

Grand Teton National Park
Moose-Wilson Corridor Road Safety Audit



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Introduction

Purpose/Background

The purpose of this Road Safety Audit (RSA) was to assess the safety of the Moose-Wilson Road Corridor, in the Grand Teton National Park, Jackson, Wyoming. This location was selected because, since the 2012 completion of the Gros Ventre River to Moose Junction portion of pathway, there has been an increase in bicyclists on the Moose-Wilson Road (MWR), in addition to increased wildlife activity (namely grizzlies) in the corridor. The RSA team was comprised of individuals with a variety of backgrounds including: engineering, planning, and landscape architecture. There were representatives from Grand Teton National Park, the Teton County ~~Public Works office~~ [Engineering Department](#), the Wyoming Department of Transportation, the Federal Highway Administration (FHWA) Resource Center and Western Federal Lands Highway Division.

The Grand Teton National Park, shown in Figure 1, was established in 1929 and was expanded to its current size in 1950. The park has approximately 2.5 million recreational visits per year, making it one of the top ten most visited national parks in the U.S.¹ The peak season extends from May through September and in 2011, the park averaged about 500,000 visitors per month during this period.²

The 310,000 acre park is approximately 45 miles in length and 25 miles in width and has varying terrain ranging from the sagebrush filled valleys at an elevation over 6,000 feet to the Teton

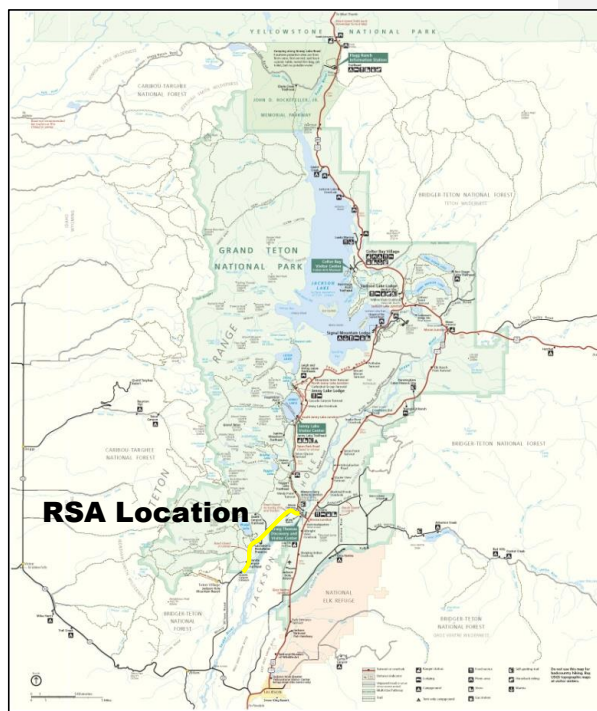


Figure 1. Map of Grand Teton National Park.

¹ National Park Service. Grand Teton National Park. Available: <http://www.nps.gov/grte/index.htm>

² National Park Service. Visitor Use Statistics for the Grand Teton National Park. Available: <https://irma.nps.gov/Stats/Reports/ReportList>

Range with the highest peak at an elevation of 13,770 feet. Average temperatures range from about 70 degrees (F) in the summer to the single digits in the winter with snow blanketing the park from early November to May. The highest temperature ever recorded was 93 degrees in 2003 and the lowest was -63 degrees in 1933. Average precipitation for the year ranges from 1.23 inches in August to 2.92 inches in November.³

There are a variety of ways to experience the park from boating and fishing, mountain climbing and hiking, to driving or biking through wildlife and scenic areas. Skiing and snowshoeing are popular winter activities at the park. There are three visitor centers, six campgrounds, 200 miles of hiking trails, and over 100 miles of paved roads and 14.5 miles of shared use paths available for walking, rollerblading and biking as shown in Figure 2. The first 8 miles of shared use paths in the park were opened in 2009. The park opened a second phase of its system in spring 2012 which connected Moose south to the Gros Ventre River passing through Gros Ventre Junction. This segment connects to a Jackson Hole Community Pathways segment which extends south from the river to the Town of Jackson, WY. The Jackson Hole Community Pathway also has a route on WY 390, which extends from WY 22 north to the Park boundary at Granite Canyon Entrance Station. See Appendix C for the bicycling maps from the Park and the Jackson Hole Community Pathways.

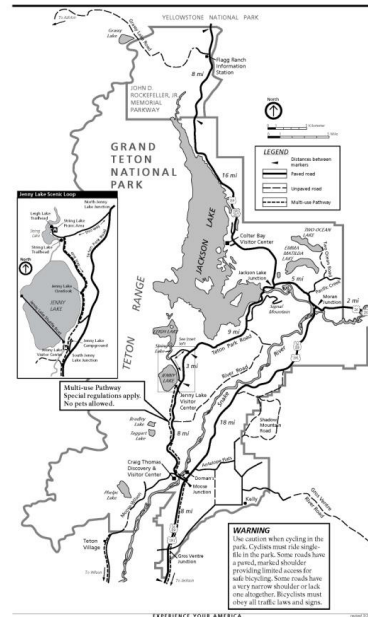


Figure 2. Map of Park Bicycling Facilities (see Appendix C for full-size map).

This RSA reviewed the Moose-Wilson Road corridor to address concerns about the safety of visitors using this corridor for wildlife viewing, cycling, and other recreational opportunities.

Study Area

The location for this Road Safety Audit (RSA) was the Moose-Wilson Road and three other intersecting roads within this corridor: the road to the Murie Ranch, the road to the Death Canyon Trailhead, and the road and parking lot at the Laurence S. Rockefeller Preserve (LSR). This corridor is located on the south-west corner of the park, between Moose and Teton Village, as shown in Figure 3. The Moose-Wilson Road corridor is used by park visitors and local

³ The Weather Channel. Monthly Averages for Grand Teton National Park.

residents primarily for recreation and wildlife viewing, though some commuters and taxis were observed during the field review.

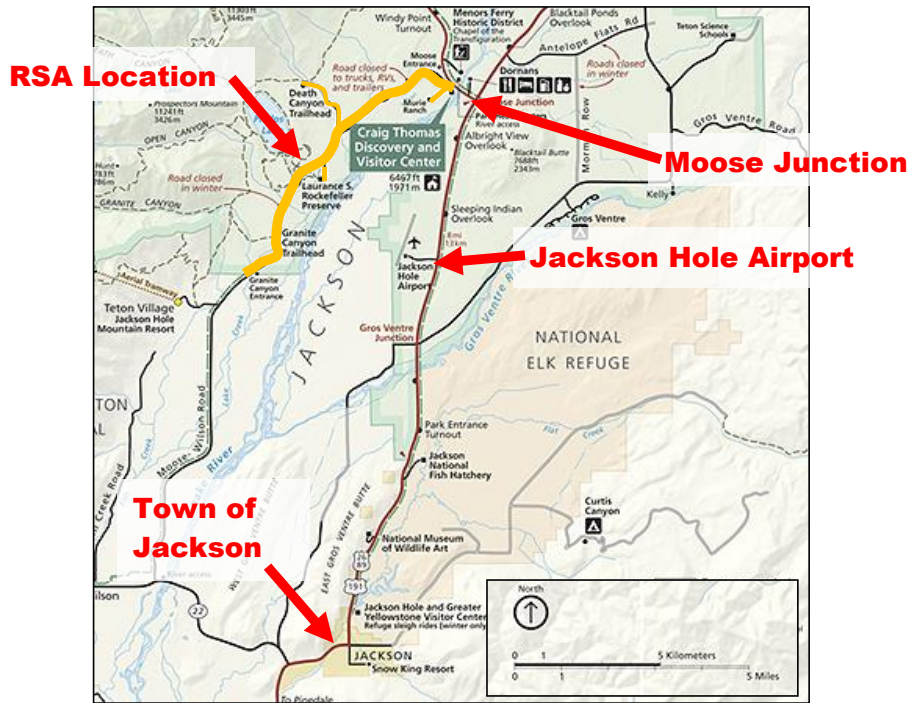


Figure 3. RSA Location

Existing Conditions

Site Characteristics

The study area consists of the Moose-Wilson Road from the intersection with Teton Park Road in Moose to the Granite Canyon Entrance Station in the southwest corner of the Park. The road meanders through sage brush, wet lands, and forested areas for just over 7 miles. The route began life as a wagon route and has evolved over time into a road that has about 5 miles of paved surface at the north end, approximately 1.25 miles of gravel surface in the middle, and about 1 mile of paved surface at the south end. The intersecting roads to the Murie Ranch (0.75 mile long) and the LSR (0.50 mile long) are gravel, while the road to the Death Canyon Trailhead has approximately 0.75 miles of paved surface and 1 mile of rough dirt surface.

The Moose-Wilson Road is a two-way facility with widths ranging from ~~18~~17-24 feet. The speed limit for the northern ½ mile is 35 MPH while the rest of the route is 25 MPH. The other intersecting roads are no wider than 18 feet. The paved portions of the Moose-Wilson Road has faded or no pavement markings. There are some unpaved Park-developed parking areas at key wildlife viewpoints, along with some user-created pullouts due to wildlife presence or to assist maneuvers of passing vehicles.

Comment [S01]: See center photo on page 11 ... measured at 17' or so. I wouldn't be surprised if some areas were paved at 16'.

Signing is minimal on the route with some warning signs, guide signs, and regulatory signs. Pedestrian crossings, a single-lane bridge and some curves are signed, but generally there ~~is not much signing to reinforce what's ahead on the road~~ are few advanced warning signs. In addition, many signs are ~~buried in or~~ obscured by vegetation.

Traffic Data

The Park initiated some traffic data collection in June 2013 in preparation for a resource management study of the Moose-Wilson Road corridor. This data includes traffic counts and vehicle classification information at key locations along the route, along with some turning movement counts at two intersections. Figure 4 shows the locations of the traffic counts. Traffic data was not collected during overnight hours (such as from 8:00 PM to 6:00 AM), even though traffic can still access and was seen traveling the road during a night-time review as part of the RSA Field Review. The data collection the Park initiated will continue **through the end of 2013**, with only the information collected from June through August being included in this report.

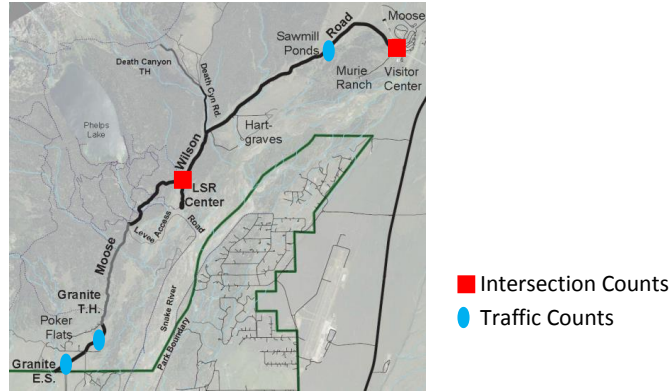


Figure 4 - Traffic Data Locations

Preliminary tube counts were taken near Sawmill Ponds and Poker Flats from early June through late August. The average total vehicles per day (VPD) for these locations are shown in Table 1.

Sampling Period	Sawmill Ponds	Poker Flats
June	1872	1598
July	2252	2009
Aug 1-15	2341	2166
Aug 16-29	2279	1767

Table 1 – Average VPD

In addition to these tube counts, approximately seven days of vehicle counts were taken in late July and early August near the Granite Canyon Entrance Station with a system that could capture vehicle direction and bicycle presence. These counts showed the directional split of the traffic is approximately 50/50, with ~~an approximately a pretty much~~ even split of the total daily traffic ~~for-between~~ inbound and outbound traffic (Figure 5). The counts also show a distribution of 97-percent of the traffic being vehicular and 3-percent being bicyclist (Figure 6).

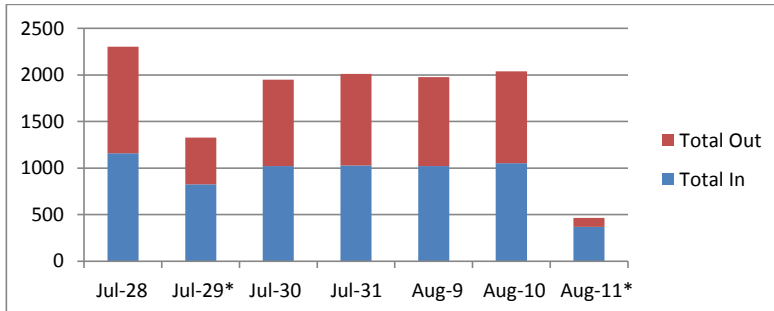


Figure 5 - Traffic at Granite Entrance Station
 *Incomplete due to equipment malfunction.

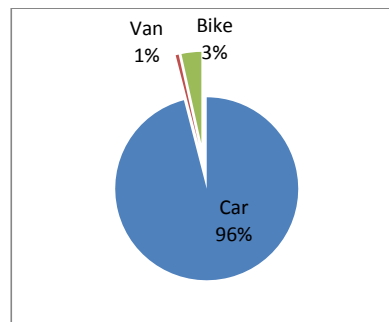


Figure 6 - Average Distribution of Traffic Type

Due to incomplete data on two days due to equipment malfunctions (July 29 and August 11) only the five full days of traffic counts were used for evaluating the morning and afternoon peak hours for traffic volume. The morning peak hour of traffic for both inbound and outbound traffic was between 10:00-11:00 AM for both vehicles and bicycles. The afternoon peak hour of traffic for both inbound and outbound vehicular traffic was between 4:00-5:00 PM on Sunday through Friday, and between 3:00-4:00 PM on Saturday. For bicycles, the afternoon peak hour varied from as early as 12:00-1:00 PM to as late as 3:00-4:00 PM.

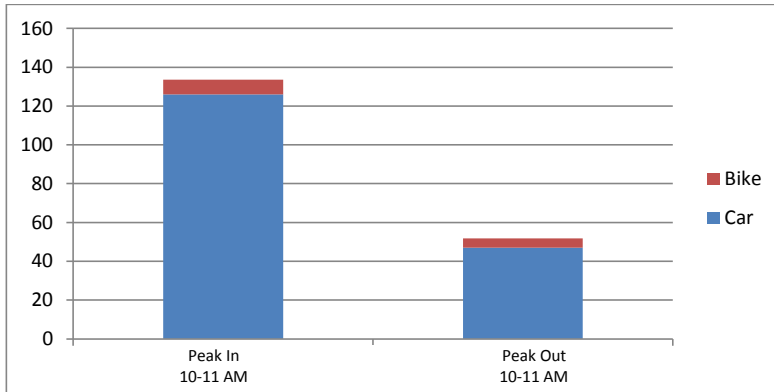


Figure 7 - Peak AM Average Traffic

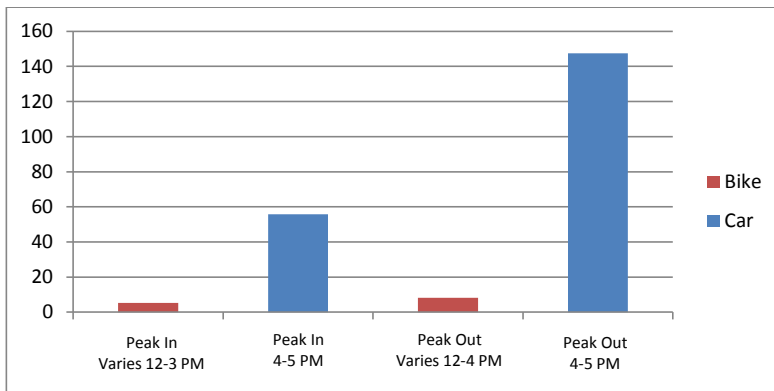


Figure 8 - Peak PM Average Traffic

Intersection turning movements were gathered at the intersection of Moose-Wilson Road with Teton Park Road (on a Sunday) and at the intersection with the LSR (on a Saturday). This data also included vehicle type breakdown by car, van, bicycle, and motorcycle. This classification was ~~only~~ for the total daily vehicular traffic ~~only, so consequently bicycle traffic~~ ~~no~~ peak hour of bicycle traffic at these intersections is ~~un~~known. For the Moose-Wilson/Teton Park Road intersection, the predominate traffic movements overall and for the AM and PM peak hours were the through movements on Moose-Wilson Road ~~(to/from Park Headquarters)~~ and the left turns from westbound Teton Park Road to Moose-Wilson Road. The right and left turns from eastbound Teton Park Road to Moose-Wilson Road were about even for the day, with left turns peaking in the morning and right turns peaking in the afternoon (Figure 9). For the Moose-Wilson/~~LSA-LSR~~ intersection, the dominate traffic movements overall and for the AM and PM peak hours were the north and south through movements on Moose-Wilson Road and the ~~east-~~

to-north right turns from LSR to Moose-Wilson (Figure 10). See Appendix X for traffic counts and directional distribution for both of these intersections.

Comment [SO2]: A little confusing since MWR is running east-west in this location ... perhaps you could say "northbound, right-turning"

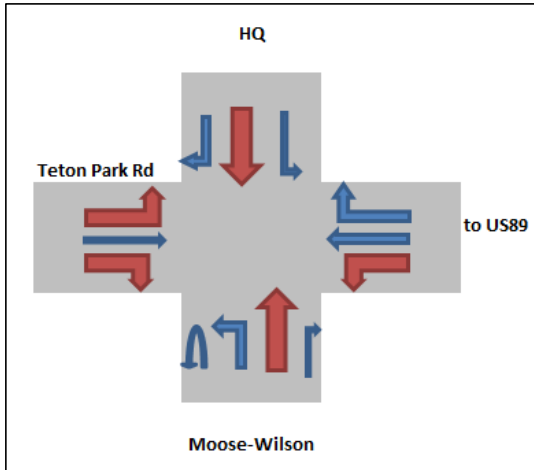


Figure 9 - Turning Movements at Teton Park Rd

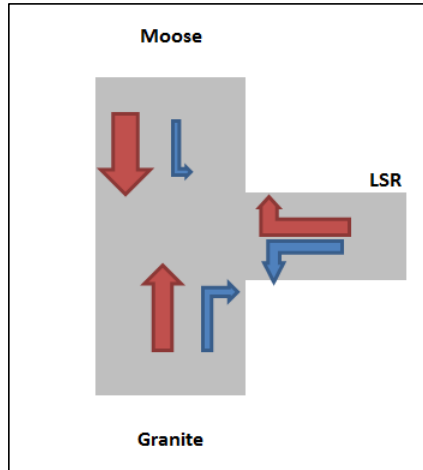


Figure 10 - Turning Movements at LSR

Since the Park Headquarters [are at is located on](#) the [southbound-northbound](#) approach of the intersection of Moose-Wilson Road with Teton Park Road, this could explain the majority of the traffic being north and south through movements as Park employees access the Headquarters and/or attend to maintenance and wildlife issues on Moose-Wilson Road. The morning peak left turns into Headquarters may also be attributed to employees making the left from Teton Park Road to head into work from other employee housing farther up Teton Park Road. The afternoon peak right and left turns onto Moose-Wilson Road may be attributed to visitors and employees who are returning to their residences near Teton Village [and Wilson](#). Less than 1-percent of the total traffic can be attributed to bicycles, with the majority traveling straight through in both directions on Teton Park Road.

The turning movements at the intersection of Moose-Wilson Road at the LSR show approximately equal left and right turns into the LSR, with about a 70-30 split of the vehicles leaving the LSR going north toward Moose as opposed to south to Teton Village. Approximately 3-percent of the total traffic can be attributed to bicycles, with the majority traveling straight through in both directions on Moose-Wilson Road.

Collision Data

The Moose-Wilson Road experienced 42 reported incidents between January 2002 and December 2012. This data did not include detailed information on crash location or

contributing factors, so the following summary only provides an overview of crash severity, collision types, and time of year. Anecdotally, the RSA Team heard that there are several incidents of road rage that lead to physical confrontations between drivers or drivers and cyclists which may not be captured in the crash data.

The crash frequency for Moose-Wilson is 3.8 crashes per year or 0.5 crashes per mile per year. Similar roads in Wyoming have XX crashes per year. Approximately 90-percent of the crashes (38 total) were property damage only (PDO), with the remaining incidents consisting of three injury crashes (two involving bicyclists), and a pedestrian-involved incident with no reported injuries. Half of the crashes (21) involved single vehicles in run-off-road incidents and a third (14) of the crashes involved multiple vehicles (Figure 11). Approximately 20-percent of each of these types of crashes involved government vehicles. The other crashes included collisions with wildlife (3 elk), bicycles (2), a pedestrian, and a horse.

Comment [S03]: There are no similar roads in Wyoming! There are a few County roads with comparable ADTs ... would that be useful information?

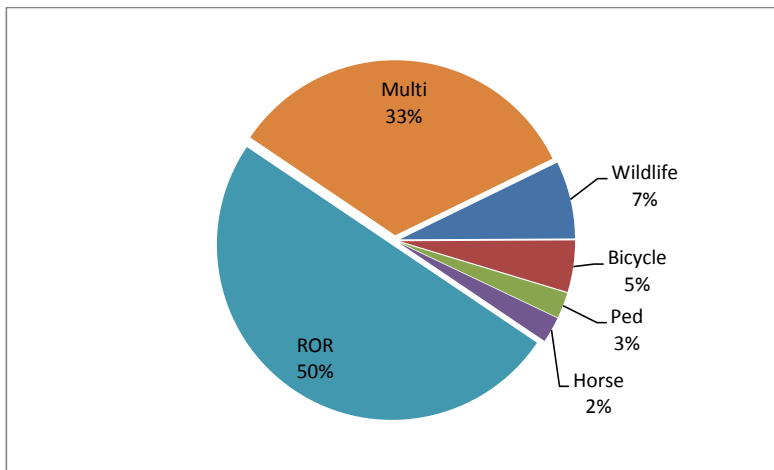


Figure 11 - Collision Type

The majority of the reported crashes happened between June and September, the peak visitation months of any year, with about 25-percent of the crashes occurring during the rest of the months. In other words, one-quarter of the 12 months in a year experience 75-percent of the crashes (Figure 12).

Comment [S04]: Of course, MWR is closed between Granite and Death Canyon for six months of the year – approx. Nov1 – May 1.

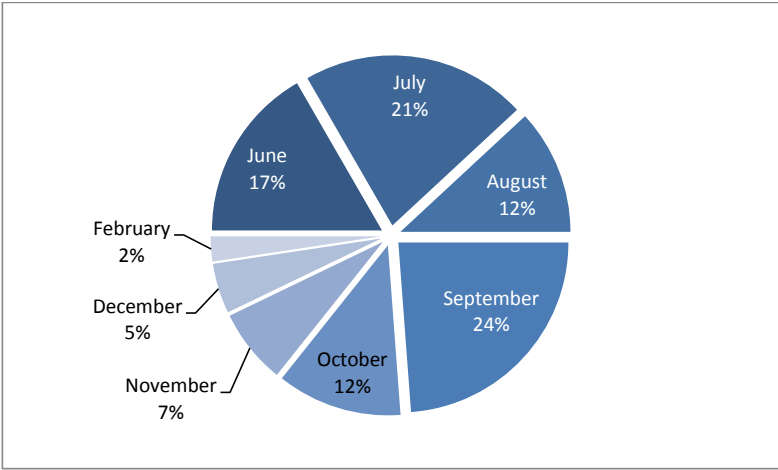


Figure 12 - Crashes by Month, 2002-2012

Assessment of Findings

Benefits of Existing Roadway

While conducting the RSA, the RSA Team noted positive features of the existing roadway, including the following.

- **Wildlife:** There is outstanding wildlife viewing opportunities in addition to Park staff being responsive to any wildlife jams that occur.
- **Surface Condition:** The unpaved section undergoes maintenance three times per year, there is an awareness of surface concerns, and there is a desire to improve the conditions for ALL road users even if it is difficult to address everything with the resources on hand.
- **Road Characteristics:** Park staff and visitors like the rural, meandering characteristics of the road. The current road characteristics also tend to keep speeds low which most likely contributes to the low number of crashes and crash severities, in addition to the lack of wildlife injuries or deaths.
- **Positive Warning and Guidance:** While there could be improvements to warning and guidance messages on the route, there were signs to inform motorists of pedestrian crossings, a narrow bridge, horses, and vehicle restrictions. The hiking trails crossing Moose-Wilson also had signs and guidance to alert pedestrians of the upcoming intersection.



From left to right – black bear, roadway characteristics, and signing for pedestrians and vehicles.

Constraints

Before examining the safety issues and suggestions for improvement, it was necessary to identify potential constraints. As the site is located in a National Park, there are environmental, historical, and visual impacts to consider when suggesting mitigation strategies.

Comment [VB5]: Incomplete. Paragraphs under each subsection still need more information. Also need to put them in order of importance or priority.

Identified Safety Issues

The following is a detailed discussion of each of the safety issues identified during the RSA with suggestions for improvement. Detailed explanations of the suggested improvements are provided in the following section.

Traffic Control Devices

There are warning, guide, and regulatory devices present, but the messages may not be clear, vegetation may block the view of the devices, and lack of way-finding through the route leave some drivers asking pedestrians: “Is this the way to Moose?”

There are an increasing number of cyclists on the road, but few signs warning drivers about their presence, especially where the road narrows. There are also pedestrian crossings where the warning signs are right at the crossing instead of being in advance of the crossing and the pavement “markings” are stone and colored concrete. In addition, there are now horse trail crossings which have no signs or markings at all.

Suggested Improvements:

- *Improve location of signs and sign messages*
- *Trim vegetation that block signs*
- *Prepare a plan for addressing sign retroreflectivity*
- *Provide guide signing*
- *Provide pavement markings at crossings and intersections*

Travel Demand

Northbound vehicles need to go through an entrance station at the Granite Canyon Entrance but southbound traffic does not have to go through an entrance station. Therefore, northbound travelers may be informed of wildlife jams or road conditions, but southbound travelers know nothing about lies ahead. As witnessed during the RSA and supported by field reviews, travelers will often stop where they can when wildlife is spotted, and many times they’ll stop in the road and effectively block other travelers.

Suggested Improvements:

- *Create a north entrance station or tie road in behind the station on Teton Park Road*
- *Consider restricting access based on volume, permit*
- *Develop map or website with driving times and road conditions*
- *Improve pullout frequency, size, and surfacing*

Maintenance

The RSA team heard that Park maintenance attempts to keep the road surface (paved and unpaved) in decent condition along with trying to control the creation of new or expansion of existing pullouts to a minimum. However, [Park personnel indicated that](#) ~~some~~^{time} maintenance activities [\(e.g. chemical treatments on the gravel section\) do not receive the do not have sufficient time on the road necessary to address issues like allowing gravel treatments to cure and achieve full compaction, or fixing potholes in the paved section.](#)

Comment [S06]: Not sure what gravel treatment the Park uses ... I assume mag chloride.

Suggested Improvements:

- *Remove stumps at edge of the road*
- [Improve sight distance around curves](#) *and at signs through selective brushing*
- *Develop a corridor-wide pullout strategy*
- [Address edge drop-offs on paved sections](#)
- [Close the road for 24-48 hours to allow for full curing of the gravel treatment](#)

Comment [S07]: This could result in higher speeds.

Education

Depending on the resource used to learn about the Moose-Wilson Road, visitors may learn different things about the road surface, vehicle restrictions, and other users on the road.

Suggested Improvements:

- *Provide consistent message on corridor in ALL media*
- *Collaborate with others on corridor awareness*

Unpaved Section

The middle section of Moose-Wilson Road is unpaved and there are drainage and ponding issues in many locations, along with pot holes in many curves.

Suggested Improvements:

- *Improve grading to reduce drainage issues and reduce puddles and potholes*
- *Evaluate alternative gravel maintenance practices*
- *Consider traffic calming techniques if section is paved in the future – [including maintaining a narrow \(18' – 20' wide\) pavement surface](#)*

Confusion among Unfamiliar Drivers

Drivers in this intersection are a mix of local residents, visitors, and commercial entities. Users of the corridor encounter numerous conflicts from other traffic types, wildlife, and numerous drivers who are unsure about their location. Park staff and the RSA team have witnessed many drivers stopping in the middle of the road [and exiting their vehicles](#) to take photos of wildlife,

asking for directions to Moose or Teton Village, driving oversize vehicles past the restriction signs, and passing on blind horizontal and vertical curves.

Suggested Improvements:

- *Additional way-finding signage*
- *Improve information on vehicle restrictions*
- *Increased enforcement of unsafe maneuvers*

Suggestions for Improvement

The following are suggestions for improvement for the identified safety issues. The short term and some mid-term suggestions may be items the Park can consider as part of current maintenance and administrative actions. Other mid-term and all the long term suggestions are items the Park should consider in the development of their corridor resource management study.

Short Term

- **Sign Placement Evaluation –**
Several signs along the route are not visible due to lateral offset or vegetation blocking sight-distance. Ensuring the signs are at proper mounting height and are located where they're not blocked by vegetation or other road features would improve driver response. For example, the location of the pedestrian warning signs at the trail crossings south of the LSR should have a diagonal down arrow if they will stay at the crossing, or they could be moved away from the crossings to be advance warning. (MUTCD 2C.50)
- **Travel Time and Condition Map –**
Many travelers may not be aware of an increase in travel time on the road due to wildlife activity or due to the condition of the road, especially in the unpaved section. A map with general travel times and/or increased travel times would be good information for visitors and residents alike. Information on the road condition would also be useful to motorized and non-motorized visitors, and could help them consider an alternate route depending on their destination.
- **Roadside Vegetation Maintenance –**
Roadside vegetation grows close to the edge of traveled way and can block signs and sight distance around horizontal and vertical curves. Selective brushing would improve the visibility of warning and guide signs, along with increasing the sight distance for approaching vehicles at curves.

Comment [VB8]: Incomplete. Paragraphs under each subsection still need more information.

- **Bicycle Route Rating Information –**

While the Moose-Wilson Road is not noted in Park documents as a bicycle route, other agencies have included it in their maps and brochures. However, this route is not like the other Pathway systems in the area where a rider with any competency level could most likely handle the route. Having a sign, brochure, or other information for cyclists regarding the level of difficulty for Moose-Wilson should be considered and could be similar to the trail rating designations used in skiing.

- **Improve Unpaved Road Drainage –**

The unpaved section of Moose-Wilson is sometimes graded below nearby natural ground levels leading to ponding of water and soft spots in many areas. Improving the drainage in these locations would minimize pot holes and puddles which many visitors try to negotiate around by traveling in the opposing traffic lane. Eliminating or reducing the number of potholes and puddles will also improve the driving experience so that visitors can enjoy the scenery instead of focusing on the condition of the road.

Comment [S09]: Either due to the ponding or the chemical treatment, the vegetation along the gravel section is in poorer condition than the rest of the road. This has resulted in a wider disturbed area. Raising the driving surface, improving roadside drainage, and paving (narrow) may keep speeds low and benefit the resource.

Mid Term

- **Improve Sign Messages –**

The messages on the signs should also be evaluated to be consistent throughout the corridor and to also be pertinent to the purpose of the signs. Bike, ped and equestrian signage could be improved [in several ways: 1\) to alert motorists to the presence of these non-motorized users along the entire corridor and 2\) to alert motorized prior to specific crossing locations for both general presence on the road and at the known crossings](#). In addition, warning sign messages may not accurately reflect the purpose of the message or be understandable by travelers when it comes to FROST HEAVES and ROUGH ROAD. For example the sign placed before the unpaved section is ROUGH ROAD rather than PAVEMENT ENDS, which may have a different meaning for different drivers. Signing for turnouts should be considered, along with improved way-finding guide signing at Death Canyon Road. Being consistent with the message and use of signs throughout the corridor will improve visitor expectations and experience. For example, the signs regarding restricted vehicles have information that is different at each end of the corridor, along with being different from what is shown on Park maps and in the seasonal Park newsletters. And the signing at the bridge locations (Lake Creek and Granite Supplemental Ditch) should be evaluated for signing consistency, in warning signs and object markers, as drivers approach these location.

- **Improve Sign Retroreflectivity –**

When replacing signs, the retroreflectivity of the sign should also be addressed so that the signs are visible at night and in low light conditions. Since the Moose-Wilson Road runs through some forested areas with heavy shadows, retroreflective or retroreflective fluorescent sheeting would improve the visibility of signs that warn of pedestrians, bicyclists, or the single-lane bridge.

- **Pavement Markings on Road –**

Strategic use of pavement markings should be considered in the paved sections of the road. This would include the evaluation of center and/or edge lines, along with markings at trail crossings and at intersections. If bicycle usage grows on the road, the use of sharrows may be beneficial on the uphill grades where slow cyclists may be present. The current trail crossings lack pavement markings that could highlight the actual crossing better than the stone bordered colored concrete that currently exists at a couple locations. Visitors going through the Death Canyon Road intersection face a large paved area which has no clear information on which direction goes to Moose or Teton Village, or where their lane is when crossing the intersection.

- **Roadside Vegetation Maintenance –**

Stumps remaining from dead or downed trees can be found right at the edge of the road, but most especially in the unpaved section. These stumps, varying in diameter from about 4-inches to more than a foot and heights up to 10-inches, pose a roadside hazard for motorists and bicyclists. Consider removing the stumps or cutting them flush with ground level.

- **Unpaved Road Maintenance –**

The unpaved section was in fairly good condition when the RSA Team conducted the field review, but there were some locations that had pot holes. A re-grading and dust treatment of the gravel section had been conducted the week prior, but wet weather and lack of curing time affected the road condition in low spots where water ponds. Alternative gravel maintenance practices regarding materials, dust abatement, and closure periods for necessary “curing” should be evaluated so that the unpaved section of Moose-Wilson can eliminate pot holes, especially at curves.

- **Pullout Strategy –**

There are several well-developed “official” pull-outs on the route along with user-created ones based on where wildlife is present. The Park has been managing the creation of new pullout by placing cones or logs where parking is not wanted, and developing other locations where visitors can safely pull off the road to view wildlife. It

is recommended that the Park develop a proactive pull-out strategy for the corridor in order to better manage existing pullouts they want to maintain and/or expand, along with creating a consistent method for evaluating the creation and closure of new pull-outs. [In order to minimize illegal parking and “in-road stopping”, it may be beneficial to provide signs indicating “parking ahead in X feet”.](#)

- **Corridor Awareness –**

Due to the Moose-Wilson Road corridor being a key feature of the Park and of great interest to locals and visitors for recreational and wildlife experiences, collaborating with other agencies and entities on corridor awareness is recommended. This collaboration would focus on education and awareness of the corridor features, road conditions, and recreational use. Partners in this collaboration would include the City of Jackson, Teton County, outfitters, rental car companies, the cycling community and more. Besides this collaboration at a local region level, there could also be work done with mapping companies and other entities to ensure Moose-Wilson Road is not available as a route from the airport to Teton Village, or at least have warnings about road conditions or wildlife jams.

- **Travel Time and Condition Map –**

A further improvement to the map mentioned in the short term suggestions is to develop real-time corridor travel time information via ITS method. This could be through the use of transponders handed out at the entrance stations or through cell phone technology. These real travel times would be uploaded to on-line maps where visitors and residents could determine whether an alternate route to their destination would be better than driving through the Moose-Wilson corridor.

Long Term

- **Managing Travel Demand –**

Travel demand management in the corridor was evaluated both through parking availability and overall access to the Moose-Wilson Road. The parking demand can be managed through improved surfacing at the pull-outs, the number of pull-outs, and the size of pull-outs – [and better signage](#). The Pullout Strategy mid-term suggestion could have guidance which would affect how pull-outs will be used and managed in the future in this corridor.

To manage the overall demand for access to the Moose-Wilson Road, the Park could consider restrictions by volume or permit, or through the building of an entrance station at the northern end of the road. Controlling the access to the route from [both ends](#) is

something that could reduce the number of southbound traffic that currently travels the route for free, and control at both ends would be necessary if volume or permit restrictions is pursued. [Shifting the north access to the Moose Wilson Road to a location north and west of the Teton Park Road entrance station would also increase both the time and distance \(and potential cost\) of a trip between the Airport and Teton Village. This new alignment would be a disincentive to commercial \(taxi\) trips.](#)

- **Pavement Maintenance –**

Address edge drop-offs and raveling pavement edges during future road improvements and the incorporation of the Safety Edge_{SM}. The Safety Edge_{SM} provides a consolidated 30-degree wedge of asphalt which will not ravel or become a vertical edge drop-off. This would improve the edge of the pavement and allow errant vehicles to return to the road.

- **Unpaved Road Improvements –**

If the unpaved section is paved in the future, it should include the Safety Edge_{SM} along with consideration of traffic calming techniques in some of the straighter sections. Since the current unpaved section has some longer and straighter sections than the rest of the route, paving it may lead to unsafe speeds or passing maneuvers. Traffic calming through the use of pavement marking, roadside or shoulder treatments, [narrow lane widths](#), or alignment could help reduce undesired behaviors.

- **Bicycling Improvements –**

It is assumed bicycle presence on Moose-Wilson Road will continue to increase as the local Pathways are expanded and improved. To help improve the cycling experience in this corridor there are several options to consider, including: a separated pathway for all or part of the route; one-way loop or couplet for part of the route; transit only with bike lane; and directional restrictions.

In addition to these specific suggestions, a general suggestion is [to](#) enhance public information regarding the importance of safe behavior when accessing Moose-Wilson Road for both motorized and non-motorized visitors. More traffic and safety data is also recommended when considering the mid- and long term suggestions as that data could reveal travel patterns other areas for improvement. Working closely with enforcement and emergency services is also recommended as any operational changes could affect response times to incidents and access to medical services.

Conclusions

RSAs are not solely based on documented crash data but also take into consideration the perceived risk.⁴ Using [Error! Reference source not found. Table 2](#) along with the information gathered prior to, and during the RSA, the perceived risk of the Moose-Wilson Road corridor is low to moderate. This is because there is a risk of occasional crashes with moderate injury levels. The perceived risk for bicycles in the corridor is moderate to high because there is an occasional risk of crashes with serious or fatal injury levels.

Potential Crash Frequency	Potential Crash Injury Severity			
	Minor	Moderate	Serious	Fatal
Frequent	High	High	Highest	Highest
Occasional	Moderate	Moderate	High	Highest
Infrequent	Low	Low	Moderate	High
Rare	Lowest	Low	Moderate	High

Table 2- Prioritization Matrix

During the RSA, six safety issues were identified. While all of the safety issues are important, xxxxxxxx were identified as the top priorities by the RSA team due to xxxxxxxx. The next priorities in order were xxxxx.

Comment [VB10]: Could list the topics from pages 12-13.

Engineering, education, and enforcement suggestions have been provided for each of the safety issues and have been categorized into short, mid-, and long term implementation time frames.

⁴ FHWA. Road Safety Audit Guidelines and Prompt Lists.

Appendix A

This appendix includes information on the RSA Audit Team, Interested Parties, and information available to the team for the audit.

Location	Grand Teton National Park (Moose, WY)
Audit Team	Craig Allred, Safety, Resource Center, FHWA Tori Brinkly, PE, Highway Safety Engineer, Western Federal Lands, FHWA Allen Olsen, Safety Engineer, Wyoming Division, FHWA Lance Johnson, Safety Engineer, Idaho Division, FHWA Barbara Burke, Highway Safety Engineer, Central Federal Lands, FHWA Sean O'Malley, County Engineer, Teton County <i>Bob Hammond, Resident Engineer, Wyoming DOT</i>
Project Owners	Grand Teton National Park, http://www.nps.gov/grte/index.htm
Interested Agencies	Teton County Jackson Hole Pathways Friends of Pathway More...
Review Date	September 9-12, 2013
Audit Stage	In-service
Start-Up Meeting	September 9, 2013, 3:30 pm
Attended By	See attached Sign-In sheet

Documents Available for the Audit:

- *Moose-Wilson Corridor Adaptive Management Plan (Draft), December 2009*
- *Moose-Wilson Corridor Internal Workshop, February 2013*
- 2001-2012 Crash data
- Preliminary traffic data from University of Utah contract
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Appendix B

This appendix includes the preliminary traffic data the University of Utah has been collecting for the corridor resource management study efforts.

Comment [VB11]: Will include the data sheet and other tables beyond those used in the report.

Appendix C

Comment [VB12]: This may be expanded to include the equestrian and other Park brochures. Include other entity brochures as well?


The following two pages are from the park bike brochure, which can be found here:

http://www.nps.gov/grte/planyourvisit/upload/Bike_12.pdf


Grand Teton

National Park Service
U.S. Department of the Interior

Grand Teton National Park
John D. Rockefeller, Jr.
Memorial Parkway



Bicycling




Grand Teton National Park and the John D. Rockefeller, Jr., Memorial Parkway offer more than 100 miles of paved roads and a multi-use pathway that provides spectacular views of the rugged Teton Range.

Rules and Regulations

- Bicyclists must obey all traffic laws and signs.
- Bicycles are allowed on paved and unpaved roads open to motorized vehicles, unless otherwise posted.
- Between sunset and sunrise an operator or bicycle must have a white light or reflector that is visible from at least 500 feet to the front, and a red light or reflector that is visible from at least 200 feet to the rear.
- Bicycles are allowed on the multi-use pathway from dawn to dusk only.
- Bicycles are NOT allowed on trails or in backcountry areas.
- In the park, operating a bicycle abreast of another bicycle is prohibited.
- The use of personal audio devices is strongly discouraged.
- Notify other recreators before passing. Yield to slower users.
- Helmets and bright-colored clothes are recommended due to heavy traffic.
- Pets are not allowed on the multi-use pathway.

WARNING
Use caution when cycling in the park. Some roads have paved, marked shoulders providing limited access for safe bicycling. Some roads have very narrow shoulders or lack them altogether. Narrow unpaved roads become extremely dusty during dry weather. Ride single file on the right side of the road and be alert for vehicles. Traffic is heavy during the summer, with daily peaks mid morning to late afternoon. Road construction and repairs occur every year. Be prepared for delays and rough roads.

Wildlife and Weather



Wildlife
The multi-use pathway and roads pass through a variety of wildlife habitats. Users must be prepared for wildlife encounters. NEVER FEED, APPROACH OR HARASS WILDLIFE—especially large mammals. Stay at least 100 yards from bears and wolves and 25 yard from other wildlife. Maintain control of your speed and stay aware of your surroundings. Never leave food unattended including backpacks and bike panniers. Follow food storage regulations. Travel in groups if possible. Carry and know how to use bear spray.

Weather

- **Spring** (April-June) Days are cool and cloudy with rain showers and occasional snow.
- **Summer** (July-August) Weather is generally good for bicycling with mid-day temperatures around 80 degrees. Afternoon thunder showers may form quickly with heavy, cold rain and dangerous lightning.
- **Fall** (September-early October) Days are often clear and cool, but rain and snow showers frequently occur.

Recommended Bicycling Routes

ROAD BIKING
Multi-use Pathway
Paved pathway heads north from Jackson paralleling US 26/89/191 to Moose Junction; then follows the Teton Park Road to South Jenny Lake. Open to non-motorized users from dawn to dusk. The section of the pathway from Jackson to Gros Ventre Junction is closed from Oct. 1 to April 30.

Jenny Lake Scenic Loop (One-Way)
Access this 7-mile loop from South Jenny Lake. Ride north along the Teton Park Road 3 miles, turn left at North Jenny Lake Junction, and left again on the "one-way" Jenny Lake scenic road with a striped lane for stunning views of the Teton Range. Turn right onto a paved pathway to return to South Jenny Lake.

Antelope Flats – Kelly Area
Secondary paved roads wind through sagebrush flats with spectacular views of the Teton Range.

MOUNTAIN BIKING
Two Ocean Lake Road
Three miles of dirt road lead from Pacific Creek Road to Two Ocean Lake for a scenic ride over rolling terrain.

Grassy Lake Road
Travel an old American Indian route through the John D. Rockefeller, Jr. Memorial Parkway. Ride all or part of the 52-mile dirt road from Flagg Ranch to Ashton, ID.

Outside the Park
Venture into the surrounding Bridger-Teton National Forest for additional adventures. For information about area trails such as Shadow Mountain, Teton Pass, Snow King or Cache Creek inquire at area bicycle shops.

RENTALS
Bicycles can be rented at Dorman's in Moose, or in the nearby towns of Jackson and Teton Village.

