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Preserving a Landmark in the Sky

Rehabilitation of the Going-to-the-Sun Road

Federal Highway Administration
U.S. Department of Transportation

National Park Service
U.S. Department of the Interior

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Welcome to Glacier National Park

Beginning in the late 1800s, visitors started arriving at what is now known as Glacier National Park. In 1900 the area was recognized as a Forest Preserve but was still open to mining and homesteading. President Taft in 1910 designated the land as a National Park, the tenth in the nation.

The construction of the Going-to-the-Sun Road was a huge undertaking. Even today, visitors to the park marvel at how such a road could have been built. The final section of the Going-to-the-Sun Road, over Logan Pass, was completed in 1932 after 11 years of work. The road is considered an engineering feat and is a National Historic Landmark. It is one of the most scenic roads in North America. The construction of the road forever changed the way visitors would experience Glacier National Park. Future visitors would drive over sections of the park that previously had taken days of horseback riding to see.

Just across the border, in Canada, is Waterton Lakes National Park. In 1931, members of the Rotary Clubs of Alberta and Montana suggested joining the two parks as a symbol of the peace and friendship between our two countries. In 1932, the United States and Canadian governments voted to designate the parks as Waterton-Glacier International Peace Park, the world's first. More recently the parks have received two other international honors. The parks are both Biosphere Reserves, and were named as a World Heritage Site in 1995. This international recognition highlights the importance of this area, not just to the United States and Canada, but to the entire world.

While much has changed since the first visitors came to Glacier, it is possible to relive some of Glacier's early history. You can take a horseback ride like an early visitor. Miles of hiking trails follow routes first used by trappers in the early 1800s. Several hotels and chalets, built by the Great Northern Railway in the early 1900s, house summer guests. A visit to Glacier National Park is still a great adventure!

Come and experience Glacier's pristine forests, alpine meadows, rugged mountains, and spectacular lakes. With over 700 miles of trails, Glacier is a hiker's paradise for adventurous visitors seeking wilderness and solitude. Relive the days of old through historic chalets, lodges, transportation, and stories of Native Americans. Explore Glacier National Park and discover what awaits you.

Preserving a Landmark in the Sky

Federal Highway Administration and the National Park Service embark on a monumental restoration of Montana's historic Going-to-the-Sun Road

Amy Vanderbilt
&
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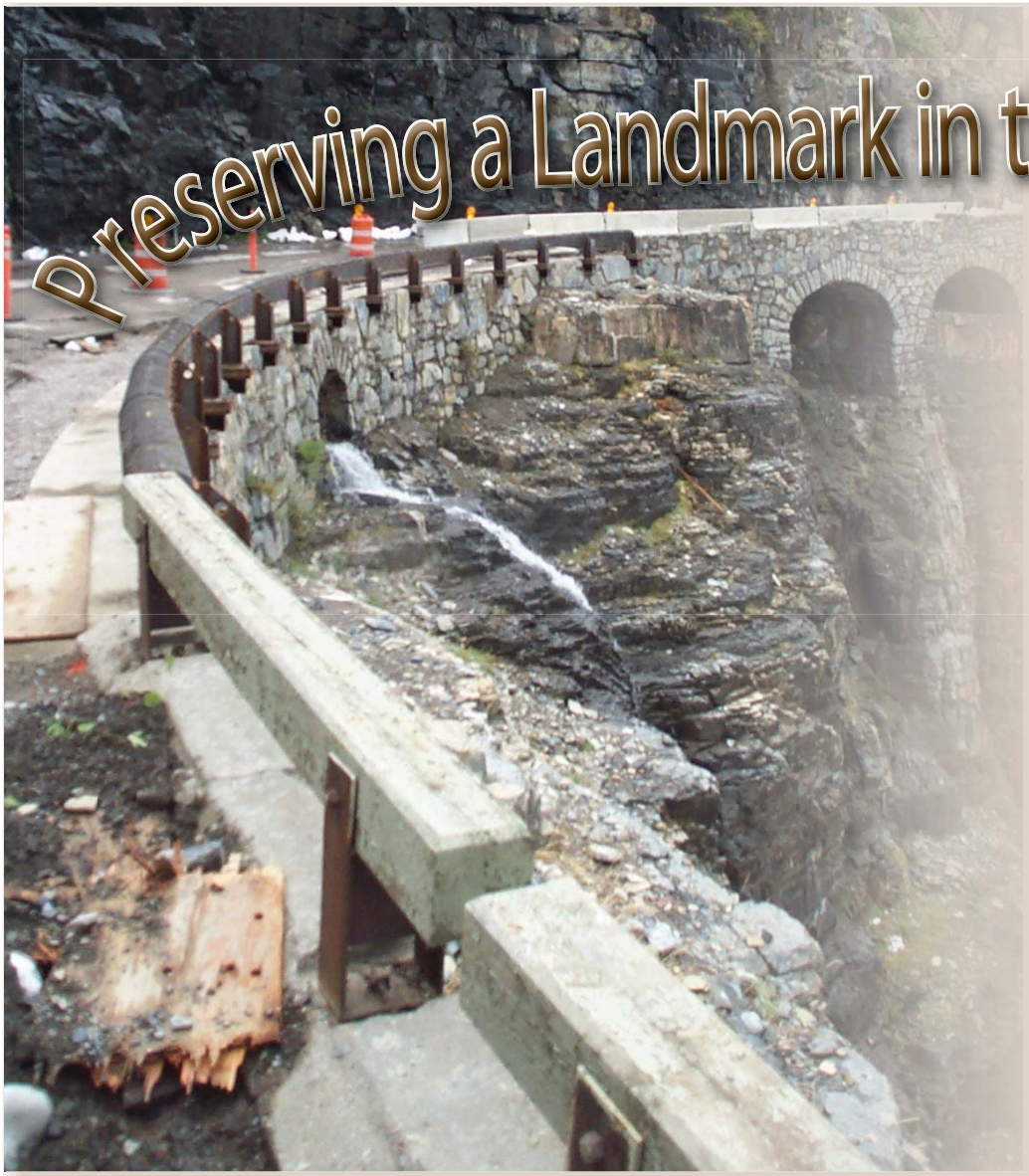


NPS

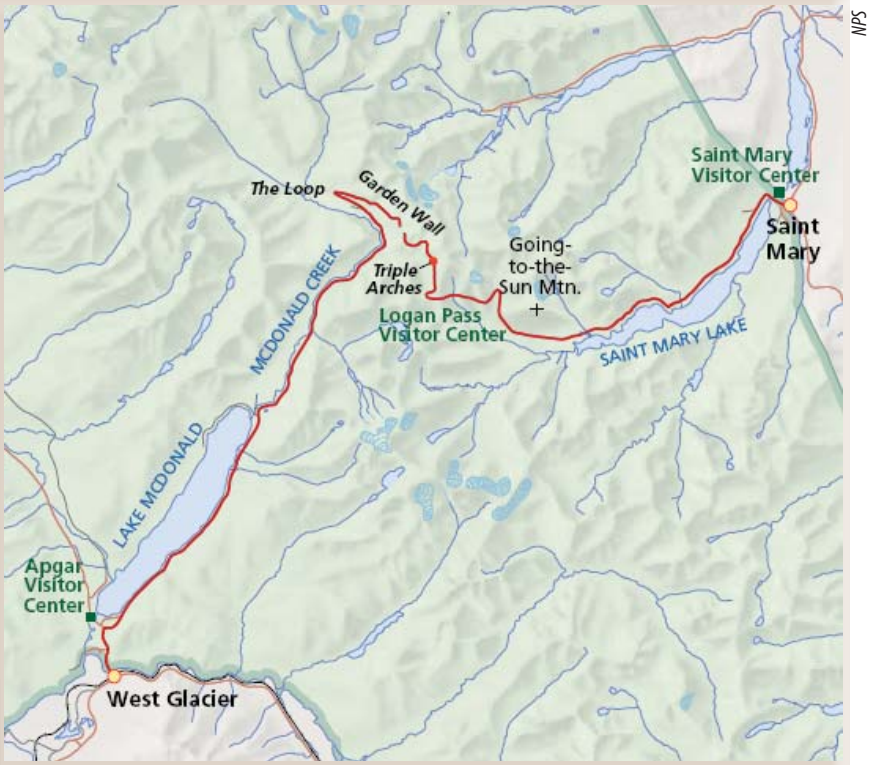
Most of the guard walls along the Going-to-the-Sun Road near Triple Arches were either sheared off or damaged by avalanches and rockslides. Some of the old guardrails are visible in the foreground. As part of the restoration of the road, a new generation of removable steel-backed guardrails, seen in the background, are installed prior to the spring road opening and removed when the road closes in the fall so avalanches can travel over the road without causing damage.

The Going-to-the-Sun Road in Montana's Glacier National Park was once described as "the most beautiful piece of mountain road in the world." Those words, spoken by park Superintendent Eivind Scoyen to several thousand spectators at the road's 1933 dedication ceremony, will continue to ring true for many users now that a historic rehabilitation is underway.

The Sun Road, as some abbreviate it, is an 80.5-kilometer (50-mile), two-lane highway that winds through the heart of the park, up the steep slopes of the Continental Divide, and over 2,026-meter (6,646-foot) Logan Pass. Motorists can experience what some view as the most spectacular mountain scenery in North America -- glacier-carved peaks, deep blue lakes, and lush forests.

The highway itself, built mostly between 1921 and 1937, is considered an engineering marvel by virtue of its designation as a National Civil Engineering Landmark. Most of the 19-kilometer (12-mile) "alpine," or high mountain, section over Logan Pass was built into the sides of near-vertical cliffs using a network of stonemasonry bridges, tunnels, and arches. A series of 130 retaining walls support the roadbed along the steepest sections, and more than 11 kilometers (7 miles) of guard walls and guardrails help guide motorists and keep them on the road. These stonemasonry guard walls give the road much of its historic character and architectural aesthetic appeal.

From east to west, the Going-to-the-Sun Road, shown here in red, starts in the village of Saint Mary, follows the northern shore of Saint Mary Lake, passes Going-to-the-Sun Mountain, climbs to Logan Pass, hugs the Garden Wall and turns the Loop, then follows McDonald Creek down to the southern shore of Lake McDonald, ending in the village of West Glacier.



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Today the Sun Road has more than 475,000 vehicles traveling it during Glacier's peak visitor season from June to October, or about 3,500 vehicles per day. Approximately 80 percent of the park's two million annual visitors travel the road, according to park surveys.

However, 70 years of rockslides and avalanches, severe weather, heavy traffic, and inadequate maintenance left the road in urgent need of repair. Without aggressive action, the historic structures for which the Sun Road is so admired might have been lost forever.

Preserving a National Treasure

The National Park Service (NPS) and Federal Highway Administration (FHWA) have embarked on a monumental rehabilitation project to save this national treasure. Indeed, the most urgent repairs on structures in danger of catastrophic failure were completed during previous phases. The two agencies originally intended to invest $140 million to $170 million over 7 to 8 years to restore the Sun Road's entire length. However, due to a lack of available funding, complete rehabilitation could take longer. According to the latest estimates, the rehabilitation is projected to last up to 10 years at a cost of $250 million. Both agencies, in partnership with local, State, and Federal officials are committed to completing the Sun Road rehabilitation in the soonest possible timetable as funding allows. The effort involves repairing damaged and deteriorating stonemasonry retaining walls and guard walls, inadequate drainage systems, crumbling pavement, and tunnels and bridges. Safety improvements will be made at high-priority rockfall locations and at pullouts, overlooks, and parking areas. A comprehensive mitigation program will limit impacts on tourism.

"This is the largest and most complex project our office has ever undertaken," says Ricardo Suarez, project delivery director and acting division engineer for FHWA's Western Federal Lands Highway Division (WFLHD), which is jointly managing the project with NPS.

The project is also one of the largest road rehabilitations in NPS history, according to Glacier Superintendent Mick Holm. "The road is not the only jewel in the park's 'crown,' but a trip across the Sun Road does provide an iconic experience for a vast number of Glacier's visitors," he says. "The scope and magnitude of this project is clearly unprecedented and daunting. But I believe we can and must do nothing short of completing this rehabilitation in a timely manner, thereby preserving this phenomenal mountain byway experience for generations to come."

A Monumental Task

The Sun Road rehabilitation actually began in the late 1980s at the village and park entry point of West Glacier. The remaining work involves about 13 construction phases in all. The first four, to rehabilitate the most severely damaged retaining walls, have already been completed through Park Roads and Parkways funding, a joint NPS-FHWA program to develop and maintain roadways throughout the national park system. Phase 5 was completed in 2005 and involved rehabilitating the West Side Tunnel's east portal and high-priority guard walls, correcting various drainage and roadside deficiencies, and repairing damage from a recent rockslide.

But it is the remaining phases that have turned the Sun Road work into an extraordinary project. Those phases involve rehabilitating the entire roadway itself and making the most critical and complex

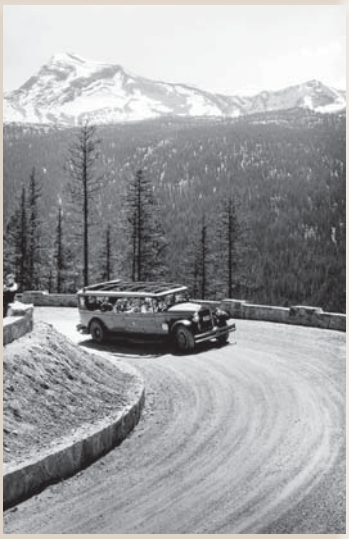
A Road–and History–in the Making

The first tourists to visit what is now Glacier National Park came by train beginning in the 1890s. A typical trip involved getting off the train at the Great Northern Railway's Belton Station in present-day West Glacier, taking a 4.8-kilometer (3-mile) stagecoach ride to Lake McDonald, and then traveling by boat to the Lewis Glacier Hotel, now Lake McDonald Lodge. Guests also could go by horseback to backcountry lodges and chalets.

The automobile's proliferation at the start of the 20th century drastically changed the travel scenarios. By the time Congress designated Glacier a national park in 1910, many visitors already were arriving by private automobile via old wagon trails and dirt roads. Demand soon increased for a better road system that would allow enjoyment of the spectacular scenery without damaging the environment.

NPS archives

Workers drag drainage pipes by horseback in 1927 during construction of the road west of Logan Pass.



NPS archives

A historic red bus in the late 1920s rounds The Loop, the only switchback constructed on the Going-to-the-Sun Road. The entire fleet of original red "jammers" (so called by the locals because the drivers could be heard jamming the gears on the rugged mountain road) still operates in the park today.

The concept was bolstered when Congress provided $100,000 annually in the early 1920s for construction of the "Transmountain Highway," as the Sun Road was first named. This was enough to start work on the road's flatter east and west ends in 1921. Construction of the more rugged central section over the Continental Divide loomed as a far greater challenge.

In 1918 NPS engineer and acting park superintendent George Goodwin had proposed a route similar to today's alignment, except that it included a steep climb over Logan Pass via 15 switchbacks and hairpin turns. Goodwin's proposal was typical of engineering at the time: It was fairly scenic, followed the shortest possible route, and above all was economical.

But NPS policy had come to stress the importance of "harmonizing park improvements with the landscape," and concerns about the plan were expressed during a route inspection in the summer of 1924. NPS Director Stephen Mather asked Thomas Vint, an agency landscape engineer, to review Goodwin's proposal. Vint said the switchbacks would look "like miners had been in there." Instead he proposed a road carved directly into the Garden Wall, a 4.8-kilometer (3-mile) section of nearly vertical cliffs near the summit of Logan Pass.

Vint's route was eventually chosen because it provided flatter grades, less environmental impact, better panoramic views, more sun exposure for faster spring snowmelt, and only one switchback—The Loop. The project received its second large cash infusion when Congress appropriated $1 million in 1924 and 1925 specifically for the Transmountain Highway.

In January 1926, NPS and the Bureau of Public Roads (BPR)—the predecessor agency to FHWA—signed a memorandum of agreement outlining how they would cooperate in building the road. The agreement combined BPR's high engineering standards and expertise with NPS's vision for preserving the landscape. It became the model for future national park road building and the basis for today's Park Roads and Parkways program, still a joint NPS-FHWA effort.

BPR soon accepted bids for construction of the western 19.3-kilometer (12-mile) stretch from Logan Creek up to Logan Pass, the most challenging section of the road and including Vint's route and single switchback. The construction firm (Williams and Douglas-Tacoma, WA) worked on the section for four seasons, building retaining walls, guard walls, Logan Creek Bridge, the West Side Tunnel, and Haystack Creek Culvert and Triple Arches.

Two other companies constructed the remaining 16 kilometers (10 miles) on the east side of Logan Pass in 1931 and 1932. The most difficult challenge was constructing the 123.5-meter (405-foot) East Side Tunnel. Workers had to carry out all the excavated rock by hand because power equipment could not reach the tunnel. One section was so remote that a power shovel had to be barged up St. Mary Lake to reach it.

In October 1932, after more than three decades and $2 million of construction, the first automobile drove the entire 80.5 kilometers (50 miles) of the new road, which was officially opened in a dedication ceremony on July 15, 1933. The road then was renamed after the nearby Going-to-the-Sun Mountain, which many think is the most aptly named road in the Nation given that motorists feel like they are traveling toward the sun as they ascend it.

NPS archives

A crew uses a power shovel east of Logan Pass in 1932. Going-to-the-Sun Mountain, for which the road is named, is seen in the background.

Many retaining walls, like this one near Crystal Point, are being "repointed," the process of removing and replacing damaged and deteriorated mortar. Here a crane lowers a worker, enclosed for safety in a cage-like basket, to perform repairs.

repairs to historic structures along the alpine section. Under a more typical schedule, this work would have been completed in small segments over a much longer period, but for economic and environmental reasons, NPS and WFLHD have decided to accelerate construction so the final phases can be completed more rapidly than past repairs.

The final phases were assessed under an environmental impact statement (EIS) and two records of decision (RODs), one by the NPS and the other by WFLHD. All the work will be done while the road remains open during the normal tourist season. The RODs were based on an accelerated rehabilitation schedule and were dependent on projections of increased project funding from the Park Roads and Parkways program; a congressional earmark from the new transportation reauthorization bill, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users; and other sources.

"I compare the Sun Road rehab to the restoration of the Statue of Liberty in the mid-1980s," says Ron Carmichael, former WFLHD division engineer who worked on the project during most of its early planning until retiring in September 2005. "Like the statue, the Sun Road is a national treasure that has fallen into disrepair. It is our obligation to rehab the road in a way that replicates the intent of the original constructors while preserving the historic and cultural resources and the visitor experience that was originally intended."

Many Challenges Ahead

Construction on the remaining phases is expected to be complex and challenging, according to engineering studies. Work can be done only 5 to 6 months of the year, typically mid-May to mid-October, because of harsh weather and the annual winter road closure. The terrain where much of the work will be performed is steep, and the roadway is extremely narrow, less than 6 meters (20 feet) wide along many stretches. Adding to the difficulties is the requirement that the road remain open throughout the entire rehabilitation. Finally, its designation as a National Historic Landmark requires NPS and WFLHD to minimize harm to the road's historic character and fabric in accordance with the Secretary of Interior's Standards for the Treatment of Historic Properties and related Federal and State regulations.

FHWA Resident Engineer Margaret Moen, who worked on the project until early 2006, inspects a construction site where a new and hidden concrete retaining wall was constructed inside the original wall, allowing the historic wall to maintain its original appearance without having to support its former structural load.

NPS

Over the years, avalanches, such as this one that took place on May 22, 2003, at Haystack Creek, have ripped up pavement, sheared off guard walls, and caused other road damage at 70 known avalanche chutes along the Sun Road.

Rehabilitation will focus on five high-priority engineering areas:

Retaining walls, arches, and tunnels. Many of the road's stonemasonry retaining walls suffer from structural deterioration, primarily from age and impacts from rockslides, vehicles, and avalanches. Damage also has been caused by rain and snowmelt repeatedly freezing and thawing inside and behind the walls. Thirteen retaining walls, determined by WFLHD to be in immediate danger of catastrophic failure, were repaired in the first four phases. Remaining problems include decaying and inadequate foundations, poor embankment stability, inadequate drainage, and the breakdown of mortar (the binding that holds the stones together).

To solve these problems, many sections of retaining walls either have been or will be "repointed" with new mortar. In more severe cases entire walls will be rebuilt. Some retaining walls will be preserved by building second, hidden walls behind them to carry some of the structural load.

Guard walls and removable guardrails. Many sections of the road's stonemasonry guard walls have suffered damage from age, impacts from vehicles, avalanches, and rockslides, and improper repairs over several decades. As with the retaining walls, water seepage has caused cement on some guard walls to leach out from the grout. Some guard walls have just a few stones broken or missing, while parts of others have been sheared off or are leaning precariously over cliffs.

Entire sections of guard wall will have to be completely reconstructed in the most severe cases. In others, missing stones can simply be replaced. To meet current safety standards for guard wall height, either the walls will be raised or the road grade lowered.

For decades, finding a reliable and high-quality supply of historically compatible stone has been a challenge. Having assessed surrounding quarries, WFLHD and NPS currently are evaluating three possible sites with the required stone—Helena Formation limestone—with a preferred site expected to be chosen soon.

The Sun Road has 70 documented avalanche chutes where stonemasonry guard walls are susceptible to damage. Over the years NPS has installed various types of removable timber guardrails so avalanches pass over the road without causing damage. However, the original log rails of the 1930s were not crashworthy in that they did not withstand

Masonry workers are attaching a historically compatible stone veneer to a new concrete retaining wall near Triple Aches.

vehicles hitting them and over time were found to crowd travel lanes as larger vehicles began using the road. Also, the high maintenance costs of removing the rails in the fall and reinstalling them each spring prompted NPS and WFLHD to seek other options.

Recent projects have used a new generation of removable guardrails that have been crash-tested and designed to protrude no farther into the travel lane than the guard walls. The new rails are more historically authentic and aesthetically pleasing to many than their predecessors.

New avalanche-resistant guard walls have been constructed with a reinforced concrete foundation and core, then finished with a historically compatible stonemasonry facing. A concrete slab anchored with small piles (micropiles) was laid within the roadway underneath the new guard wall, and the concrete colored to match the adjacent asphalt pavement. Two prototype guard walls performed well in a winter 2004 demonstration project, according to former WFLHD Project Manager Dick Gatten, who retired in January 2006. Each avalanche site, he says, will be evaluated to determine whether a resistant guard wall or removable guardrail will be installed.

Drainage. Many of the road's original drainage systems are still functioning as designed, but some added after the road was paved in the 1950s now suffer a variety of problems, from broken and separated pipes to crumbling stonemasonry headwalls. All historic structures slated for repair or rehabilitation will be designed with new drainage features to minimize water seepage and other damage due to the harsh climate. Structures not needing repair will have their drainage systems evaluated and rebuilt if necessary, with enlarged culverts.

Slope stability. Rockfall safety hazards are present along the steepest road sections because of unstable slopes and rock cuts, according to engineering studies. The roadway is also "creeping" (shifting) because of drainage problems, fill settlement, and avalanches.

Removing rockfall hazards within the original cut will involve selective rock scaling, the process of removing potentially loose and unstable slabs and outcrops before they crash down on the roadway. Those that are too large to scale will be bolted or anchored to more stable rock foundations. Also, to help support unstable rock, holes are drilled below the rocks that are to be stabilized; steel dowels are inserted; "shotcrete," a type of concrete, is applied under pressure between the rocks and dowels; then the shotcrete is shaped, textured, and colored to match its surroundings. Slumping or creeping roadways will be evaluated and, if necessary, corrected with drainage improvements, retaining wall construction, reinforced earth, tieback anchors, and micropiles.

Pavement. The roadway in many locations has deficient subgrade and road base, and along many other sections the surface is damaged and uneven. Solutions involve subexcavation to remove and replace unsuitable subgrade and road base material, as well as laying new pavement. Damaged or uneven pavement will be repaired and repaved. Remaining sections will be resurfaced.

As shown in this photo, more durable and longer-lasting reinforced concrete pavement is being installed in rockslide and avalanche-prone areas such as this site just east of Triple Arches.

NPS

The three orange safety markers demarcated a section of guard wall that has been sheared off by repeated vehicle impacts. This guard wall will be reconstructed with new and stronger footings and historically compatible stone.

Success Starts With Careful Planning

A project of this magnitude requires years of intense and collaborative planning. The process for completing the final phases on a faster-than-normal schedule began in the mid-1990s, when NPS and WFLHD launched a retaining wall management program to identify, evaluate, and monitor the Sun Road's 130 retaining walls. Having found serious structural problems in many of the walls, the agencies collaborated on various studies and initiatives in the late 1990s and early 2000s that led to the decision to rehabilitate the entire road—and as quickly as possible to prevent catastrophic wall failures and minimize impacts on the park and its visitors.

One initiative during the planning process involved forming a congressionally authorized Citizens Advisory Committee in February 2000 to help NPS develop initial alternatives that were considered in the project's EIS. In addition to potential environmental and social impacts, the committee had to consider other issues, including project costs, scheduling, and historic preservation.

A major goal of the rehabilitation is maintaining the quality of the visitor experience, particularly during construction. Glacier is a world-famous destination that accounts for much of the region's tourism. A sudden dramatic drop in visitation because of intense construction along its most popular sightseeing route could result in undesirable economic consequences. The committee spent about a year and a half developing five recommended alternatives. All but one of the alternatives were analyzed in the project EIS as follows.

Alternative 1: Repair as Needed or No Action. Under this option, rehabilitation would continue as funding allowed over 50 years at an annual cost of $7 million to $8 million. Work would primarily focus on critical and emergency repairs without substantial long-range planning. This alternative was rejected because the badly needed repairs would not occur soon enough to preserve and protect the features and character of the Sun Road as a National Historic Landmark.

Alternative 2: Priority Rehabilitation. Rehabilitation would occur over 20 years, with total funding at $157 million to $186 million, or about $8 million to $9 million per year. The road would remain open to visitors, and a maximum cumulative delay

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Crews at the site shown here excavated the original retaining wall (at the far right) down to bedrock in preparation for reconstruction. They constructed a temporary retaining wall between the original retaining wall and the Jersey barrier to stabilize the work zone while they were reconstructing the historic retaining wall.

of 30 minutes would be allowed when traveling the Sun Road's entire length. This option would allow for advance planning to rehabilitate high-priority sites and would address current structural road deficiencies but with only a few improvements to visitor facilities, such as turnouts, parking areas, and walkway access to interpretive sites. This option was not selected because repairs would not occur soon enough, resulting in continued road deterioration, loss of historic features, possible damage to natural resources, and greater economic impacts than Alternative 3.

Alternative 3: Shared Use With Extended Rehabilitation Season. Rehabilitation would occur over 7 to 8 years at a total cost of $140 million to $170 million, or about $18 million to $24 million per year, provided the needed funding would be available or unforeseen delays did not occur. This alternative would accomplish the needed road repairs while maintaining visitor use and access to the Sun Road. Roadwork would be conducted throughout the visitor season, but work requiring substantial traffic delays would occur during the shoulder season, the time prior to mid-June and after mid-September. Otherwise, a maximum cumulative delay of 30 minutes would be allowed when traveling over the length of the road between mid-June and mid-September, the peak season. Up to 1 hour of cumulative delays over the length of the road would be possible during nonpeak hours in the mornings (8 a.m. to 10 a.m.) and evenings (3 p.m. to 8 p.m.), Monday through Thursday. Variable traffic delays would be used for night work, with advance notice to the public of the construction schedule.

Alternative 4: Accelerated Completion With Isolated Road Segment Traffic Suspensions. The objective of this alternative would be to complete the rehabilitation as soon as possible by using isolated traffic suspensions Monday through Thursday from the months of May through October. Visitor access would be maintained on the weekends. This alternative planned for repairs to be completed in 6 to 8 years at a cost of $126 million to $144 million, or $16 million to $24 million per year. Alternative 4 contained the same visitor use improvements and visitor development mitigation funding as Alternative 3. Because of the faster rate of repair, Alternative 4 would have minimized further deterioration to the Sun Road and historic, cultural, and natural resources. However, it would have the greatest impact on park visitation and annual impact on the local economy. Therefore, Alternative 4 was rejected.

Preferred Alternative–Open for Business

During the EIS process, which included extensive public involvement through meetings, open houses, and a 60-day comment period, NPS and WFLHD selected Alternative 3 (Shared Use) as the best option. After some small changes, Shared Use was documented

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These renderings show the interior and exterior of a new transit center that will be constructed near Apgar Village at the park's west entrance. This transit center, and another adjacent to an existing visitors' center at the park's east entrance, are part of a new Glacier shuttle bus system designed to minimize traffic congestion during construction.

The Beginnings of Context Sensitive Solutions

A modern-day construction principle may be traceable specifically to 1924 and NPS. In that year, NPS's first director, Stephen Mather, sought help from BPR on Glacier National Park's Transmountain Highway project, saying it warranted the "best engineers and the best landscape architects in the country."

Under a January 1926 memorandum of agreement, BPR and NPS landscape engineers (landscape architects) worked together on road plans that blended the highway into the surrounding environment while meeting other objectives such as safety and capacity goals. "This is an early example of what is now called 'Context Sensitive Solutions,'" according to NPS Landscape Architect Jack Gordon.

NPS Landscape Engineer Thomas Vint, who was associated with numerous park developments throughout his extensive career, wrote to NPS Chief Landscape Engineer D. R. Hull: "Construction details such as bridges, tunnels, retaining walls, parapets, culverts, etc., should not be monumental or stylistic but native, simple in line, and retiring."

Bridges, retaining walls, and guard walls were all constructed of native rock excavated from initial road cuts and roadside quarries. Different stone colors, including red and green argillites and buckskin limestone found along the alignment, were reflected in adjacent guard walls.

This practice established a unique appearance and a precedent for other national parks to follow. It fulfilled the desire of landscape engineers to "fit foreign, manmade works as an inconspicuous, homogeneous part of the natural scenery," according to Gordon.

Other environmentally friendly practices included the requirement that contractors use the least destructive blasting techniques possible, and crews were prohibited from "side-casting," dumping excavated materials over the roadside to the terrain below. Spoils were used as fill material whenever possible, and unsuitable material had to be properly dumped in designated locations.

This sensitivity to surroundings may be best expressed in the Triple Arches, arguably the most renowned structure along the Sun Road. Originally, Triple Arches was not even in the road's plans, according to the Historic American Engineering Record, where NPS road records are archived. NPS and BPR originally wanted to bridge a gap in the mountainside at the site of Triple Arches by constructing a large retaining wall and building up the roadbed with huge amounts of fill material. But the contractor came up with the more innovative three-arch design.

NPS archives

A large retaining wall was originally planned for the site at Triple Arches, shown here. After construction started, the contractor obtained approval to build the more attractive triple-arch structure. But for all its engineering innovation, Triple Arches also mistakenly incorporated a design flaw: The westernmost arch, on the far left, was built with its spring line—the imaginary line connecting the bottom of the two ends of the arch—parallel to the road's 6-percent grade, rather than horizontally. This was corrected in the remaining two arches.

and approved in the NPS's ROD in November 2003 and WFLHD's ROD in March 2004 because it provided the best balance of protecting historic, scenic, and natural resources while minimizing economic impacts.

Since the final EIS and documentation in the RODs, the anticipated funding levels required to complete the entire repairs in 7 to 8 years did not become available. Consequently, NPS and WFLHD are jointly developing a strategy that will include public involvement and repair of the Sun Road in the earliest possible timetable, as available funding allows.

Keeping Business as Usual

These strict road-closure limitations and the need to reduce traffic congestion became the driving force behind development of a comprehensive mitigation program. How to keep 3,500 vehicles moving through a major construction zone every day on a narrow, steep mountain road without causing gridlock was one of the biggest challenges from the outset, according to Superintendent Holm. "During the next decade, visitors driving over the Sun Road are going to see more construction than normal," he says. "So we needed to take measures to mitigate this. We want to make the driving experience as enjoyable and trouble free as possible."

One of the first efforts toward this goal was completion of a construction sequencing strategy that details when and how all pieces of the rehabilitation puzzle will fit together to minimize traffic congestion and delays. The strategy calls for construction to progress generally from west to east where traffic will be reduced to one lane most of the time. Temporary traffic signals, vehicle-actuated devices set on fixed cycles for times other than the actual work period, will be installed at each end of most work zones to control one-way traffic. During the work periods, flaggers usually will work in two-person teams, one

to control traffic and the other to walk the lines of stopped vehicles to answer questions and provide information.

WFLHD is using a traffic modeling computer program called QuickZone to predict traffic impacts at each work zone. The program can estimate traffic backups, delay times, and optimum construction schedules, and can estimate impacts resulting from construction schedule changes, flaggers, and signal timing.

Leave the Driving to Glacier

Another key component of the mitigation program is a new voluntary transit system. Visitors will still be able to drive their own vehicles over the road as usual, but they will have the option of leaving their cars at two transit centers—one at each end of the park—and taking regularly scheduled shuttle buses to the Sun Road's most popular destinations, such as trailheads, overlooks, and interpretive sites. The system will be phased in over two seasons, with initial service covering a limited area starting in summer 2007 and the whole system scheduled to be fully implemented over the entire Sun Road by summer 2008. The transit center near the west entrance will be a new facility featuring a building where riders can obtain transit and road project information, a sheltered pickup and dropoff area for riders of the shuttle buses, and parking for about 150 vehicles.

A Federal, State, and local partnership has been established to purchase and operate the shuttle bus fleet during both the construction and off-seasons. The off-season program will help meet other Montana-wide transit needs and make the entire transit system more cost effective. This partnership with the Montana Department of Transportation will leverage existing Flathead and Glacier County maintenance facilities, provide year-round employment in local gateway communities, and reduce the direct burden on FHWA and NPS for operating and maintaining the system.

"We are really encouraging our visitors to use the transit system whenever possible, once it's up and running," says Superintendent Holm. "Our goal is to reduce vehicle traffic on the Sun Road by 10 percent. If we can reach this goal, I think the driving experience will be enjoyable for everyone, whether you decide to drive, take an interpretive tour with either Sun Tours or aboard the historic red buses, or take a shuttle bus."

Smart Transportation System

The entire Sun Road mitigation program will be supported by an extensive intelligent transportation system (ITS) computerized communications network that will provide real-time information to visitors regarding road conditions, parking availability, traffic, weather, transit schedules, and more. For example, travelers planning a trip to Glacier, or en route to the park, will be able to receive construction information via the Internet, highway advisory radio, Montana's 511 telephone traffic information system, and variable message signs strategically located inside and near the park.

Other features to enhance the visitor experience include new interpretive signs and exhibits at transit stops and other strategic locations that tell the story of the park's history, wildlife, plant life, and the construction of the original Sun Road. Several locations will have interactive information kiosks.

In addition to ITS technologies and enhanced educational services, the mitigation program will mount a comprehensive public information effort, identified by the advisory committee as an essential element in the Sun Road rehabilitation. This initiative will provide timely and accurate information through a variety of sources, such as the Internet, travel and tourism guides and magazines, the news media, brochures and signs at surrounding communities, gateway tourism and travel businesses, and public service announcements. The public information and outreach also will include customer service training for frontline employees about the project and related services.

The extraordinary effort that NPS and WFLHD are making to maximize the Glacier National Park experience throughout the entire construction project gives visitors added opportunities to witness history in the making -- the preservation of a national treasure.

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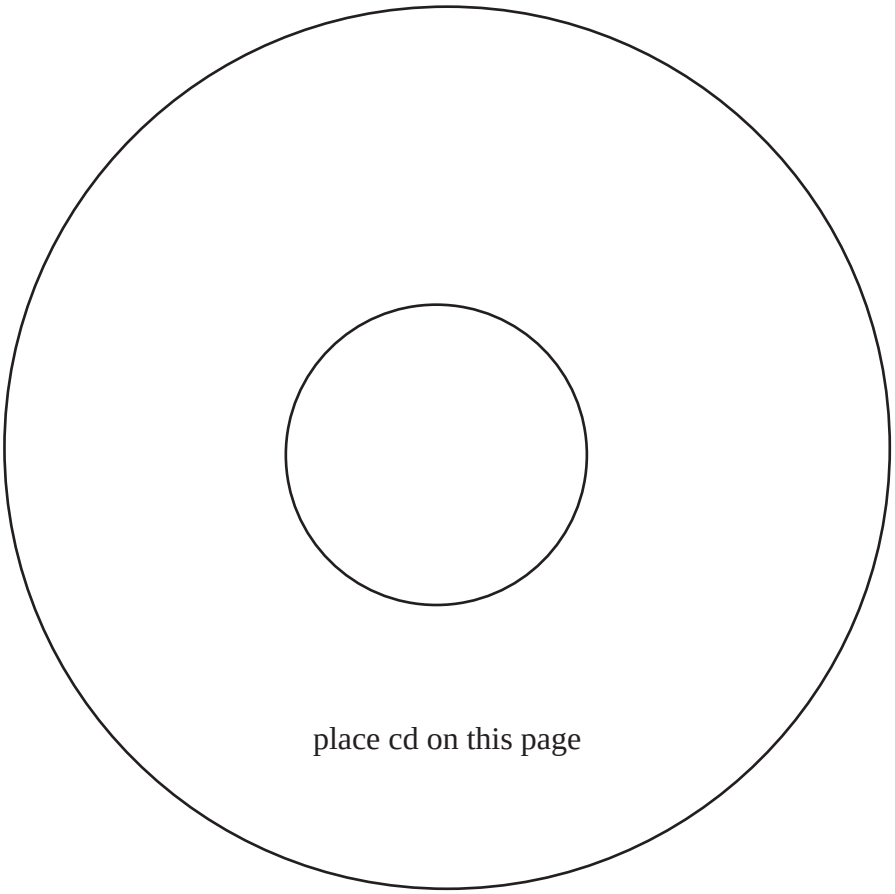
http://www.tfhrc.gov/pubrds/06nov/04.htm



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