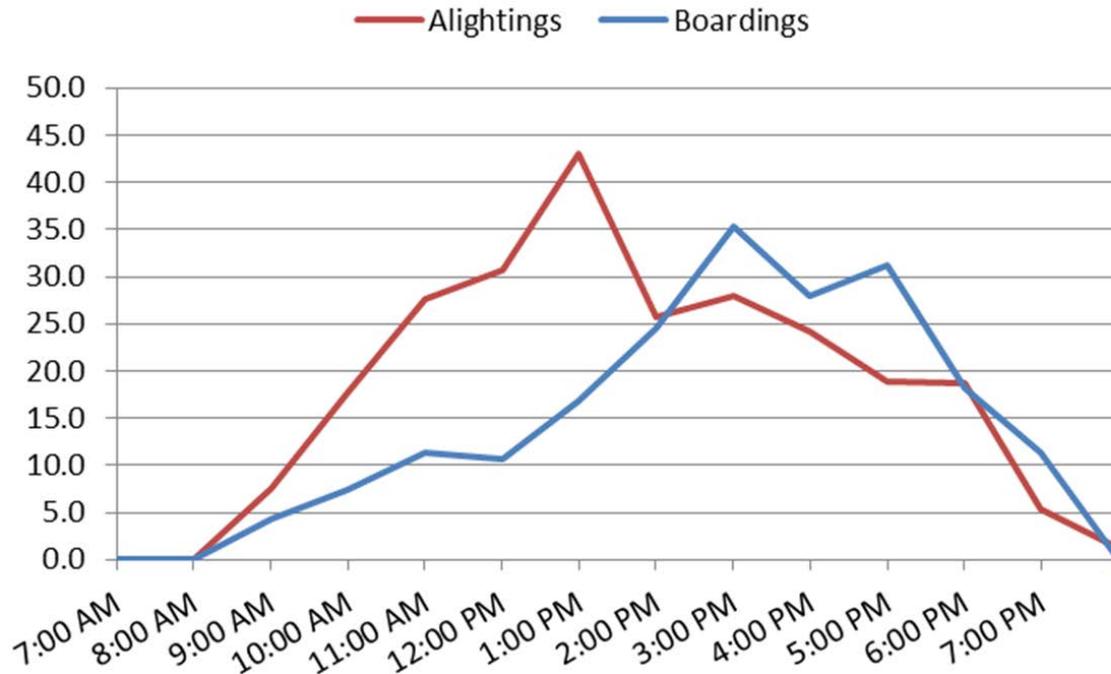
**Figure 38**  
**Average Daily Use of the Shuttle at the Loop**

Source: Glacier National Park Boardings and Alightings (See Footnote 4 for exact dates)



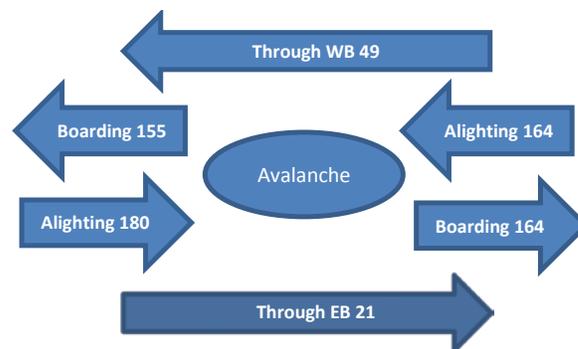
**Figure 39**  
**West Side Shuttle Use at Logan Pass**

Source: Glacier National Park Boardings and Alightings (See Footnote 4 for exact dates)



**Figure 40**  
**Average Daily Use of the Shuttle at the Avalanche**

Source: Glacier National Park Boardings and Alightings (See Footnote 4 for exact dates)



Avalanche is the most complicated area of the GTSR corridor due to the myriad of recreational uses and the location of the shuttle transfer point. Ridership on the west side routes was analyzed to determine what patterns may exist. As the smaller Sprinter buses pull out in the morning, they carry a significant percent of passengers through Avalanche to the higher stops at the Loop and Logan Pass and similarly, many passengers returning in the afternoon stay on those vehicles that continue through Avalanche. Since most of the day visitors are transported between Apgar and Avalanche on the larger Optimas and then need to transfer to the Sprinters to travel farther east, Table 8 includes the relative rate of people alighting and boarding in a given time period as a proxy

of the number of passengers who might stay on board if the vehicle were to travel through Avalanche. Overall the number of visitors who arrive from the west is greater than the number of people who board the shuttle heading east. This represents visitors using the shuttle to visit and enjoy the resources at Apgar itself. It is believed that a large proportion of visitors who alight at Avalanche might not if the vehicle they were on continued. During some hours, the number of visitors boarding eastbound at Avalanche exceeds the number arriving by shuttle. This may be due to Avalanche being used for parking for visitors wanting to take the shuttle east without having to transfer.

**Table 8**  
**Hourly Shuttle Use at Avalanche**

Source: Glacier National Park Boardings and Alightings, July-August 2012 and 2013 Shuttle Schedules

Time	Off EB	ON EB	potential EB transfers	Off WB	On WB	Potential WB transfers	EB Through	WB Through
7:00 AM	0.0	0.0		0.0	0.0		0.0	0.0
8:00 AM	0.2	1.7		0.0	0.0		14.3	0.0
9:00 AM	14.3	14.2	99%	3.7	1.2	32%	5.3	0.0
10:00 AM	34.7	19.5	56%	6.8	5.2	76%	1.2	0.0
11:00 AM	12.3	32.7	265%	9.3	0.8	9%	0.0	0.0
12:00 PM	49.5	24.2	49%	15.5	11.5	74%	0.0	-0.5
1:00 PM	22.2	25.5	115%	17.3	19.0	110%	0.0	1.5
2:00 PM	20.2	24.0	119%	21.8	18.7	85%	0.0	1.0
3:00 PM	18.5	13.0	70%	25.2	34.2	136%	0.0	9.2
4:00 PM	5.7	6.8	121%	23.3	27.3	117%	0.0	15.3
5:00 PM	1.7	2.7	160%	25.7	18.2	71%	0.0	7.0
6:00 PM	1.0	0.2	17%	13.0	17.8	137%	0.0	6.0
7:00 PM	0.0	0.0		2.5	0.8	33%	0.0	9.0
8:00 PM	0.0	0.0		0.0	0.0		0.0	0.0
Total	180.2	164.3	91%	164.2	154.7	94%	20.8	48.5

### *Shuttle Occupancy Rates*

The qualitative data from park staff indicate that the shuttle system is operating at or close to capacity. According to their observations, early morning shuttle riders at Apgar form long lines to wait for shuttles to take them east along GTSR. In the afternoon, it is not uncommon for hikers to have a full shuttle pass by at a location like the Loop. This leads to significant wait times when delays from road rehabilitation increase headways further.

A relatively simplistic analysis of seat availability was conducted to roughly quantify shuttle capacity. Analysis of the shuttle capacity for the 2013 season was based on the zero delay schedules for both the east and west sides. Average daily ridership was estimated based on 2013 total seasonal ridership. Ridership is relatively evenly split on the east side between Apgar to Avalanche and Avalanche to Logan Pass routes and a 50/50 split was assumed.

Based on this methodology, the east side shuttle between Apgar and Avalanche has the highest utilization rate as can be seen in Table 9. It is important to note that total capacity considers one seat to be available on each trip in each direction. It's possible that a seat may be utilized by two

visitors on a single trip. For example, if a passenger rides from Logan Pass to the Loop and gets off and another passenger gets on to ride to Avalanche. While this could cause the utilization rate to be over 100 percent, it happens rarely (which is why space is left on the Sprinters to allow for boardings at the Loop). In addition, early morning trips into the park will very rarely bring more than one or two passengers back out from the interior. Similarly, late evening trips into the park will be emptier while the return trip carrying passengers back to the gate will be at capacity. The midday trips in which there are passengers entering the park as well as leaving are the best measure of available capacity.

**Table 9**  
**Shuttle Service Capacity**

Source: Glacier National Park Transit Summary Report 2007-2013 and 2013 Shuttle Schedules

Shuttle Route	West Side – Apgar to Avalanche	West Side – Avalanche to Logan Pass	East Side
One-way Trips	36	144	30
Vehicle Capacity	43	12	43
Total Daily Capacity	1548	1728	1290
2013 Season Ridership	55,516	55,516	39,591
Daily Ridership	881	881	628
% capacity used	57%	51%	49%

### *Shuttle Impacts*

The shuttle system was put in place with a goal to relieve congestion on the road throughout the rehabilitation project. It is difficult to determine precisely how many personal vehicles the shuttle system has removed from GTSR. A rough estimate was calculated based on several assumptions. In estimating visitation, the NPS Public Use Statistics Office estimates that each vehicle contains 2.9 visitors (Glacier NP Public Use Counting and Reporting Instructions, 2003). Dividing total GTSR visitation by 2.9 yields an estimate of total vehicles on the road (Total GTSR Visitation Vehicles in Table 10). Since ridership is calculated by counting every time a visitor boards the bus, two boardings replace a round trip by private car. Shuttle boardings are therefore divided by 2.9 and then again by 2 to estimate vehicle trips eliminated (Ridership Round Trip Equivalents in Table 10). The highest percent of vehicle trips removed from the road was in 2011 with an estimate of nearly 27,000 round trips or 6.1 percent. Using this calculation, nearly 170,000 vehicle round trips have been removed from the road by the shuttle service since it started in 2007, which is about 5 percent of total vehicle trips traveling GTSR in that time.

**Table 10****Estimated Vehicles Removed from GTSR Corridor by Shuttle Service**

Sources: Glacier National Park Transit Summary Report 2007-2013 and PUSO Glacier Year-to-Date Visitation Consolidated Report.

	Total GTSR Visitation		Ridership		Estimated % Vehicle Round Trips Removed
	People	Vehicles	Shuttle Boardings	Round Trip Equivalents	
2007	1,221,340	421,152	132,093	22,775	5.4%
2008	1,269,862	437,884	105,639	18,214	4.2%
2009	1,412,790	487,169	156,602	27,000	5.5%
2010	1,513,359	521,848	170,466	29,391	5.6%
2011	1,284,102	442,794	155,938	26,886	6.1%
2012	1,460,474	503,612	138,398	23,862	4.7%
2013	1,467,551*	506,052	150,622	25,969	5.1%

\* Estimated based on average percent of 67 percent GTSR visitation from total park visitation since 2013 data not available.

There are a few potential weaknesses with this calculation that should be noted. First, in the context of shuttle use at GLAC, it is likely that vehicles with a greater number of people are less likely to use the transit system than a vehicle with only two passengers.<sup>5</sup> Therefore, the 2.9 people per vehicle may be an overestimate of vehicle trips for total GTSR visitation and an underestimate of vehicle trips for shuttle riders, which would result in a higher percentage of total vehicle trips removed from the road by the shuttle. A second weakness in the calculation is the potential impact of one-way hiking on shuttle ridership counts. UMT surveys in 2007 and 2012 found that about 30 percent of hikers use the shuttle for one-way hikes (Bedoya and Freimund, 2012b). They drive on GTSR to a particular trailhead, hike the trail in one direction, and use the shuttle to return to their car. Logan Pass, St. Mary Falls, and the Loop were the top three locations where one-way hikes were started. The top three ending destinations for one way hikes were the Loop, Logan Pass, and Sunrift Gorge. The use of the shuttle system for one-way hikes is greater than originally anticipated and reduces to some degree the effectiveness of the system to remove vehicles from the corridor.

### *Shuttle Synthesis*

The Glacier shuttle system has proven to be a very popular transportation option for park visitors. It has had impacts across the corridor, from reducing rehabilitation-related congestion to facilitating one-way hiking on many already popular trails. While the degree to which congestion has been reduced is unclear, the shuttle has consistently provided transportation to 8-12 percent of visitors to the GTSR corridor and removed approximately 5 percent of vehicles from the road.

There is variation in service between the east and west sides due to the need to transfer to smaller Sprinter vehicles at Avalanche as well as high demand for west side destinations. As GLAC considers changing to an all-Sprinter fleet through vehicle replacement, and as corridor rehabilitation is completed, the differences between the two sides may diminish. In general, GLAC faces rising shuttle system operating costs (primarily due to inflation), but operating revenues

<sup>5</sup> A car with four or five passengers will want to stay together as a group and not risk being separated by a cutoff point on the shuttle vehicle. Vehicles with only two passengers may feel they have a greater chance of getting onto a shuttle together and can enjoy their time more without one person having to focus on driving.

remain relatively constant under the current fee structure (which anticipates no increase in fees over time). At the same time, the system is nearly at capacity and demand is projected in the proforma analysis to continue to grow about 7 percent per year. Increasing ridership does not result in higher revenues for the service since it is tied to the entrance fee. It has not been determined how this demand will be served. The analysis assumes that the current operations will continue at capacity. At this time, there is no additional operational funding available to expand service.

## Local Transportation Systems, Connections, and Concessions

Cars are by far the most common transportation mode along GTSR. On the west side, 88 percent of travelers use a car. On the east side, 85 percent of travelers use a car. It stands to reason that if most travelers use a private vehicle inside GLAC, most travelers also use a private vehicle to get to GLAC and GTSR.

This section details the ways, other than by private vehicle, that visitors can get to GLAC and the other transportation modes they can use to explore the park once they arrive.

### Getting to GLAC

#### Airports

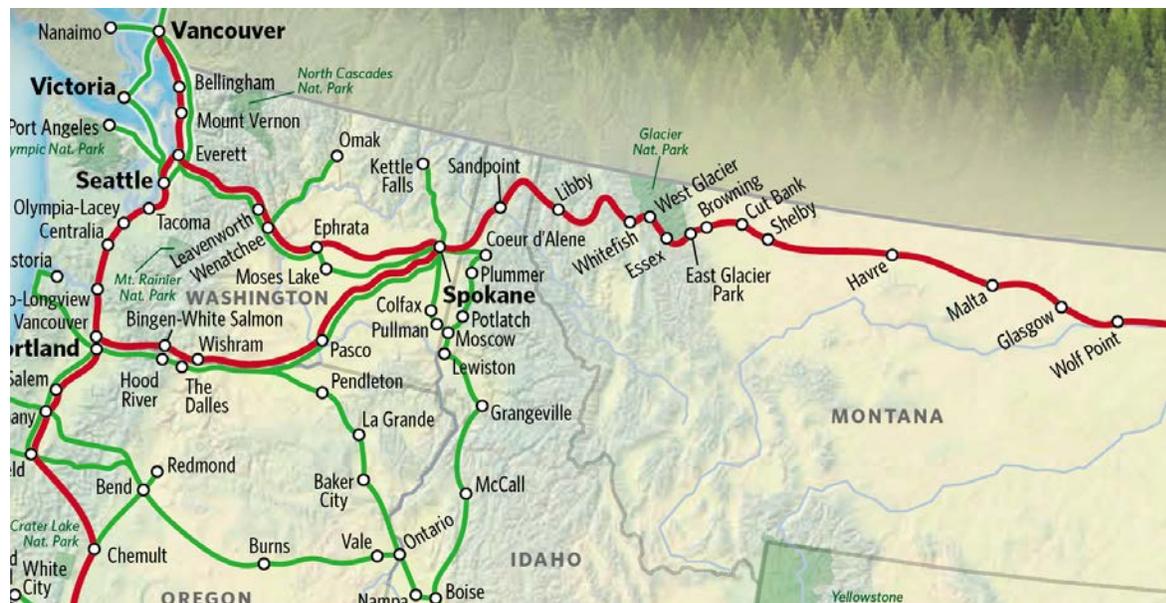
The Glacier Park International Airport in Kalispell is just over 28 miles from the west entrance of the park. Car rentals and privately operated shuttles are available to take passengers from the airport to the Apgar Transit Center. Great Falls International Airport is about two and a half hours southeast of the park; Missoula International Airport is three and a half hours south of the park; Calgary International Airport in Alberta, Canada, is four and a half hours north of the park; Spokane International Airport and Seattle-Tacoma International Airport are five and a half hours and eight and half hours west respectively.

#### Amtrak Train Service

Amtrak's "Empire Builder" route connects Chicago and Seattle with many stops throughout Montana (see Figure 41). Train stations closest to GLAC are East Glacier Park and West Glacier. The historic East Glacier station is only open from the beginning of May through October 1. During the rest of the year, passengers may get off the train at Browning to access the east side of the park, although that station is not staffed.

**Figure 41**  
**Amtrak Empire Builder Route Map**

Source: <http://www.amtrak.com>



The West Glacier station is in an historic depot, but does not have a ticketing office or ticketing machines. This station is about one mile from the west entrance to GLAC and an additional mile to Apgar Transit Center where shuttle service starts. There is no formal transportation service between the station and the transit center; however, Xanterra provides a reservation based shuttle service during the summer months from the train station to Lake McDonald Lodge and Village Inn within GLAC for a small fee (Glacier National Park Lodges, 2014).

The closest full service Amtrak station near the park is in Whitefish, MT, which is a little more than 25 miles from the West Glacier entrance. Car rentals are available at Whitefish.

### **Flathead County Eagle Transit**

Eagle Transit operates transit services for the nearby towns of Kalispell, Whitefish and Columbia Falls. These services are a combination of fixed route city buses and on-demand vehicles and do not provide connectivity to GLAC.

### **Blackfeet Nation Transit**

The Blackfeet Nation operates a small transit service within the reservation that does not have any connectivity with the GLAC shuttle system.

### **Rocky Mountain Transportation**

This company is a former concessioner to GLAC and operates an on-demand service to the park that includes passenger vans that seat up to 12 people, and motor coaches that seat up to 55 people. These van and motor coach services are only a small portion of its local business, which includes car rentals at Glacier Park International Airport. Rocky Mountain Transportation is headquartered in Whitefish, MT, about 30 minutes west of GLAC. Visitors contact the company via email to arrange on-demand services.

### **GPI Shuttle**

Separate from the GTSR shuttle service, a shuttle bus operated by Glacier Park, Inc. (GPI) provides service to locations along the east side of the park, making stops between Glacier Park Lodge near the East Glacier train station and to Prince of Whales Lodge in Waterton Lakes National Park in Canada. The service facilitates car free visits to a broad range of GLAC sites. The GPI Shuttle ranges from \$15 to \$55 and stops at seven sites between 8:15 AM and 5:30 PM, with specific times and routes varying by site. Although the GPI shuttle does provide outside connectivity to Waterton, this route may be eliminated.

### **National Bus Carriers**

The closest national bus carrier stops in Missoula, MT, which is 120 miles from GLAC. Service previously operated closer to the park but has since been suspended.

## *Traveling within GLAC*

Transportation services within GLAC are typically provided by concessioners and give visitors the opportunity to get out of their private vehicles and experience GLAC on shuttles.

There are several alternative transportation options available to GLAC visitors, detailed below. While these options provide mobility through GLAC, only some actually eliminate a private vehicle trip into the park. The Red Bus Tours, GPI shuttle, Sun Tours, and bike trips provide alternative mobility for visitors. In some cases, boat tours may provide a link, allowing visitors to make a one-way hike that might otherwise necessitate one or more cars. Services such as these could be encouraged to reduce traffic on GTSR. All of the services described below require agreement from

GLAC through a concessions contract or other authorization. Through these mechanisms, GLAC has the opportunity to require the service provider to operate within certain constraints that could otherwise impact the transportation system, such as limits to specific times or places, starting service outside of the park and having all participants arrive at the site via concession vehicles or the GLAC shuttle.

Table 11 gives a sense of the potential impact based on the use of each service.

**Table 11**  
**Average Annual Participation in Concessioner Activities (2002-2013)**

Source: Glacier National Park Concessioner Visitor Use Figures

Activity	Annual Average Participation
Glacier Park Boat Tours	55,299
Red Bus Tours	37,687
Horse Back Trail Rides*	10,529
Glacier Park Boat Rentals**	7,638
GPI Shuttle	4,111
Sun Tours	3,285
Concession Guided Day Hikes	2,554
Concession Guided Overnight Hikes	1,137
Bike Permit***	550

\* 2007 - 2013 only. Operations varied in previous years.

\*\*2009-2012 only data available

\*\*\*2002-2011 only data available

## Red Bus Tours

Guides offer tours on historic convertible buses called Red Jammers, with routes that run on the west and east sides of GTSR. The concessioner was recently changed to Xanterra Parks & Resorts (Glacier National Park Lodges) and there are expected to be some changes to the routes and schedules moving forward.

There are several tour options that take various lengths of time and are priced differently. Several of these tours let visitors leave the Jammer and hike, offering a linkage between vehicle and pedestrian modes and opportunities to explore trails that visitors might not otherwise have had. Pricing and time length details for the shortest and longest tours are as follows (based on 2014 routes and rates):

- **West Side**
  - *Western Alpine Tour*  
West Side to Logan Pass (\$50-60 adults, \$25-27.50 child)
  - *West Side of the Crown of the Continent Tour*  
From the west side through the Continental Divide to St. Mary (\$80-86 adult, \$40-43 child)
  - *Evening Discovery Tour*  
West side to Logan Pass (\$50-55 adult, \$25-27.50 child)
  - *Mountain Majesty Tour*  
West side to Rising Sun (\$55-63 adult, \$27.50-31.50 child)

- **East Side**

- *Eastern Alpine Tour*  
East side to Logan Pass (\$30-40 adult, \$15-20 child)
- *Big Sky Circle Tour*  
Round trip from Glacier Park Lodge across entire GTSR (\$80 adult, \$40 child)
- *Evening Discovery Tour*  
East side to Logan Pass (\$30-40 adult, \$15-20 child)
- *East Side Crown of the Continent*  
East side to Lake McDonald (\$55-80 adult, \$27.50-40 child)

### **Sun Tours**

Sun Tours highlights Blackfeet culture during its tours on 25-passenger coaches. These tours are similar to Red Bus Tours in that they require visitors to leave their private vehicles. Tours run from mid-June to September 30, traveling the length of GTSR and back during full-day tours from East Glacier and Browning, and half day tours from St. Mary and St. Mary Visitor Center. Prices range from \$40-75 for adults and \$20-25 for children based on duration of tour (Sun Tours, 2014).

### **Hiking**

Glacier Guides, Inc. operates day and overnight hikes. Statistics for hikes are divided into two groups: Guided Day Hikes and Guided Overnight Hikes. Day hikes are offered five days per week for \$85 for children and adults, and custom hikes are offered every day at \$100 per day per person with a \$500 day minimum. Overnight hikes range from 3 days to 8 days, for adults and children ranging from \$165 to \$190 per day per person. There are numerous trails throughout the park and trails connect at every major parking area along GTSR.

### **Horseback Trail Rides**

Swan Mountain Outfitters provides guided horseback rides along trails that begin and return to corrals at Apgar, Lake McDonald, and Many Glacier, near where these sites connect or are close to GTSR. Rides last from one hour to a full day throughout the summer. Participants drive along GTSR to the respective corrals to begin their rides. Parking is available at the Apgar Corral, Lake McDonald Lodge, and Mary Glacier Hotel for these services.

### **Glacier Park Boat Tours**

The Glacier Park Boat Company operates boat tour and guided hikes associated with their boat tour at Apgar Corral, Lake McDonald Lodge, Many Glaciers, Rising Sun, and Two Medicine. Some cruises at Many Glacier, Two Medicine, and St. Mary also offer optional guided hikes. Boat tour prices range from free for small children, \$8 to \$12 for older children, and \$12 to \$24.25 for adults, depending on the launch site. One way fares are available at some locations. At St. Mary, visitors can take a boat across the lake to access backcountry trails that connect to various points along GTSR and throughout GLAC.

### **Glacier Park Boat Rentals**

The Glacier Park Boat Company also operates a boat rental service. Small boats are available for rent at Apgar, Lake McDonald, Two Medicine, and Many Glacier sites. Prices range from \$15 per hour for single kayaks to \$25 per hour for motorboats based on location and type of boat.

## *Encouraging Alternative Transportation*

Every time a visitor parks in GLAC and uses alternative transportation, or does not use a car at all to get around GLAC, that means one less vehicle on GTSR and one less opportunity for vehicle congestion to build. GLAC staff can encourage more bike use by providing more public information and maps on existing bike trails. GLAC staff are able to use shared bicycles in an internal “red bike” program. The bikes are available to employees for travel between various operational locations.

## Traveler Information

Visitors use a variety of ways to get information about their trip before and during their visit. In general, more visitors are using smart phones and other devices, in addition to traditional methods such as toll-free phone numbers and signage throughout the park, to monitor campground and road status. The more that visitors know about current conditions and alternative routes before arriving and while at GLAC, the more they will be able to make decisions that lead to less congestion along GTSR. The beginning of each section notes whether the section refers to resources for *trip planning*, *real-time* information, or both.

### *Information at Entrance Stations*

#### *Real-time and Trip Planning*

The east and west entrances gates are an important opportunity for GLAC staff to provide visitors with a range of information in a short period of time. From safety information to vehicle length restrictions, permit requirements, campground status, shuttle information and driving directions, it can be difficult for visitors to absorb everything. Unfortunately, when the west gate queue extends to Route 2 and vehicles are waved through to clear congestion, the opportunity to share information and gather revenue is lost. The park does not have a formal travel demand management strategy or system, and real-time information about parking throughout the park is not available.

### *Telephone Services*

#### *Real-time and Trip Planning*

Visitors can receive toll-free road condition and rehabilitation information by dialing the Montana Department of Transportation Traveler Information System at 511 and selecting option 5. Automated prompts lead users to information on specific roads, such as GLAC roads and nearby highways. Visitors can access the same information by dialing 800-226-7623, or by calling GLAC at 406-888-7800 and then pressing 2. GLAC staff can provide guidance on general trends and give information about specific sites.

To ensure accurate telephone services, staff can periodically call the State-run 511 number and its own automated telephone systems to confirm that the information provided is accurate and timely.

### *Wayfinding and Informational Signs*

#### *Static*

Signs and information about traveling throughout GLAC are particularly detailed at the Apgar, St. Mary, and Logan Pass stations. The St. Mary station offers real-time information for all campgrounds. In spring 2014, GLAC staff will review the signage plan between Siyeh Bend and Rising Sun, to determine whether excessive signage confuses visitors rather than help them travel about the park.

Entrance signage could be improved to better inform visitors about road and camping conditions and park regulations. The entrance sign at West Glacier, for instance, can be programmed, but it is not used as part of the park's ITS efforts.

## *Intelligent Transportation Systems*

### *Real-time*

Intelligent transportation systems (ITS) use various technologies to monitor, evaluate, and manage transportation in real-time or near real-time. For example, ITS might monitor rehabilitation delays, weather conditions, and arrival times, and display information on roadside LED signs. The full-build original plan for ITS would have improved traffic flow in the park by providing parking management, rehabilitation management, and trail and campground status updates. Difficulties integrating the systems of two subcontractors resulted in the full system as originally planned not being fully realized, but the following ITS elements are in place:

- A virtual box at every shuttle stop that triggers an approaching shuttle to announce the upcoming stop and its resources to passengers.
- When shuttles approach a station a video feed of the station turns on at the shuttle dispatch office at the Apgar Transit Center.
- Shuttle drivers use canned text messages to communicate with dispatchers. These programmed messages work for most predictable situations and let shuttle drivers focus on safety rather than relaying information.
- Shuttle driver can respond to dispatch messages with “yes,” “no,” or “acknowledged”
- GPS automatically updates a shuttle’s location on the driver’s display.

The following ITS elements were unsuccessful and discontinued:

- Underground vehicle counters installed at entrance stations. They did not work during the winter and were damaged by snow plows.
- Automatic rider counters on shuttle buses.
- Fare tools, which did not present accurate ridership.

GTSR rehabilitation did not include installing new telecommunications cable. Cell phone service is limited past Apgar on the west and Rising Sun on the east, and radio communication is limited to specific sites along the road. However, radio communications are constantly being revised to improve them along the GTSR. Since cell service is limited, visitors cannot rely on cell phones for contacting park staff, real-time traveler information, or other information on park resources. Park data can be downloaded for use in advance of arriving or at entrances.

## *Websites, publications, and software applications*

### *Trip planning and Static*

GLAC staff can improve trip planning tools for visitors by working with the companies that maintain the websites and applications below to ensure those tools include information that park staff want visitors to know.

- The **Glacier National Park website** offers information, including directions by car, air, and rail in its *Plan Your Visit* section. It has information on how visitors can travel within the park, including by bike. The section on shuttle buses tells readers how to ride the shuttles, frequently asked questions, trailheads at shuttle stops, and has a map of stops; the *Going-to-the-Sun Road* section within the *Plan Your Visit* section includes road status, frequently asked questions, plowing status, an audio driving tour, and other information.
- Several **newsletters**, available online and at entrance stations, provide information on activities and transportation in GLAC: the *National Park Service Waterton Glacier Guide* provides information on entrance fees, seasonal activities, and weather and safety

information by season; the *Glacier National Park Vacation Planner* has information on lodging, bear safety, and scenic drives; and *Day Hikes in Glacier* maps hiking trails and shuttle stops along trails.

- The following **other websites**, some which are maintained by service providers, provide information that can be useful for arranging lodging and activities:
  - <http://www.hikinginlacier.com>
  - <http://www.glacierhikers.com>
  - <http://www.glaciermt.com>
  - [http://visitmt.com/national\\_parks/glacier](http://visitmt.com/national_parks/glacier)
  - <http://www.glacierparkinc.com>
  - <http://www.xanterra.com>
- Several **software applications** for smartphones and tablets may be helpful for planning visits to GLAC, including the following:
  - Hiking Glacier National Park, by TUA Outdoors (\$1.99)
  - Glacier National Park, by Swan Informatics (\$1.49)
  - Chimani Glacier National Park, by Chimani (free)
  - Glacier Guide from the National Parks, by National Geographic (various prices)

## Conclusion

Going-to-the-Sun Road and the attractions along its 50-mile corridor provide key experiences for GLAC visitors. Understanding how the corridor is currently used is the foundation of strategic planning for the transportation and visitor management plan that will preserve the integrity and usefulness of the corridor well into the future.

The east and west sides of GTSR are functionally and physically distinct from each other, which may impact how the corridor is managed. On the west side, from Apgar Transit Center to Logan Pass, there is a higher level of activity and more physical constraints than are found on the east side. More than two-thirds of visitors to the corridor enter through the west gate and about three-quarters of shuttle ridership is based on the west side.

Both the east and west sides experience congestion at parking areas and popular destinations. The distribution of parking capacity generally aligns with vehicle distribution across the corridor—about 60 percent of vehicles and parking spaces are on the west side, while the east side carries approximately 40 percent of vehicles and parking capacity. With the exception of the traffic increase at Apgar, parking capacity has stayed relatively stable even as the road has been rebuilt. Parking in some areas was formalized with painted parking spaces, which will improve efficiency and enable more cars to be parked. A few parking spaces were shifted between proximate parking areas.

Shifting visitor use from the west to the east side of the park may be challenging, given that larger population centers are located on the west side of the park. During the peak season (mid-July to mid-August), the west entrance experiences significant traffic backups all the way to State Highway 2, requiring gate operators to wave vehicles through almost daily. The west entrance is based out of a historic building, which limits options for relocating the gate or reconfiguring operations. Delays at the historic St. Mary gate are less severe than on the west side. Vehicles are rarely waved through since lines do not extend far enough to interfere with local highways or roads.

Two of the most popular destinations on GTSR are Avalanche and Logan Pass. Avalanche is a hub of activity between shuttle transfers, campgrounds, picnic areas, and hiking destination. Its various functions complicate access to and within Avalanche. Logan Pass is a key link between the east and west shuttle service and provides access to two of the most sought after trails in the corridor, Highline and Hidden Lake. As a result, it can be a significant point of congestion. Moving forward, transportation management strategies should consider opportunities to more effectively deal with crowds at Avalanche and Logan Pass.

The shuttle system has proven to be very popular, handling about 5 percent of total visitors to GTSR, an average of 144,000 boardings each season. It has been used to facilitate one-way hiking. This trend has diminished the shuttle's impact on removing vehicles from the corridor, since hikers continue to drive to their desired destination.

It remains unclear the degree to which the shuttle has reduced congestion on GTSR overall. Rough estimates indicate that approximately five percent of vehicles have been removed annually since the service began in 2007. Distribution of the service is heavily skewed toward the west side, which carries 75 percent of ridership. Based on rough capacity analysis, the east side service has capacity for ridership growth. GLAC may choose to reallocate some of this capacity to the west side to improve service on more heavily traveled routes, or find ways to bring more shuttle riders to the east side service. It should be noted that since revenue for the shuttle service is tied to total visitation, adding service to accommodate more visitors may create a financial hardship for the park.

Safety issues along GTSR are not well understood using existing data. The data does not include adequate detail to identify patterns or significant risk associated with specific areas. Primary conclusions from the safety analysis are that 55 and 45 percent of incidents occur on the west and east sides, respectively. Ten locations on the road account for 52 percent of accidents. Safety improvements have been implemented as part of the corridor rehabilitation. Crosswalks were added, parking was formalized, and designated pedestrian pathways were created between parking areas and trailheads. The impact of these specific improvements will be difficult to ascertain since the baseline safety problems are vague.

Communication in mountainous areas is a significant challenge since the terrain imposes operational constraints on radio and cell networks. Communication between operational teams in the GTSR corridor is critical to ensuring coordinated responses to various situations or emergencies. For instance, Logan Pass operators inform staff at the west and east gates when the parking area is full and temporarily closed, so that entering visitors are aware and adjust their plans accordingly. Communication between shuttle drivers is also important for coordinating service. Park staff overcome radio connectivity issues by planning to transmit and receive radio communications at specific sites along the road.

Visitor experience can also be impacted by the ability of the park to communicate real-time information. Ideally, visitors could receive information along the road in addition to receiving it at park gates and transit centers. GLAC's current campground status system could be a model for providing road status updates to drivers along the GTSR corridor.

GTSR is a popular visitor site, partially due to its historic significance. This makes it more challenging to expand or use management strategies used in non-park settings. Management strategies will have to be the primary tool to mitigate transportation issues along the corridor, although it is recognized that there are limited staff and monetary resources to support extensive initiatives. Creativity and care will need to be taken as the park seeks solutions to better manage transportation along the GTSR corridor.

## Appendix A: Recommendations

Throughout the Existing Conditions analysis, a number of recommendations were generated. While these are not typically part of an Existing Conditions report, they are captured here for future consideration in the corridor management plan process.

### Site Specific:

- Better demarcation and signage of parking spaces at the Loop should help make full use of available parking at the Loop.
- Trail head parking at Jackson Glacier Overlook and Gunsight Pass could accommodate more spaces and increase hiking activity on Piegan Pass and Gunsight Pass trails.

### Parking:

- The corridor's parking capacity is finite and alternatives to parking expansion are needed to address congestion at key destinations, such as metering or a reservation system.

### Shuttle:

- Operations will need to increase frequencies to accommodate the same number of riders with lower-capacity Sprinter vehicles and additional staff will be needed to operate them . If the shuttle is considered to be part of a comprehensive congestion mitigation strategy that encourages more ridership, additional funds to account for increased operating costs will need to be identified.
- As GLAC moves forward with its management plan, the park may consider adjusting the imbalance by encouraging more east side activity or providing greater resources to fulfill the demand on the west side.
- Park management will need to determine whether using the shuttle to facilitate one-way hiking should be discouraged.

### Safety:

- Generally, safety conditions can be improved by clearing sightlines, upgrading signage and road markings, and redesigning infrastructure where needed. Recommendations include safety audits of locations that have high crash counts and policies and facilities that promote bicycle safety. One particular opportunity for improvement is to address the shortage of marked crossings and clear signage for pedestrians using shuttle buses.
- Safety audits, starting with the West Entrance and Avalanche, would enable park managers to better assess risks and opportunities for safety enhancements.
- Improving signage and wayfinding can be a low cost method to better orient visitors to the corridor and reduce driver confusion.

Focus Area	Summary of Existing Conditions	Projected Conditions	Data Source(s)	Possible Management Strategies to Consider in Alternatives Development
<b>Corridor Wide</b>				
<b>Financial Sustainability (shuttle)</b>			2012 proforma	Increase fee Change fee structure (who pays what, where) Reduce service Capture wave-throughs
<b>Shuttle Operations</b>	Used to facilitate one-way hikes Vehicles often at capacity and unable to pick up waiting visitors at midpoints		Interview with Sharon Bengston UMT reports (multiple) Dec 2013 existing conditions workshop	Eliminate Apgar loop Express service to LP Redesign east side service (more limited hours of service, move start of service to Rising Sun) Use of single vehicle type
<b>Traffic Congestion</b>	Significantly impacted by ongoing construction Shuttles block travel lanes when vehicles park in transit stops Wildlife siting also causes backups		Dec 2013 existing conditions workshop	Update procedures at entry gate
<b>Parking Congestion</b>	Parking shortage along majority of corridor Visitors park in transit stops blocking shuttle Construction exacerbates issue with pulses of traffic instead of steady stream	Will continue to remain a problem or worsen	UMT reports (multiple) Dec 2013 existing conditions workshop	Communicate lot status real time to public Metered entry/ reservations Maximum stay limits Variable parking prices
<b>Safety</b>	Slightly more incidents on west side (55% vs 45%)	Some conditions will improve due to reconstruction		Safety audits of high crash locations Consider bike policies and/or facilities

<b>Focus Area</b>	<b>Summary of Existing Conditions</b>	<b>Projected Conditions</b>	<b>Data Source(s)</b>	<b>Possible Management Strategies to Consider in Alternatives Development</b>
<b>Non-Private Auto Access</b>	Limited access for bikes No service between west side entrance and train station (more than 1 mile to Apgar TC) Tours operate independently			Consider options for facilitating Flathead Transit or other private operators access
<b>Location Specific (includes capacity, safety, shuttle operations)</b>				
<b>West Entrance Station Hot Spot</b>	Backs up to highway about once per day in peak Vehicles waived through to clear entrance Possible safety issues for park staff In top 3 crash sites	Will continue to be heavily used and face congestion The degree to which it will get worse will depend on NFI projections	Dec 2013 existing conditions workshop	Consider moving to north of Camas Rd intersection to facilitate fee structure change Automated access for pass holders Direct visitors to VC for questions
<b>Apgar Transit Center Hot Spot/Shuttle Stop 1</b>	In top three stops for boarding/alighting Safety not a major issue Busy throughout the day (boarding – AM, alighting – PM)	VC relocation will impact traffic here Expanded parking should help address increased visitors	Phase 3: 2007 UMT report Phase 5: 2009 UMT report Boarding-Alighting 2012-Jul-Aug (UMT)	Ticketed entry system for shuttle instead of making visitors wait in line Fee structure change could necessitate fee collection station at lot entrance Wayfinding within TC/VC Parking information signage board

<b>Focus Area</b>	<b>Summary of Existing Conditions</b>	<b>Projected Conditions</b>	<b>Data Source(s)</b>	<b>Possible Management Strategies to Consider in Alternatives Development</b>
<b>Apgar Village Hot Spot/Shuttle Stop 2</b>	Current location of VC In the top half of transit stops for boarding/ alighting Not a major safety or congestion issue location	Moving visitor center likely to reduce congestion in this area (look up distance to TC)	Boarding- Alighting2012- Jul-Aug (UMT)	Consolidate to TC/VC Improve signage to TC/VC Visitor bike share
<b>Apgar Campground Hot Spot/Shuttle Stop 3</b>	In bottom half of stops for boarding but higher in alighting Not a major safety or congestion issue location		Boarding- Alighting2012- Jul-Aug (UMT)	Consolidate to TC/VC Improve signage to TC/VC Visitor bike share
<b>Sprague Creek Hot Spot/Shuttle Stop 4</b>	In bottom half of stops for boarding/alighting Within top 10 crash sites		Boarding- Alighting2012- Jul-Aug (UMT)	Consider eliminating
<b>Lake McDonald Lodge Hot Spot/Shuttle Stop 5</b>	In top half of stops for boarding/alighting Within top 10 crash sites		Boarding- Alighting2012- Jul-Aug (UMT)	Consider streamlining routing through lodge area

Focus Area	Summary of Existing Conditions	Projected Conditions	Data Source(s)	Possible Management Strategies to Consider in Alternatives Development
<p><b>Avalanche Hot Spot/Shuttle Stop 6</b></p>	<p>Top shuttle stop for boarding, 2<sup>nd</sup> for alighting  Major attractions – camping, hiking, picnics  Key shuttle transfer point  ~ 1/3 of parking is &gt;6 hrs  Issues with parking shortage, safety and congestion  In top 3 crash sites</p>		<p>Phase 6: 2011 UMT report Boarding-Alighting2012-Jul-Aug (UMT)</p>	<p>Run an express route between Apgar and Logan Pass to alleviate some transfer activity  Consider changes to transit operations  Focused parking areas/ better manage parking (time limits, restrictions, etc.)</p>
<p><b>The Loop Hot Spot/Shuttle Stop 7</b></p>	<p>Major destination for hiking &amp; vistas  Top four transit stop for boarding but lower for alighting  Shuttle appears to be alleviating some congestion problems  Issues with parking shortage, safety and congestion</p>		<p>Boarding-Alighting2012-Jul-Aug (UMT)  UMT 2010 Synthesis report</p>	<p>Stronger visual key to keep cars out of transit stops  Time limitations  Two-way transit communications (let shuttle know how many waiting/capacity needed)</p>

Focus Area	Summary of Existing Conditions	Projected Conditions	Data Source(s)	Possible Management Strategies to Consider in Alternatives Development
<p><b>Logan Pass Hot Spot/Shuttle Stop 8</b></p>	<p>Top shuttle stop for alighting, 2<sup>nd</sup> for boarding Most popular destination on GTSR Parking tends to be long Issues with parking shortage, safety and congestion Closes due to capacity constraints about once a day in peak Peak activity between 10 AM and 4 PM In top 3 crash sites</p>		<p>Dec 2013 existing conditions workshop Boarding-Alighting 2012-Jul-Aug (UMT)</p>	<p>Meter access to parking Express shuttles from Apgar Provide real time status info to gates/VCs/other parking areas Differentiated parking (time limits, restrictions, etc.) for different areas Manage/Design for pedestrian access from unofficial parking areas</p>
<p><b>Siyeh Bend Hot Spot/Shuttle Stop 9</b></p>	<p>Trail head to Piegan Pass Shuttle used to facilitate one-way hikes with Sunrft Gorge Significantly more alighting activity than boarding Not in the 10 top crash sites</p>		<p>Dec 2013 existing conditions workshop Jack Gordon conversations UMT 2012 Hiker Survey Boarding-Alighting 2012-Jul-Aug (UMT)</p>	

<b>Focus Area</b>	<b>Summary of Existing Conditions</b>	<b>Projected Conditions</b>	<b>Data Source(s)</b>	<b>Possible Management Strategies to Consider in Alternatives Development</b>
<b>Jackson Glacier Overlook/ Gunsight Pass Hot Spot/Shuttle Stop 10</b>	New configuration with shuttle stop in 2014 In bottom half of stops for boarding/alighting Within 10 top crash sites	Less congestion with reconfiguration and connectivity with Gunsight Pass Improved pedestrian circulation	Dec 2013 existing conditions workshop Jack Gordon conversations	Monitor reconfiguration to ensure effectiveness Balance demand/reduce stopping by improving visibility of glacier from Gunsight
<b>St. Mary Falls Hot Spot/Shuttle Stop 11</b>	Most congested location on east side Within 10 top crash sites In top half of stops for boarding/alighting New configuration in 2014	Less congestion with reconfiguration Improved pedestrian circulation Fewer vehicles parking in transit stop	Dec 2013 existing conditions workshop Jack Gordon conversations Boarding-Alighting2012-Jul-Aug (UMT)	Monitor reconfiguration to ensure effectiveness
<b>Sunrift Gorge Hot Spot/Shuttle Stop 12</b>	Not in 10 top crash sites In top half of stops for boarding but not alighting 2 crosswalks added in2014 One-way hike pair with Siyeh Bend along Piegan Pass trail	Improved pedestrian circulation/safety	Dec 2013 existing conditions workshop Boarding-Alighting2012-Jul-Aug (UMT)	Encourage parking here and shuttle to Siyeh Bend Stronger visual key to keep cars out of transit stops
<b>Sun Point Hot Spot (Stop eliminated)</b>	Within 10 top crash sites In bottom half of stops for boarding/alighting			Consider stop elimination or on-demand stop request

<b>Focus Area</b>	<b>Summary of Existing Conditions</b>	<b>Projected Conditions</b>	<b>Data Source(s)</b>	<b>Possible Management Strategies to Consider in Alternatives Development</b>
<b>Rising Sun Boat Dock Hot Spot/Shuttle Stop 13</b>	Not in 10 top crash sites In bottom half of stops for boarding/alighting			Consider stop elimination or on-demand stop request
<b>Rising Sun Hot Spot/Shuttle Stop 14</b>	Not in 10 top crash sites In top half of stops for boarding/alighting			Consider starting east side shuttle here to minimize travel time Consider how stop works with campground
<b>St. Mary Visitor Center Hot Spot/Shuttle Stop 15</b>	Within 10 top crash sites In top 5 stops for boarding/alighting			Add real time parking information

## Appendix B: Identified Data Gaps/Additional Research Needed

Additionally, the Existing Conditions analysis uncovered areas where additional data is needed to provide a clearer picture of what is happening at the park. This section captures those data gaps here for future consideration in the data collection efforts.

- While the vast majority of visitors drive to the park, it is unknown how many are traveling by personal car relative to the number of visitors who rent a car for the purposes of visiting GLAC.
- Finer grain data regarding specific vehicle movements are needed to be able to draw conclusions regarding how many visitors are through travelers relative to return travelers, and to understand how far return travelers go on the GTSR before turning around. This will also provide information on the proportion of visitors using GTSR as a pass through.
- Additionally, more detailed traffic data should be collected in the future to better understand what is happening at ATC, Avalanche, and Logan Pass.
- Travel speed data is not available and analysis cannot tell the degree to which people are stuck in traffic.
- Additional parking area observations and counts are needed to determine more clearly how the ATC operates in light of these changes. It is expected that a significant portion of vehicles will be parked at ATC for long durations while visitors ride the shuttle to various locations within the park. Spaces occupied by visitors only accessing the new visitor center will turn over more quickly.
- Additional data, such as traffic counts by vehicle type and parking area observations, are needed to determine more clearly how visitors are using Avalanche.
- Additional research is needed to understand whether notification of Logan Pass closure at the park entry alters visitor activities.
- Since the last observations of the parking areas at Siyeh Bend were done nearly ten years ago, additional research and new observations are needed to better understand how this location currently functions in conjunction with the shuttle stop and rising park visitation.
- Additional research and observations are needed to better understand how St. Mary Falls operates under the new configuration.
- Additional research and new observations are needed to more clearly determine how the SMVC will operate in light of changes to Red Bus operations.

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<b>6. AUTHOR(S)</b>	<b>5d. PROJECT NUMBER</b>
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<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b>	<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>
	<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>

**12. DISTRIBUTION/AVAILABILITY STATEMENT**

**13. SUPPLEMENTARY NOTES**

**14. ABSTRACT**

**15. SUBJECT TERMS**

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<b>a. REPORT</b>	<b>b. ABSTRACT</b>	<b>c. THIS PAGE</b>			<b>19b. TELEPHONE NUMBER (Include area code)</b>







As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.