Little Bighorn Battlefield
National Monument

National Park Service
U.S. Department of the Interior

Alternative Transportation Feasibility Study

VOLUME II
OPTIONS AND CRITERIA FOR EVALUATION

NOVEMBER 2012

LITTLE BIGHORN BATTLEFIELD NATIONAL MONUMENT

Alternative Transportation Feasibility Study

PMIS 163914

Options and Criteria for Evaluation Report

October 15, 2012

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1. INTRODUCTION

Little Bighorn Battlefield National Monument (the park) is facing substantial transportation challenges. In recent years, the park has received over 300,000 visitors a year,[1] most of whom came to the park during the summer months from June to August. During the peak visitor season, parking lots adjacent to the visitor center are frequently full, while other parking areas may still be underutilized, such as the Stone House parking lot. Parking unavailability is a particularly significant problem for oversized vehicles, which include recreational vehicles, trailers, and buses typically over 25-feet in length, because there are too few spots for the number of vehicles. Vehicles frequently keep circulating in the visitor center parking area looking for a parking spot, aggravating vehicle-to-vehicle and vehicle-to-pedestrian conflicts in this area. Turning radii in the parking areas are too small for large vehicles to maneuver, and there is no safe location for bus loading and unloading.

The 5.2-mile long tour road (from the entrance station to Reno-Benteen Battlefield), which traverses the sensitive battlefield landscape, was built in the mid-1900s and is the only roadway that connects the two park units – Custer Battlefield and Reno-Benteen Battlefield. With a pavement width of 17- to 20-feet (typically about 18-feet wide) and no shoulder,[2] the tour road is narrow and difficult for two-way traffic consisting of many large size vehicles. Although no collisions have been reported on the tour road, minor accidents have been observed, such as side mirrors being broken by a passing vehicle in the opposite direction and vehicles veering off the pavement while passing.[3] The roadbed and pavement surface were not designed to withstand the current traffic load of oversized vehicles, resulting in excessive deterioration and requiring frequent maintenance. Over the last several decades, layers of pavement have been built up above the shoulder, creating steep drop-offs.

Parking and roadway issues, as well as other challenges such as an outdated and undersized visitor center, have caused negative impacts to visitor experience and present increasing difficulties for the National Park Service (NPS) to protect precious cultural and natural resources in the park. Since completion of the 1986 General Management Plan (updated in 1995),[4] many efforts have been made to evaluate parking congestion and other transportation challenges facing the park and study potential solutions. Although a number of options have been proposed, including relocating the visitor center and museum collection to a site out of the current park boundary, expanding parking lots for oversized vehicles, and widening the tour road; most of them have not been implemented due to political and economic reasons. As a result, the park continues to face increasing transportation and related challenges.

Most recently in 2010, the National Park Service conducted a public engagement process on management issues during which the public was invited to share thoughts on four management issues that have significantly impacted the park for the past three decades, including the following:[5]

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1. *National Park Service visitor database*, NPS Public Use Statistics Office, http://www.nature.nps.gov/stats/park.cfm?parkid=310, website accessed October 2011.
2. *Traffic Safety Study – Little Bighorn Battlefield National Monument*. Robert Peccia & Associates for National Park Service. October 1998.
3. *Existing Traffic and Parking Conditions and Implications for Transportation Alternatives: Little Bighorn Battlefield National Monument*, Jonathan Upchurch, December 16, 2010.
4. *Final General Management and Development Concept Plans*. Little Bighorn Battlefield National Monument. Original August 1986, Updated May 1995.
5. *Public Engagement on Management Issues and Next Steps Brochure*. Little Bighorn Battlefield National Monument. March 2011.

- The park's inadequate and undersized visitor center
- Insufficient museum collection storage
- Narrow and failing roads and insufficient parking
- Significant portions of the battlefield remaining unprotected and inaccessible

As a result of this extensive public engagement process, the National Park Service recommended several "next steps" to address the identified management issues. One of the next steps to be undertaken in 2011 was to commence this alternative transportation feasibility study (ATFS) to help the park staff determine mid-term and long-term solutions to transportation challenges.[6]

Starting in late September of 2011, the study team conducted extensive data collection, literature review, and transportation system analysis to evaluate parking and traffic circulations in the park. A multi-day workshop in a charrette setting was held at the park in October 2011. During the workshop, members from the park, NPS Intermountain Region (IMR), NPS Denver Service Center (DSC), and URS study team observed site conditions first-hand, reviewed results from existing condition analysis, identified detailed transportation issues, established preliminary goals and objectives, and discussed potential transportation solutions.

Following the early study activities, the study team developed a preliminary range of transportation options; established a set of criteria for the purposes of initial and detailed screening, respectively; and conducted technical analysis and evaluation of options using a two-step screening process – initial screening and detailed screening. In May 2012, a one-day workshop to evaluate transportation options was held at the park. During the workshop the study team presented information on previous study activities and results from the initial screening, described transportation options that were being carried forward through the detailed screening, and discussed analytical steps needed for the detailed screening. Workshop participants, including members from the park, IMR, DSC, and URS went through the detailed screening process and discussed next steps of the study.

These study activities and results are documented in the previous study deliverables, including an Existing Conditions memorandum (Appendix A), a Synthesis of Project Kickoff Workshop Results memorandum (Appendix B), and a Synthesized Results of Evaluation of Options Workshop memorandum (Appendix C).

Draft versions of this report – Options and Criteria for Evaluation – have been submitted for NPS review. NPS comments on the draft versions are incorporated in this report. It should be noted that the first draft report only includes information on the initial set of transportation options, initial screening process, and initial screening results, while this report contains the same initial options and screening information (Sections 2 and 3), as well as the detailed screening process and results (Section 4).

This report, building upon previous study efforts of the ATFS including the aforementioned deliverables, documents the following:

- The study process and methodology of formulating and evaluating transportation improvement options, including alternative transportation options
- Description of the initial range of options resulting from the options development process
- A set of initial screening criteria that were used to evaluate the initial range of options

6. *Critical Issues and Opportunities for the 21st Century.* Little Bighorn Battlefield National Monument. October 2010.

- Description of the initial screening process
- Results from the initial screening, including definition of the options that survived the initial screening and were carried forward to the detailed screening
- Description of the detailed screening process and continued evolution of the options
- Results from the detailed screening
- Discussion of next steps

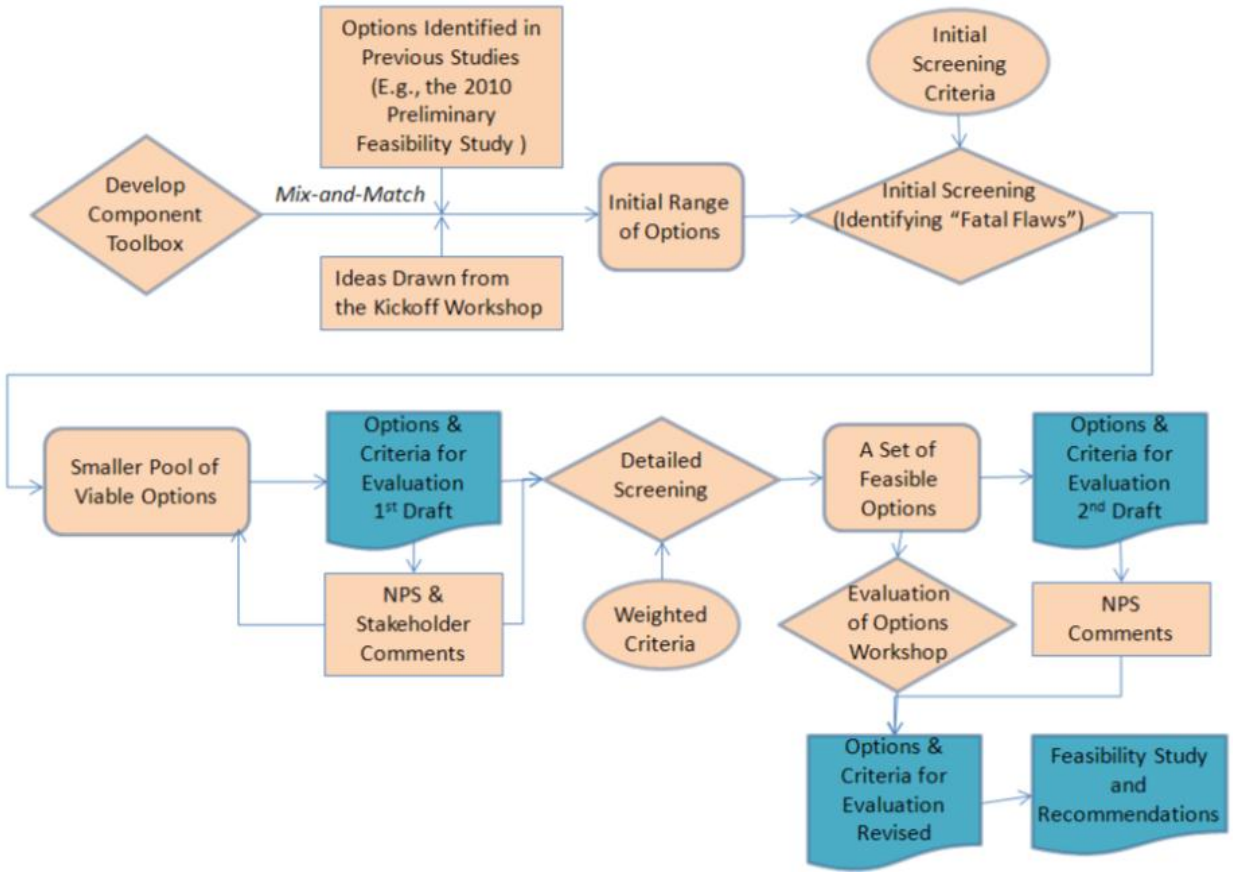
2. OPTIONS DEVELOPMENT

This section discusses the overall process of development and evaluation of transportation options, presents a comprehensive toolbox from which transportation improvement measures can be mixed-and-matched to formulate an initial range of options, and describes the resulting initial range of options that are potentially capable of addressing transportation issues in the park.

2.1 PROCESS

This ATFS includes an iterative process of identifying, evaluating, and refining transportation options, as illustrated by the flow chart in Figure 2-1. The three-phase process includes: (1) formulating a broad range of initial options, (2) an initial screening to yield a smaller pool of viable options, and (3) a detailed screening using a set of weighted criteria to identify a refined set of feasible, detailed options.

Figure 2-1: Options Development and Evaluation Flow Chart



Source: URS Corporation

The URS study team began by exploring a wide range of transportation options, some of which were discussed with the NPS team at the project Kick-off Workshop in October 2011, while others were drawn from past studies, including the 2010 Preliminary Feasibility Study. Input of potential options and ideas from previous studies and planning efforts is summarized in Table 2-1, which lists previously identified transportation options by source.

The wide range of transportation options formulated from previous studies and planning efforts, early study activities of the ATFS including the Kickoff Workshop/Charrette, and a "toolbox" developed for the ATFS (as described in the following sub-section), was synthesized into an initial set of distinctive options. These initial options were then screened against general criteria derived from the project goals and objectives in order to narrow the scope of options to a relatively short list of viable options, as described in Section 3.

Taking into consideration such factors as infrastructure requirements, operations and maintenance, general impacts to visitor experience and resources, general impacts to park staff and management, and total costs, the study team conducted a detailed evaluation of the viable options that had passed the initial screening. A set of weighted criteria, including both qualitative and quantitative parameters, were established and used throughout the detailed screening process. In May 2012, the study team conducted a workshop at the park, with participants from the park, DSC, and IMR to systematically evaluate the options by applying the weighted criteria. Since the workshop, the study team has been continuously refining and evaluating the transportation options and incorporating input and comments from the NPS staff.

2.2 OPTIONS TOOLBOX

As input to formulating and refining transportation options, the study team developed a "toolbox" of specific transportation improvement measures ("tools") that, by mixing-and-matching together, have the potential to achieve the goals and objectives of this ATFS as discussed in Section 3. These improvement measures were drawn from previous studies for the park, relevant project experience, and ideas generated in the October 2011 workshop. The toolbox was used to help formulate both the initial set of options and viable options that passed the initial screening and were carried forward for detailed screening. The tools are summarized in Table 2-2 and organized around the following categories:

- Management tools such as Intelligent Transportation System (ITS), Travel Demand Management (TDM), and special event management. These tools typically incur relatively low cost and are particularly useful for short-term or mid-term improvements.
- Infrastructure tools including construction projects of roadway, parking, and related facilities.
- Alternative travel mode tools (excluding transit and private automobiles) in and adjacent to the park, such as facilities for bicyclists, pedestrians (hikers), and other viable travel modes.
- Transit tools including infrastructure and operations components and ownership, funding and marketing.

Table 2-1: Previously-Identified Transportation Options

October 2011 ATFS Project Kickoff Workshop Charrette
▪ Multimodal One-Way Loop Accommodating Transit, OVs, PVs, Bicyclists, Hikers, and Other Modes ▪ Multimodal Two-Way Tour Road with Detached Multi-use Path ▪ Multimodal Two-Way Tour Road for Transit, Bicyclists, and Other Modes ▪ Mandatory Transit Two-Way Tour Road (no OVs/PVs during peak) ▪ Relatively minor structural/management improvements without a transit element
2010 Preliminary Feasibility Study – Alternative Transportation (Draft)
Main Ideas:(1) ▪ Expanding Existing Parking Lots & Widen Road (4R Project) ▪ Offsite Oversized Vehicle Parking & Shuttle (Seasonal Oversized Vehicle Restrictions possible) ▪ Oversized Vehicle Demand Management (No-Build) ▪ Close Tour Road (from Entrance Station to Reno-Benteen) to Motorized Vehicles ▪ One-Way Loop Road (from GMP) *Less or Not Feasible Options:*(1) ▪ No Action ▪ Permit System (visitors make reservations in advance, limiting number of visitors in the park) ▪ Private Vehicle Restrictions on Tour Road
2010 Existing Traffic and Parking Conditions and Implications for Transportation Alternatives
▪ Shuttle bus system operating from mid-June through the third week of August, a period of approximately 10 weeks ▪ Designated towed vehicle drop-off area or lot
2005 Environmental Assessment / Assessment of Effect: Rehabilitate Tour Road
▪ No Action ▪ Preferred Alternative: Road-Widening (24-ft) to have two 11-foot lanes with 1-foot shoulders and parking lot expansion/reconfiguration ▪ Road-Widening (22-ft) to have two 10-foot travel lanes and 1-foot shoulders and parking lot expansion/reconfiguration
1998 Traffic Safety Study
▪ Vehicle Length Restrictions on Tour Road ▪ Reservation System ▪ Remote Parking (at the junction of MT 342 & US 212) with a Visitor Transportation System ▪ Short-Term Recommendations (minor road/parking changes)
1986/1995 General Management Plan
▪ Tour Road Extension from Reno-Benteen Battlefield to I-90 (forming a one-way loop with two alternative locations for Visitor/Administration Facility) ▪ Tour Bus / Transit Service on the New One-Way Loop Road

Notes: OV – oversized vehicles. PV – private vehicles. 4R – resurfacing, restoration, rehabilitation, and reconstruction. GMP – General Management Plan. MT 342 – Montana State Highway 342 (Park access road). US 212 – US Highway 212.

(1) "Main Ideas" and "Less or Not Feasible" are the categories listed in the Draft 2010 Preliminary Feasibility Study.

Table 2-2: Options Development - Toolbox

Intelligent Transportation System (ITS)	Travel Demand Management (TDM)	Special Event Management
▪ Dynamic Message Signs (DMS) ▪ Pre-Trip Planning: Internet, TV/radio, 511 phone ▪ En-route Planning: wireless devices, Highway Advisory Radio (HAR), in-vehicle signing, electronic yellow pages ▪ Advanced Parking: availability and directions ▪ Electronic Payment & Pricing ▪ Transit Management: AVL/CAD, Dynamic Routing/Scheduling, in-vehicle surveillance	▪ Real-Time Traveler Information ▪ Parking Pricing (meters, hourly/fixed fee) ▪ Parking Restrictions: duration, vehicle type ▪ Fringe Parking (offsite) ▪ Variable admission fee ▪ Fee incentives for transit riders ▪ Cell phone audio tour ▪ Foldable signs (to direct to additional parking, remote lot, etc.)	▪ Temporary parking (on and offsite) ▪ Transit scheduling: higher frequency of bus departure, longer service period, on-demand, Para-transit, etc. to accommodate high visitation and/or unusual visiting patterns ▪ Alternate transit route(s): temporary routes such as transporting visitors between Billings/Hardin and the visitor center ▪ Volunteers assisting traffic & parking guidance ▪ Mobilizing community/commercial vehicles
Alternate Infrastructure Improvement	**Capital Improvement - Roads**	**Capital Improvement - Parking**
▪ Expanding OV parking near VC ▪ Multiple turn-around locations along Tour Road ▪ Reconfiguring Reno-Benteen parking lot ▪ Wayside parking spaces for OVs between VC and Reno-Benteen ▪ Signing & Striping: regulatory, warning, guidance, wayfinding	▪ One-way loop tour road via I-90 frontage road ▪ One-way loop tour road via US 212 north and east of the park ▪ Resurfacing, restoring, rehabilitating, reconstructing, and/or widening Tour Road ▪ Restrictions to certain vehicle types ▪ Seasonal/special events/time of day restrictions ▪ Prohibiting all private vehicl es on Tour Road	▪ Reconfiguration, signing, striping ▪ Expanding existing parking lots ▪ Drop lot for towed vehicles ▪ New parking lot(s) in the park ▪ Offsite parking at the old casino ▪ Offsite parking at US 212 & MT 342 junction ▪ Offsite parking at Garryowen area ▪ Other offsite parking locations ▪ Temporary parking for peak days/hours ▪ Restrictions to certain vehicle types ▪ Seasonal/special events/time of day restrictions ▪ Pricing (meters, hourly/flat fees, etc.)

Table 2-2 Options Development – Toolbox, continued

Alternative Travel Mode - Bicycles	Alternative Travel Mode - Hikers
▪ Bike lane on the tour road ▪ Multi-use path along tour road ▪ Paved shoulder along tour road ▪ Shared lane on tour road ▪ Bike access to Park ▪ Allowing bikes on trails	▪ Trail connections ▪ Multi-use path along the tour road ▪ Sidewalks along the tour road ▪ Additional trails (paved, gravel, or dirt) ▪ Pedestrian access to park
Transit	
Infrastructure and Operational Components	**Ownership, Funding, and Marketing**
▪ Vehicle Type: shuttle, van, tour bus, rubber-tired or guided-way tram ▪ Fuel Type: diesel, gasoline, compressed natural gas (CNG), propane, liquefied petroleum gas (LPG), hybrid, electric ▪ Routes: single vs. multiple, seasonal alternate, offsite to VC to Reno-Benteen ▪ Schedule: year-around, seasonal, special events, frequency/headways, weekly/daily variation, dwell times ▪ Service Type: guided tour, shuttle, commercial tour buses ▪ Facilities: staging, maintenance, fuel storage/supply, washing, ticket/operations office ▪ Choice of mode: mandatory vs. voluntary ▪ Options for mandatory transit: time of day vs. all day, peak days vs. seasonal vs. year-round, OVs vs. all vehicles, entire Park vs. part of Tour Road	▪ NPS owns, maintains, and operates transit ▪ Owned by NPS, O&M by concessionaire ▪ Concessionaire provides all transit vehicles, facilities, and O&M via contract with NPS ▪ Park adds a Transportation Fee onto the entrance fee ▪ Partnership for funding and marketing with: ▪ Montana DOT ▪ Billings and/or other municipalities ▪ Crow Tribe and other stakeholders ▪ Custer Battlefield Preservation Committee ▪ Interested local/regional businesses

Source: URS Corporation.

Notes: ITS – Intelligent Transportation System. TDM – Travel Demand Management. HAR – Highway Advisory Radio. AVL – Automatic Vehicle Location. CAD – Computer Aided Dispatch. OV – Oversized Vehicles. VC – Visitor Center. PT – Personal Transporter. O&M – Option and Maintenance. MT 342 – Montana State Highway 342 (Park access road). DOT – Department of Transportation

2.3 INITIAL RANGE OF OPTIONS

This section presents 13 options that were developed for the initial screening. The purpose was to determine "fatal flaws" and identify which options would be developed and evaluated in greater detail. The initial options are grouped into the following categories: construction, no-build, and transit. These initial options are summarized in Table 2-3 and then described in narrative and graphic descriptions, which are brief and general but intended to provide sufficient base information for the initial screening process to determine viability.

Table 2-3: Initial Transportation Options

Option	Description
CONSTRUCTION OPTIONS	
1) Repair Existing Road and Parking Reconfiguration	Reconstruct the road to a consistent width and correct structural deficiencies. Reconfigure parking lots without enlarging footprint.
2) Widen Road and Expand Existing Parking Lots	"4R" project – Tour road widened to 24-feet and parking expansion/reconfiguration at the visitor center and Reno-Benteen
3) One-Way Loop with Access from I-90 Frontage Road	Park tour road extension from Reno-Benteen Battlefield south and west to I-90 to form a one-way loop with two alternatives for Visitor/Admin Facility
4) One-Way Loop with Access from U.S. 212	Park Tour Road Extension north from Reno-Benteen Battlefield to U.S. 212 to form a one-way loop
5) Detached Multimodal Trail Paralleling Tour Road	Add a detached multi-use trail for hikers/bicycles along the entire Tour Road
6) Alternative Infrastructure Improvements	Additional vehicle turnarounds at key locations on the tour road; installation of information kiosks and enhanced wayside pullouts with OV parking between VC and Reno-Benteen; parking reconfiguration at the visitor center and Reno-Benteen; drop-off lot for towed vehicles
NO-BUILD OPTIONS	
7) Management Improvements	Implement special event management strategies. Enhance cell phone audio tours. Relocate employee parking to increase visitor parking spaces at VC area. Improve signing, striping, and wayfinding system.
8) Seasonal Reservation/ Permit System	Visitors reserve an entry permit by phone, website, etc. prior to visiting the park during the summer months or predetermined peak periods
9) Permanently close Tour Road to ALL Motorized Vehicles and Maintain it as a Trail	Close the tour road between the entrance station and Reno-Benteen to all visiting motorized vehicles and maintain it as a trail
TRANSIT OPTIONS	
10) Voluntary Transit	Seasonally provide guided or unguided shuttle, tour bus, and other transit service for visitors; likely require offsite parking and staging; could include a drop-off lot for towed vehicles
11) Mandatory Peak/Special Events/Seasonal Transit	During peak hours, peak days, special events, or seasonally, close road to all private vehicles after the VC; provide a tour shuttle for visitors; likely require offsite parking and staging during peak periods and could include a drop-off lot for towed vehicles

Table 2-3: Initial Transportation Options, continued

Option	Description
12) Mandatory OV Transit	Seasonally close road to oversized vehicles after the VC and have a mandatory parking/drop-off lot for OVs/towed vehicles; provide a tour shuttle for visitors with OVs; likely require offsite OV parking and parking shuttle at peak periods
13) Mandatory Transit for All	Close road to private vehicles after the VC; provide a tour shuttle for visitors; require offsite parking and staging

Source: URS Corporation.

Notes: 4R – Resurfacing, Restoration, Rehabilitation, and Reconstruction. VC – Visitor Center. OV – Oversized Vehicle.

Construction Options

1) Repair Existing Road and Parking Reconfiguration

This option would repair the existing Tour Road and reconfigure the existing parking lots in the visitor center area without increasing the paved footprint of the parking lots.

Construction work on the tour road includes minor widening of the tour road, where necessary, to a consistent 20-foot pavement width; restoring the pavement structure and correcting structural deficiencies; applying new or recycled layer(s) of pavement material to restore or enhance the ride quality; and improving drainage where necessary.

Parking reconfiguration would be accomplished within the existing parking area footprint through signing, striping/restriping, and possibly modifying landscape and driveways for more efficient parking patterns.

2) Widen Road and Expand Existing Parking Lots

This is a construction project to resurface, restore, rehabilitate, and reconstruct (4R project) the tour road, as well as expand the parking lots at the visitor center area and Reno-Benteen Battlefield.

This option (Figure 2-2) is described as Option A in the *2010 Preliminary Feasibility Study* and was the preferred alternative in the *2005 Environmental Assessment / Assessment of Effect: Rehabilitate Tour Road* for Little Bighorn Battlefield National Monument. This option would widen the tour road to 24-feet to accommodate safe passing for oversized vehicles and to correct structural deficiencies in the road. The tour road cross-section would consist of two 11-foot travel lanes with one-foot shoulders. Parking at the visitor center and Reno-Benteen Battlefield would be modified and expanded to include bus pull-outs, motorcycle parking, better accommodations for oversized vehicles, and improved traffic flow (Figure 2-3).

This option would not preclude transit; the widened road could support future shuttle service with larger transit vehicles and the improved visitor center parking lot could serve as a staging area for transit.

Figure 2-2: Expand Existing Parking Lots & Widen Road

Reproduced from *2010 Preliminary Feasibility Study – Alternative Transportation (Draft)*

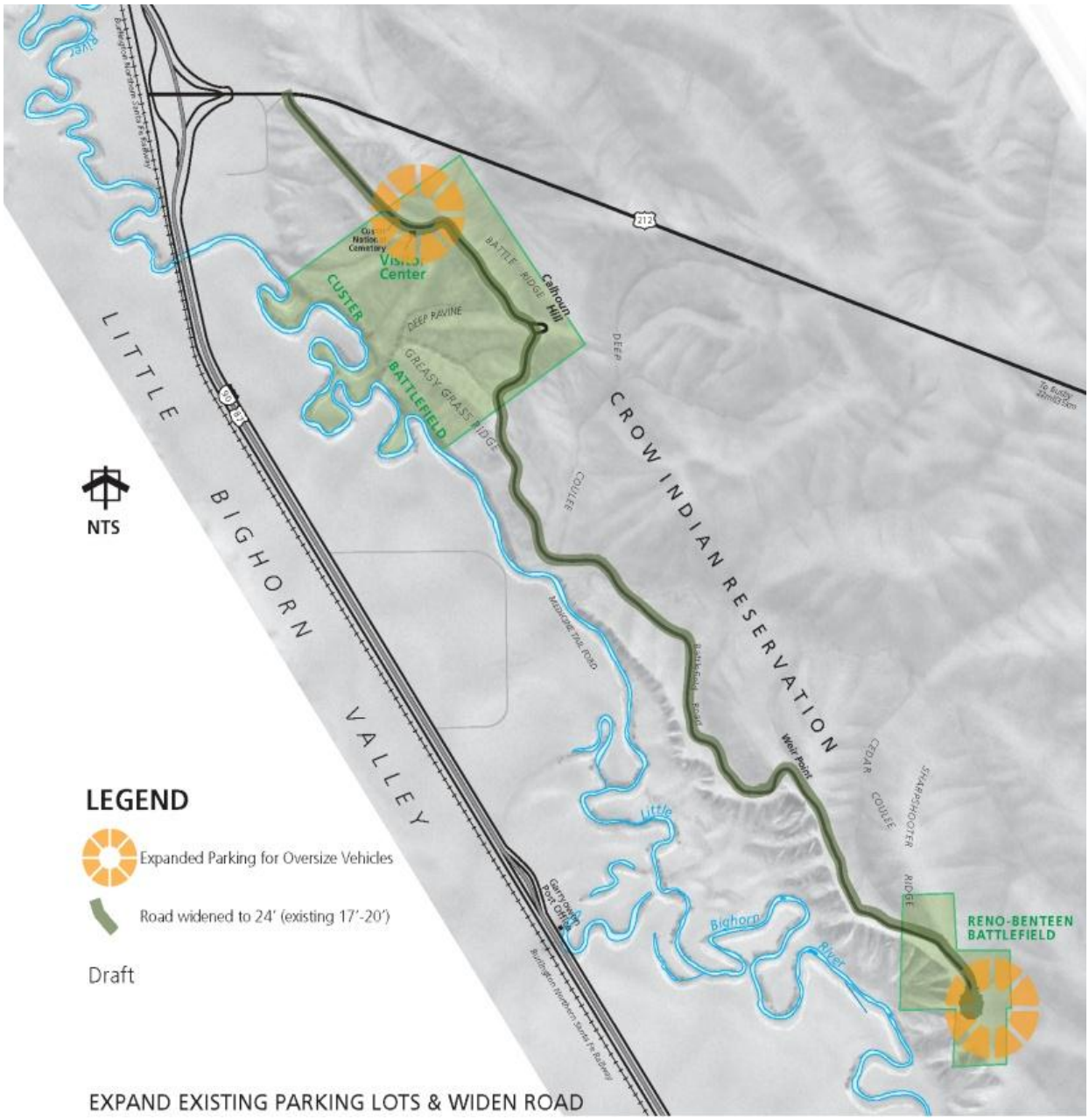
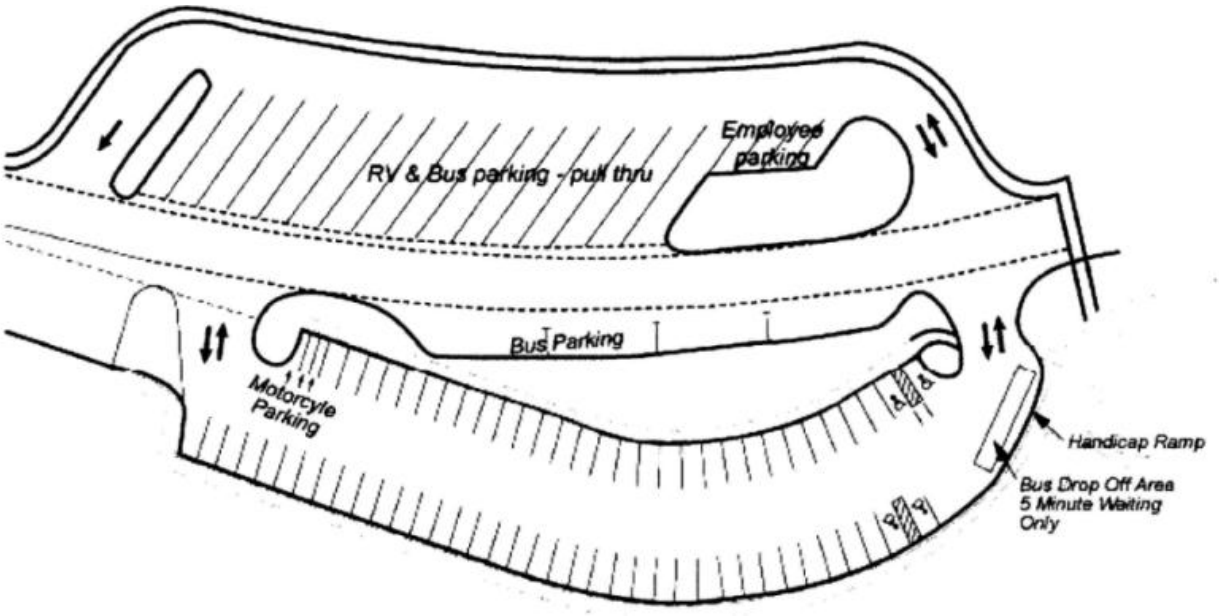


Figure 2-3: Proposed Visitor Center Parking Improvements

Reproduced from *2005 Environmental Assessment/Assessment of Effect: Rehabilitate Tour Road*



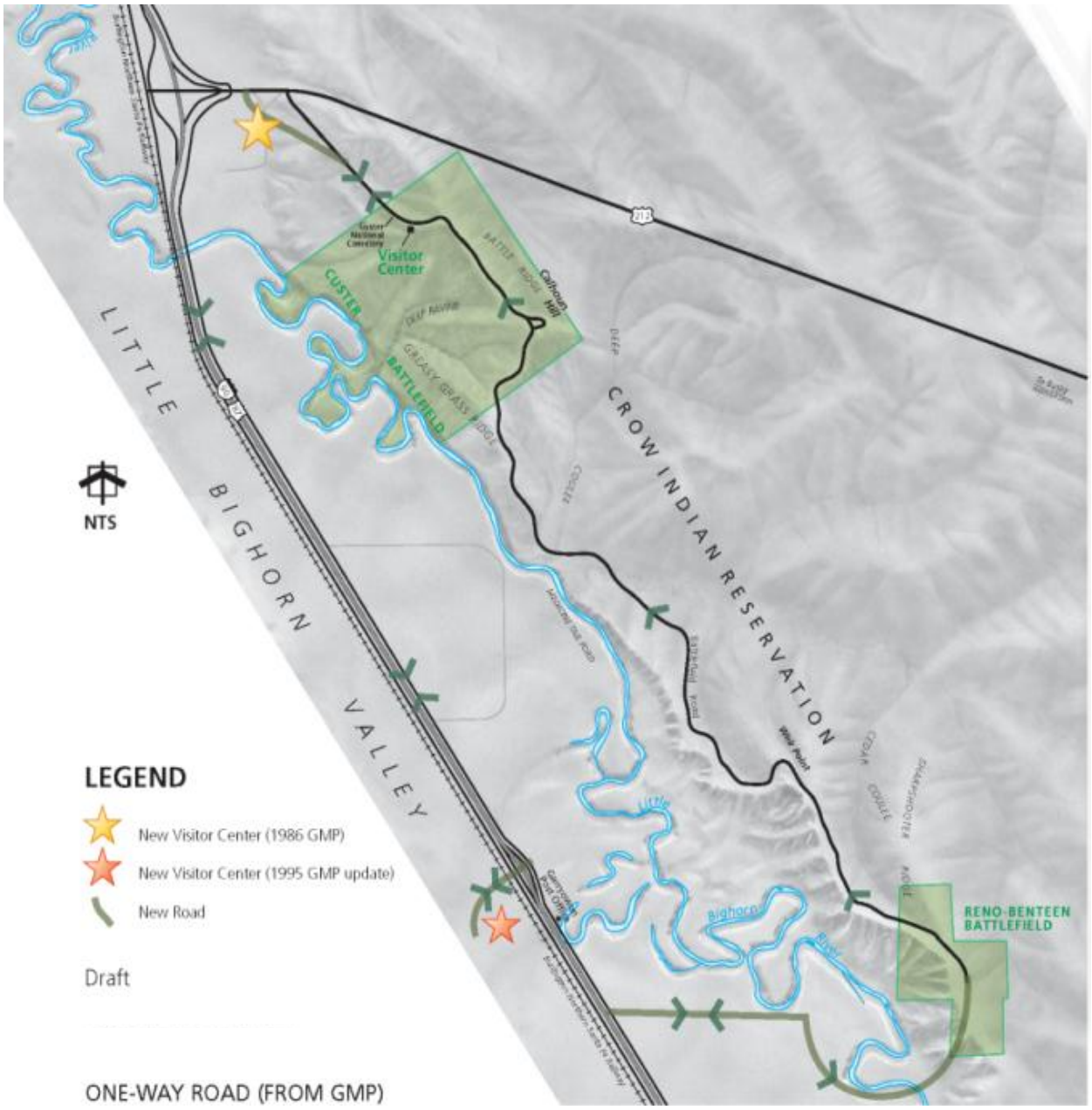
3) One-Way Tour Loop with Access from I-90 Frontage Road

This option (Figure 2-4) includes converting the existing tour road to one-way only and a proposed tour road extension from Reno-Benteen Battlefield south and west to the I-90 frontage road, forming a counter-clockwise one-way tour loop. This one-way loop would allow visitors to experience the historic sites in the chronological sequence of the battle. The tour road extension would require a bridge over Little Bighorn River and was originally envisioned in conjunction with a new visitor orientation/ administration facility and parking area. Additional parking has also been proposed west of the Little Bighorn River, at the beginning of the one-way tour road segment.

This option was first presented in the 1995 General Management Plan Update and again in the 2010 Preliminary Feasibility Study as Option E. It was also revisited during the ATFS Project Kick-off Workshop in October 2011 (Appendix B). This option would include transit service on the tour road and the new one-way traffic circulation would improve traffic safety. Additionally, the one-way conversion might free up right-of-way for other multi-modal improvements in the future.

Figure 2-4: One-Way Loop Tour Road via I-90 Frontage Road (from GMP)

Reproduced from *2010 Preliminary Feasibility Study – Alternative Transportation (Draft)*

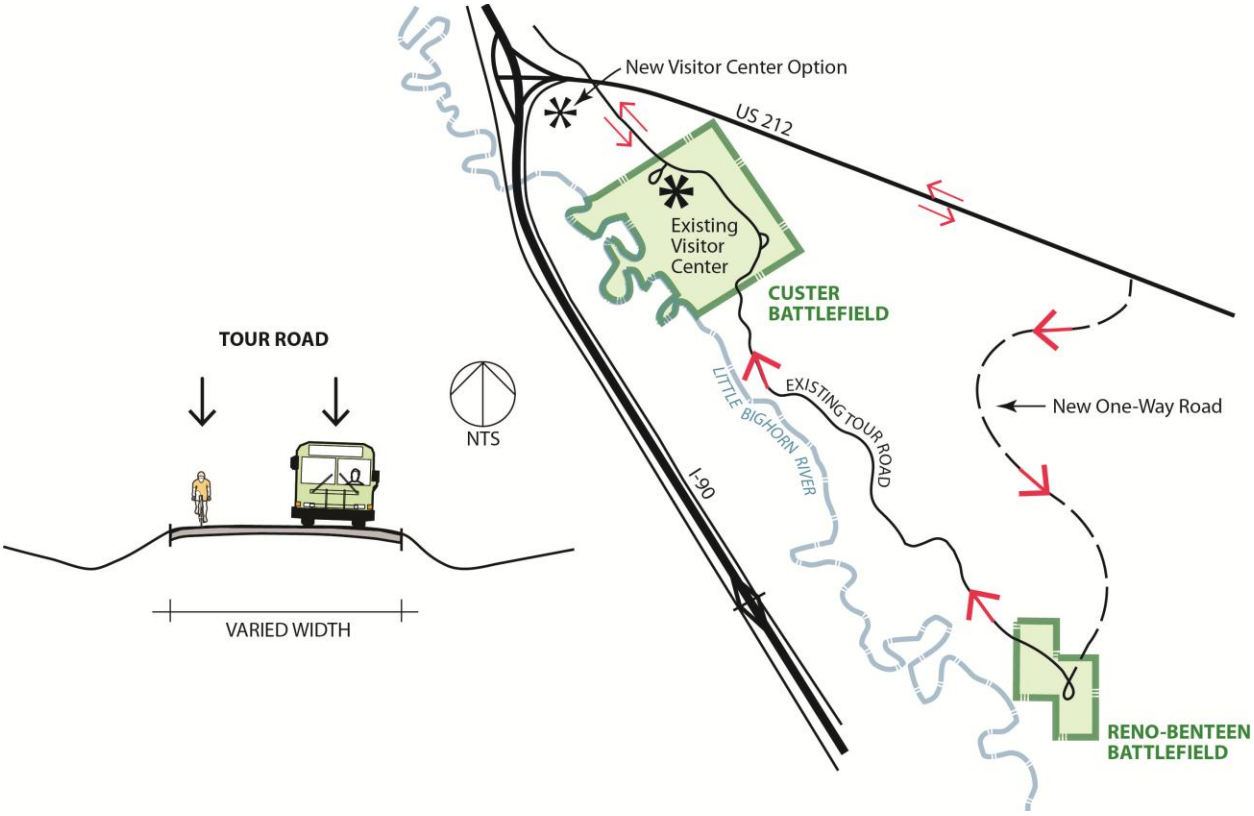


4) One-Way Tour Loop with Access from U.S. 212

This option (Figure 2-5) includes a proposed tour road extension from Reno-Benteen Battlefield north to U.S. 212, forming a clockwise one-way tour loop. Like the previous option, the one-way tour road would allow visitors to experience the historic sites in the chronological sequence of the battle; however, this extension would avoid the costs and impacts associated with a new bridge over the Little Bighorn River. New parking would likely be required at the beginning of the one-way segment.

This option was discussed at the ATFS Project Kick-off Workshop in October 2011. Like the previous option, the road extension and traffic modifications to one-way circulation could include transit service and would improve traffic safety. Additionally, the one-way conversion might free up right-of-way for other multi-modal improvements, particularly to accommodate non-motorized travel modes, in the future.

Figure 2-5: One-Way Loop Tour Road via U.S. 212

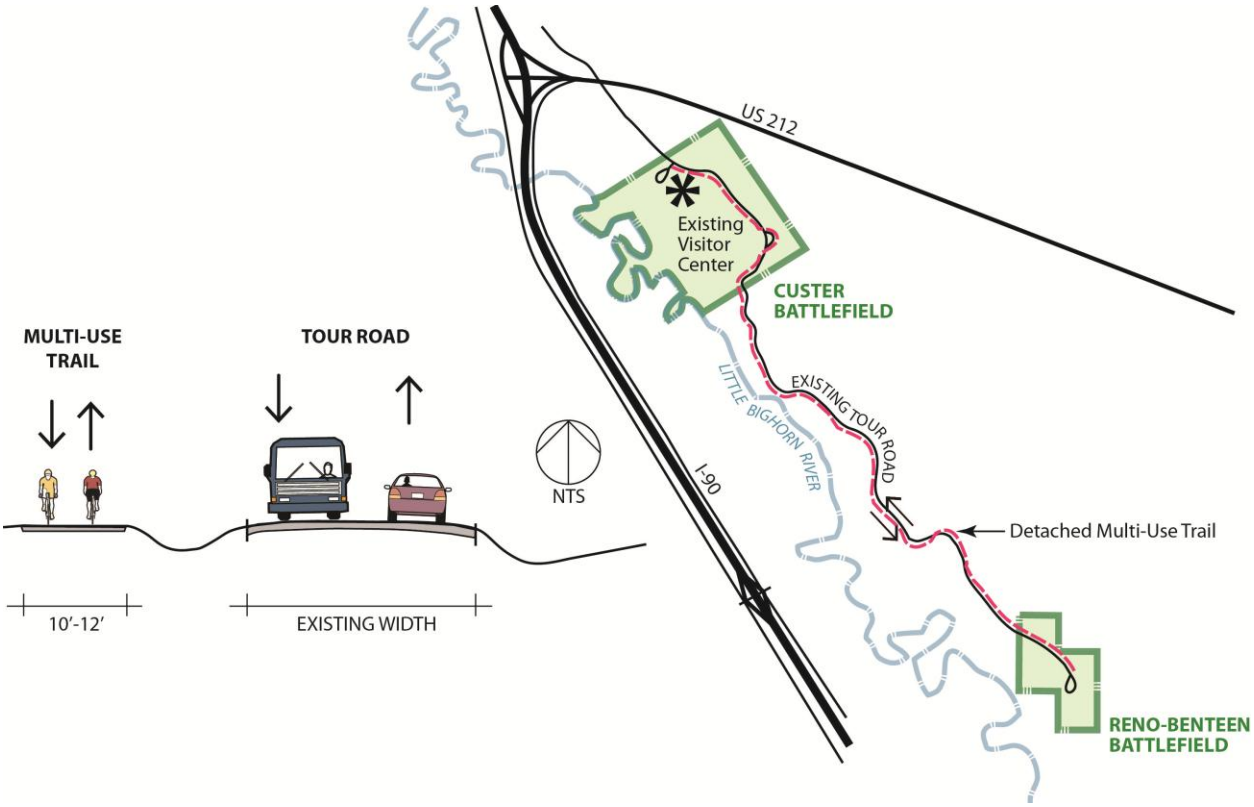


Source: URS Corporation.

5) Detached Multi-use Trail Paralleling Tour Road

This option (Figure 2-6) proposes a detached multi-use trail for non-motorized travel modes along the entire Tour Road. This trail would be 10- to 12-feet wide and could be paved, gravel, or unpaved. Discussed at the ATFS Project Kick-off Workshop in October 2011, this option would significantly improve access and safety for non-motorized travel modes.

Figure 2-6: Detached Multi-use Trail

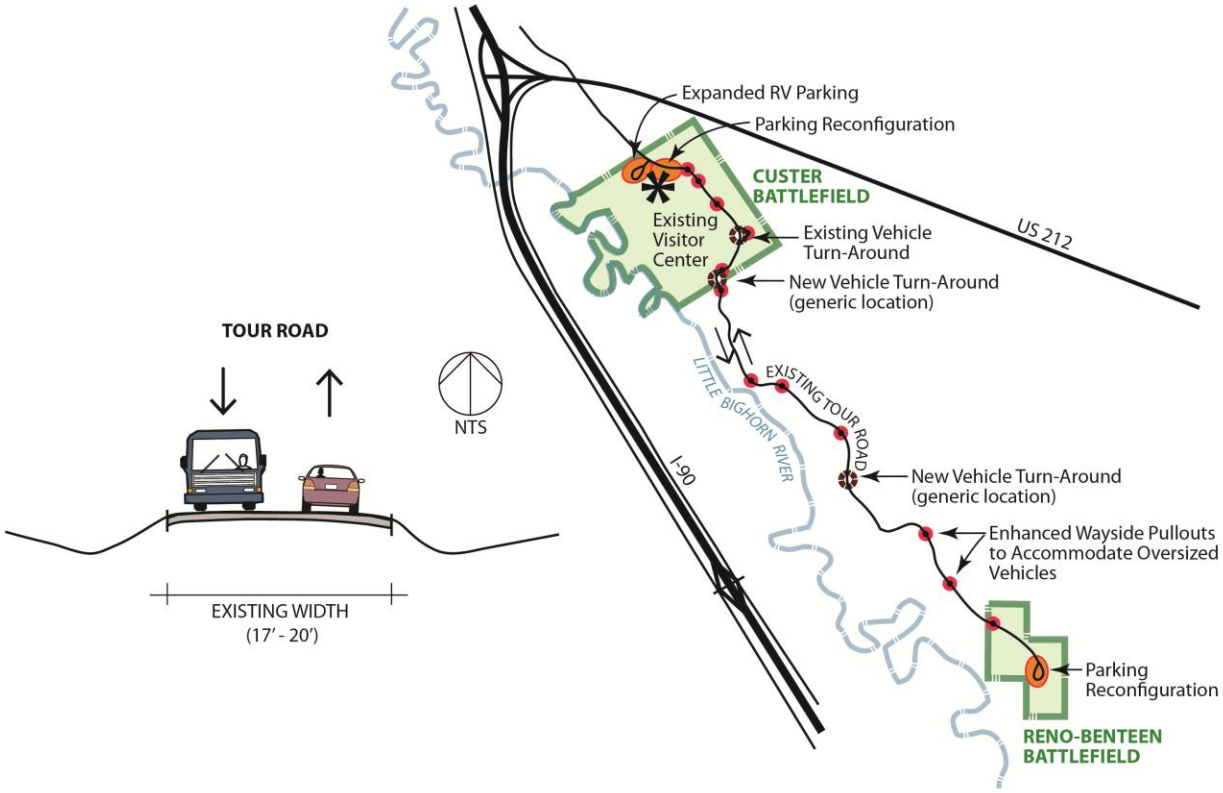


Source: URS Corporation.

6) Alternate Infrastructure Improvements

This option (Figure 2-7) is a collection of various lower-impact/lower-cost infrastructure improvements meant to enhance visitor experience and protect cultural and natural resources in and adjacent to the park. Improvements under this option, many of which were discussed at the ATFS Project Kick-off Workshop in October 2011, include vehicle turnarounds at key locations on the tour road, enhanced or additional wayside pullouts with oversized vehicle parking, and expansion/ reconfiguration of oversized vehicle parking in a less sensitive area east of the visitor center (Figure 2-8). A drop-off lot for large vehicles towing fifth wheels or RVs towing cars could be incorporated into the parking changes east of the visitor center or could be located offsite. These improvements could be made in conjunction with expansion of the trail network for hikers and other non-motorized travel modes. It should be noted that the parking layout shown in Figure 2-8 is only for illustration purpose, not actual design.

Figure 2-7: Alternate Infrastructure Improvements



Source: URS Corporation.

Figure 2-8: New Oversized Vehicle Parking (October 2011 Project Kickoff Workshop)

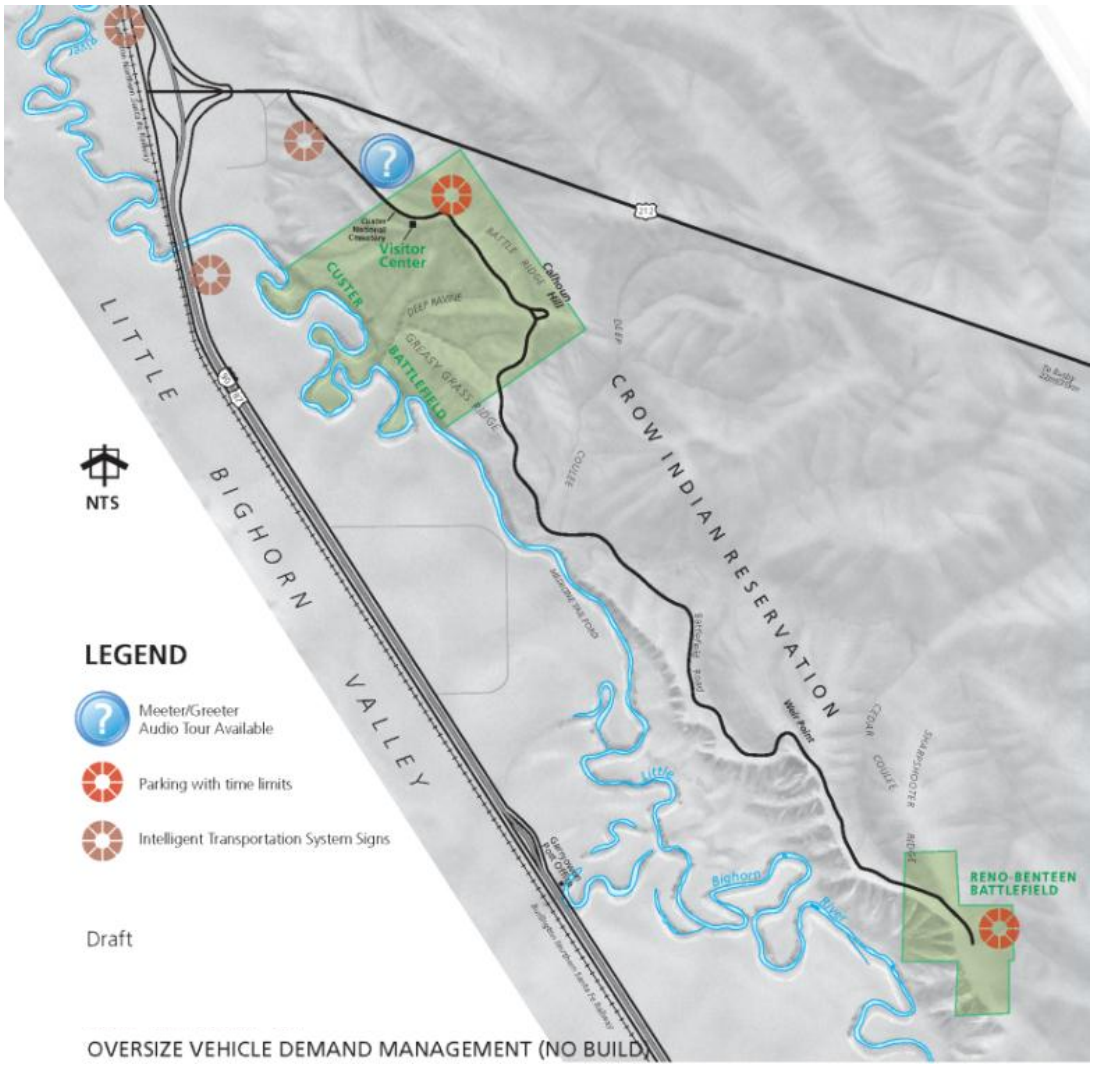
No-Build Options

7) Management Improvements

This option is a collection of lower-cost and lower-impact operational changes to enhance visitor experience. Many of these changes were suggested in the *2010 Preliminary Feasibility Study – Alternative Transportation* as Option C (Figure 2-9). This option utilizes existing facilities but seeks to improve communications with visitors and to smooth parking. Intelligent Transportation System (ITS) signs would be added along I-90, at the entrance to the park, and inside the park. A seasonal "meeter/greeter" would assist visitors with parking logistics and promote use of the park's tour road audio tour at peak times when parking is unavailable at the visitor center. Additionally, the visitor center parking area could be signed with time limits to encourage turnover. It should be noted that enforcement of time restrictions in the parking area could be difficult and require extra efforts of park staff, but these restrictions have the potential to substantially mitigate congestions and conflicts in the parking area.

Figure 2-9: Oversized Vehicle Demand Management

Reproduced from *2010 Preliminary Feasibility Study – Alternative Transportation (Draft)*

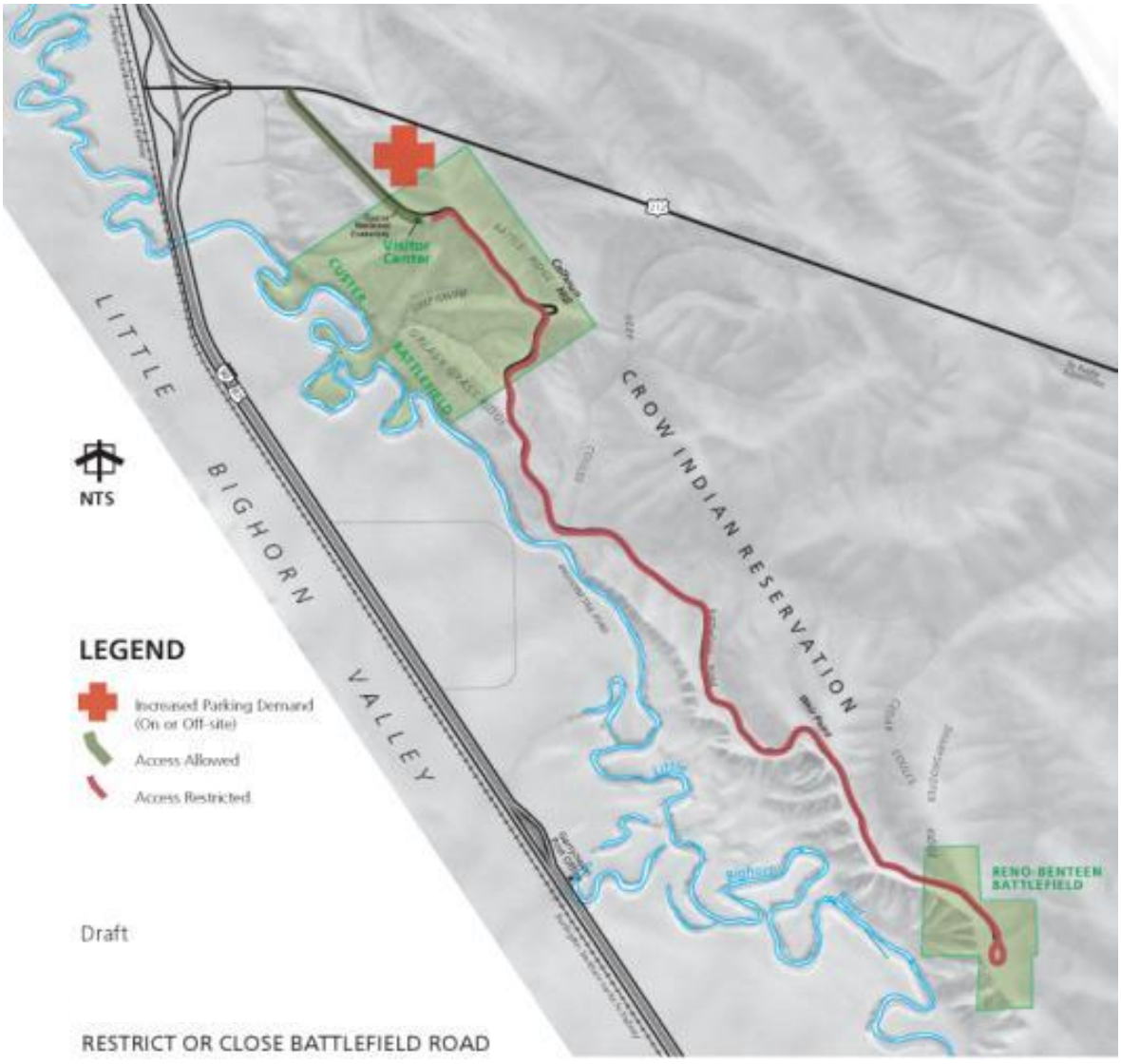


8) Seasonal Reservation / Permit System

This option (Figure 2-10) would seasonally restrict access to the park and require that visitors reserve an entry permit ahead of time. This option was first identified in the *1998 Traffic Safety Study* and was mentioned in the *2010 Preliminary Feasibility Study – Alternative Transportation* as a less feasible option. This option would not preclude transit service. Alternative modes such as transit, bicycles, and hiking could be incentivized by not requiring an access permit or reservation.

Figure 2-10: Restrict or Close Tour Road

Reproduced from *2010 Preliminary Feasibility Study – Alternative Transportation (Draft)*



9) Permanently Close Tour Road to All Motorized Vehicles

This option would close the road to motorized vehicles after the visitor center and maintain it as a trail instead. This option was mentioned in the *2010 Preliminary Feasibility Study – Alternative Transportation* as a more restrictive version of then Option D. This option would open the tour road right-of-way to non-motorized travel modes and would encourage cycling and hiking. Depending on demand, this option may require additional visitor center and/or offsite parking.

Transit Options

10) Peak Period/Special Events/Seasonal Voluntary Transit

This option would provide a voluntary seasonal shuttle/tour bus service for visitors to see the sights along the tour road. This option would likely require offsite parking and a parking shuttle to transport visitors into the park. It could also include a drop-off lot for towed vehicles. This option may improve safety for bicyclists riding in mixed traffic by potentially reducing the number of private vehicles on the tour road. Like the other transit options, this option could encourage walking and bicycle trips by providing return transportation on shuttle buses equipped with bicycle racks.

11) Peak Period/Special Events/Seasonal Mandatory Transit for All Visitors

This option would close the tour road to all private vehicles after the visitor center during peak hours, peak days, or certain seasons. Parking and tour shuttles would provide access to the tour road and offsite parking location(s). This option would effectively reduce or eliminate traffic and parking congestion in the park, improve safety for bicyclists and hikers utilizing the tour road, and reduce impacts to resources. Like the other transit options, the shuttle could encourage walking and bicycle trips by providing return transportation on shuttle buses equipped with bicycle racks. This option could also include a drop-off lot for towed vehicles.

12) Peak Period/Special Events/Seasonal Mandatory Transit for Visitors with Oversized Vehicles

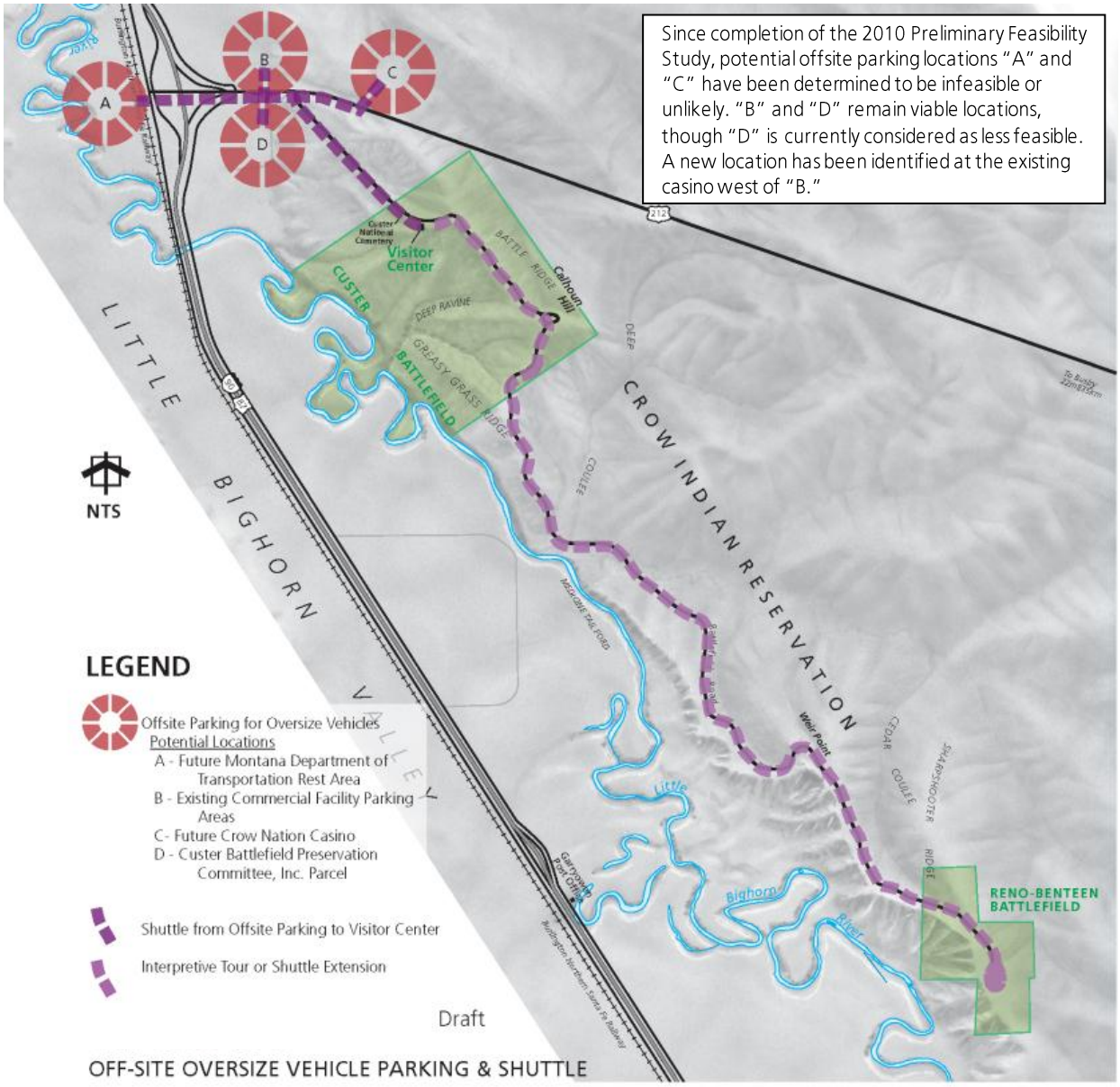
This option would seasonally close the tour road to all oversized vehicles after the visitor center and a tour shuttle would provide access to the tour road. This option would likely require a mandatory drop-off lot for towed vehicles, an offsite oversized vehicle parking lot, and a parking shuttle. By prohibiting oversized vehicles on the tour road, this option would improve traffic safety for all visitors utilizing the roadway. Like the other transit options, the shuttle could encourage walking and bicycle trips by providing return transportation on transit vehicles equipped with bicycle racks.

The original ideas of this transit option were first explored in the *1998 Traffic Safety Study* and revisited in subsequent studies. The *2010 Preliminary Feasibility Study – Alternative Transportation* explored transit in conjunction with offsite oversized vehicle parking and possibly seasonal oversized vehicle restrictions on the tour road (from Entrance Station to Reno-Benteen) as Option B (Figure 2-11**).** The October 2011 Project Kickoff Workshop explored similar concepts but considered road access restrictions for all private vehicles during peak times/days.

The service time period of each of the above three transit options (10, 11, and 12) can be varied to operate during the peak season – typically from Memorial Day to Labor Day; a few weeks during the summer months when the park encounters parking and traffic congestion; or only during some special events such as the Memorial Day weekend, the park's anniversary (June 25), the Sturgis Motorcycle Rally, and Labor Day.

Figure 2-11: Offsite Oversized Vehicle Parking & Shuttle

Reproduced from *2010 Preliminary Feasibility Study – Alternative Transportation (Draft)*

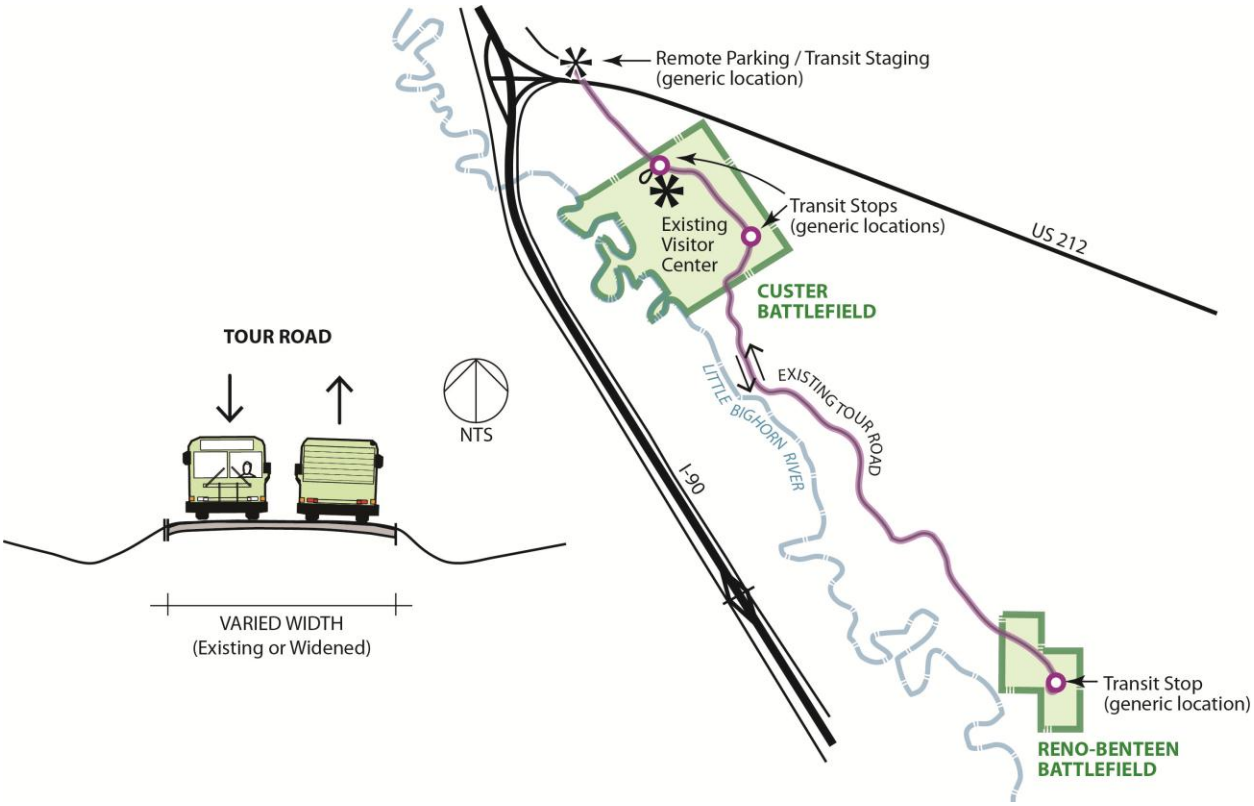


13) All-time Mandatory Transit for All Visitors with Motorized Vehicles

This transit option (Figure 2-12) would close the tour road to ***all*** motorized vehicles after the visitor center throughout the year. A tour shuttle would provide access to the tour road between the visitor center and Reno-Benteen. This option would likely require offsite vehicle parking and a parking shuttle as well. This option would significantly improve access and safety for alternative travel modes utilizing the roadway including bicyclists, hikers, etc. due to motorized vehicles being prohibited on the tour road. Like the other transit options, the shuttle could encourage walking and cycling trips by providing return transportation on vehicles equipped with bicycle racks.

Similar mandatory transit options were explored in the *1998 Traffic Safety Study* and revisited in subsequent studies. The *2010 Preliminary Feasibility Study – Alternative Transportation* suggested that restricting all private vehicles on the tour road would be a less feasible option. The October 2011 Project Kickoff Workshop did not distinguish between oversized and regular-size private vehicles and considered various transit and multi-modal scenarios which would restrict motorized vehicle access.

Figure 2-12: Transit Option



Source: URS Corporation.

3. INITIAL SCREENING

This section presents the method, criteria, results, and recommendations from the initial screening process for the ATFS. It begins with a general description of baseline resources in the park, including cultural and natural resources. A summary of the project goals and objectives, developed by the study team with the National Park Service, was then presented, as well as a description of how these goals and objectives were used to derive and establish the initial screening criteria. This is followed by descriptions of the initial screening process and results, which identify "fatal flaws" by assigning "pass," "neutral," or "fail" ratings to the initial options. The last subsection presents the recommended options to be carried forward. The initial screening criteria and results are summarized in Table 3-2. The options which passed the initial screening and are recommended for further developments are presented in Table 3-3.

3.1 BASELINE RESOURCES INFORMATION

Assessment of the transportation options in the park is enhanced with a consideration of impacts on the extant cultural and natural resources. Cultural resources are defined as the "collective evidence of the past activities and accomplishments of people. Buildings, objects, features, locations, and structures with scientific, historic, and cultural value are all examples of cultural resources. Cultural resources are finite and non-renewable resources that once destroyed cannot be returned to their original state."[7] Such resources can be determinate and confined to a limited geographic area (e.g., a "site"), or they can be expansive and cover a larger area (e.g., a "cultural landscape"). The Custer and Reno-Benteen Battlefields fit the definition of a *cultural landscape*, as relatively large areas where significant events occurred (in this case, a short span of time), which left behind physical evidence of those events.[8] In contrast, a *site* is more spatially limited and representative of perhaps a single activity, such as Last Stand Hill, where General Custer and his soldiers fought and died. In contrast, natural resources are more encompassing, including "any material from nature having potential economic value or providing for the sustenance of life, such as timber, minerals, oil, water and wildlife," but could also be defined as "environmental features that serve a community's well-being."[9]

Cultural Resources

On June 25-26, 1876, two cultures clashed on the bluffs above the Little Bighorn River in south-central Montana. The Battle of the Little Bighorn (or, to the Indian tribes who participated, the Battle of the Greasy Grass) was an armed engagement between combined forces of Lakota, Northern Cheyenne, and Arapaho people against the 7th Cavalry Regiment of the U.S. Cavalry, under the command of General George Armstrong Custer. Custer and his men fought and died at what is now called Custer Battlefield within the park boundaries, while his subordinates, Major Marcus Reno and Captain Frederick Benteen, established a defensive position at what is now known as the Reno-Benteen Battlefield. The battle became a rallying point for the military's subjugation of Native Americans in the West and an icon in American culture. Over the years, the events that actually occurred at the Battle of Little Bighorn became shrouded in legend, making it difficult to separate

7. New York State Museum, "Frequently Asked Questions about Cultural Resources." Electronic document, http://www.nysm.nysed.gov/research/anthropology/crsp/crm_faq.html, accessed August 21, 2012.
8. National Park Service, "Guidelines for Treatment of Cultural Landscapes." Electronic document, http://www.nps.gov/tps/standards/four-treatments/landscape-guidelines/terminology.htm, accessed August 21, 2012.
9. *Black's Law Dictionary*, 7th Edition, 1999, West Publishing Company, St. Paul, Minnesota.

fact from fiction. Beginning in 1958, archaeological investigations conducted within the park boundaries have confirmed the locations of such positions as the defense perimeter, the field hospital location, individual rifle pits, and battle-related artifacts.[10] The partial remains of several soldiers have also been recovered. The data produced from the archaeological surveys have revealed new information about troop and warrior positions and even glimpses of the course of the battle itself.

The Custer Battlefield, Reno-Benteen Battlefield and ridges between these areas, the Indian village site, and the primary viewshed surrounding the monument are all important elements associated with the Battlefield cultural landscape. Many of the surrounding lands also contain artifacts and sites related to the battle. Several Indian tribes participated in the battle, including the Northern Cheyenne, Lakota, Arapaho, Arikara, and Crow. The modern descendants of those tribes who participated in the battle have come to view the conflict as a uniquely important event that helped to bolster Indian pride in the face of continuous efforts to remove them from their homelands. Unfortunately, little is known of these contemporary Indian interpretations of the site and the event itself.

Natural Resources

The battlefield is located along the banks of the Little Bighorn River in a northern high plains environment. Natural resources at the battlefield are heavily influenced by climate and topography.[11] Moderate precipitation with abundant sunshine, low relative humidity, and clay soils combine to produce a suitable environment for middle to tall grass prairies. Soils range from deep to very shallow, and from clay to loamy fine sands. The features, such as steepness of slope, are more decisive in determining land classification and range sites than are the soil characteristics. The lower slopes have deep soils, which are prone to both wind and water erosion. Two vegetation community types found in Little Bighorn are the Northern Mixed Grass Prairie with sections of sagebrush-dominated shrub steppe. Cottonwood and sedge riparian areas exist along the Little Bighorn River. Mixed-grass prairie is typically dominated by Bluebunch wheatgrass, which makes up about one-third of the vegetation at Little Bighorn. Presently, Bouteloua-Stipa-Agropyron is the dominant cover type on the battlefield. Other grasses include Idaho fescue, western wheatgrass, green needlegrass, prairie junegrass, and blue grama. The main shrubs are hawthorn, chokeberry, silver sage and big sagebrush. Cottonwood trees are prominent in areas along the Little Bighorn River, very little of which lies within the present monument boundary. Native willows appear to have declined since the time of the Battle. Mammals such as whitetail deer, cottontail rabbits, porcupines, skunks, coyotes, and foxes are represented in the monument. A growing village of prairie dogs lies approximately a thousand yards outside the northwest boundary of the Custer Battlefield. Rattlesnakes and bull snakes represent most of the reptile population. Birds frequently seen within the monument are western meadowlarks, robins, sparrows, sharp tail grouse, and magpies.

10. National Park Service, "Little Bighorn Battlefield National Monument Resources Management Plan," 2007.
11. New York State Museum, "Frequently Asked Questions About Cultural Resources." Electronic document, http://www.nysm.nysed.gov/research/anthropology/crsp/crm_faq.html, accessed August 21, 2012.

3.2 CRITERIA FOR INITIAL SCREENING

One of the important outcomes of the kickoff workshop was the agreement between the National Park Service and the study team that the ATFS would use a two-step screening process to evaluate, compare, and refine transportation options. The first level, referred to as initial screening, was intended to identify "fatal flaws" by rating each initial option using a "pass," "neutral," or "fail" system, based on a set of criteria. These "fatal flaw" ratings represent critical flaws of each option that would be reason to not carry it forward for more detailed development and evaluation. As described in later sections of this report, the second step occurred following NPS' review and discussion of the initial screening results and involved a more detailed screening of the options that passed the initial screening. The detailed screening not only evaluated each option that passed the initial screening but also ranked them in order to identify the most promising transportation options. The detailed screening criteria built upon the initial screening criteria but also incorporated additional parameters for financial feasibility, park management, general impacts on cultural and natural resources, general impacts on visitor experience, and other considerations.

The study team derived initial screening criteria from the project goals and objectives that were developed during the Kickoff Workshop, with the following considerations:

- Criteria collectively should assess whether an option would be able to help fulfill the park mission, which is presented in the following subsection.
- Criteria need to be consistent with established goals and objectives resulting from the Kickoff Workshop, while avoid looking into detailed performance measures, which will be the focus of detailed screening.
- Criteria should balance short-term and long-term transportation needs. Although some goals and objectives target short-term improvements more than others, each criterion needs to avoid focusing only on short-term or long-term improvements and impacts.
- Criteria should be applied to evaluate each option's effectiveness in solving the critical transportation issues summarized in the Existing Conditions memorandum (Appendix A) and identified through previous planning and study efforts for the park.

Park Mission

The following park mission statement describes conditions that exist when the legislative intent for the park is being met:

"*Little Bighorn Battlefield National Monument preserves, protects, and interprets the historic, cultural, and natural resources, including lands, pertaining to the Battle of the Little Bighorn, leaving them unimpaired, and provide visitors with an understanding of the historic events leading up to the battle, the encounter itself, and the consequences by both the military and American Indian contingents, for the enjoyment of future generations.*" [12]

12. *Preliminary Feasibility Study – Alternative Transportation (**Draft**).* Little Bighorn Battlefield National Monument, National Park Service - Denver Service Center, and National Park Service – Intermountain Region; February 2010.

Project Goals and Objectives

The draft goals and objectives developed in the kickoff workshop were subsequently reviewed and reorganized by the study team and are presented below.

Goal #1: Reduce operation and management requirements through asset management

- Reduce impacts on pavement shoulders, adjacent facilities, and resources
- Contribute to sustainable maintenance practices and funding
- Ensure that new construction projects are sustainable
- Identify both short-term (easier) and long-term projects

Goal #2: Exercise management practices to solve short-term transportation problems

- Improve signs and information ("way-finding")
- "Manage" way out instead of "building" a way out
- Rework patterns within existing paved footprint
- Better manage existing visitor parking inventory
- Rework RV circulation and parking
- Use combination of incentives and enforcement to implement new management practices

Goal #3: Develop transportation alternatives that protect resource values and enhance visitor experience

- Reduce noise impacts and air emissions
- Protect resources by limiting expansion of parking and vehicle "footprint"
- Recognize a continuum of resource significance at the park
- Examine appropriate technical alternative transportation system options
- Reduce parking frustration for visitors
- Improve "waysides" experience
- Consider ITS applications
- Use trip planning and the park website as a tool
- Improve visitor safety

Goal #4: Recognize opportunities to improve public and community support

- Encourage public and community input and communication
- Engage in identifying and evaluating solutions
- Consider options outside the park boundaries
- Utilize and enhance local concession capability

Given the goals and objectives articulated at the Kickoff Workshop, the study team set forth the following criteria for screening the initial set of transportation options:

A. Enhance visitor experience
B. Minimize impacts to historical, cultural, and natural resources
C. Reduce traffic congestion and parking shortage in the park
D. Manage transportation assets to maintain acceptable conditions
E. Improve visitor safety

The matrix in Table 3-1 shows the relationship between the goals and objectives and the initial screening criteria. In several cases, specific objectives are addressed by two or more criteria. Similarly, each criterion addressed multiple goals and objectives.

Table 3-1: Relationship between Goals/Objectives and Initial Screening Criteria

	Initial Screening Criteria				
	A	B	C	D	E
Goals and Objectives	**Enhance visitor experience**	**Minimize impacts to historical, cultural, and natural resources**	**Reduce traffic congestion and parking shortage in the park**	**Manage transportation assets to maintain acceptable conditions**	**Improve visitor safety**
Goal #1: Reduce Operation and Management requirements through asset management					
Reduce impacts on pavement shoulders, adjacent facilities, and resources		■	■	■	
Contribute to sustainable maintenance practices and funding				■	
Ensure that new construction projects are sustainable				■	
Identify both short-term (easier) and long-term projects	■	■	■	■	■
Goal #2: Exercise management practices to solve short-term transportation problems					
Improve signs and information ("way-finding")	■			■	■
"Manage" way out instead of "building" way out		■		■	
Rework patterns within existing paved footprint	■	■	■	■	■
Better manage existing visitor parking inventory	■		■	■	■
Rework RV circulation and parking	■		■	■	■
Use combination of incentives and enforcement to implement new management practices	■	■		■	■

Table 3-1: Relationship between Goals/Objectives and Initial Screening Criteria, continued

	Initial Screening Criteria				
	A	B	C	D	E
Goals	Enhance visitor experience	Minimize impacts to historical, cultural, and natural resources	Reduce traffic congestion and parking shortage in the park	Manage transportation assets to maintain acceptable conditions	Improve visitor safety
Goal #3: Develop transportation alternatives that protect natural and cultural resources and enhance the visitor experience					
Reduce noise impacts and air emissions	■	■	■		
Protect resources by limiting expansion of parking and vehicle "footprint"		■			
Recognize a continuum of resource significance at the park		■			
Examine appropriate technical alternative transportation system options	■	■	■		■
Reduce parking frustrations for visitors	■		■		■
Improve "waysides" experience	■	■			
Consider Intelligent Transportation Systems (ITS) applications	■		■	■	
Use trip planning and the park website as a tool	■		■	■	
Improve visitor safety	■		■		■
Goal #4: Recognize opportunities to improve public and community support					
Encourage public and community input and communication	■	■			■
Engage public and community in identifying and evaluating solutions	■	■			■
Consider options outside the park boundaries	■	■	■	■	
Utilize and enhance local concession capability	■		■		

Source: URS Corporation.

The application of these criteria to evaluate the initial transportation options is presented in Table 3-2 and explained in the following subsection.

3.3 SCREENING RESULTS

This subsection presents the initial screening results for each of the 13 initial transportation options. The results of the screening are summarized in Table 3-2 and discussion which follows. It should be noted that the letters "A" through "E" assigned to each criterion are only for identification purposes and do not denote significance or importance of criteria.

Three of the construction options, including Option 1 - Repairing Tour Road and Reconfiguring Parking Lots; Option 2 - Widening Tour Road and Expanding Parking Lots (4R Project), and Option 3 - One-way Loop via I-90 Frontage Road (the GMP Option) passed the initial screening. Each of these three options is rated as "pass" or "neutral" against all initial screening criteria. It should be noted that the 4R Project and GMP Option were initially rated as "fail" against the criterion "minimize impacts to historical, cultural, and natural resources." However, prior to this study, both options were cleared for environmental compliance. As a result of the environmental clearance, their affects/impacts on park resources can be avoided, minimized, or mitigated. Therefore their rating was adjusted to "neutral" against the resource impact criterion.

In the no-build category, one of the three options, Option 7 - Management Improvements and Parking Reconfiguration, is rated as "pass" or "neutral" against all initial screening criteria, and therefore is considered as passing the initial screening. The other two no-build options are each rated "fail" against at least one criterion.

In the transit category, one of the four options, Option 10 - Voluntary Transit for All Visitors, is rated as "pass" or "neutral" against all initial screening criteria, and therefore is considered as passing the initial screening. The other three transit options are each rated "fail" against at least one criterion.

General discussions of evaluating the 13 options against each criterion (the initial screening process) are presented in the following paragraphs, organized by the initial options in the same order as in Table 3-2. The numbered item labels A, B, C, D, and E under each option represent the initial screening criteria, similar to the column headers in Table 3-2. The parenthesized word "(Pass)", "(Neutral)", or "(Fail)" following each letter label is the rating against the corresponding criterion. Reasoning for the rating is presented in each numbered item.

Table 3-2: Initial Screening Matrix

	Initial Screening Criteria				
	A	B	C	D	E
Initial Set of Options	Enhance visitor experience	Minimize impacts to historical, cultural, and natural resources	Reduce traffic congestion and parking shortage in the park	Manage transportation assets to maintain acceptable conditions	Improve visitor safety
CONSTRUCTION OPTIONS					
1) Repair Tour Road and Reconfigure Parking	Pass	Neutral	Neutral	Pass	Neutral
2) Widen Road and Expand Existing Parking Lots (4R Project)	Pass	Neutral	Pass	Neutral	Pass
3) One-Way Loop via I-90 Frontage Road (GMP Option)	Pass	Neutral	Pass	Neutral	Pass
4) One-Way Loop via U.S. 212	Pass	Fail	Pass	Neutral	Pass
5) Detached Multiuse Trail Paralleling the Tour Road	Pass	Fail	Fail	Fail	Neutral
6) Alternate Infrastructure Improvements	Pass	Fail	Neutral	Pass	Neutral
NO-BUILD OPTIONS					
7) Management Improvements and Parking Reconfiguration	Pass	Neutral	Pass	Neutral	Neutral
8) Seasonal Reservation/ Permit System	Fail	Neutral	Pass	Neutral	Neutral
9) Permanently Close Road to Motorized Vehicles and Maintain it as a Trail	Fail	Pass	Fail	Neutral	Neutral
TRANSIT OPTIONS					
10) Voluntary Transit for All Visitors	Pass	Pass	Neutral	Neutral	Pass
11) Mandatory Peak/Seasonal/Special Events Transit for All Visitors with Motorized Vehicles	Fail	Pass	Neutral	Neutral	Pass
12) Mandatory Transit for Visitors with Oversized Vehicles	Fail	Pass	Neutral	Neutral	Pass
13) Mandatory Year-round Transit for All Visitors with Motorized Vehicles	Fail	Pass	Pass	Fail	Pass

Source: URS Corporation.

Note: ☆ = option passes initial screening

1) Repair Tour Road and Reconfigure Parking

This construction option passed or was neutral against all five evaluation criteria:

A. (Pass) Minor widening of the road to a consistent 20-foot pavement width and more efficient parking would make the park easier to visit, improve traffic and parking conditions, better accommodate oversized vehicles, reduce visitor frustration at the parking lots and on the tour road, and therefore enhance visitor experience.

B. (Neutral) Minor widening of the tour road would increase roadway footprints and may impact cultural and natural resources; however, reduced congestion and conflicts because of a wider road and more efficient parking patterns would mitigate current impacts by visitor activities.

C. (Neutral) The slightly wider road with strengthened roadbed, aggregate, and pavement and more efficient parking configuration would provide effective relief to traffic congestion and parking shortage in the short term. Long-term traffic and parking benefits could diminish if visitor volumes grow substantially in the future.

D. (Pass) Repairing the tour road could address deferred maintenance, making asset management more sustainable due to stabilized and strengthened roadway and parking infrastructure. In addition, total pavement would only slightly increase due to minor widening of the road, which is not expected to incur significantly higher costs for asset management.

E. (Neutral) Although the improved tour road and more efficient parking configuration would reduce vehicle related conflicts and improve visitor safety, the extent of safety benefits are limited and could diminish if visitor volumes grow substantially in the future.

As a result, this option was carried forward to the next step of the study for further refinement and evaluation.

2) Widen Road and Expand Existing Parking Lots (4R Project)

This construction option passed or was neutral against all five evaluation criteria:

A. (Pass) Widening the road from 18-feet to 24-feet and increasing parking spaces would make the park easier to visit, improve traffic and parking conditions, better accommodate oversized vehicles, reduce visitor frustration at the parking lots and on the tour road, and therefore enhance visitor experience.

B. (Neutral) Construction would increase roadway and parking footprints, and therefore impact park resources; however, reduced congestion and conflicts because of a wider road and more parking spaces would mitigate current impacts by visitor activities. Furthermore, an Environmental Assessment (EA) was completed and consequently a Finding of No Significant Impacts (FONSI) was issued for this 4R project. Therefore, resource impacts by this 4R project can be avoided, minimized, or mitigated.

C. (Pass) The wider road with strengthened roadbed, aggregate, and pavement; increased parking; and more efficient parking configuration would provide effective relief to traffic congestion and parking shortage.

D. (Neutral) The 4R project or construction projects of a similar scope could address deferred maintenance, making asset management more sustainable due to stabilized and strengthened roadway and parking infrastructure. On the other hand, total pavement would significantly increase, which would incur higher costs for asset management.

E. (Pass) Improving road and parking infrastructure, as the 4R project is aimed at, is likely to reduce the number and severity of conflicts in the park.

As a result, this option was carried forward to the next step of the study for further refinement and evaluation.

3) One-Way Loop via I-90 Frontage Road (GMP Option)

The GMP option passed or was neutral against all five evaluation criteria:

A. (Pass) The one-way loop would enhance visitor experience by providing a more pleasant drive, significantly reducing traffic conflicts, presenting the waysides in a correct chronological order of the Battle, and allowing visitors to start their experience in the Little Bighorn Valley/Reno Skirmish Line.

B. (Neutral) Expanding the paved footprint could impact cultural and natural resources, a change that would be very difficult, if possible, to mitigate to the satisfaction of all stakeholders. However, in 1985 an EA was completed that disclosed the potential environmental consequences of implementing this option as well as other GMP elements. As a result, resource impacts by the GMP option can be avoided, minimized, or mitigated.

C. (Pass) The one-way road, combined with additional (offsite) parking facility and a transit service, is expected to effectively relieve congestions and parking shortage in the park.

D. (Neutral) A one-way loop could reduce vehicle trips in the park by half (in terms of one-way trips) and contribute to better asset management. However, significantly increased pavement, new road segments in a hilly terrain, and a new bridge would incur high costs for maintenance.

E. (Pass) The one-way loop road coupled with increased (offsite) parking would effectively reduce the number and severity of conflicts, providing a safer transportation system for all visitors.

This option is the preferred alternative in the GMP, and is still considered as the long-term improvement plan for the park. However, due to its high costs and resource impacts, this option is not anticipated to be implemented in the foreseeable future.

As a result of the initial screening, this option was carried forward to the next step of the study for further refinement and evaluation.

4) One-Way Loop via U.S. 212

The fourth construction option is similar to Option 3 but follows a different alignment. It failed one criterion and was neutral on or passed the others:

A. (Pass) The clockwise one-way loop would enhance visitor experience by providing a more pleasant drive, removing the need for vehicles to pass each other, and presenting the waysides in a correct chronological order.

B. (Fail) This option would require construction of a one-way road from Reno-Benteen Battlefield north to U.S. 212, a new road of approximately 3.5 to 4.5 miles long that runs through the sensitive battlefield landscape in a hilly terrain. This significant expansion of the paved footprint would significantly impact cultural and natural resources, and some of those impacts might not be possible to mitigate in a way that satisfies all stakeholders.

C. (Pass) The one-way road coupled with additional (offsite) parking facility is expected to effectively relieve congestions and parking shortage in the park.

D. (Neutral) A one-way loop could reduce vehicle trips in the park by half (in terms of one-way trips within park boundaries) and contribute to better asset management. However, it would not eliminate oversized vehicles which contribute to pavement deterioration. Furthermore, significantly increased pavement, signing, drainage associated with the new one-way road would incur higher costs for maintenance.

E. (Pass) The one-way loop road as well as increased (offsite) parking would effectively reduce the number and severity of conflicts, providing a safer transportation system for all visitors.

Compared with Option 3, this one-way loop may not require a bridge, but would have a significantly longer new road to connect Reno-Benteen to U.S. Highway 212.

This option is not carried forward to the next step of the study and is therefore eliminated from further consideration.

5) Detached Multi-use Trail Paralleling Tour Road

The fifth construction option failed three evaluation criteria and was neutral on or passed the others:

A. (Pass) A detached trail would enhance visitor experience by providing non-motorized travel modes, including pedestrians and bicyclists, safe access parallel to yet separate from the tour road.

B. (Fail) New construction required for a detached trail would impact natural and cultural resources and would be difficult to mitigate.

C. (Fail) A multi-use trail would not be able to mitigate parking shortage in the visitor center area, nor is it expected to significantly reduce the number of motorized vehicles on the tour road.

   Most visitors to the park come off I-90 on their way to elsewhere, and their stay in the park is typically no more than a couple of hours. Therefore a multi-use trail is unlikely to attract a significant number of visitors out of their automobiles to take a bike ride or walk along the tour road.

D. (Fail) The detached trail would not be able to relieve the vehicle loads on the tour road and parking lots, but would incur higher costs for maintenance.

E. (Neutral) Though it is expected to improve pedestrian and bicyclist safety along the tour road, it would not be able to reduce conflicts in the parking areas or on the tour road involving oversized vehicles.

This option is not carried forward to the next step of the study and is therefore eliminated from further consideration.

6) Alternate Infrastructure Improvements

The sixth construction option failed one criterion and passed or was neutral on others:

A. (Pass) In the short-term, this option would improve traffic circulations on the tour road and provide more efficient parking in the park, thus enhancing visitor experience. Due to the moderate improvements to roadway and parking infrastructure, visitor experience may be diminished in the future if the number of visitors increase significantly.

B. (Fail) Additional turn-around areas and pullouts would increase the paved footprint, although to much less extent compared with other major construction options, such as Option 4. Parking expansion to better accommodate oversized vehicles would impact the visual landscape immediately adjacent to the entrance station. Cultural and natural resource impacts could be difficult to mitigate.

C. (Neutral) This option is expected to moderately relieve parking congestion, but not traffic congestion in the other areas, in particular on the tour road involving oversized vehicles.

D. (Pass) A comprehensive program of alternative structural improvements could address deferred maintenance.

E. (Neutral) The safety benefit from this option is considered marginal, if any, for visitors on the tour road.

This option is not carried forward to the next step of the study and is therefore eliminated from further consideration.

7) Management Improvements

This no-build option, limited to management improvements only, is a relatively low-cost and low-impact approach to improving transportation at the park. It passed or was neutral in all the categories.

A. (Pass) This option would moderately improve visitor experience in the short-term by providing clear and updated information, wayfinding guidance, more efficient parking (in particular for oversized vehicles), etc. However, visitor experience is not expected to change significantly, and these benefits would diminish if visitor volumes grow significantly in the future.

B. (Neutral) Current visitor impacts to cultural and natural resources are not expected to change substantially, i.e., this option would not be able to reduce resource impacts.

C. (Pass) It is expected to moderately relieve parking congestion at the visitor center area, but not traffic congestion in the other areas, in particular involving oversized vehicles on the tour road.

D. (Neutral) This option would not substantially affect asset conditions.

E. (Neutral) Since it does not address the narrow tour road with outdated pavement design, this option would not be able to improve visitor safety on the tour road; however, it could improve safety in the parking lot at the visitor center.

As a result of the initial screening, this option was carried forward to the next step of the study for further refinement and evaluation.

8) Seasonal Reservation/ Permit System

A second no-build option to manage visitation through a reservation/permit system is relatively unfavorable; it failed one criterion and passed or was neutral on the remaining criteria:

A. (Fail) Although the experience of some visitors would be enhanced due to better visitor demand management, others might be discouraged if they come to the park and are denied access because they did not obtain a permit in advance. In particular, the park is considered as an intermediate, even impromptu, stop by many visitors on their way to somewhere else via I-90, and these visitors typically are unlikely to make reservations to the park in advance. Therefore, a reservation/permit system could have an overall negative impact on visitor experience and discourage many visitors from coming to the park.

B. (Neutral) Cultural and natural resource impacts are unlikely to change substantially with implementation of this option, although moderate mitigation may be expected due to reduced congestion at parking lots and on the tour road.

C. (Pass) It is expected to reduce traffic congestion on the tour road by better managing visitor distribution, in particular during the peak periods.

D. (Neutral) Although this option may help reduce the intensity of vehicle loads on the pavement, it is not expected to substantially improve asset conditions or ease asset management.

E. (Neutral) This option could improve visitor safety on the narrow tour road by reducing congestion, but the safety benefit would be marginal since the narrow tour road is not improved. Furthermore, the congestion would be shifted to the visitor center parking lots (if a permit is only required to drive on the tour road, not at the visitor center parking lots), where there would be increased potential for conflicts.

This option is not carried forward to the next step of the study and is therefore eliminated from further consideration.

9) Permanently Close Road to Motorized Vehicles and Maintain It as a Trail

The third no-build option is a more aggressive approach to managing visitation and relieving vehicle congestion by permanently closing the tour road. As described below, it failed in two categories and passed or was neutral on the others:

A. (Fail) It could discourage many visitors from venturing any farther than Last Stand Hill because motorized vehicles would not be allowed. Most of the visitors to the park come off I-90 for a relatively short stop, while on their way to somewhere else. Many of them may simply give up the idea of visiting the park once they learn that the tour road is closed to motorized vehicles.

B. (Pass) Reduced visitor use, in particular elimination of motorized vehicle use on the tour road, would have a positive impact on cultural and natural resources.

C. (Fail) Although it would prevent the tour road from having congestion, most cars might stay longer in the visitor center area, aggravating conflicts, congestion, and parking shortage in this area.

D. (Neutral) Although this option would benefit management of the tour road, the visitor center area is expected to be more difficult to manage and maintain.

E. (Neutral) It would improve safety on the tour road, but deteriorate safety conditions in the visitor center area.

This option is not carried forward to the next step of the study and is therefore eliminated from further consideration.

10) Voluntary Transit for All Visitors

The first transit option takes a voluntary approach and passed or was neutral in all categories:

A. (Pass) Visitor experience would be enhanced by reducing congestion and including interpretation with transit or tour operations. Visitors can choose between riding the transit vehicles or drive their own vehicle to tour through the battlefield.

B. (Pass) Cultural and natural resources would be better protected with a reduced number of cars on the tour road.

C. (Pass) With appropriate passenger incentive and offsite parking, this option would effectively reduce congestion and parking shortage.

D. (Neutral) Transit would facilitate better asset management and enhance park sustainability by reducing private motorized vehicles in the park or on the tour road; however, this option may not be very effective in reducing oversized vehicles in the park. Furthermore, it requires substantial staffing resources to manage the contract with a concessioner to provide the transit service.

E. (Pass) It would offer safety benefits to passengers who would otherwise have to drive their own cars on the narrow tour road.

As a result of the initial screening, this option was carried forward to the next step of the study for further refinement and evaluation.

11) Mandatory Peak/Seasonal/Special Events Transit

This mandatory peak transit option is presented as part of a suite of mandatory transit options (11, 12, and 13). It failed in one category and passed or was neutral in other categories:

A. (Fail) For visitors who would prefer transit rather than driving their own vehicles, their experience would be enhanced by reduced or eliminated congestion and the ability to include interpretation with transit or tour operations. However, most of the visitors to the park come off I-90 for a relatively short stop, while on their way to somewhere else. Many of them would be discouraged from visiting the park once they learn that they have to leave their vehicles at an off- or on-site parking lot and take transit to the tour road.

B. (Pass) It would minimize visitor impacts on cultural and natural resources by significantly reducing the number of vehicles on the tour road and in the visitor center area (with offsite parking).

C. (Neutral) With offsite parking, this option is expected to significantly reduce or eliminate traffic congestion on the tour road and in the visitor center area. If offsite parking cannot be provided, it could substantially aggravate parking shortage in the visitor center area.

D. (Neutral) Transit would facilitate better asset management by reducing the number of vehicles on the tour road during peak periods. If offsite parking cannot be provided, it could substantially aggravate parking congestion in the visitor center area and make it more difficult to manage assets in this area.

E. (Pass) It would offer significant safety benefits by reducing vehicular volumes in the park.

This option is not carried forward to the next step of the study and is therefore eliminated from further consideration.

12) Mandatory Peak/Seasonal/Special Events Transit for Visitors with Oversized Vehicles

This mandatory transit option would require oversized vehicle users to take the transit. Visitors with regular size vehicles would be able to choose between using their own vehicles or take the transit. Similar to option #11, this option failed in one category and passed or was neutral in other categories:

A. (Fail) For visitors who would prefer transit rather than driving their own vehicles, their experience would be enhanced by reduced congestion and the ability to include interpretation with transit or tour operations. However, most of the visitors to the park come off I-90 for a relatively short stop, while on their way to somewhere else. Due to the "passer-by" nature of their trips to the park, many oversized vehicle users would perceive it as very inconvenient that they have to leave their vehicles at an off- or on-site parking lot and take transit to the tour road.

B. (Pass) Cultural and natural resources would be better protected due to significant reduction of oversized vehicles on the tour road, since in recent years up to 25% of vehicles entering the park are oversized vehicles.

C. (Neutral) Traffic congestion on the tour road is expected to be reduced due to significantly fewer oversized vehicles. However, if sufficient offsite parking cannot be provided, parking shortage at the visitor center area could be aggravated.

D. (Neutral) This transit option would facilitate better asset management by restricting oversized vehicles on the tour road during peak periods. If offsite parking cannot be provided, it could aggravate parking congestion, in particular for oversized vehicles, in the visitor center area and make it more difficult to manage assets in this area.

E. (Pass) Visitor safety would be improved due to the restriction of oversized vehicles on the tour road during peak periods.

This option is not carried forward to the next step of the study and is therefore eliminated from further consideration.

13) Mandatory Year-round Transit for All Visitors with Motorized Vehicles

This is the most aggressive transit option being evaluated. It failed in two categories and passed others:

A. (Fail) For visitors who would prefer transit rather than driving their own vehicles, their experience would be enhanced by reduced congestion and the ability to include interpretation with transit or tour operations. However, most of the visitors to the park come off I-90 for a relatively short stop, while on their way to somewhere else. Due to the "passer-by" nature of their trips to the park, many users would perceive it as very inconvenient that they have to leave their vehicles at an off- or on-site parking lot and take transit to the tour road. Furthermore, requiring visitors to take transit during the off-peak seasons, when visitor volumes are usually low, are likely to cause visitor frustration and confusion.

B. (Pass) This option would minimize visitor impact on cultural and natural resources by keeping private vehicles off the tour road.

C. (Pass) By keeping private vehicles off the tour road or out of the park (when sufficient offsite parking is provided), this option would effectively eliminate vehicle-related congestion and parking shortage in the park.

D. (Fail) Mandatory transit would facilitate better asset management and reduce pavement deterioration; however, it would be uneconomical and difficult to maintain and operate a transit system during off-peak seasons when visitation is low.

E. (Pass) Mandatory transit is expected to offer safety benefits to all visitors by significantly reducing the number and severity of vehicle-related conflicts in the park.

This option is not carried forward to the next step of the study and is therefore eliminated from further consideration.

3.4 OPTIONS RECOMMENDED FOR FURTHER DEVELOPMENT

As described in the previous subsection, 5 of the 13 initial options rated neutral or pass in all categories, while the others failed in at least one category. The study team determined that those options passing or neutral in all of the initial screening criteria would be carried forward to the next stage of further development and refinement and subjected to detailed screening.

In summary, three distinctive construction options, one no-build (management improvements), and one transit option were recommended to be continued to the next stage of development and detailed screening. The results from the initial screening are listed in Table 3-3.

Table 3-3: Recommended Options for Further Development

Initial Screening Options	Initial Screening Results	Further Refinement and Evaluation
CONSTRUCTION OPTIONS		
1) Repair Tour Road and Reconfigure Parking	Pass or Neutral	Yes
2) Widen Road and Expand Existing Parking Lots (4R Project)	Pass or Neutral	Yes
3) One-Way Loop via I-90 Frontage Road (GMP Option)	Pass or Neutral	Yes
4) One-Way Loop via U.S. 212	Fail	No
5) Detached Multi-use Trail Paralleling the Tour Road	Fail	No
6) Alternate Infrastructure Improvements	Fail	No
NO-BUILD OPTIONS		
7) Management Improvements	Pass or Neutral	Yes
8) Seasonal Reservation/ Permit System	Fail	No
9) Permanently Close Road to Motorized Vehicles and Maintain it as a Trail	Fail	No
TRANSIT OPTIONS		
10) Voluntary Transit for All Visitors	Pass or Neutral	Yes
11) Mandatory Peak/Seasonal/Special Events Transit for All Visitors with Motorized Vehicles	Fail	No
12) Mandatory Transit for Visitors with Oversized Vehicles	Fail	No
13) Mandatory Year-round Transit for All Visitors with Motorized Vehicles	Fail	No

Source: URS Corporation.

4. DETAILED SCREENING

The second step of the development and evaluation of options process, detailed screening, involved the refinement of the options that passed the initial screening to a greater level of detail, as well as application of a set of detailed screening criteria to evaluate the transportation options. This section presents the refinement and evaluation process and results from the detailed screening.

4.1 REFINEMENT OF TRANSPORTATION OPTIONS

This subsection presents and defines the refined transportation options, following the initial screening and further development and analysis. Input from the Evaluation of Options Workshop that was conducted at the park on May 7, 2012 (Appendix C) was taken into consideration. It is noted that options 1, 2, 3, and 7 have been renamed Options I, II, III, and IV for the detailed screening. Option 10 evolved into three transit options V, VI-A, and VI-B for the detailed screening.

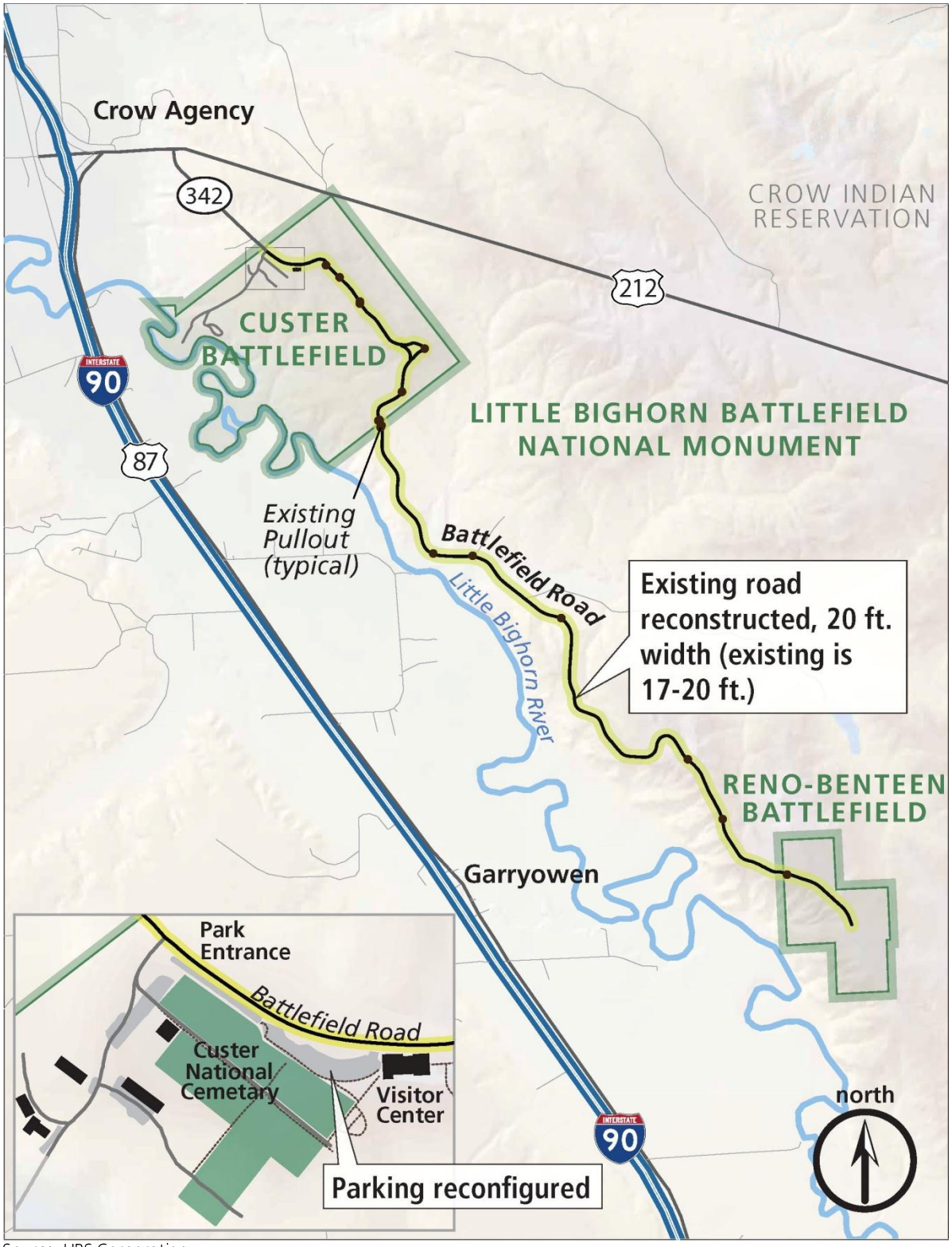
Option I – Repair the Tour Road and Reconfigure Parking

Option I is a reconstruction project that would repair, but not substantially increase, the footprint of the existing tour road. This option is illustrated in Figure 4-1 and Figure 4-2. The following proposed features define the key components of this transportation option:

1. The tour road from the visitor center to Reno-Benteen Battlefield, approximately 5.2 miles in length, would be rehabilitated to correct structural deficiencies. The repaired road should have an enhanced pavement structure that is sufficient to withstand repeated loads of oversized vehicles.

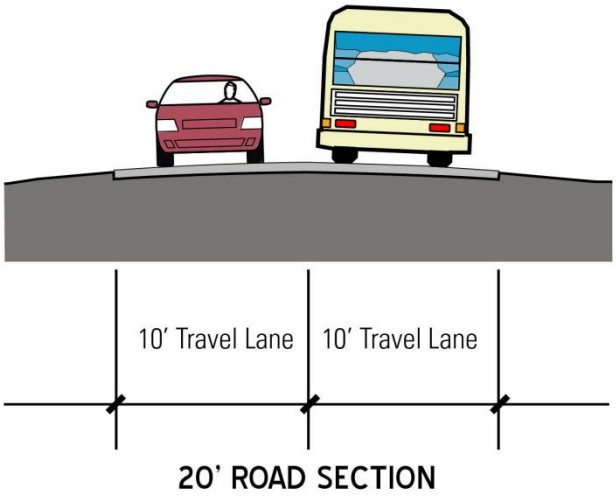
2. Construction work on the tour road also includes minor widening of the tour road, where necessary, to a consistent 20-foot pavement width (Figure 4-2); applying new or recycled layer(s) of pavement material to restore or enhance the ride quality; and improving drainage where necessary.
3. Horizontal and vertical realignment and reconstruction are NOT included in this option.
4. Repairs to the tour road would be properly engineered and may widen the road slightly for standardization and proper construction.
5. The tour road improvements would work with existing cattle guards and box culverts.
6. Shoulders would not be provided; however, proper roadside treatment, such as side slopes, would be created to improve safety.
7. Parking lots would be reconfigured or restriped without enlarging the footprint. Appropriate signs which provide wayfinding guidance and redistribute parking to less congested areas should also be installed.
8. This option does not include new or expanded transit service for visitors, but would accommodate the existing interpretive Apsaalooke tours.

Figure 4-1: Option I – Repair Existing Road



Source: URS Corporation.

Figure 4-2: Proposed Cross-section for Option I



Source: URS Corporation.

Option II – Widen the Tour Road and Expand Existing Parking Lots (4R Project)

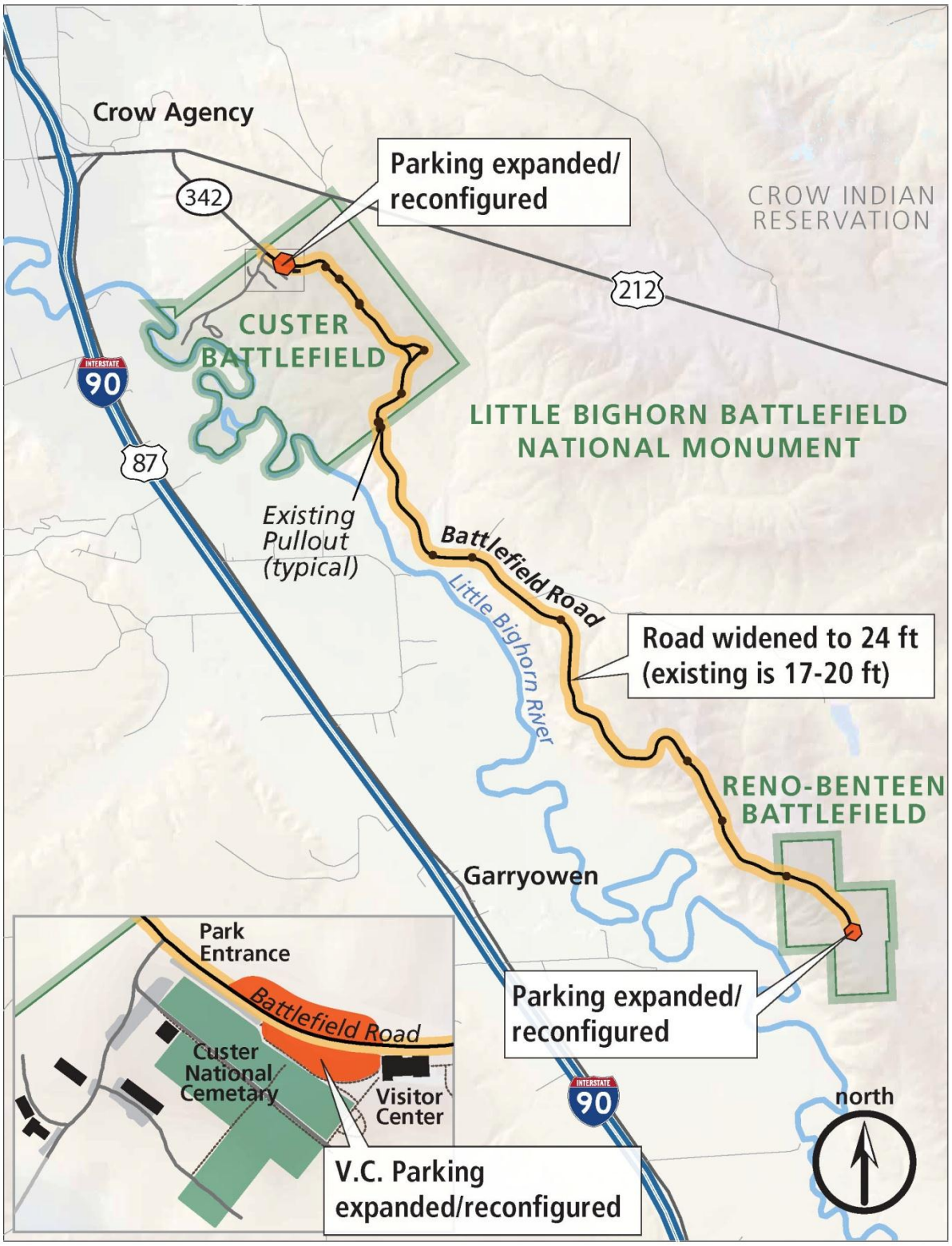
This option consists of a resurfacing, restoration, rehabilitation, and reconstruction (4R) project that would widen the tour road from an average 18-foot width to 24-feet wide, correct structural deficiencies of the pavement, and improve horizontal and vertical alignment. The widened tour road will have two 11-foot travel lanes with one-foot shoulders on both sides.

In addition to roadway widening and reconstruction, parking at the visitor center and Reno-Benteen Battlefield would be modified and expanded to include bus pull-outs, motorcycle parking, better accommodations for oversized vehicles, and improved traffic flow. In total, 34 new parking spaces would be added in the park.

This option was the preferred alternative in the *2005 Environmental Assessment/Assessment of Effect: Rehabilitate Tour Road*. Although this option does not include new or expanded transit service, it would not preclude transit; the widened tour road could support future shuttle service with larger transit vehicles and the improved visitor center parking lot could serve as a staging area for transit.

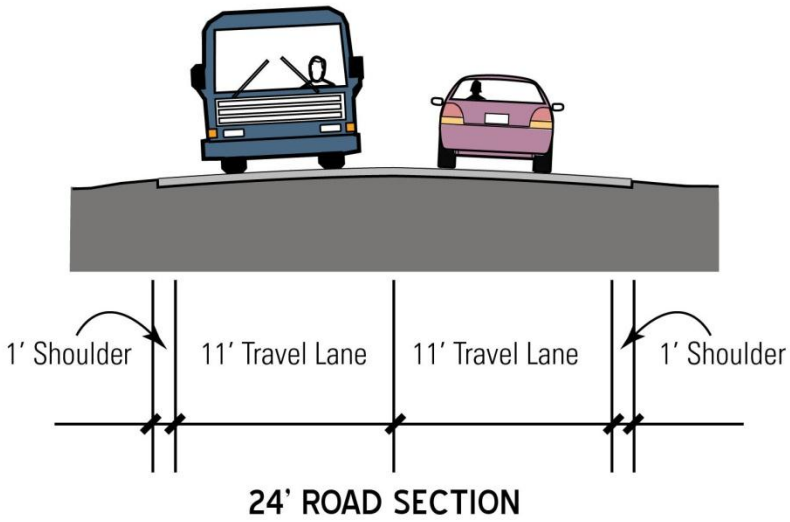
This option is illustrated in Figure 4-3 and Figure 4-4.

Figure 4-3: Option II - 4R Road Widening and Parking Expansion



Source: URS Corporation.

Figure 4-4: Proposed Cross-section for Option II



Source: URS Corporation.

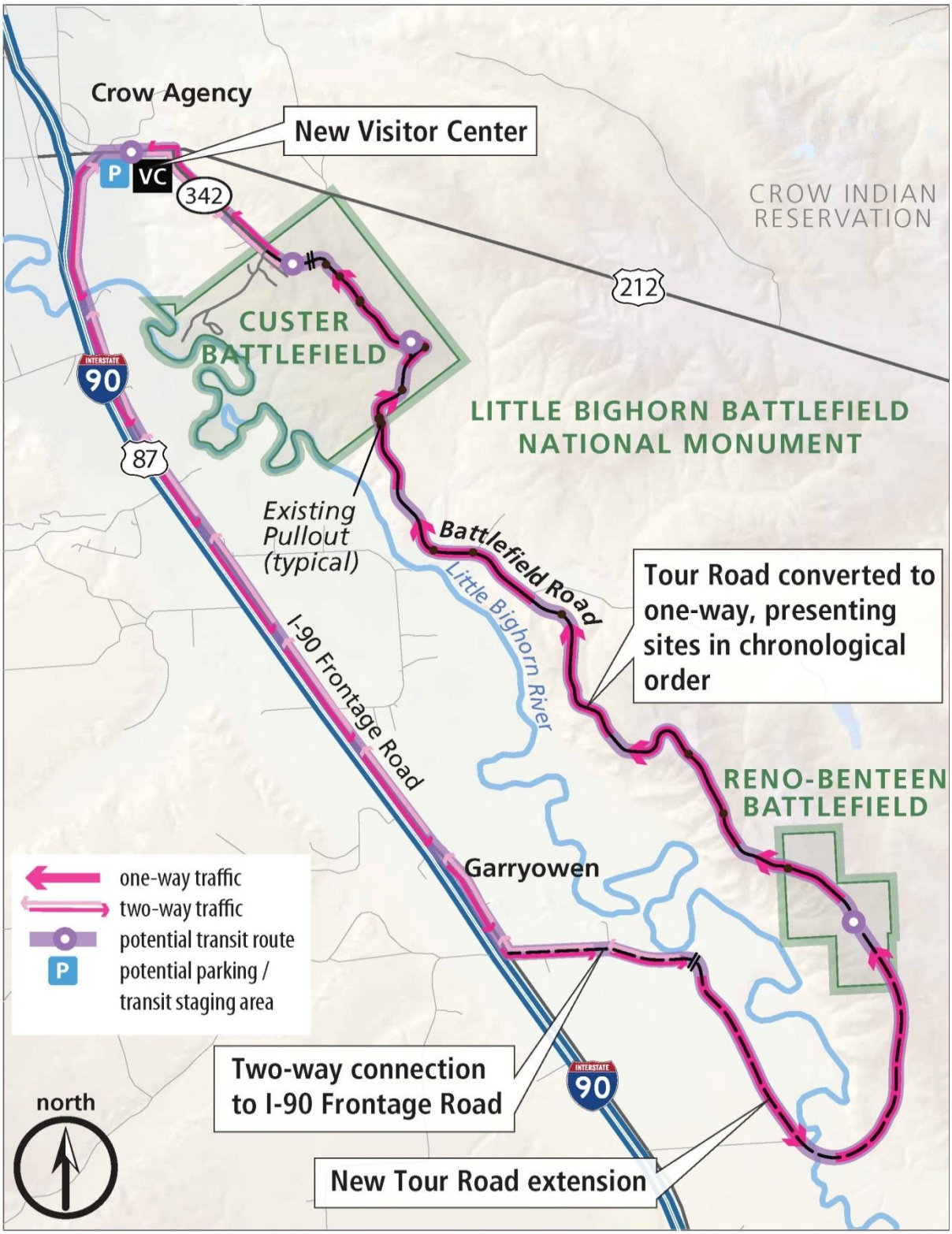
Option III – GMP One-Way Tour Loop via I-90 Frontage Road

This option would extend the tour road from Reno-Benteen Battlefield south and west to the I-90 frontage road, forming a counter-clockwise one-way tour loop. The park's General Management Plan (originally published in 1986 and updated in 1995) calls for a new visitor orientation/administration facility which should be located with convenient access from I-90. The tour would start at the new visitor orientation facility, proceed on the I-90 frontage road to Reno's first skirmish line site at Garryowen, and then cross under I-90 to arrive at Reno's Crossing. The tour would then follow a new one-way road from Reno's crossing, extend southeast along the west side of the Little Bighorn River to Reno Creek, enter the existing Reno-Benteen Battlefield from the south, connect with the existing tour road, and proceed over the tour road to Last Stand Hill. This option is illustrated in Figure 4-5.

Key features of this transportation option include:

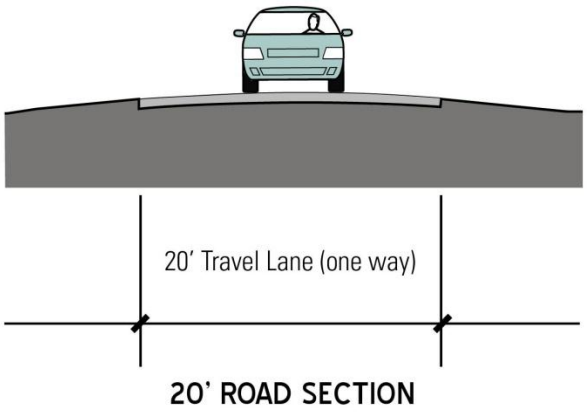
- A proposed tour road extension from Reno-Benteen Battlefield south and west to the I-90 frontage road would form a counter-clockwise one-way tour loop. This one-way loop would provide visitors the opportunity to tour the battlefield in a correct, chronological order.
- The existing tour road from the visitor center to Reno-Benteen Battlefield, approximately 5.2 miles in length, would be rehabilitated to correct structural deficiencies. The repaired road would have an enhanced pavement structure that is sufficient to withstand repeated loads of oversized vehicles.
- Construction work on the tour road also includes minor widening of the tour road, where necessary, to a consistent 20-foot pavement (Figure 4-6); applying new or recycled layer(s) of pavement material to restore or enhance the ride quality; and improving drainage where necessary.
- The repaired tour road would be converted from two-way to one-way from Reno-Benteen Battlefield to Last Stand Hill. The 20-foot wide pavement would be striped and signed to clearly designate the one-lane, one-way operation.

Figure 4-5: Option III - GMP One-way Tour Loop via I-90 Frontage Road



Source: URS Corporation.

Figure 4-6: Proposed Cross-section for Option III on Existing Tour Road



Source: URS Corporation.

- This option includes a seasonal transit service that would provide shuttle tours from Memorial Day through Labor Day. The shuttle tours provide a large percentage of the annual visitation the opportunity of a guided tour of the battlefield and its environments.
- New visitor parking lots would be constructed at the new visitor orientation facility and at the Reno-Crossing site west of the Little Bighorn River, where the new one-way road begins.
- For visitors who would like to tour the battlefield, they can choose to take the shuttle tour or use their own vehicles to proceed through the one-way loop; for visitors who only intend to visit the Last Stand Hill or the national cemetery, they may drive along the current access road, Montana Highway 342, from the north to enter the park at the existing entrance station.

Option IV – Management Improvements

This option is a collection of lower-cost and lower-impact operational changes to enhance the visitor experience. It utilizes existing facilities but seeks to improve communications with visitors and to smooth parking. Option IV includes various elements that could be implemented at the discretion of park management, including seasonal, peak time, and trial applications. Key features include:

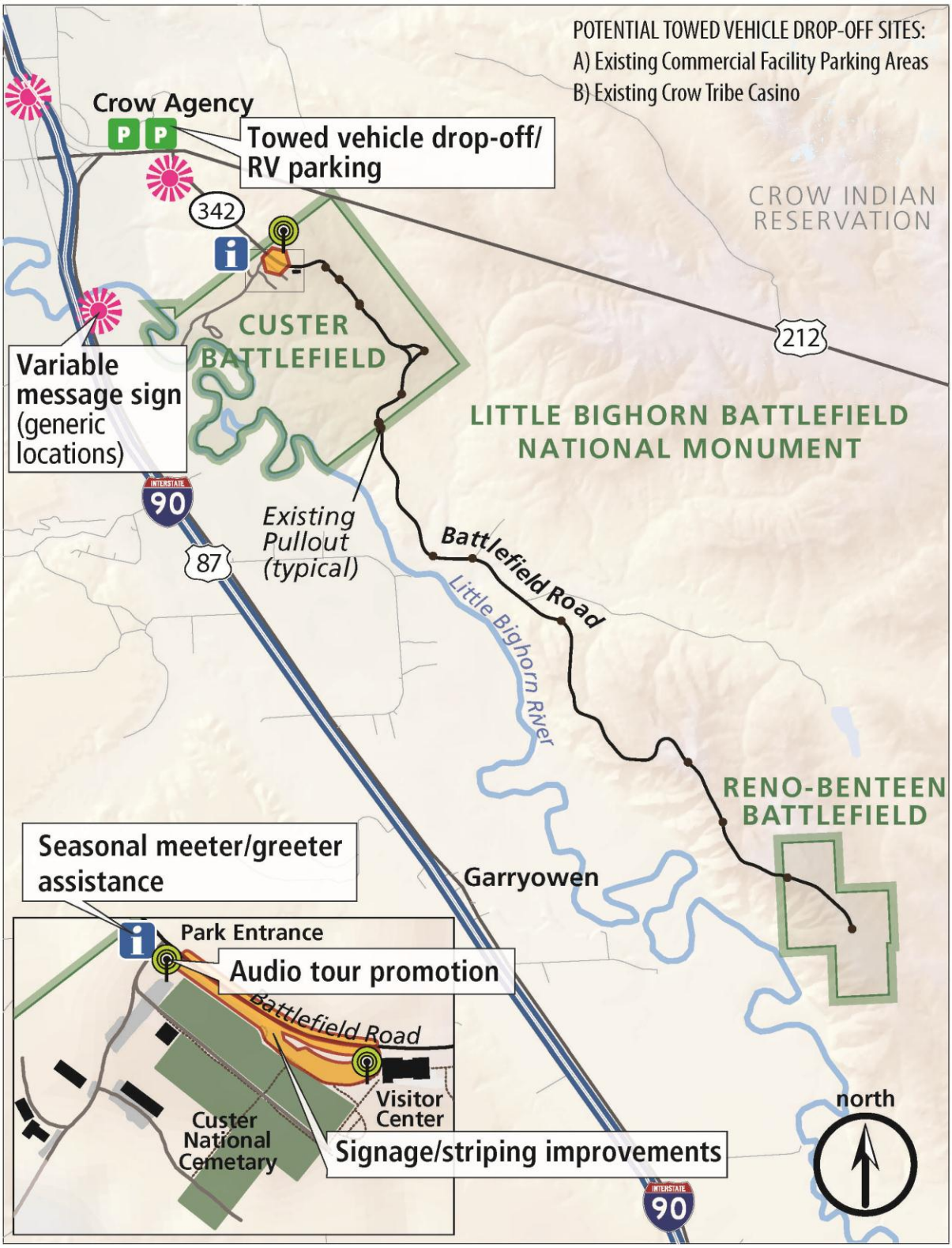
- Variable message signs (VMS) could be installed on I-90 and on the access road (Montana Highway 342) before the entrance station. The message signs could alert visitors to parking options and restriction, including oversized vehicles, and provide information about special events such as times or special limitations.
- The park's internal signage/striping could be improved. The following recommendations from the 2010 Upchurch report have been retained:
    - New signage would direct visitors to additional parking areas located by the Stone House and the visitor center.
    - Change "Towed Vehicle Parking Only" to "Oversized Vehicle Parking Only." Supplement with pavement markings adjacent to the edge line that read, "Oversized Vehicles Only."

  - New signage on the west side of the oversized vehicle parking area (the curb north and south of the restrooms) to indicate oversized vehicles only.
  - "Additional Car Parking" directional signing at both the beginning and end of the island (north and south of the restrooms) to direct regular sized vehicles to main road parking area.

- Visitor Use Assistant(s) (VUA) could be employed on a seasonal basis to assist with managing visitors and congestion. The VUAs would proactively direct visitors to available parking and provide other critical information to entering visitors to help mitigate congestion, especially during peak events. The use of volunteers to assist with parking management is not included due to staff impacts in arranging for and managing the volunteers. The seasonal employee could:
  - Be stationed or float around inside the entrance station and parking areas to assist visitors with wayfinding and parking.
  - Help reduce regular vehicle parking in the oversized vehicle parking area.
  - Discourage parking in non-designated locations.
  - Promote use of the park's audio tour at peak times when parking is unavailable at visitor center.
  - Alternatively, existing park staff could continue to carry out these duties as part of their "collateral duties." The use of existing staff would be more flexible, only requiring deployment at peak times. However, this variation takes staff time away from other important duties.
- The visitor center parking area could be signed with time limits to encourage turnover, such as a one-hour time limit from 9 a.m. to 3 p.m. Although enforcement of time restrictions in the parking area could be difficult and require extra efforts of park staff, these restrictions have the potential to substantially mitigate congestions and conflicts in the parking area.
- Additional turnover at the visitor center parking lots could be encouraged by shortening the length of the visitor orientation movie and program.
- The park could provide cemetery tours to attract parking into the Stone House lot. While this element requires additional programming, this management strategy does not require significant construction and redistributes parking activities away from the visitor center parking lots.
- A wayfinding plan should be developed and implemented to provide clear guidance for visitors to access the park and tour the battlefield. Although the various VMS and traditional signing and striping, as described in this subsection, would collectively serve the wayfinding purpose, a comprehensive wayfinding plan should also consider other media such as the Internet, HAR, 511 phone, etc.
- No significant changes are proposed for the tour road. This option does not increase the paved footprint, nor requires construction.
- An offsite parking lot should be provided, via partnership with existing land owners, for towed vehicle drop-off and recreational vehicles that tow a smaller automobile. Potential locations include the old casino parking lot and other underutilized parking areas adjacent to the junction of US 212 and MT 342.

Some of the key features in this option are illustrated in Figure 4-7.

Figure 4-7: Option IV – Management Improvements



Source: URS Corporation.

The only transit option that passed the initial screening – Peak Period/Special Events/Seasonal Voluntary Transit – was further developed into three transit options as described below.

Option V – Seasonal Transit from Offsite Staging/Parking to Visitor Center

This option would provide a seasonal shuttle service for visitors to access the park. Key features of this option are described below:

- A shuttle service would be provided between an offsite staging/parking area and the visitor center during the summer season. No intermediate shuttle stops would be provided.
- The operating season/time would be Memorial Day to Labor Day (approximately 14 weeks), 9 a.m. to 5 p.m.
- The shuttle service is not offered on the tour road south of the visitor center.
- Visitors can choose to take the shuttle or use their own vehicles, and they are allowed to use designated visitor parking inside the park, at the visitor center area, and at Reno-Benteen Battlefield.
- Variable messaging signs, as well as traditional signs and pavement markings, would be installed to notify visitors of the available shuttle, parking locations and limitations, and options to access the park.
- Under this option, Option I – Repairing Tour Road and Reconfiguring Parking would be included as one element.
- Clear message needs to be delivered to visitors that if they plan to tour the battlefield via the tour road, there is no transit service on the tour road and they would have to use their own vehicles. This could be delivered prior to and at the staging area, on the access road, and at the entrance station using variable message signs, traditional information signs, transit contractor's staff, and fee collection staff.

This option is illustrated in Figure 4-8.

Figure 4-8: Option V – Seasonal Transit from Offsite Staging/Parking to Visitor Center

Source: URS Corporation.

Option VI-A – Seasonal Transit from Offsite Staging/Parking to Reno-Benteen Battlefield

This option would provide a seasonal shuttle service for visitors to access the park and see sights along the tour road. Key features of this option are described below:

- A shuttle service would be provided between an offsite staging/parking area, the visitor center, and Reno-Benteen Battlefield.
- Three shuttle stops are recommended: visitor center, Last Stand Hill, and the Reno-Benteen parking lot. Each stop would have a bus pull-out, a bench, and a bus sign with a supplemental plaque of appropriate schedule information. Rest facilities, such as a shelter and a restroom, will not be included at the remote sites due to significant visual impacts on the sensitive battlefield landscape.
- Shuttle stops outside of the park boundaries along the tour road are not recommended, since the park discourages parking or walking outside of the park boundaries which are mostly private properties, although the park has a 60-foot right of way along the tour road.
- Visitors can choose to take the shuttle or use their own vehicles to access the park and tour the battlefield, and they are allowed to use designated visitor parking inside the park, at the visitor center area and at Reno-Benteen Battlefield.
- The operating season/time would be Memorial Day to Labor Day (approximately 14 weeks), 9 a.m. to 5 p.m.
- Variable messaging signs, as well as traditional signs and pavement markings, would be installed to notify visitors of the available shuttle, parking locations and limitations, and options to access the park.
- Under this option, Option I – Repairing Tour Road and Reconfiguring Parking will be included as one element.

Option VI-B – Peak Days Transit from Offsite Staging/Parking to Reno-Benteen Battlefield

This transit option is very similar to Option VI-A. The only difference is that Option VI-B only provides a shuttle service during a few peak visitation days in the summer (approximately 10-15 days), including some special events (such as the park's Anniversary on June 25); while Option VI-A provides a seasonal shuttle service from Memorial Day to Labor Day. Due to their similarities, these two transit options are numbered with the same Roman number "VI", but with a different letter designation A and B.

The rationale for Option VI-B, as a variation of Option VI-A is to create a transit option that is focused only on the days when traffic, parking, and circulation are most adverse and would most benefit from transit. This approach could potentially reduce total life cycle costs for the transit operation while achieving the most important benefits for the park and the visitors. This variation concept emerged from discussions after the Evaluation of Options Workshop held in May 2012.

The characteristics of this transit variation would be essentially identical to those of Option VI-A in terms of time span of service, staging, route, etc. Bus frequency/headway would be dependent on the demand level during those peak days as well as vehicle type from the contractor. Transportation fee

collection procedures could remain the same as for the seasonal transit but may be lower due to the expected lower total life cycle cost of this concept compared to the full seasonal transit option.

The peak days only transit option introduces several issues and risks compared to the full seasonal transit service. There may be confusion for both park staff and visitors about which days have transit. Signing, web sites, and other information would need to be very clear regarding the occasional availability of the transit service. There may not be consistent staffing / drivers over the summer due to the sporadic nature of the service. Buses for this concept are most likely to come from an existing fleet (as opposed to a park-dedicated fleet for the full seasonal transit) that is available during the summer such as school buses, or other fleets with peaks in the winter recreation season. The buses would likely not have a park themed "livery" (paint scheme) to fit the park setting and make them easily identifiable and attractive. Finally, there is some risk that a willing entity may not be found to contract for so few days spread out over the summer months. But perhaps a partnership can be developed with another entity that has underutilized vehicles available during the summer months. These potential partners include a nearby school district or its transportation provider, and recreation facilities that have transit resources but whose peak season is in the winter months.

Due to its relatively low total lifecycle costs and effectiveness in mitigating the most severe traffic congestion, safety, and parking shortage by focusing on the relatively few peak days, Option VI-B could be implemented as a special events management strategy for other non-transit options, including Options I to IV. It could also be considered as the first phase, or a pilot transit program, for the full-seasonal transit options including Options V and VI-A.

Transit options VI-A and VI-B are illustrated in Figure 4-9.

Figure 4-9: Options VI-A and VI-B – Transit from Offsite Staging/Parking to Reno-Benteen Battlefield

Source: URS Corporation.

4.2 DETAILED SCREENING CRITERIA

The transportation options, as described in subsection 4.1, were evaluated and ranked according to more refined screening criteria, with the goal of identifying a list of feasible options. These options are expected to be carried forward by the National Park Service for a potential environmental compliance and planning process which is not in the scope of this study. The criteria used for detailed screening is presented in Table 4-1.

Some of the criteria in the table, including safety improvements, parking availability, and changes in delay and congestion, were also used for initial screening. However, the objective of initial screening is to simply determine whether an option would "pass," be "neutral" to, or "fail" a criterion; while the detailed screening uses more quantitative measures (on a scale of 0 to 10) and weighting factors so that options can be ranked from high to low based on their measurement on the weighted criteria.

Table 4-1: Detailed Screening Criteria

Category	Criteria	Measure/Unit	Effects/ Impacts	Weighting Factor	Sub Total
General Impacts to Park Resources, Visitor Experience, and Management	Reduction in vehicle miles traveled (VMT)	VMT	Direct	7%	60%
	Reduction in vehicle emissions	tons, cubic feet	Indirect and Cumulative	10%	
	Footprint for additional transportation infrastructure	square feet	Direct and Cumulative	10%	
	Changes in delay and congestion	0-10 with 10 being best		7%	
	Parking availability	0-10 with 10 being best		7%	
	Safety improvement	0-10 with 10 being best		7%	
	Convenience and comfort	0-10 with 10 being best		7%	
	General impacts to park staff and management	0-10 with 10 being best		5%	
Financial Feasibility	Total Cost of Ownership	US Dollars		18%	40%
	Revenue	US Dollars		10%	
	Funding Sources and Cost Sharing	0-10 with 10 being best		12%	

Source: URS Corporation.

Notes: Estimated values (measures/units) of each criterion will be converted proportionally to a rating score of 0-10 (0 being the worst, 10 being the best) before multiplying an assigned weighting factor.

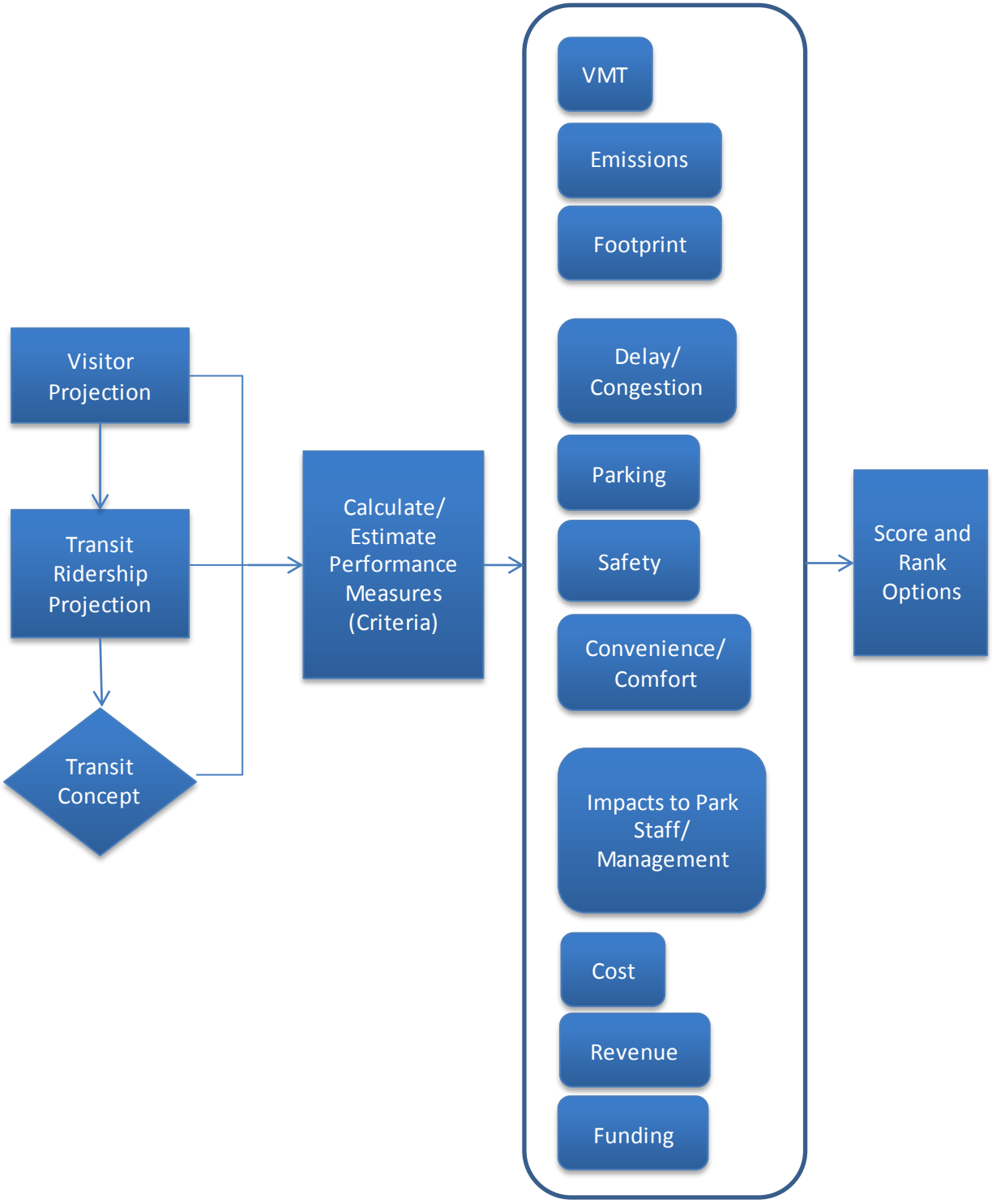
The total of weighting factors of all criteria is 100%.

The following discussions are intended to assist readers in understanding how these criteria were applied:

1. Each of the 11 criteria listed in Table 4-1 can be considered as a "performance measure" for the corresponding impact category. For instance, reduction in Vehicle Miles Traveled (VMT) is a performance measure for general impacts to natural and cultural resources, while total cost of ownership is a performance measure for financial feasibility.
2. Three criteria – reduction in VMT, reduction in emissions, and footprint increase – collectively measure the extent of general impacts to natural and cultural resources. All these criteria are quantitative measures that can be calculated for each transportation option.
3. Four criteria – change in delay and congestion, parking availability, safety improvement, and convenience and comfort – collectively measure the general impacts to visitor experience. These are used as qualitative measures and were estimated, using a scale 0-10 (a higher score represents less impact), for each transportation option.
4. The criterion "General impacts to park staff and management" is used to consider how each transportation option would affect park management, in terms of staffing, budget, maintenance, operation, enforcement, etc. on a scale 0-10.
5. Three criteria – total cost of ownership, revenue, and funding sources and cost sharing – collectively measure the financial feasibility of each transportation option. Costs and revenue are both quantitative measures and were calculated for each transportation option. The third criterion, funding sources/availability and cost sharing opportunities, is a qualitative measure and was estimated for each option.
6. For quantitative criteria, such as reduction in VMT, each option was scored at a scale 0-10 with 10 being best (i.e., least impact). For qualitative criteria, such as safety improvement, the numerical assessment (0-10) of each option automatically transferred into a score of 0-10.
7. For each criterion, one of the seven transportation options (Option I to VI-B) would score zero while another option would score 10. In other words, both ends of the score spectrum (0-10) would be assigned to a transportation option.
8. After each transportation option is assigned a score (0-10) on all 11 criteria, the 11 scores of the option would be weighted using their corresponding weighting factors (in percentage), resulting a single weighted score.
9. Each criterion has a weighting factor, expressed as percentage, which represents the relative importance of the criterion – compared with other criteria – in scoring the transportation options. These weighting factors were discussed during the Evaluation of Options Workshop, held at the park on May 7, 2012, and agreed upon by workshop participants.

The flow chart in Figure 4-10 illustrates major steps of the detailed screening process. Following subsections of this section describe each major step, estimated or calculated performance measures (screening criteria), and how these performance measures were used to score and rank the seven options.

Figure 4-10: Detailed Screening Process



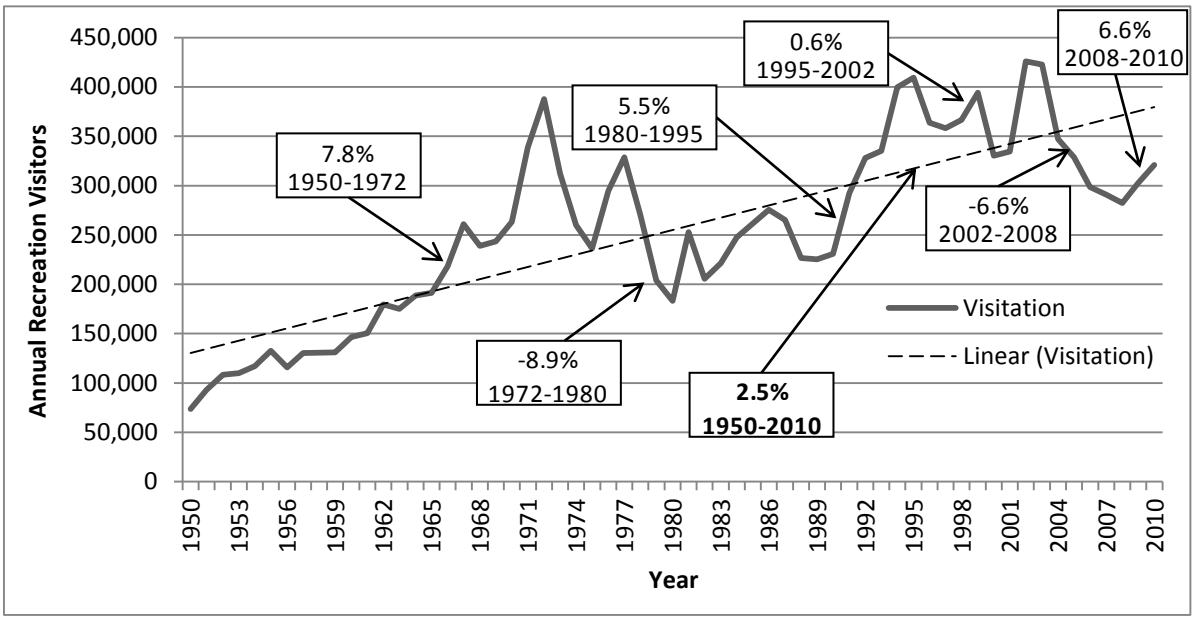
Source: URS Corporation.

4.3 VISITOR PROJECTION

The Existing Conditions Memorandum (Appendix A) evaluated visitation trends in terms of annual, monthly, and daily (Design Day) visitation and traffic circulation patterns in the park. However, this ATFS needs to account for future conditions as well, typical for similar planning studies. Therefore the existing data must be projected to estimate future conditions. Since a regional or area travel/visitor demand forecasting model does not exist for many national parks, including Little Bighorn Battlefield National Monument, projections are typically performed by factoring existing visitor data by a long-term annual visitation growth rate.

Since recreation visits to the park are discretionary and may not have been planned well in advance – most of the visitors come off I-90 for a relative short stay at the park while on their way to elsewhere, determining the appropriate growth rate for visitor projections can be difficult. Short-term events such as rising and falling gas prices and weather can cause substantial variations in visitation. Therefore, it is important to consider annual visitation variations over a long period. Federal Transit Administration (FTA) suggests that a minimum of past ten years need to be evaluated while projecting future visitor volumes for Federal Land Management Areas (FLMA)[13]. Figure 4-11 revisits historical visitor volumes to the park presented in the Existing Conditions Memorandum (Appendix A).

Figure 4-11: Annual Recreation Visitors 1950-2010



Source: NPS Public Use Statistics Office. Data Compiled by URS Corporation.

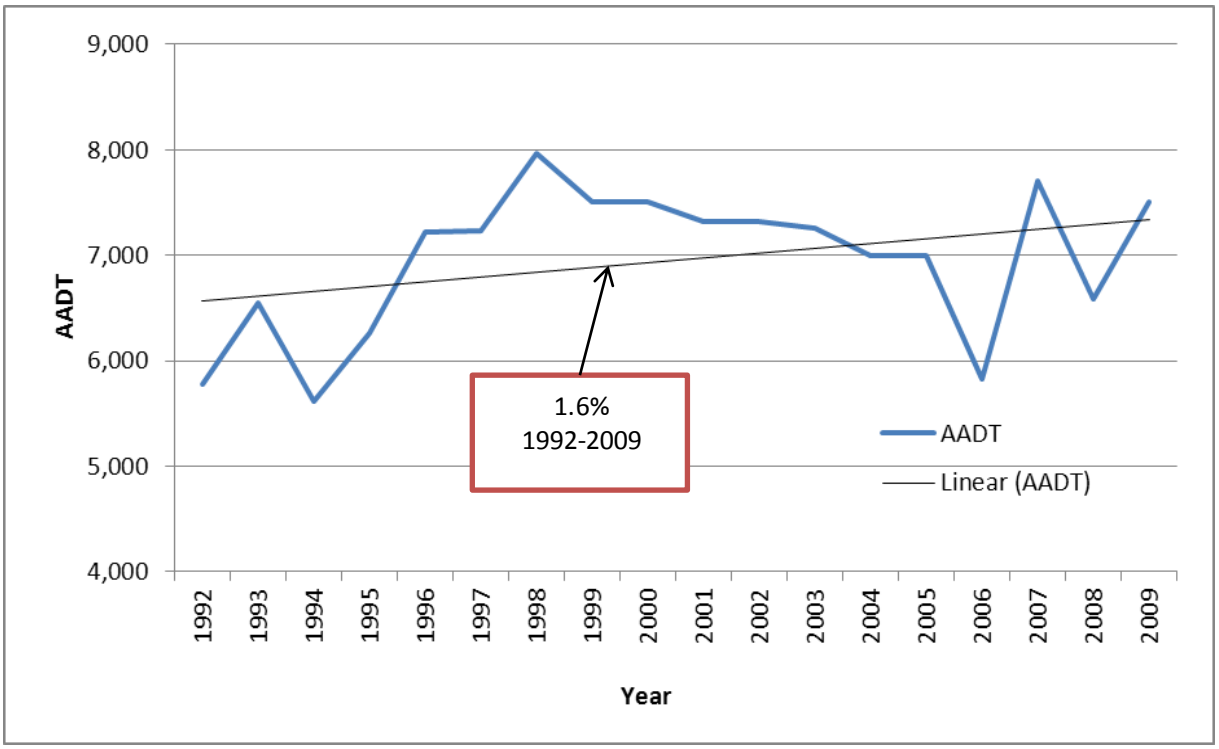
Recreation visitation to Little Bighorn Battlefield National Monument experienced significant fluctuations over the last six decades, as shown in Figure 4-11. From 1950 to 1972, visitation increased by over four times, or 7.8% per year; between 1972 and 1980, visitation fell by almost 9% a year; from 1980 to 1995, visitation on average increased by 5.5% a year and then stayed relatively stable until 2002, although there had been large spikes in between these years; between 2002 and

13 Transportation Planning Process for Transit in Federal Land Management Areas, Volume Three: Methods to Define the Transit Need. Federal Transit Administration. April 2008.

2008, visitation fell by an average 6.6% a year. Recently, annual visitors have been increasing again over the past three years (2008-2010) by approximately 6.6% a year. Overall, visitation has increased by approximately 2.5% a year over the past six decades. It should be noted that this average growth rate is a result of a linear regression of the last six decades, which accounted for the fluctuation of year-by-year visitation.

Since most visitors come to the park via I-90, it is worthwhile to explore the relationship between visitation to the park and traffic volumes on I-90. The study team analyzed historical traffic volumes on I-90 mainline, collected by Montana Department of Transportation (MDOT) at the Crow Agency Interchange area[14], as supplemental data for visitor growth rate analysis. Figure 4-12 displays traffic volume fluctuations on I-90 over the 18-year period between 1992 and 2009. The average traffic growth rate on I-90 is approximately 1.6% per year between 1992 and 2009.

Figure 4-12: Traffic Volumes on I-90



Source: Montana Department of Transportation.

Notes: AADT – Annual average daily traffic. Traffic counter located on I-90 at Mile Post 509 + 0.231.

Considering long-term visitor growth (2.5% a year from 1950 to 2010) and traffic growth on I-90 (1992-2009), as well as consultation with park staff concerning recent visitation trend, the study team decided to use a growth rate of 1.0% per year for visitation projections. Future year visitor projection was then performed by factoring this annual growth rate to 2010 annual visitors, as displayed in Table 4-2.

From 2010 to 2030, annual park visitors are estimated to increase from 321,000 to approximately 392,000, a 22% growth over the next 20 years. It should be noted that the projected annual visitation

14. *Traffic Data Collection and Analysis*, Montana Department of Transportation, webpage: http://www.mdt.mt.gov/publications/datastats/traffic_maps.shtml. Website accessed January 2011.

in year 2030 is still substantially lower than the park's historically highest annual visitation, which was close to 426,000 visitors in 2002.

The total number of vehicles that enter the park per year was calculated using estimated number of recreation visitors and factors suggested by the NPS Public Use Statistics Office[15], as follows:

*(Annual Total Vehicles) = (Annual Recreation Visitors) / (0.99*2.6)*

Where 0.99 = percentage of recreation vehicles, 2.6 = persons per vehicle multiplier

Table 4-2: Estimated Future Annual Visitation

Year	Recreational Visitors	Total Vehicles
2012	327,410	127,200
2013	330,680	128,470
2014	333,990	129,760
2015	337,330	131,050
2016	340,700	132,360
2017	344,110	133,690
2018	347,550	135,020
2019	351,030	136,370
2020	354,540	137,740
2021	358,080	139,120
2022	361,660	140,510
2023	365,280	141,910
2024	368,930	143,330
2025	372,620	144,760
2026	376,350	146,210
2027	380,110	147,670
2028	383,910	149,150
2029	387,750	150,640
2030	391,630	152,150

Source: NPS Public Use Statistics Office. URS Corporation.

15. *Public Use Counting and Reporting Instructions*, Little Bighorn Battlefield National Monument. NPS Public Use Statistics Office, January 1994

4.4 TRANSIT RIDERSHIP PROJECTION

As discussed previously, three transit options (Option V, VI-A, and VI-B) moved past the initial screening to this detailed screening process. The potential success of a transit option largely depends on how many visitors will be attracted to use the transit system. Although there are several common models available for forecasting transit ridership for discretionary (voluntary) urban transit systems, these methods may not be applicable to a potential transit system in the park since park visitors typically have different motivations for riding transit than urban commuters.

A relatively simple method to determine transit ridership is application of a "transit trip generation rate," which reflects the proportion of estimated transit riders to the total visitors[8]. To determine such a rate for FLMAs, the FTA sponsored a survey of existing transit systems in FLMAs. All surveyed transit programs happen to serve NPS sites, with three mandatory systems and seven voluntary systems. Table 4-3 summarizes service characteristics and ridership information for each of these programs. As shown in the table, one-way passenger trips per recreation visitor for voluntary transit programs vary widely from as low as 0.06 at Cape Cod to 0.80 at Yosemite. Further analysis of the data indicated that frequent service, congested roads, and lack of parking at Yosemite National Park make transit an attractive alternative to private vehicles[8].

Table 4-3: FLMA One-Way Passenger Trips per Recreation Visitor

(**Reproduced** from *Transportation Planning Process for Transit in Federal Land Management Areas, Volume Three: Methods to Define the Transit Need*. Federal Transit Administration. April 2008.)

	FLMA	Service Period		Service Time		Service Headway		Passenger Trips per Recreation Visitor
		Start Date	End Date	Start	End	Peak	Low	
Mandatory	Inyo National Forest/Devils Postpile National Monument	29-Jun	1-Oct	7:15 AM	8:30 PM	20 min	45 min	1.78
	Harpers Ferry National Historical Park	Year-Round		8:00 AM	6:00 PM - 7:00 PM	15 min		1.39
	Zion National Park	25-Mar	30-Oct	5:30 AM	11:30 PM	6 min	30 min	1.29
Discretionary	Acadia National Park	23-Jun	11-Oct	6:30 AM	Midnight	15 min	60 min	0.21
	Bryce Canyon National Park	27-May	18-Sep	9:00 AM	6:00 PM	12 min		0.40
	Cape Cod National Seashore (Provincetown)	Memorial Day Weekend	Columbus Day Weekend	6:00 AM	Midnight	20 min		0.06
	Denali National Park (Front Co. Shuttles)	Mid May	Mid Sept	5:30 AM	11:00 PM	30 min	120 min	0.08
	Grand Canyon National Park (Village Route)	Year-Round		1 hour before sunrise	9:00 PM 11:00PM	15 min	30 min	0.43
	Rocky Mountain National Park	17-Jun	2-Oct	7:00 AM	8:00 PM	10 min		0.14
	Yosemite National Park	Year-Round		7:00 AM	10:00 PM	6 min	30 min	0.80

Notes: FLMA – Federal Land Management Area. Min – minute.

One-way passenger trips per recreation visitor for mandatory transit programs range from 1.29 to 1.78. Note that for mandatory transit programs, even though each rider would typically make at least two one-way trips by transit, the number of passenger trips per recreation visitor is less than two because all transit services exempt certain types of visitors, such as overnight campers and disabled visitors.

Based on analysis of the survey data and other data sources, the FTA suggested the following equation to be a "rule of thumb" transit trip generation rate for voluntary transit programs at FLMAs:

Equation 4-1 Transit Trip Generation Rates on FLMAs

$$(Number\ of\ One\ Way\ Transit\ Passenger\ Trips) = 0.45 \times (Recreation\ Visitors)$$

It should be noted that many transit programs in Table 4-3 do not cover the entire park – visitors have no other choice but to use private vehicles when they explore other parts of the park not covered by the transit route(s). Higher transit trip generation rate may be anticipated if a transit program provides services to all or most of the park.

The study team adopted Equation 4-1 to forecast ridership for the three transit options (V, VI-A, and VI-B), as well as for the transit service element of Option III – GMP One-way Tour Loop, with the following considerations:

1. For Option III – GMP One-way Tour Loop via I-90 Frontage Road, the number of one-way passenger trips per recreation visitor is assumed to be 0.38, lower than in Equation 4-1 since the one-way tour loop is expected to have low traffic congestion, if any. Furthermore, because transit service in Option III operates along the one-way tour loop which is approximately 14.5 miles, visitors who only intend to go to the visitor center would mostly choose to use their own vehicles for a 1-mile drive.
2. For Option V – Seasonal Transit to Visitor Center, the transit system would mostly serve visitors who only intend to visit the Custer Battlefield unit. Therefore, transit ridership is expected to be relatively low in comparison with other transit options/component. Accordingly, the number of one-way passenger trips per recreation visitor is assumed to be 0.3.
3. For Options VI-A – Seasonal Transit to Reno-Benteen Battlefield, the number of one-way passenger trips per recreation visitor is assumed to be 0.40, slightly lower than in Equation 4-1. This option provides visitors the opportunity to tour through the entire battlefield and would also attract visitors who only intend to visit the Custer Battlefield unit.

   It should be noted that in comparison with Option III, Option VI-A is expected to have slightly higher ridership since it could be attractive to visitors who only intend to go to the visitor center, while the transit system in Option III would be less attractive to the same group of visitors.
4. For Options VI-B – Peak Days Transit to Reno-Benteen Battlefield, the number of one-way passenger trips per recreation visitor is assumed to be 0.60. The rational for this higher value includes:
   a. This option provides visitors with opportunities to visit the visitor center area and tour the battlefield.

b. During the peak days when the transit system is in operation, parking shortage and road congestion in the park are at the highest level of the year, and therefore transit would be more attractive to visitors as an alternative transportation mode.

Table 4-4 summarizes the above estimates of transit ridership factors, in terms of transit riders and transit passenger trips per recreation visitor for all three transit options (Options III, V, VI-A, and VI-B). There are notable differences between the two terms "One-way Passenger Trips per Recreation Visitor" and "Transit Riders per Recreation Visitor":

1. The number of one-way passenger trips per recreation visitor accounts for boarding and alighting activities of transit passengers.
2. The number of transit riders per recreation visitor simply measures the percentage of visitors who would use the transit service, regardless of boarding and alighting activities.
3. For instance, assuming one out of a total of four recreation visitors used the transit service, the number of transit riders per recreation visitor would be 0.25 (1/4). Assuming this rider first got off the bus at the visitor center for a short visit, stepped onto another bus, then got off at Reno-Benteen, and eventually boarded a bus to exit the park. The resulting number of one-way passenger trips per recreation visitor was 0.75 (1x3/4).

Table 4-4: Transit Riders and Passenger Trips per Recreation Visitor

	Option III: Seasonal Transit on One-way Loop	Option V: Seasonal Transit to Visitor Center	Option VI-A: Seasonal Transit to Reno-Benteen	Option VI-B: Peak Days Transit to Reno-Benteen
One-way Passenger Trips/Recreation Visitor	0.38	0.30	0.40	0.60
Transit Riders/Recreation Visitor	0.17	0.13	0.18	0.27

Source: URS Corporation.

Notes: Each transit rider is estimated to make an average 2.25 passenger trips riding transit. This value (2.25) is based on the Intermountain Region Long Range Transportation Plan, Baseline Conditions Report – Draft, National Park Service, 2011.

The Existing Conditions Memorandum identified the three summer months (June, July, and August) as representing the peak season of visitation to the park, witnessing approximately 68% of annual recreation visitors. May and September are the shoulder season, which combined with the peak season to account for 87% of annual recreation visitors.

As described in subsection 4.1, Options III, V, and VI-A would offer transit service to visitors from Memorial Day through Labor Day; while Option VI-B would operate transit service only during 10-15 peak visitation days. Accordingly, transit ridership projections for each of the four transportation options of the future years were performed using ridership factors (Table 4-4) and forecasted recreation visitors (Table 4-2). As a result, forecasted annual transit riders are illustrated in Table 4-5.

Table 4-5: Forecasted Annual Transit Riders for Year 2020

	Annual Recreation Visitors	Transit Riders[1]	Reduction in Private Vehicles[2]
Option III - Seasonal Transit on One-way Loop	354,540	33,190	12,900
Option V - Seasonal Transit to Visitor Center	354,540	26,210	10,180
Option VI-A - Seasonal Transit to Reno-Benteen	354,540	34,940	13,580
Option VI-B - Peak Days Transit to Reno-Benteen[3]	354,540	6,430	2,470

Source: URS Corporation.

Notes: (1) Visitors that enter the park via transit vehicles

(2) Reduction of private vehicles entering the park

(3) Option VI-B is assumed to offer transit service for 15 peak visitation days in 2020

(4) Both transit riders and Reduction in Private Vehicles are calculated based on the number of recreation visitors and vehicles during the time periods when transit service is available, not the total annual visitors or vehicles

4.5 TRANSIT CONCEPTS

Visitor and transit ridership projections, as described previously, establish visitation data of future conditions that will be used to estimate performance measures (screening criteria) for all options. In addition, the transit options/concepts need to be further refined with necessary components before their performance measures (screening criteria) can be calculated and/or estimated with relative accuracy. This subsection describes refined concepts, built upon descriptions of options in subsection 4.1, of the following transit concepts:

- Option III: the GMP option with a seasonal transit service on the one-way tour loop
- Option V: a seasonal transit service from offsite staging/parking to the visitor center
- Option VI-A: a seasonal transit service from offsite staging/parking to Reno-Benteen
- Option VI-B: a peak days/special events transit service form offsite staging/parking to Reno-Benteen

Transit Route

All transit options will have a single route starting from the staging area, presumably at the junction of U.S. Highway 212 (US 212) and Montana State Highway 342 (MT 342, or park access road).

For Option III, the transit route will follow the one-way tour loop via the I-90 frontage road, proceed to Reno's first skirmish line at Garryowen, and then cross under I-90 to arrive at Reno's Crossing. The route would then follow a new one-way road from Reno's crossing, extend southeast along the west side of the Little Bighorn River and up to Reno Creek, enter the existing Reno-Benteen Battlefield from the south, connect with the existing tour road, and proceed over the tour road to Last Stand Hill. From Last Stand Hill, transit vehicles would then continue to the existing visitor center area, exit the park via the current entrance station, and arrive at the staging area. This loop route is approximately 14.5 miles long.

For Option V, the transit route would be simply a round trip between the offsite staging/parking and the visitor center via MT 342, of approximately 2.1 miles in round trip distance.

For Options VI-A and VI-B, the transit route would continue on MT 342 through the entrance station, visitor center area, tour road, and the Reno-Benteen parking lot/turnaround area. After turning around, transit vehicles would follow the same route, in the opposite direction, back to the staging area. The round-trip distance is approximately 11.8 miles.

For each transit concept, there would be a single staging/launching area, simplifying transit information for visitors and utilizing staff and transit vehicles more efficiently.

Annual/Daily Span of Service

For Options III, V, and VI-A, the transit service would operate from Memorial Day to Labor Day. For Option VI-B, the transit service would only operate during the peak days. The number of peak days to have transit service may vary from year to year dependent on visitation. As the purpose of the transit service under Option VI-B is to relieve traffic congestion and parking shortage during days when these problems are most severe, generally it should be offered for 10 to 15 days during the summer season. Special events that should be included in the transit service period include the park's anniversary (June 25), Memorial Day, the Sturgis Motorcycle Rally, and one or more days

immediately prior to and after these events. For the purpose of evaluating options, a 15-day transit service period is assumed for Option VI-B.

Table 4-6 displays the 15 peak visitation days in 2010. It should also be noted that these 15 days spread out through the summer season, which may make it more difficult for the park and a concession contractor to schedule and operate the transit service.

Table 4-6: 15-Day Peak Visitation in 2010

Ranking	Entering Vehicles	Date	Special Event
1	993	6/25/2010	Anniversary
2	756	6/26/2010	One Day After Anniversary
3	750	8/8/2010	Sturgis Motorcycle Rally
4	693	8/9/2010	Sturgis Motorcycle Rally
5	692	6/27/2010	Two Days After Anniversary
6	663	7/18/2010	
7	660	7/21/2010	
8	658	7/22/2010	
9	647	8/11/2010	Sturgis Motorcycle Rally
10	643	7/20/2010	
11	638	7/17/2010	
12	637	8/10/2010	Sturgis Motorcycle Rally
13	636	8/24/2010	
14	634	6/24/2010	
15	632	5/31/2010	Memorial Day
Total	**10,332**		

Source: Existing Traffic and Parking Conditions and Implications for Transportation Alternatives: Little Bighorn Battlefield National Monument, Jonathan Upchurch, December 16, 2010

On each day during the transit operating period, the first shuttle would leave the staging area at 9:00 a.m., and the last shuttle would leave the staging area at 5:00 p.m. Visitors coming before 9:00 a.m. or after 5:00 p.m. would need to use their own vehicles to access the park.

It should be noted that from Memorial Day to July 31st, the park opens at 8:00 a.m. and closes at 9:00 p.m. From August 1st to Labor Day, the park opens at 8:00 a.m. and closes at 8:00 p.m.

Transit Facilities

Due to compliance requirements and the latest policies regarding capital improvement strategies, building any additional infrastructure in the park to support a transit system is unlikely. Therefore, if a transit option is selected for the park, all transit facilities described in this subsection, except for transit stops, would need to be located outside the park boundary and would not be owned by National Park Service.

As discussed previously, a potentially feasible location for the staging/launching area would be adjacent to the junction of US 212 and MT 342. The staging area would include sufficient parking spaces, varying among the transit options/concepts, for both regular size and oversized vehicles. The parking area would need to accommodate towed-vehicle decoupling and drop-off. A ticket/operation office could be located in or close to the staging area, as well as maintenance/storage facilities, washing area, and a fueling station.

Since the transit system of the various transportation options evaluated in this study would only operate during the peak visitation season or peak days, it is possible that the transit system would share an existing local maintenance facility with a local business or agency, therefore avoiding the capital costs of building a separate maintenance facility. Similarly, the transit system could use local fueling stations within a few miles without having to build its own fueling station.

Besides an offsite staging/launching area, three transit stops would be located along the entire route, including the visitor center, Last Stand Hill, and Reno-Benteen parking/turnaround area. Each transit stop would have a bench and appropriate signage. Optional amenities may include a trash can at each stop. Option V would use only the visitor center stop.

The park would own and maintain the transit stops located in the park. Preferably, the park should contract via concession with a national, regional, or local transit provider who would be responsible for transit facilities outside the park. Ownership of the outside transit facilities would need to be determined among the concession contractor, land owner(s), local businesses adjacent to the staging area, and other stakeholders. Some other national parks, such as Bryce Canyon National Park, has been using this type of partnership with a transit provider and local communities to provide transit services for visitors and effectively reduced the costs of having to own all transit facilities.

Transit Vehicles

Transit vehicle types are dependent on estimated ridership (passenger trips or transit riders) and closely related to expected service frequency/headway. For each transit concept, it is determined that the entire transit fleet should consist of 15-seat passenger vans (no standees). This determination is based on forecasted ridership for a bus lifecycle of 12 years.

A 15-seat Van

For analysis purposes, year 2020 was assumed to be the middle year of the bus lifecycle and was used to estimate performance measures (criteria) of transit options.

All transit vehicles should have a low floor to provide relative convenience for boarding and alighting and to reduce loading/unloading times. If possible, they should be equipped with wheelchair tie-downs and lifts.

An in-vehicle interpretation program should be implemented to the transit system. This interpretation could be a series of pre-recorded audio tours that the shuttle operator plays to the passengers during the tour, or have the shuttle operator directly as the narrator/interpreter.

Other common transit vehicles that have been used at national parks include 30- to 40-seat shuttle buses as well as 50-seat tour buses, varying from 30-feet to 60-feet in length. These larger transit vehicles are determined as not needed at the park based on forecasted ridership. In addition, until road conditions are improved in the park, larger buses cannot be used on the existing park roads as the tour road cannot handle the weight and width of these buses.

40-seat Bus

30-seat Bus

Service Frequency/Headway

Service frequency is determined based on monthly and daily ridership projections, and varies among the transit options. For the purpose of evaluating options, the frequency/headway distribution as displayed in Table 4-7 is estimated using forecasted ridership of year 2020.

Table 4-7: Transit Service Headway and Vehicle Capacity

	Peak (9 a.m.- 3 p.m.) Headway (minute)	Off-peak (3 p.m.- 5 p.m.) Headway (minute)
Option III	15	30
Option V	20	30
Option VI-A	15	25
Option VI-B	10	20

Source: URS Corporation.

Dwell Time and Travel Time

As described previously in subsection "Transit Route", the round-trip distance is approximately 14.5 miles for Option III, 2.1 miles for Option V, and 11.8 miles for Options VI-A and VI-B. The average speed, excluding stops, is assumed to be 29 miles per hour, slightly lower than a presumable speed limit of 30 miles per hour.

For all transit options, shuttle vehicles, would stop at each designated transit stop for loading and unloading. The dwell time at the offsite staging area, visitor center, and Reno-Benteen turnaround area is assumed to be five minutes each to accommodate loading, unloading, and recovery time when necessary; and two minutes at the Last Stand Hill transit stop. The round-trip travel time is estimated to be approximately 60 minutes for Option III, 18 minutes for Option V, and 50 minutes for Options VI-A and VI-B.

4.6 GENERAL IMPACTS TO NATURAL AND CULTURAL RESOURCES

Three criteria listed in Table 4-1 fall into the category of general effects or impacts to cultural and natural resources: VMT, vehicle emissions, and footprint for additional transportation infrastructure. Each of these criteria would have a direct or indirect effect or cumulative impact upon the extant cultural and natural resources. For cultural resources, e*ffect* is defined at 36 CFR 800.16(i) as an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register of Historic Places (NRHP). A *historic property* is defined at 36 CFR 800.16(l)(1) as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. The National Environmental Policy Act (NEPA) defines *direct effects* as those that are caused by the action and occur at the same time and place (40 CFR § 1508.8). *Indirect effects* are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR § 1508.8). *Cumulative impact* results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

This subsection describes methods to calculate and/or estimate each of the criteria for all options, and summarizes how each option fares in each criterion on scores at the scale from zero to ten.

Vehicle Miles of Travel

For the purpose of evaluating options, forecasted annual visitors, vehicles, and transit ridership of year 2020 were used to estimate VMT for all options. The determination of round trip distance for various scenarios is described below.

- For all options, the round trip for a visitor who only intends to go to the existing visitor center area, either using a private vehicle or riding transit, is considered as starting from the junction of US 212 and MT 342, continuing on MT 342 to the visitor center. The length of such a round trip is approximately 2.1 miles. Approximately 45% of total visitors are in this category
- For all options except Option III (One-Way Loop via I-90 Frontage Road, or the GMP Option), the round trip for a visitor who intends to tour the battlefield, either using a private vehicle or riding transit, is considered as starting from the junction of US 212 and MT 342, continuing on MT 342 and then Tour Road, turning around at the Reno-Benteen parking lot, and arriving back at the staging area. As previously discussed, the length of such a round trip is approximately 11.8 miles. For the GMP option, this trip would follow the entirety of the one-way tour loop, a distance of 14.5 miles. Approximately 55% of total visitors would tour through the battlefield

Because the seven transportation options (I to VI-B) have different vehicle mixes, the number of vehicle trips need to be estimated accordingly. Two of the three construction options (I and II) and

the no-build option (IV) would have the same number of vehicle trips, as there is no transit available to divert from private vehicles. The GMP option (III) and the three transit options (V, VI-A, and VI-B) would have reduced vehicle trips compared with the other options, as on average each transit vehicle trip would carry more passengers than a private vehicle trip. However, vehicle trips vary significantly among these transit options including the GMP option, as each of the transit program would attract a different number of recreation visitors to ride the transit.

Table 4-8 summarizes results from calculating VMT and corresponding scores (0-10) for the seven options. Note that both private vehicle trips and transit trips refer to round trips.

Table 4-8: VMT Calculations and Scores for Year 2020

Option[1]	I	II	III [2]	IV	V	VI-A	VI-B
Miles per round trip to Reno-Benteen	11.78	11.78	14.52	11.78	11.78	11.78	11.78
Miles per round trip to visitor center	2.08	2.08	2.08	2.08	2.08	2.08	2.08
Private Vehicles to visitor center (thousand) [3]	138	138	62	138	128	124	135
Private Vehicles on tour road (thousand)	76	76	63	76	70	68	73
Bus trips	0	0	2,760	0	2,760	3,404	660
Annual VMT (thousand)	1,021	1,021	1,081	1,021	952	961	1,000
VMT Score (1-10)	**5**	**5**	**0**	**5**	**10**	**9**	**6**

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen

(2) For GMP option, it is assumed that 45% of visitors would drive from the new visitor contact station to Custer Battlefield, and the other 55% would take the one-way loop either via their own vehicles or via transit.

(3) For GMP option, these include private vehicles that only get to the visitor center but not the tour road. For other options, these include all private vehicles entering the park.

All options are scored, at a scale from zero to 10, against their respective VMT estimations using the following equation (results are rounded to integers):

VMT score of Option N = (maximal VMT of all options – VMT of Option N) X 10 / (maximal VMT of all options – minimal VMT of all options)

It should be noted that the above equation would result in a score of 10 (the highest score possible) for the option with the lowest total VMT – the lowest impact, and a score of zero (the lowest score possible) for the option with the highest total VMT – the most adverse impact. The other options would have an interpolated score between zero and ten.

The VMT scores are directly correlated with the direct effects and impacts upon cultural and natural resources. The heavier transit vehicles could, over time, adversely affect/impact buried cultural resources, soils, and vegetation along the roadways.

Vehicle Emissions

The study team considered four motorized vehicle emission types, including hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO_X), and carbon dioxide (CO_2). Emission rates for passenger cars and light trucks (including passenger vans) are from US Environmental Protection Agency (EPA) highway vehicle emission factor models[16]. Fuel economy is estimated at 21.5 miles per gallon (mpg) for passenger cars and 17.2 mpg for light trucks[17]. Emission rates for oversized vehicles are estimated by extrapolating rates for regular size vehicles, using an estimated fuel economy of oversized vehicles at nine miles per gallon. Other input for calculating vehicle emissions include annual VMT of year 2020 and vehicle mixes of each option.

Table 4-9 displays average emission rates of the three considered vehicle types (passenger cars, light trucks, and oversized vehicles). In order to estimate vehicle mixes, it is assumed that of all private vehicles, excluding oversized vehicles, passenger cars account for 65% and light trucks account for 35%.

Table 4-9: Emission Rates

	Oversized vehicle	Light Truck	Passenger Car
Emission Rates			
Hydrocarbons (g/mi)	6.71	3.51	2.80
Carbon Monoxide (g/mi)	52.97	27.70	20.90
Oxides of Nitrogen (g/mi)	3.46	1.81	1.39
Carbon Dioxide (lbs./mi)	2.20	1.15	0.92

Source: US Environmental Protection Agency, URS Corporation.

Notes: g/mi = grams per mile.
lbs. /mi = pounds per mile.

16. *Emission Facts: Average Annual Emissions and Fuel Consumptions for Passenger Cars and Light Trucks*. US Environmental Protection Agency, April 2000.
17. *Transportation Energy Data Book: Edition 19*. Prepared for US Department of Energy, prepared by Oak Ridge National Laboratory, September 1999.

Table 4-10 summarizes results from calculating vehicle emissions and scores for all options. The method of calculating the score (on a scale of zero to 10) of emissions for each option is similar to that of VMT.

Table 4-10: Vehicle Emissions and Scores of Options for Year 2020

Option[1]	I	II	III	IV	V	VI-A	VI-B
Emission Type	Annual Emission (pounds)						
Hydrocarbons	8,100	8,100	8,800	8,100	7,600	7,400	8,000
Carbon Monoxide	62,400	62,400	68,300	62,400	58,400	57,100	61,500
Oxides of Nitrogen	4,100	4,100	4,500	4,100	3,800	3,800	4,000
Carbon Dioxide	1,203,200	1,203,200	1,315,300	1,203,200	1,126,900	1,100,200	1,186,000
Emission Score	**5**	**5**	**0**	**5**	**9**	**10**	**6**

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen

Option VI-A - Seasonal Transit from Offsite Staging/Parking to Reno-Benteen scores the highest (10) due to its deepest reduction in all emission types. On the other end, Option III - GMP Option scores the lowest (zero) since it requires the longest distance of a round trip which results in the highest amount of emissions.

Vehicle emissions, especially with increased VMT and larger transit vehicles, would have an indirect effect on the viewshed, which is a significant aspect of the park's interpretive function, by introducing particulates in the air and reducing visibility. These emissions would also have indirect and cumulative impacts on local vegetation and wildlife.

Footprint for Additional Transportation Infrastructure

Footprint considered in this study includes increased pavement areas due to new or widened road, new or expanded parking spaces (on and off site), and other transportation facilities such as transit stops and bus maintenance/storage building(s). The measured footprint increases for each option are relative quantities compared to the No-Build option, which does not increase the footprint. The current parking demand indicates there is not a shortage of parking spaces at the Reno-Benteen site. Therefore some of the options, as discussed in the following paragraphs, do not include new parking for the current Reno-Benteen parking lot. However if visitation continues to grow, there is a potential for footprint increase due to new parking being added at the site.

For Option I – Repairing Tour Road and Reconfiguring Parking, the increased footprint results from the minor widening of the tour road of approximately 5.25 miles long, from 18 feet wide to 20 feet wide.

For Option II – 4R Project, the increased footprint results from widening (from 18 to 24 feet wide) the tour road of approximately 5.25 miles long and expanding parking lots in the visitor center area and Reno-Benteen Battlefield. According to the Environmental Assessment / Assessment of Effect – Rehabilitate Tour Road (Little Bighorn Battlefield National Monument, 2005), the 4R project would

add a total of 20 spaces at the visitor center parking lots including six regular, two handicapped, four motorcycle, and eight oversized vehicle parking spaces; and a total of 14 parking spaces at the Reno-Benteen parking lot including five regular and nine oversized vehicle parking spaces. On average each new parking stall is estimated to add 350 square feet of new pavement[18], including access lanes and landscaping.

For Option III – the GMP Option, the increased footprint mainly comes from a new road connecting the proposed new visitor station at Garryowen (assumed to be 2.5 miles with a typical width of 12 feet), a new parking lot at the new visitor contact station/shuttle staging area (approximately 170 parking spaces needed at this parking lot), and additional parking spaces (about 30) needed at Reno-Crossing site where the one-way road starts.

As discussed earlier, Option IV – Management Improvements would not cause footprint increase or decrease.

For transit options V – Seasonal Transit to Visitor Center and VI-A – Seasonal Transit to Reno-Benteen, the increased footprint are a result of required parking lot(s) at an offsite staging area (170 parking spaces), a maintenance/storage facility, operation management/ ticket office, and transit stop amenities. In addition, the increased footprint by repairing the tour road also needs to be accounted for each of these two options.

For transit option VI-B – Peak Days Transit to Reno-Benteen, the increased footprint are a result of required parking lot(s) at an offsite staging area (170 parking spaces). The relatively few days of transit operation do not warrant other separate transit facilities such as maintenance and washing area. The parking spaces for the temporary use do not need to be paved. The existing business parking lots close to Highway 212 and 342, such as the casino parking lot, may be utilized if an agreement can be reached with the parking lot owners. Nevertheless, the potential footprint increase, in case a new parking area has to be established, is accounted for in this study.

Table 4-11 summarizes footprint calculations and resulting scores for all seven transportation options. The method of calculating scores for increased footprints is similar to that for VMT and emissions.

18. *Transportation Cost and Benefit Analysis II - Parking Costs*. Victoria Transport Policy Institute (www.vtpi.org), 2011

Table 4-11: Increased Footprints and Scores of Options

Option[1] / Footprint[2]	I	II	III	IV	V	VI-A	VI-B
Widened/New Road (acres)	1.27	3.82	6.36	0.00	1.27	1.27	0.00
Expanded/New Parking (acres)	0.00	0.27	1.45	0.00	1.32	1.32	1.32
Total Footprint Increase (acres)	1.27	4.09	7.81	0.00	2.60	2.60	1.32
Footprint Score	**8**	**5**	**0**	**10**	**7**	**7**	**8**

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen
(2) Footprint for the transit options include parking, transit vehicle maintenance/storage, management/ticket office, and transit stop amenities.

The option with lowest amount of increased footprint – the no-build – scores 10 while the option with the highest amount of increased footprint – the GMP Option – scores zero. Scores for other options were then interpolated. Option I (the 4R Project) scored low at five due to the widened Tour Road at a significant length.

Creating new roads, widening existing roads, and expanding parking lots in the park would have direct effects on any cultural resources, known or undiscovered, immediately adjacent to those roads and parking lots. Likewise, adjacent soils and vegetation would be directed affected by these increased roads and expanded parking lots.

4.7 GENERAL IMPACTS TO VISITOR EXPERIENCE

The retelling of the battle of Little Bighorn requires balancing conflicting viewpoints, history, perspectives, and cultures to give a complete picture of the events and the times. So too, the interpretation of the Battlefield National Monument must be balanced with the need to preserve the place itself while at the same time allowing the public to experience, view, and understand what happened here so long ago.

In achieving this balance, there will inevitably be compromises, conflicts, and trade-offs. Accommodating increasing visitors for summer events as well as throughout the year will predictably encroach on the park's resources. Improving the facilities needed for travel, parking, viewing, and exploring the battleground, as well as visitor safety and comfort, is necessary to improve the visitor experience.

The following checklist contains goals for consideration when making changes designed to enhance the visitor experience of the historical events that took place at this park. Clearly, not all of these goals can be achieved as there are inherent conflicts between them and the need to preserve the battlefield. Rather, the checklist is a tool to use as a framework for discussion about both broad and specific ideas for improving visitor experience. It is intended to help decision makers be both thoughtful and deliberate about the benefits and consequences associated with the choices they make.

Overview

The land is largely open prairie with few trees. Therefore, whatever is added to, or a part of the landscape – even temporarily - can be seen for a long distance. This includes monuments, interpretive signage, traveling vehicles, roads, and parking lots. The haunting beauty of the battleground largely depends on maintaining the large, open feeling with minimal interruption. The design imperative is, therefore, to maintain the uninterrupted rolling plains and big sky to the degree possible.

Land Use

- Minimize disturbance to the battleground and its adjacent monuments, cemeteries, and other important components.
- Design buildings to be low and neutrally adorned or painted. Likewise, consider the impact of interpretive signage and its placement.
- Allow public access to the various areas within the park where important events occurred, overall views of the battleground can be seen, and specific monuments are located.
- Do not allow large parking lots to overwhelm the sites within the park.
- Maintain as much of the existing prairie grounds as practicable while also providing for visitor activities, transportation, interpretation, comfort, and safety.

Roadways

- Consider the placement of new roadways in relation to viewscapes and ridge lines. Avoid silhouetting traffic against the sky if possible.
- If a narrow cross-section is desired or maintained on existing roadways, provide pull-outs along the way so that disabled traffic can move out of the traffic lanes. The placement of these should be made so that their visual impact is minimized.

Public Transportation

- If public transit is implemented throughout the year, consider minimal shade structures for shuttle stops, as well as clear signage.
- If public transit is implemented only for special events or short periods of time, consider temporary shade structures for waiting passengers.

Views

- Determine viewsheds from important places within the battlefield site and try to minimize disturbing the landscape within that view shed, especially at ridgelines.

Interpretation

- Consider practical ways to minimize the intrusion of interpretive signage, such as placing it low to the ground.
- Use websites, recorded tours, or other non-invasive means of providing interpretation without signage.
- Explore other interpretive organizational methods other than the sequential incidents during the battle. For example, organize the tour by starting with the people involved or an

explanation of the cultures that clashed. Because the location of the entrance and the place where the battle began are at two ends of the park separated by several miles of non-park land, organizing by time is inherently problematic.

Facilities

- Provide bathrooms within easy distance of major sites. For example, at a minimum, in both the north and south portions of the park.
- Provide places for rest, perhaps made from local stone, along the interpretive trail.
- Provide water within easy distance of major sites.

Finally, in the preliminary design phase of any physical project, create a process that screens for unintended consequences or secondary effects associated with making changes to the park.

Performance Criteria Applied to Visitor Experience

As listed in Table 4-1, the following four performance criteria were considered in the category of general impacts to visitor experience:

- Changes in delay and congestion
- Parking availability
- Safety improvement
- Convenience and comfort

Scores on each of the above criteria for options were determined based a qualitative assessment of each option, in comparison with the no-build option. Detailed analysis of traffic operation, parking operation, and safety is beyond the scope of this feasibility study.

Delay and Congestion

Assessment of delay and congestion in this subsection is relative to the no-build option.

For Option I - Repairing the Tour Road and Reconfiguring Parking, congestion on the tour road and parking lots is expected to be relieved in the short term. However, since this option neither increases parking spaces nor offers a transit service, delay and congestion are expected to exist during some peak days and could deteriorate if the number of visitors increases.

For Option II - Widening the Existing Tour Road and Expanding Parking, or the 4R Project, congestion at parking lots, particularly at the visitor center area, is expected to be substantially mitigated due to increased parking spaces and reconfigured circulation patterns. Similarly, the widened tour road would provide sufficient pavement width for oversized vehicles to meet and pass each other, and therefore effectively reduce local congestion and consequent delay, which have mainly been the result from presence of oversized vehicles on the narrow tour road.

For Option III - One-Way Loop via I-90 Frontage Road, or the GMP Option, the one-way loop road would eliminate the need for vehicles running in opposite directions to pass each other, and therefore effectively address congestion and delay issues on the tour road. Assuming the parking area at the new visitor contact station will provide sufficient parking spaces for both regular size and oversized vehicles, parking congestion would also be mitigated. Furthermore, this option offers a seasonal transit service which is expected to substantially help manage visitation and reduce delay and congestion. Due to the increased trip length of this one-way loop road, passing lanes and additional pullouts may need to be included in the GMP Option.

If a construction project is designed to accommodate short-term to mid-term visitor demand, as is the case for many FLMAs, future visitor demand higher than the projections could trigger the need for additional improvements, which could be very costly. The inherent difficulties in visitor projections for most FMLAs certainly aggravate this situation, which would remain a prominent issue for the construction options without transit service.

By providing public transportation that would move visitors more efficiently and in larger groups, the transit options (V, VI-A, and VI-B) are expected to effectively mitigate or eliminate congestion and consequent delays at the parking areas in the park and on the tour road, although to various extents. Compared with no-build and the construction options, with exception of Option III, which does offer seasonal transit service, transit options would reduce the total number of vehicles entering the park and on the tour road, and therefore help reduce delay and congestion.

Parking Availability

Option II - the 4R Project and Option III – the GMP Option would provide sufficient parking spaces for short-term demand. The GMP would have the largest number of new parking spaces of all options and offer a transit service which would reduce parking demand in the park.

The three transit options (V, VI-A, VI-B) are expected to be relatively flexible and efficient in addressing long-term parking issues, though to various extents. All transit options are expected to provide sufficient parking at the offsite staging area and reduce parking demand in the park. However, none of these transit options would increase parking spaces in the park.

Safety Improvement

The three construction options (I, II, and III) would improve visitor safety to various extents, in relation to their capabilities of mitigating vehicle/pedestrian conflicts in the parking areas and on tour road. The three transit options (V, VI-A, and VI-B) offer safety benefits by reducing the number of vehicles in the park. Option IV – Management Improvements is expected to moderately improve safety by redistributing visitors/vehicles away from "hot spot" areas.

Convenience and Comfort

All options would provide relative convenience and comfort to visitors to various extents. Because the 10-15 peak visitation days are spread throughout the summer season, some of which are around certain special events (such as the park's anniversary), while others are not (a few days in mid-July 2010 ranked in top 10), visitors could easily be confused and frustrated over which days have a transit service and how to use the transit when it is offered.

The GMP option is scored the highest (10) since the one-way tour loop provides an opportunity for visitors to tour the battlefield in the correct chronological order, eliminates conflicts of vehicles passing each other, and offers a voluntary transit service.

The 4R project would make it easier for visitors to find a parking space and drive on the tour road with less conflicts, congestion, and delay compared with the no-build option. Options V and VI-A provide opportunities for visitors who prefer not to drive their own vehicles while experiencing the park. Option VI-B provides similar benefits during the peak days; however, it could also cause confusion and frustration with regard to bus scheduling and availability, which would negatively affect visitors' convenience and comfort.

The comfort level of riding a transit vehicle is typically higher than that of driving. For transit options, it is crucial to make the transit information readily available to all visitors and to provide frequent services (short headways) so that visitors do not have to wait long for the buses/vans.

Table 4-12 presents scores on criteria for general impacts to visitor experience, resulting from qualitative assessment of each option against the criteria. For each criterion, the option providing the lowest quality scores zero, while the option with highest quality scores 10. Other options score between zero and 10.

Table 4-12: Impacts on Visitor Experience – Scores

Option / Impact	I	II	III	IV	V	VI-A	VI-B
Delay & Congestion	0	7	10	3	5	8	6
Parking Availability	0	7	10	4	6	8	5
Safety Improvement	0	8	10	5	4	7	6
Convenience & Comfort	4	8	10	2	5	6	0

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen

4.8 GENERAL IMPACTS TO PARK STAFF/MANAGEMENT

Scores of options on general impacts to parks staff/management are based upon qualitative assessment of anticipated impacts, in comparison with the no-build option. Table 4-13 presents impact assessment and reasoning of scores in terms of pros and cons, as well as resulting scores of all options.

Table 4-13: Impacts to Park Staff/Management and Scores

Option	Pros	Cons	Score
I	In short-term, reduces requirements for park staff to direct traffic and respond to emergency situations in parking areas and on the tour road.	Does not address long term parking shortage issues that would require park staff to redistribute parking during peak days	2
II	Reduces requirements for park staff to direct traffic and respond to emergency situations in parking areas and on the tour road. Realignment and pavement improvements effectively mitigate deferred maintenance	Widened road and expanded parking require more staff resource and budget to maintain	10
III	Reduces requirements for park staff to direct traffic and respond to emergency situations in parking areas and on the tour road.	The longer road increases workload for maintenance. The seasonal transit service would require park staff to manage transit contract and marketing	8
IV	Helps reduce the need for park staff to direct traffic and parking	Does not address delayed maintenance of transportation assets	6
V	Reduces requirements for park staff to direct traffic and respond to emergency situations in the visitor center parking lots, due to fewer vehicles in the park.	Requires park staff to manage transit contract and marketing.	4
VI-A	Reduces requirements for park staff to direct traffic and respond to emergency situations in the parking lots or on the tour road, due to fewer vehicles in the park.	Requires park staff to manage transit contract and marketing.	3
VI-B	Reduces requirements for park staff to direct traffic and respond to emergency situations in the parking lots or on the tour road, due to fewer vehicles in the park during peak days.	Requires park staff to manage transit contract and marketing. Likely causes confusion of park staff over which days transit should operate. Requires more time for preparation and mobilization.	0

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen.

4.9 FINANCIAL ANALYSIS

As shown in Table 4-1 on page 56, three performance measures (criteria) – total cost of ownership, revenue, and funding resources/cost sharing – are included in the category of financial feasibility. This section presents the financial analysis methods and process resulting in estimated values (costs and revenues), qualitative assessment (funding sources/cost sharing), and scores for the seven options.

Total Cost of Ownership

The study team estimated lifecycle cost of ownership, including capital, operation, and maintenance over a 12-year span. The 12-year span is applied to all options to be consistent with the *Bus Lifecycle Cost Model for Federal Land Management Agencies*[19] which is adopted for this ATFS for transit cost estimates.

It should be noted that costs of ownership for each option would continue to accrue beyond the first 12-year lifecycle, including recapitalization of transit fleets, continued operating and maintenance costs, depreciation of transportation infrastructure, etc. However, these continued costs are expected to be proportional to the first 12-year lifecycle. Therefore, for options evaluation purpose, it is not necessary to account for the costs beyond the 12-year lifecycle.

As previously discussed in section 4.5 – Transit Concepts, it was assumed that a transit system for the park would seasonally rent or otherwise share an existing local maintenance facility to avoid the capital costs of building a separate maintenance facility. Therefore, a total leasing fee of $75,000 over the 12-year lifecycle – approximately 10 percent of the construction costs – is assumed for the transit system to use an existing maintenance facility. An exception is Option VI-B – Peak Days Transit, for which a maintenance facility was not accounted for in the cost estimate since the system would only operate during 10-15 days a year and local maintenance may not be needed.

An engineer cost estimate, using the Montana Department of Transportation Average Prices Catalog[20], was performed for Option I – Repairing the Tour Road and Reconfigure Parking, Option II – Widening the Tour Road and Expanding Parking (the 4R Project), Option III – One-way Tour Loop via I-90 Frontage Road (the GMP Option), and the construction components (repairing the tour road and new parking) for Options V and VI-A, respectively. The estimating methods follow the guidelines of the *NPS Cost Estimating Requirements Handbook*, specifically *Class C Construction Cost Estimates for Feasibility Studies (Least Detailed)*. Itemized cost elements that need conceptual design components were generalized to a higher level so that reasonable assumptions can be made. Cost estimate of transit options and concepts was performed using the *2011 Bus Lifecycle Cost Model for Federal Land Management Agencies.*

Due to very limited conceptual information on these options available to the study team, these cost estimates are considered as "order of magnitude" and rely heavily on engineering judgment. Cost estimating with relative accuracy cannot be achieved until conceptual design and engineering drawings are developed, which is beyond the scope of this ATFS. Table 4-14 describes some of the mark-up and add-on factors that are required for Class C Cost Estimates.

Results from cost estimates are summarized in Tables 4-15 to 4-22.

19. *Bus Lifecycle Cost Model for Federal Land Management Agencies*, prepared for US Department of Transportation, prepared by John A. Volpe National Transportation Systems Center, 2011.

20. *Average Prices Catalog: Metric and English*, Montana Department of Transportation, Contract Plans Bureau, January 2011 to June 2011 Edition.

Table 4-14: Mark-up and Add-ons for Class C Cost Estimate

Mark-up/Add-on	Value	Description
Location Factor:	0.00%	Montana DOT average price catalog accounts for the location of the project in Montana.
Remoteness Factor:	7.00%	Site is approximately 70 miles from closest commercial center (Billings). State highway and Freeway access to site.
Wage Rate Factor:	0.00%	Montana DOT average price catalog accounts for wage rates based on Davis Bacon Act
State & Local Taxes:	0.00%	Crow Agency, MT has 0.0% sales tax. There is no sales tax in the State of Montana, and no documented localized sales taxes in Crow Agency.
Design Contingency:	30.00% or 10.00%	Maximum suggested percentage for conceptual plans. Current conceptual plans are very general in detail requiring an increased contingency percentage. Includes drainage, traffic control and signing/striping. Since Option II – the 4R project – has been designed, it should no longer be considered as a conceptual plan. Accordingly, a design contingency of 10% was applied for Option II in this study.
Standard General Conditions:	10.00%	A mid-range percentage was selected from the suggested 4-20% range to account for multiple remote worksites to be coordinated.
Government General Conditions:	5.00%	Half of the standard general conditions to account for the increased administrative and quality requirement of the NPS.
Historic Preservation Factor:	2.00%	Construction will take place in a historic district - no impact to historic structures is anticipated at this time.
Contractor Overhead:	0.00%	Contractor overhead is included in the average unit costs calculated by the Montana DOT.
Contractor Profit:	0.00%	Contractor profit is included in the average unit costs calculated by the Montana DOT.
Bonds and Permits:	2.50%	2 percent bonds and 0.5 percent permit costs anticipated.
Contracting Method Adjustment:	10.00%	Competitive Negotiation of Construction is anticipated; however, other methods may be used.
Construction Management Adjustment:	8.00%	Estimate for construction management activities of the project. Has been requested on other feasibility level estimates.
Washington contingency:	10.00%	Estimate for possible Washington office involvement. Has been requested on other feasibility level estimates.
Annual Inflation Escalation Factor:	5.00%	Estimated annual inflation rate for construction activities in Montana.
Time Until Project Midpoint (Months)	39	December 2014 is estimated as the midpoint of the construction efforts. Added additional 12 months for unit prices from 2011.
12-year Maintenance Estimate	N/A	To provide consistent estimates with ATS options: a 12 year maintenance estimate was established. Average annual cost was assumed to be $10,000/mile, increasing 5% annually thru year 12.

Source: National Park Service and Montana Department of Transportation. Data compiled by URS Corporation.

Table 4-15: Summary of Lifecycle Cost Estimation – Option I

(Part 1: PROJECT COST SUMMARY)

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Option 1 - Repair Existing Road	1	VALUE	$1,672,112	$1,672,112
2	Not Used	1	VALUE	$0	$0
3	Not Used	1	VALUE	$0	$0
4	Not Used	1	VALUE	$0	$0
5	Not Used	1	VALUE	$0	$0
6	Not Used	1	VALUE	$0	$0
7	Not Used	1	VALUE	$0	$0
8	Not Used	1	VALUE	$0	$0
9	Not Used	1	VALUE	$0	$0
10	Not Used	1	VALUE	$0	$0
11	Not Used	1	VALUE	$0	$0
12	Not Used	1	VALUE	$0	$0
13	Not Used	1	VALUE	$0	$0
14	Not Used	1	VALUE	$0	$0
15	Not Used	1	VALUE	$0	$0
16	Not Used	1	VALUE	$0	$0
17	Not Used	1	VALUE	$0	$0
18	Not Used	1	VALUE	$0	$0
	Subtotal Direct Construction Costs				**$1,672,112**
	Value of Government Furnished Property (GFP) Included in Direct Cost (see footnote)*				**$0**
				Direct Cost Subtotal without GFP	**$1,672,112**
	Published Location Factor	0.00%			$0
	Remoteness Factor	7.00%			$117,048
	Federal Wage Rate Factor	0.00%			$0
	State & Local Taxes (Applied to 50% of Direct Cost)	0.00%			$0
	Design Contingency	30.00%			$501,633
	Total Direct Construction Costs				**$2,290,793**
	Standard General Conditions	10.00%			$229,079
	Government General Conditions	5.00%			$114,540
	Historic Preservation Factor	2.00%			$45,816
	Subtotal NET Construction Cost				**$2,680,228**
	Overhead	0.00%			$0
	Profit	0.00%			$0
	Estimated NET Construction Cost				**$2,680,228**
	Bonds & Permits	2.50%			**$67,006**
	Contracting Method Adjustment	10.00%			$268,022.75
	CM Costs	8.00%			$214,418.20
	Washington Contingency	10.00%			$268,023
	Inflation Escalation	39	Months	5.00%	$601,015
	Total Estimated NET Cost of Construction				**$4,098,712**
	12-Year Maintenance Estimate	5.2	Miles		**$827,687**
	Total Estimated NET Cost of Construction and Maintenance				**$4,926,399**

* GFP costs are only used when the Government pre-purchases items, or provides other materials out of Government inventory, to be installed by contractor. Adjustments and Markup on GFP only include Inflation Escalation; No other adjustment factors or O&P markup have been applied.

Table 4-15: Summary of Lifecycle Cost Estimation – Option I
(Part 2: LINE ITEM COST SUMMARY)

MDT Item Number	Description	Quantity	Unit	Cost/Unit	Total Cost	Remarks
	SITE PREPARATION					Removed 1' of existing
202020140	Remove Bituminous Pavement	10830	SQYD	$ 2.08	$22,526	asphalt for clean
203020100	Excavation - Unclassified	1560	CY	$ 4.16	$6,490	construction line and
					$0	15% for deficiency
					$0	reconstruction
	SUBTOTAL SITE PREPARATION	**1**	**VALUE**	**$ 29,016.00**	**$29,016**	

MDT Item Number	Description	Quantity	Unit	Cost/Unit	Total Cost	Remarks
	SITE IMPROVEMENTS					6" HMA over 6" ABC
301020340	Crushed Aggregate Course	2850	CY	$ 18.62	$53,067	Bridge assumed to be
401020022	Commercial Mix - PG 64-28	5550	TON	$ 81.83	$454,157	300' long in total and 26'
552010302	Class B Bridge Deck Repair	870	SQYD	$ 1,305.60	$1,135,872	wide
					$0	Consistent 20 width of
					$0	construction (increased
						2' in ave width)
	SUBTOTAL SITE IMPROVEMENTS	**1**	**VALUE**	**$ 1,643,095.50**	**$1,643,096**	

TOTAL COST -	**Option 1 - Repair Existing Road**	**1**	**VALUE**	**$ 1,672,111.50**	**$1,672,112**	

Table 4-16: Summary Lifecycle Cost Estimation – Option II

(Part 1: PROJECT COST SUMMARY)

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Option 2 - 4R Project	1	VALUE	$4,074,421	$4,074,421
2	Not Used	1	VALUE	$0	$0
3	Not Used	1	VALUE	$0	$0
4	Not Used	1	VALUE	$0	$0
5	Not Used	1	VALUE	$0	$0
6	Not Used	1	VALUE	$0	$0
7	Not Used	1	VALUE	$0	$0
8	Not Used	1	VALUE	$0	$0
9	Not Used	1	VALUE	$0	$0
10	Not Used	1	VALUE	$0	$0
11	Not Used	1	VALUE	$0	$0
12	Not Used	1	VALUE	$0	$0
13	Not Used	1	VALUE	$0	$0
14	Not Used	1	VALUE	$0	$0
15	Not Used	1	VALUE	$0	$0
16	Not Used	1	VALUE	$0	$0
17	Not Used	1	VALUE	$0	$0
18	Not Used	1	VALUE	$0	$0
	Subtotal Direct Construction Costs				**$4,074,421**
	Value of Government Furnished Property (GFP) Included in Direct Cost (see footnote)*				**$0**
				Direct Cost Subtotal without GFP	**$4,074,421**
	Published Location Factor	0.00%			$0
	Remoteness Factor	7.00%			$285,209
	Federal Wage Rate Factor	0.00%			$0
	State & Local Taxes (Applied to 50% of Direct Cost)	0.00%			$0
	Design Contingency	10.00%			$407,442
	Total Direct Construction Costs				**$4,767,073**
	Standard General Conditions	10.00%			$476,707
	Government General Conditions	5.00%			$238,354
	Historic Preservation Factor	2.00%			$95,341
	Subtotal NET Construction Cost				**$5,577,475**
	Overhead	0.00%			$0
	Profit	0.00%			$0
	Estimated NET Construction Cost				**$5,577,475**
	Bonds & Permits	2.50%			**$139,437**
	Contracting Method Adjustment	10.00%			$557,747.50
	CM Costs	8.00%			$446,198.00
	Washington Contingency	10.00%			$557,748
	Inflation Escalation	39	Months	5.00%	$1,250,695
	Total Estimated NET Cost of Construction				**$8,529,300**
	12-Year Maintenance Estimate	5.2	Miles		**$827,687**
	Total Estimated NET Cost of Construction and Maintenance				**$9,356,987**

* GFP costs are only used when the Government pre-purchases items, or provides other materials out of Government inventory, to be installed by contractor. Adjustments and Markup on GFP only include Inflation Escalation; No other adjustment factors or O&P markup have been applied.

Table 4-16: Summary Lifecycle Cost Estimation – Option II

(Part 2: LINE ITEM COST SUMMARY)

MDT Item Number	Description	Quantity	Unit	Cost/Unit	Total Cost	Remarks
	SITE PREPARATION					Remove all existing pavement and sub grade
202020140	Remove Bituminous Pavement	60410	SQYD	$ 2.08	$125,653	
203020100	Excavation - Unclassified	12100	CY	$ 4.16	$50,336	
207010300	Foundation Material	12100	CY	$ 24.23	$293,183	
					$0	
					$0	
	SUBTOTAL SITE PREPARATION	**1**	**VALUE**	**$ 469,171.80**	**$469,172**	

MDT Item Number	Description	Quantity	Unit	Cost/Unit	Total Cost	Remarks
	SITE IMPROVEMENTS					6" HMA over 6" ABC Bridges assumed to be 300' long in total and 26' wide Consistent 24 width of construction. Construct all new pavement
301020340	Crushed Aggregate Course	13430	CY	$ 18.62	$250,067	
401020022	Commercial Mix - PG 64-28	26290	TON	$ 81.83	$2,151,311	
552010302	Class B Bridge Deck Repair	870	SQYD	$ 1,305.60	$1,135,872	
Lump Sum Est.	Parking Lot Expansion	34	spaces	$ 2,000.00	$68,000	
					$0	
	SUBTOTAL SITE IMPROVEMENTS	**1**	**VALUE**	**$ 3,605,249.30**	**$3,605,249**	

TOTAL COST -	**Option 2 - 4R Project**	**1**	**VALUE**	**$ 4,074,421.10**	**$4,074,421**	

Table 4-17: Summary of Lifecycle Cost Estimation – Option III (Excluding Transit Costs)

(Part 1: PROJECT COST SUMMARY)

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Option 3 - GMP One-way Loop	1	VALUE	$6,377,717	$6,377,717
2	Not Used	1	VALUE	$0	$0
3	Not Used	1	VALUE	$0	$0
4	Not Used	1	VALUE	$0	$0
5	Not Used	1	VALUE	$0	$0
6	Not Used	1	VALUE	$0	$0
7	Not Used	1	VALUE	$0	$0
8	Not Used	1	VALUE	$0	$0
9	Not Used	1	VALUE	$0	$0
10	Not Used	1	VALUE	$0	$0
11	Not Used	1	VALUE	$0	$0
12	Not Used	1	VALUE	$0	$0
13	Not Used	1	VALUE	$0	$0
14	Not Used	1	VALUE	$0	$0
15	Not Used	1	VALUE	$0	$0
16	Not Used	1	VALUE	$0	$0
17	Not Used	1	VALUE	$0	$0
18	Not Used	1	VALUE	$0	$0
	Subtotal Direct Construction Costs				**$6,377,717**
	Value of Government Furnished Property (GFP) Included in Direct Cost (see footnote)*				**$0**
				Direct Cost Subtotal without GFP	**$6,377,717**
	Published Location Factor	0.00%			$0
	Remoteness Factor	7.00%			$446,440
	Federal Wage Rate Factor	0.00%			$0
	State & Local Taxes (Applied to 50% of Direct Cost)	0.00%			$0
	Design Contingency	30.00%			$1,913,315
	Total Direct Construction Costs				**$8,737,472**
	Standard General Conditions	10.00%			$873,747
	Government General Conditions	5.00%			$436,874
	Historic Preservation Factor	2.00%			$174,749
	Subtotal NET Construction Cost				**$10,222,842**
	Overhead	0.00%			$0
	Profit	0.00%			$0
	Estimated NET Construction Cost				**$10,222,842**
	Bonds & Permits	2.50%			**$255,571**
	Contracting Method Adjustment	10.00%			$1,022,284.18
	CM Costs	8.00%			$817,827.34
	Washington Contingency	10.00%			$1,022,284
	Inflation Escalation	39	Months	5.00%	$2,292,373
	Total Estimated NET Cost of Construction				**$15,633,182**
	12-Year Maintenance Estimate	7.7	Miles		**$1,225,629**
	Total Estimated NET Cost of Construction and Maintenance				**$16,858,811**

* GFP costs are only used when the Government pre-purchases items, or provides other materials out of Government inventory, to be installed by contractor. Adjustments and Markup on GFP only include Inflation Escalation; No other adjustment factors or O&P markup have been applied.

Table 4-17: Summary of Lifecycle Cost Estimation – Option III (Excluding Transit Costs)

(Part 2: LINE ITEM COST SUMMARY)

MDT Item Number	Description	Quantity	Unit	Cost/Unit	Total Cost	Remarks
	SITE PREPARATION					Removed 1' of existing
202020140	Remove Bituminous Pavement (Tour Road)	10830	SQYD	$ 2.08	$22,526	asphalt for clean
203020100	Excavation - Unclassified (Tour Road)	1560	CY	$ 4.16	$6,490	construction line and
201130005	Clearing and Grubbing (New Road)	5.3	AC	$ 2,150.00	$11,395	15% for deficiency
203020100	Excavation - Unclassified (New Road)	2590	CY	$ 4.16	$10,774	reconstruction on
202020140	Remove Bituminous Pavement (Access Road)	2090	SQYD	$ 2.08	$4,347	existing Tour Road and
203020100	Excavation - Unclassified (Access Road)	300	CY	$ 4.16	$1,248	access road
					$0	Constructed new 2.2
					$0	mile, 12' wide road
					$0	
	SUBTOTAL SITE PREPARATION	**1**	**VALUE**	**$ 56,780.60**	**$56,781**	

MDT Item Number	Description	Quantity	Unit	Cost/Unit	Total Cost	Remarks
	SITE IMPROVEMENTS					6" HMA over 6" ABC for
301020340	Crushed Aggregate Course (Tour Road)	2850	CY	$ 18.62	$53,067	all roads.
401020022	Commercial Mix - PG 64-28 (Tour Road)	5550	TON	$ 81.83	$454,157	Tour Road bridges
552010302	Class B Bridge Deck Repair (Tour Road)	870	SQYD	$ 1,305.60	$1,135,872	assumed to be 300' long
301020340	Crushed Aggregate Course (Access Road)	550	CY	$ 18.62	$10,241	in total and 26' wide
401020022	Commercial Mix - PG 64-28 (Access Road)	1070	TON	$ 81.83	$87,558	Consistent 20' width of
207010300	Foundation Material	2590	CY	$ 24.23	$62,756	construction (increased
301020340	Crushed Aggregate Course (New Road)	2590	CY	$ 18.62	$48,226	2' in ave width) for tour
401020022	Commercial Mix - PG 64-28 (New Road)	5060	TON	$ 81.83	$414,060	road and access road.
Lump Sum	New Bridge	16000	SQFT	$ 250.00	$4,000,000	New Road 12' wide, new
Lump Sum	Entrance Station Parking	20	Space	$ 2,000.00	$40,000	bridge 1000' x 16'
Lump Sum	Entrance Fee Booth	1	Each	$ 15,000.00	$15,000	
					$0	
	SUBTOTAL SITE IMPROVEMENTS	**1**	**VALUE**	**$ 6,320,935.90**	**$6,320,936**	

TOTAL COST -	**Option 3 - GMP One-way Loop**	**1**	**VALUE**	**$ 6,377,716.50**	**$6,377,717**	

Table 4-18: Summary of Lifecycle Cost Estimation – Option IV

(Part 1: PROJECT COST SUMMARY)

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Option 4 - ITS/Management Improvements	1	VALUE	$216,597	$216,597
2	Not Used	1	VALUE	$0	$0
3	Not Used	1	VALUE	$0	$0
4	Not Used	1	VALUE	$0	$0
5	Not Used	1	VALUE	$0	$0
6	Not Used	1	VALUE	$0	$0
7	Not Used	1	VALUE	$0	$0
8	Not Used	1	VALUE	$0	$0
9	Not Used	1	VALUE	$0	$0
10	Not Used	1	VALUE	$0	$0
11	Not Used	1	VALUE	$0	$0
12	Not Used	1	VALUE	$0	$0
13	Not Used	1	VALUE	$0	$0
14	Not Used	1	VALUE	$0	$0
15	Not Used	1	VALUE	$0	$0
16	Not Used	1	VALUE	$0	$0
17	Not Used	1	VALUE	$0	$0
18	Not Used	1	VALUE	$0	$0
	Subtotal Direct Construction Costs				**$216,597**
	Value of Government Furnished Property (GFP) Included in Direct Cost (see footnote)*				**$0**
				Direct Cost Subtotal without GFP	**$216,597**
	Published Location Factor	0.00%			$0
	Remoteness Factor	7.00%			$15,162
	Federal Wage Rate Factor	0.00%			$0
	State & Local Taxes (Applied to 50% of Direct Cost)	0.00%			$0
	Design Contingency	30.00%			$64,979
	Total Direct Construction Costs				**$296,738**
	Standard General Conditions	10.00%			$29,674
	Government General Conditions	5.00%			$14,837
	Historic Preservation Factor	2.00%			$5,935
	Subtotal NET Construction Cost				**$347,184**
	Overhead	0.00%			$0
	Profit	0.00%			$0
	Estimated NET Construction Cost				**$347,184**
	Bonds & Permits	2.50%			**$8,680**
	Contracting Method Adjustment	10.00%			$34,718.37
	CM Costs	8.00%			$27,774.69
	Washington Contingency	10.00%			$34,718
	Inflation Escalation	39	Months	5.00%	$77,853
	Total Estimated NET Cost of Construction				**$530,927**

* GFP costs are only used when the Government pre-purchases items, or provides other materials out of Government inventory, to be installed by contractor. Adjustments and Markup on GFP only include Inflation Escalation; No other adjustment factors or O&P markup have been applied.

Table 4-18: Summary of Lifecycle Cost Estimation – Option IV

(Part 2: LINE ITEM COST SUMMARY)

MDT Item Number	Description	Quantity	Unit	Cost/Unit	Total Cost	Remarks
SITE PREPARATION						
					$0	
					$0	
					$0	
					$0	
SUBTOTAL SITE PREPARATION		1	VALUE	$ -	$0	

MDT Item Number	Description	Quantity	Unit	Cost/Unit	Total Cost	Remarks
SITE IMPROVEMENTS						2 Permanent ITS Signs on I-90, 1 Permanent ITS Sign at Entrance. Additional Signing of restrictions/information (20 - 9 sf signs)
619010075	Signs-Alum Refl Sheet (I)	180	SQFT	$ 25.54	$4,597	
FHWA RITA database	Large Dynamic Message Sign (Permanent)	2	Each	$ 75,000.00	$150,000	
FHWA RITA database	Medium Dynamic Message Sign (Permanent)	1	Each	$ 45,000.00	$45,000	
619010724	Frang Sign Post BKWY-S5 X 10	20	Each	$ 850.00	$17,000	
					$0	
SUBTOTAL SITE IMPROVEMENTS		1	VALUE	$ 216,597.20	$216,597	

TOTAL COST -	Option 4 - ITS/Management Improvements	1	VALUE	$ 216,597.20	$216,597	

Table 4-19: Summary of Lifecycle Cost Estimation - Option III (Transit Component)

Cost Summary

Which worksheet did you use? Detailed Schedule

Annual O&M costs	**$177,922**
Bus type	Full-size passenger van
Number of buses	5
VMT per fleet	40,424
VHT per fleet	2,784
Driver costs per fleet	$125,280
Fuel cost per mile	$0.43
Fuel costs (per fleet)	$17,324
Maintenance cost per mile	$0.75
Maintenence cost (per fleet)	$30,318
Overhaul mileage trigger	150,000
Engine overhaul cost	$15,000
Transmission overhaul cost	$10,000
Battery replacement (hybrid)	$0
Marketing costs	$5,000
Inflation rate	3.3%

Year one costs	**$255,000**
Purchase cost	$150,000
Startup costs	$15,000
Maintenance facility	$75,000
Fueling station	$0
Bus stops and shelters	$15,000

Costs per year

Year	*O&M*	*Miles per bus*	*Engine overhaul*	*Transmission overhaul*	*Battery replacement*	*Total costs per year*	*Cumulative costs*
Year 1 O&M	*$177,922*	*8,085*				*$177,922*	
Year 1	$432,922	8,085			$0	$432,922	$432,922
Year 2	$183,794	16,169	$0	$0	$0	$183,794	$616,716
Year 3	$189,859	24,254	$0	$0	$0	$189,859	$806,575
Year 4	$196,124	32,339	$0	$0	$0	$196,124	$1,002,699
Year 5	$202,596	40,424	$0	$0	$0	$202,596	$1,205,295
Year 6	$209,282	48,508	$0	$0	$0	$209,282	$1,414,577
Year 7	$216,188	56,593	$0	$0	$0	$216,188	$1,630,765
Year 8	$223,322	64,678	$0	$0	$0	$223,322	$1,854,088
Year 9	$230,692	72,763	$0	$0	$0	$230,692	$2,084,780
Year 10	$238,305	80,847	$0	$0	$0	$238,305	$2,323,085
Year 11	$246,169	88,932	$0	$0	$0	$246,169	$2,569,254
Year 12	$254,293	97,017	$0	$0	$0	$254,293	$2,823,546

Table 4-20: Summary of Lifecycle Cost Estimation – Option V

Cost Summary

Which worksheet did you use? Detailed Schedule

Annual O&M costs	**$40,221**
Bus type	Full-size passenger van
Number of buses	2
VMT per fleet	4,593
VHT per fleet	662
Driver costs per fleet	$29,808
Fuel cost per mile	$0.43
Fuel costs (per fleet)	$1,968
Maintenance cost per mile	$0.75
Maintenence cost (per fleet)	$3,444
Overhaul mileage trigger	150,000
Engine overhaul cost	$15,000
Transmission overhaul cost	$10,000
Battery replacement (hybrid)	$0
Marketing costs	$5,000
Inflation rate	3.3%

Year one costs	**$165,000**
Purchase cost	$60,000
Startup costs	$15,000
Maintenance facility	$75,000
Fueling station	$0
Bus stops and shelters	$15,000

Costs per year

Year	*O&M*	*Miles per bus*	*Engine overhaul*	*Transmission overhaul*	*Battery replacement*	*Total costs per year*	*Cumulative costs*
Year 1 O&M	*$40,221*	*2,296*				*$40,221*	
Year 1	$205,221	2,296			$0	$205,221	$205,221
Year 2	$41,548	4,593	$0	$0	$0	$41,548	$246,769
Year 3	$42,919	6,889	$0	$0	$0	$42,919	$289,688
Year 4	$44,335	9,185	$0	$0	$0	$44,335	$334,023
Year 5	$45,799	11,482	$0	$0	$0	$45,799	$379,822
Year 6	$47,310	13,778	$0	$0	$0	$47,310	$427,132
Year 7	$48,871	16,074	$0	$0	$0	$48,871	$476,003
Year 8	$50,484	18,371	$0	$0	$0	$50,484	$526,487
Year 9	$52,150	20,667	$0	$0	$0	$52,150	$578,637
Year 10	$53,871	22,963	$0	$0	$0	$53,871	$632,507
Year 11	$55,648	25,260	$0	$0	$0	$55,648	$688,156
Year 12	$57,485	27,556	$0	$0	$0	$57,485	$745,641

Table 4-21: Summary of Lifecycle Cost Estimation – Option VI-A

Cost Summary

Which worksheet did you use? Detailed Schedule

Annual O&M costs	**$152,985**
Bus type	Full-size passenger van
Number of buses	5
VMT per fleet	33,926
VHT per fleet	2,400
Driver costs per fleet	$108,000
Fuel cost per mile	$0.43
Fuel costs (per fleet)	$14,540
Maintenance cost per mile	$0.75
Maintenence cost (per fleet)	$25,445
Overhaul mileage trigger	150,000
Engine overhaul cost	$15,000
Transmission overhaul cost	$10,000
Battery replacement (hybrid)	$0
Marketing costs	$5,000
Inflation rate	3.3%

Year one costs	**$255,000**
Purchase cost	$150,000
Startup costs	$15,000
Maintenance facility	$75,000
Fueling station	$0
Bus stops and shelters	$15,000

Costs per year

Year	*O&M*	*Miles per bus*	*Engine overhaul*	*Transmission overhaul*	*Battery replacement*	*Total costs per year*	*Cumulative costs*
Year 1 O&M	*$152,985*	*6,785*				*$152,985*	
Year 1	$407,985	6,785			$0	$407,985	$407,985
Year 2	$158,033	13,571	$0	$0	$0	$158,033	$566,018
Year 3	$163,248	20,356	$0	$0	$0	$163,248	$729,266
Year 4	$168,635	27,141	$0	$0	$0	$168,635	$897,902
Year 5	$174,200	33,926	$0	$0	$0	$174,200	$1,072,102
Year 6	$179,949	40,712	$0	$0	$0	$179,949	$1,252,051
Year 7	$185,887	47,497	$0	$0	$0	$185,887	$1,437,938
Year 8	$192,022	54,282	$0	$0	$0	$192,022	$1,629,960
Year 9	$198,358	61,068	$0	$0	$0	$198,358	$1,828,318
Year 10	$204,904	67,853	$0	$0	$0	$204,904	$2,033,223
Year 11	$211,666	74,638	$0	$0	$0	$211,666	$2,244,889
Year 12	$218,651	81,423	$0	$0	$0	$218,651	$2,463,540

Table 4-22: Summary of Lifecycle Cost Estimation – Option VI-B

Cost Summary

Which worksheet did you use? Detailed Schedule

Annual O&M costs	**$38,913**
Bus type	Full-size passenger van
Number of buses	6
VMT per fleet	7,775
VHT per fleet	550
Driver costs per fleet	$24,750
Fuel cost per mile	$0.43
Fuel costs (per fleet)	$3,332
Maintenance cost per mile	$0.75
Maintenence cost (per fleet)	$5,831
Overhaul mileage trigger	150,000
Engine overhaul cost	$15,000
Transmission overhaul cost	$10,000
Battery replacement (hybrid)	$0
Marketing costs	$5,000
Inflation rate	3.3%

Year one costs	**$210,000**
Purchase cost	$180,000
Startup costs	$15,000
Maintenance facility	$0
Fueling station	$0
Bus stops and shelters	$15,000

Costs per year							
Year	*O&M*	*Miles per bus*	*Engine overhaul*	*Transmission overhaul*	*Battery replacement*	*Total costs per year*	*Cumulative costs*
Year 1 O&M	*$38,913*	*1,296*				*$38,913*	
Year 1	$248,913	1,296			$0	$248,913	$248,913
Year 2	$40,197	2,592	$0	$0	$0	$40,197	$289,110
Year 3	$41,524	3,887	$0	$0	$0	$41,524	$330,634
Year 4	$42,894	5,183	$0	$0	$0	$42,894	$373,528
Year 5	$44,310	6,479	$0	$0	$0	$44,310	$417,838
Year 6	$45,772	7,775	$0	$0	$0	$45,772	$463,610
Year 7	$47,282	9,071	$0	$0	$0	$47,282	$510,892
Year 8	$48,843	10,366	$0	$0	$0	$48,843	$559,735
Year 9	$50,454	11,662	$0	$0	$0	$50,454	$610,189
Year 10	$52,119	12,958	$0	$0	$0	$52,119	$662,308
Year 11	$53,839	14,254	$0	$0	$0	$53,839	$716,148
Year 12	$55,616	15,550	$0	$0	$0	$55,616	$771,764

Table 4-23 presents cost estimation results and scores for all options. The option with the lowest total costs scores 10 while the option with the highest total costs scores zero. Other options were then interpolated to have their scores assigned.

Table 4-23: Summary of Cost Estimations and Scores

Option[1]	I	II	III	IV	V	VI-A	VI-B
Lifecycle Costs[2]	$3,940K-$5,910K	$7,490K-$11,230K	$15,750K-$23,620K	$430K - $640K	$4,540K - $6,810K	$5,910K - $8,870K	$620K - $930K
Score	**7**	**4**	**0**	**10**	**9**	**8**	**10**

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen

(2) The range of costs were estimated to be between -20% and +20% of calculated costs

Revenue

Revenue generated by each option, beyond the current park funding, was considered for the purpose of evaluating options. The following considerations were applied in this evaluation:

1. For construction options which improve the tour road and/or parking, such as Options I and II, the resulting improvements have the potential to attract more paid visitors to the park, and therefore bring in more revenue through sales of entrance tickets/passes. However, the additional revenue cannot be quantified
2. For the transit options and the GMP option which has a transit component, the study team assumed a transportation fee would be added on top of the current entrance fee to fund the transit programs. It should be noted that adding a transportation fee to the entrance fee requires action by Congress
3. The park currently charges an entrance fee of $10 per vehicle or $5 per individual for those who enter the park on foot or riding motorcycles or bicycles into the park. For the transit program to break even by the end of a 12-year lifecycle, i.e., to have revenue (generated from a transportation fee) equal to the transit costs, a transportation fee needs to be added on top of the current entrance fee. The amount of the transportation fee varies among the transportation options which have a transit system

   Table 4-24 illustrates the break-even transportation fee for transit options/component
4. Scores of options should consider the potential sources of additional revenue, potential amount of additional revenue, and the possibility of a transportation fee being approved. If a higher transportation fee is required to fund the transit program, chances are less that the congress would approve such a fee

Table 4-24: Transportation Fee Needed for Lifecycle Break-even

Option[1]	III	V	VI-A	VI-B
Transit Costs[2]	$2,823,500	$745,600	$2,463,500	$771,800
Break-even Transportation Fee per Vehicle[3]	$5.40	$1.50	$4.70	$1.50
Break-even Transportation Fee per Visitor[3]	$2.10	$0.60	$1.80	$0.60
Average Annual Paid Vehicles[4]	43,400	43,400	43,400	43,400
Average Annual Paid Visitors[4]	113,000	113,000	113,000	113,000

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen.

(2) Transit costs are caused directly by a transit system, as summarized in Tables 4-19 to 4-22.

(3) A break-even transportation fee would generate cumulative revenue equal to transit costs by the end of the 12th year. According to NPS Public Use Statistics Office, on average one vehicle entering the park carries 2.6 visitors.

(4) It is assumed that 32% of total visitors would pay the entrance fee plus a transportation fee, which is the same as the current percentage of paid visitors.

Table 4-25 presents scores for all options on revenue, based on the analysis as summarized above.

Table 4-25: Revenue Estimations and Scores

Option[1]	I	II	III	IV	V	VI-A	VI-B
Revenue Score	**3**	**7**	**10**	**0**	**6**	**5**	**8**

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen.

Funding Sources and Cost Sharing

Generally, funding sources for both construction projects and alternative transportation programs are limited at national parks. However, construction projects can be funded as capital improvement program (CIP) funds are allocated at the national and regional level. The 4R project was initially funded before the construction was indefinitely postponed.

For the transit options, funding can potentially be provided by multiple sources. Operating and maintenance costs can be funded at least partially by the transportation fee added on top of the entrance fee. If a break-even amount of transportation fee is approved and most visitors are willing to pay a higher entrance fee than the current price, the total capital, operation, and maintenance costs can be funded by the transportation fee. In other words, the transit options would be financially sustainable.

In addition, corporate sponsorship, such as LL Bean's support of the Island Explorer transit program in Acadia National Park, may provide capital funding for a transit system in the park. Partnership

with communities and agencies such as Montana Department of Transportation, Crow Nation Transit, and Crow Agency may also help identify potential funding sources. In comparison, funding for the construction options and the Management Improvements option is likely to be limited to regular park funding.

When the park contracts with a transportation agency, such as Crow Nation Transit, or a private transit provider to develop and operate a transit program, the partners could share operating and maintenance costs, which would reduce financial risks and potentially reduce total costs for the park.

Option IV – Management Improvements – does not include construction projects, incurs the lowest cost, and is the easiest to implement. Therefore, it is assigned the highest score of 10.

Option I – Repair the Tour Road and Reconfigure Parking – consists of minor construction, has relatively low costs, and does not substantially increase maintenance cost. Funding for this option is relatively easier to obtain than most of the other options and does not require a congressional act. Therefore, it is assigned the second highest score of nine. The GMP option would incur by far the highest capital costs, and it is unlikely to be fully funded in the near future. Therefore it is assigned the lowest score zero. Although the 4R project would incur the second highest construction cost, it would effectively mitigate delayed maintenance of the tour road and parking lots. Since it was initially funded, the 4R project is likely to secure the funding again. Therefore, Option II is assigned a relatively high score of eight. The transit options V, VI-A, and VI-B each consists of a transit system for which it would be relatively difficult to secure initial capital funding. Therefore, the three transit options are assigned relatively low scores.

Table 4-26 presents scores for all options on funding sources and cost sharing, based on the analysis as summarized above. Input from the Evaluation of Options Workshop, held at the park on May 7, 2012, provided the preliminary scores, which were later evaluated and adjusted.

Table 4-26: Scores on Funding Sources and Cost Sharing

Option	I	II	III	IV	V	VI-A	VI-B
Score	9	8	0	10	3	4	5

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen

4.10 DETAILED SCREENING RESULTS

Table 4-27 summarizes the score results from analyzing the transportation options against all detailed screening criteria and presents the overall weighted score of each option. Transit Option VI-A – Seasonal Transit from Offsite Staging/Parking to Reno-Benteen – scores the highest at 6.6, followed by Option II – Widen the Tour Road and Expand Parking (4R Project) – at 6.5. Option III – One-way Tour Loop via I-90 Frontage Road – scores the lowest at 4.2.

Table 4-27: Detailed Screening Results – Score Matrix

Options	I	II	III	IV	V	VI-A	VI-B	Weighting Factor
Vehicle miles traveled (VMT)	5	5	0	5	10	9	6	7%
Vehicle emissions	5	5	0	5	9	10	6	10%
Footprint	8	5	0	10	7	7	8	10%
Delay and congestion	0	7	10	3	5	8	6	7%
Parking availability	0	7	10	4	6	8	5	7%
Safety improvement	0	8	10	5	4	7	6	7%
Convenience and comfort	4	8	10	2	5	6	0	7%
General impacts to park staff/ management	2	10	8	6	4	3	0	5%
Total Cost of Ownership	8	5	0	10	7	6	9	18%
Revenue	3	7	10	0	6	5	8	10%
Funding Sources and Cost Sharing	9	8	0	10	3	4	5	12%
Weighted Score	**4.8**	**6.5**	**4.2**	**6.1**	**6.1**	**6.6**	**6.1**	**100%**

Source: URS Corporation.

Notes: (1) Options I to VI-B: I - Repair the Tour Road and Reconfigure Parking; II - Widen the Tour Road and Expand Parking (4R Project); III - One-Way Loop Tour via the I-90 Frontage Road, Including a Seasonal Transit Service; IV - Management Improvements; V - Seasonal Transit Service from Offsite Staging/Parking to Visitor Center; VI-A - Seasonal Transit Service from Offsite Staging/Parking to Reno-Benteen; VI-B - Peak Days/Special Events Transit Service from Offsite Staging/Parking to Reno-Benteen

4.11 FURTHER CONSIDERATION: FUEL TYPES FOR TRANSIT VEHICLES

This alternative transportation feasibility study considered a range of possible fuel types for use in transit vehicles in the park, including conventional diesel, renewable and non-renewable alternative fuels, hybrid-electric propulsion, and battery electric propulsion. The advantages and disadvantages of the various fuels are briefly highlighted in Table 4-28.

Table 4-28: Fuel Types

Fuel	Advantages	Disadvantages
Diesel	▪ Readily available ▪ Industry standard for transit vehicles ▪ Diesel engines are efficient; they operate at high compression ratios and convert a large percentage of the fuel's available energy into usable work	▪ Air pollution ▪ Prices are affected by unpredictable forces in worldwide energy markets
Biodiesel	▪ Domestically and organically produced from renewable or recycled resources ▪ Biodegradable, nontoxic, and essentially free of sulfur and aromatics ▪ Produces less particulate, smoke, hydrocarbons, and carbon monoxide emissions than conventional petrodiesel ▪ Only alternative fuel to have fully completed the health effects testing requirements under the Clean Air Act ▪ Can be used without modifying existing diesel vehicles and produces similar engine performance ▪ Can use the standard storage and handling procedures already in place for petrodiesel	▪ Historically, has been more expensive than petrodiesel ▪ Nearest distributor is at the northeast entrance to Yellowstone National Park, 131 miles away
Ethanol	▪ Domestically and organically produced ▪ Nontoxic, water soluble, and biodegradable ▪ E85 (85% ethanol blended with 15% gasoline) is appropriate for light-duty vehicles; E95 (95% ethanol blended with 5 percent diesel) can be used as a replacement for diesel fuel ▪ High octane rating, results in increased engine efficiency and performance ▪ Substantially lower tailpipe emissions, burns cleaner, and produces less carbon dioxide	▪ Lower energy content than gasoline – about a third more ethanol is required to travel the same distance as on gasoline ▪ Requires certain engine adjustments or a fuel flexible vehicle (FFV) ▪ E85 has historically had comparable costs to gasoline as a result of government subsidies ▪ E95 has historically been more expensive than petrodiesel ▪ According to e85refueling.com, one distributor of E85 is located in Sheridan, WY, about 65 miles from Little Bighorn Battlefield NM; no E95 distributors were readily identified
Natural Gas	▪ Generally emits fewer overall regulated emissions than their diesel or gasoline counterparts, particularly with respect to particulate matter ▪ CNG is primarily used in light- and medium-duty vehicles as an alternative to	▪ A non-renewable fuel source, made from a mixture of hydrocarbons (mainly methane) extracted from underground reserves ▪ Requires vehicle conversion; CNG buses cost about $25,000 to $50,000 more than a conventional diesel bus

Fuel	Advantages	Disadvantages
	gasoline; LNG is primarily used as an alternative to diesel to operate heavy-duty vehicles ▪ Historically costs substantially less than gasoline or diesel per gallon equivalent; At 25 cents per gallon savings, the typical CNG bus could pay for itself in just a little more than 3 years	▪ Although there are many refueling stations throughout the country, they are mostly built for and used by individual vehicle fleets; new natural gas vehicle fleets can install their own refueling station or explore the possibility of sharing an existing facility ▪ According to a U.S. Department of Energy database, there is a CNG distributor in Billings, MT, about 52 miles from Little Bighorn Battlefield NM
Propane/Liquefied Petroleum Gas (LPG)	▪ Emissions of hydrocarbons, carbon monoxide, and nitrogen oxide are well within EPA standards, and may offer some improvements over conventional fuels ▪ A special blend of propane, HD-5, has been developed for vehicular use which has a higher octane rating than gasoline ▪ Cost has historically been substantially less expensive than gasoline and diesel per gallon equivalents	▪ A non-renewable fuel source which primarily consists of propane and butane and is produced as part of natural gas processing and crude oil refining ▪ HD-5 has less energy content, getting about 12-15% fewer miles per gallon ▪ Requires vehicle conversion ▪ The majority of propane providers are retail operations who supply propane for a variety of purposes; most fleet users install their own infrastructure (storage tanks, meters, and dispensers) and propane is then delivered to these facilities by truck
Methanol	▪ M85 (85% methanol and 15% gasoline) is primarily used as an alternative fuel in light-duty vehicles; M100 (pure methanol) works best in heavy-duty vehicles	▪ A fuel source made from non-renewable natural gas or coal (although it can also be derived from renewable resources containing carbon) ▪ As a volatile organic compound (VOC), methanol can contribute to the formation of photochemical smog ▪ Because of the lower energy content, vehicles will have a reduced range compared to conventional fuel ▪ Fueling infrastructure is primarily limited to private facilities supporting individual fleets ▪ Price is subject to volatility based on the fluctuation in demand for its other uses ▪
Hybrid Electric	▪ Propulsion system combines on-board electric storage with a power unit that may be fueled from any of the conventional or alternative fuels ▪ Improved vehicle performance and reduced fuel consumption and emissions without compromising the range of the vehicle ▪ Reduction in fuel consumption results in cost savings	▪ Maintenance personnel and drivers will require proper training for safety and optimal vehicle operation ▪ Required infrastructure potentially includes battery charging infrastructure and access to a refueling station ▪ The cost of a hybrid vehicle is generally more expensive than a conventional vehicle
Battery Electric	▪ Does not use a fuel source, instead relying on stored energy to power the vehicle. ▪ Zero tailpipe emissions (emissions	▪ Substantially smaller driving range than conventional vehicles ▪ Can be substantially more expensive than conventional vehicles

Fuel	Advantages	Disadvantages
	associated with powering the vehicle are displaced to the power plant) ▪ Daily cost of operating an electric vehicle is based on the cost of electricity	▪ Maintenance personnel and drivers will require proper training for safety and optimal vehicle operation
Hydrogen	▪ Can be derived from renewable or non-renewable sources (water, biomass, renewable fuels, fossil fuels, and any other material rich in hydrogen) ▪ If hydrogen is stored on board in a fuel cell, then the only measurable emission is water vapor; if burned in an internal combustion engine, then small amounts of NOx and other products may be emitted	▪ Use is currently limited to experimental or prototype vehicles, either in fuel cell applications or modified internal combustion engines ▪ Has a lower energy density than natural gas and conventional fuels, requiring larger fuel storage capacities in vehicles, which adds weight or reduces cargo or passenger capacity ▪ Current high cost associated with producing hydrogen ▪ Current lack of a national infrastructure

Sources:

Federal Transit Administration, Transportation Planning Process for Transit in Federal Land Management Areas, Volume III: Methods to Define the Transit Need, April 2008.

Clean Air Trust, http://www.cleanairtrust.org.

U.S. Department of Energy, Alternative Fuels & Advanced Vehicles Data Center, http://www.afdc.energy.gov/afdc/locator/stations.

Growth Energy, E85 & Flex Fuel Station Finder, http://www.e85fuel.com.

U.S. Environmental Protection Agency, http://www.epa.gov/chemfact/s_methan.txt.

U.S. Department of Energy, Clean Cities Fact Sheet, "Natural Gas Buses: Separating Myth from Fact," May 2000, http://www.kaapeli.fi/~tep/projektit/liikenteen_biopolttoaineet/CNGbuses_MythvsFact.pdf.

An important consideration when evaluating alternative fuels is proximity to a fuel source or distributor and the cost of supplying fuel to the fleet of transit vehicles. Given the location of Little Bighorn Battlefield National Monument, far from a major metropolitan area, there are fewer practical options for supplying alternative fuels to a possible transit fleet. The park's proximity to various fuel suppliers is summarized in Table 4-29. In some cases, such as biodiesel and ethanol, the nearest supplier is more than 100 miles away, a distance that presents potential logistical and cost challenges.

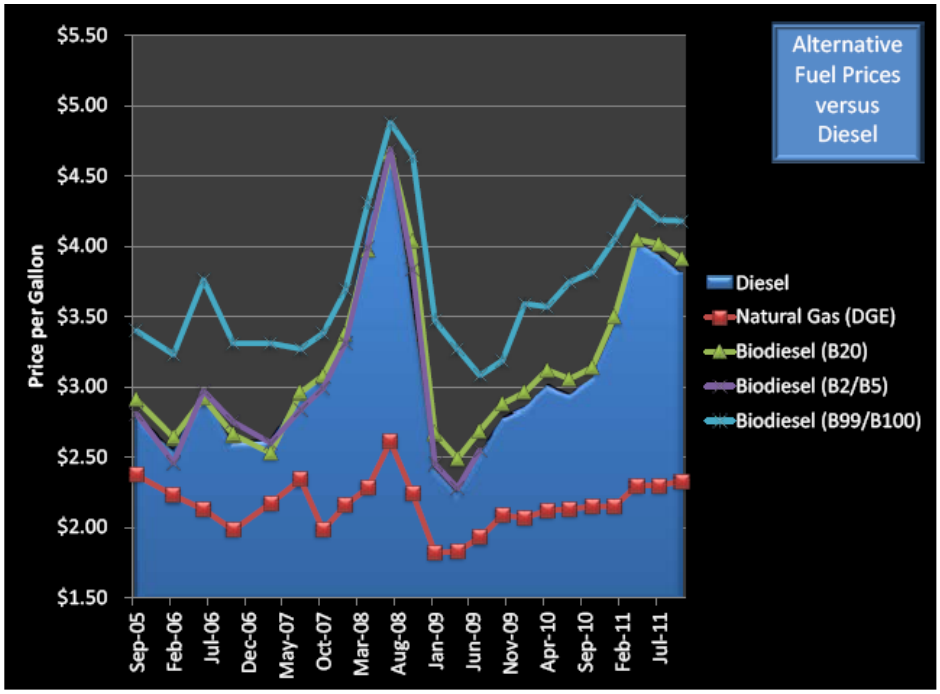
Table 4-29: Distances to Alternative Fuel Distributors

Fuel	Distance	Distributor
Propane/Liquefied Petroleum Gas (LPG)	51.2 Miles	U-Haul 1145 Main St Billings MT 59105 Phone: 406-248-7162 Access: Public
Compressed Natural Gas (CNG)	51.8 Miles	Montana-Dakota Utilities Co 408 N 18th St Billings MT 59101 Phone: 701-224-5807 Access: Public- card key at all times
Ethanol (E85)	65 Miles	Farmers Co-op Oil 117 North Scott Sheridan, WY 82801 Phone: 877-660-3050 Full Service Hours: M-F 7-6, Sat. 8-12
Biodiesel (B20 and above)	131 Miles	Yellowstone National Park - Northeast Entrance Yellowstone National Park MT 82190 Access: Private access only
Ethanol (E85)	164.2 Miles	Yellowstone National Park - Mammoth Hot Springs Park headquarters Yellowstone National Park WY 82190 Access: Private access only

Sources:
U.S. Department of Energy, Alternative Fuels & Advanced Vehicles Data Center, http://www.afdc.energy.gov/afdc/locator/stations.
Growth Energy, E85 & Flex Fuel Station Finder, http://www.e85fuel.com.

If a transit option is chosen for the park and an alternative fuel is used to run the transit fleet, it is likely that new local fueling infrastructure will be required to support the fleet. Depending on the fuel selected, the initial capital cost of the fueling infrastructure can be offset by the savings realized by using a lower-cost fuel. For example, the U.S. Department of Energy's October 2011 Alternative Fuel Price Report showed a considerable price differential between various fuels. According to the report, CNG had a lower price than diesel for all regions of the country, with the largest difference ($2.19 per diesel gallon equivalent) being in the Rocky Mountain region. As illustrated in the following graph from the report, the prices of other alternative fuels were found to be closer to, or slightly higher than, conventional diesel.

Figure 4-13: Alternative Fuel Prices versus Diesel (National Average)



U.S. Department of Energy, Clean Cities Alternative Fuel Price Report, October 2011, http://www.afdc.energy.gov/afdc/price_report.html

Given the large fuel price differential between natural gas and conventional diesel, many transit providers in the U.S. have converted their vehicles to run on CNG, and natural gas buses represent a significant and growing percentage of new bus orders. However, these buses are most often part of a large fleet. A recent analysis for the National Renewable Energy Laboratory concluded that the profitability of small transit fleets running on CNG tends to be marginal and drops precipitously if the number of transit vehicles drops below 30.[21] Although CNG has many attractive benefits – long-term cost-effectiveness, more-consistent operational costs, increased energy security, reduced greenhouse gas emissions, reduced local air pollution, and reduced noise pollution – it requires careful analysis and detailed scoping of numerous aspects of the fleet and refueling station in order to determine whether a potential transit project such as Little Bighorn Battlefield National Monument would be more cost-effective than conventional diesel.

21. Johnson, Caley. "Business Case for Compressed Natural Gas in Municipal Fleets" National Renewable Energy Laboratory, NREL/TP-7A2-47919, June 2010: http://www.afdc.energy.gov/afdc/pdfs/47919.pdf

5. SUMMARY OF STUDY RESULTS

Results from this alternative transportation feasibility study are summarized below.

1. The initial set of 13 transportation options encompasses a broad range of alternative transportation improvement measures, including roadway improvements, parking reconfiguration/ expansion, intelligent transportation system (ITS) tools, travel demand management (TDM), transit programs, and other alternative transportation improvements.
2. The initial screening of the 13 options, using a set of criteria derived from established goals and objectives for this study, eliminated eight of them from further consideration and carried the other five to the next step of the study for further refinement, development, and detailed evaluation.
3. The refined transportation options (following initial screening) include three construction options, one no-build option focused on management improvements, and three transit options, which were variations of a Voluntary Transit option analyzed in initial screening.
4. The detailed screening resulted in the seven options being ranked on a scale of zero to 10, using a set of weighted criteria.
5. Transit option VI-A – Seasonal Transit from Offsite Staging/Parking to Reno-Benteen – scored the highest among all seven transportation options. This option is more likely to meet the goals and objectives and help fulfill park mission.
6. Option II – Widening Tour Road and Expanding Parking – scores the second highest and closely behind Option VI-A. This option is promising in mitigating traffic congestion, roadway safety, and parking shortage issues in both short- and long-term.
7. Option IV – Management Improvements, Option V – Seasonal Transit from Offsite Staging/Parking to Visitor Center, and Option VI-B – Peak Days Transit from Offsite Staging/Parking to Reno-Benteen score the same as the third highest.

   Option IV offers many benefits, such as low costs, ease of implementation, effectiveness in enhancing visitor experience in the short term, and low impacts; however, it is not expected to provide substantial relief to parking shortage and road congestion issues, particularly in the long term. Considerations should be given to implement this option as a short-term solution, or as the first phase for other more comprehensive and higher cost options.

   Option V would be attractive to visitors who only intend to visit the Custer Battlefield Unit and account for approximately 45-50% of all existing visitors. It could effectively mitigate parking shortage in the visitor center area.

   Option VI-B can be implemented as a three- to five-year pilot program, or as the first phase of a more comprehensive transit program, such as Option VI-A. It could also serve as a special events management strategy for other options that do not have a transit program, such as Option I and II.
8. Although Option I – Repairing Tour Road and Parking Reconfiguration – scores relatively low, it could serve as an essential component for other options to function well, including Options III, V, and VI-A.
9. Although Option III (the GMP option) scores the lowest among the seven options, it does offer long-term solutions to transportation problems in the park and remains the long-term plan. The National Park Service will continue to work on securing funding to implement the GMP at the park.

Agency Statement

Document Number: 381/100910

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 environment and cultural values of our national parks and historical 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.

Appendix A:
Existing Conditions – Memorandum

URS

MEMORANDUM

To: Jenny Staroska, NPS DSC – Transportation Division

From: Freddy He, URS Corporation

Date: November 18, 2011

Re: An Overview of Existing Conditions, Project Goals, and Critical Issues

For the Alternative Transportation Feasibility Study, Little Bighorn Battlefield National Monument, LIBI – 163914

URS Project No. 22242502

This memorandum presents the goals of this alternative transportation (AT) feasibility study, summarizes the existing transportation conditions, and identifies critical issues in relation to parking and traffic operations in and adjacent to the Little Bighorn Battlefield National Monument (Park).

1.0 PROJECT GOALS

The purpose of this technical study is to develop and evaluate alternatives to provide visitors access to the Park, in a safe, non-stressful way that impacts the park resources as little as possible, and all in an economically responsible manner. The study team has reviewed relevant information provided by the National Park Service (NPS) and collected and reviewed data from secondary sources. Subsequently, the following draft goals of this study as established in the Scope of Services are proposed for review and discussion:

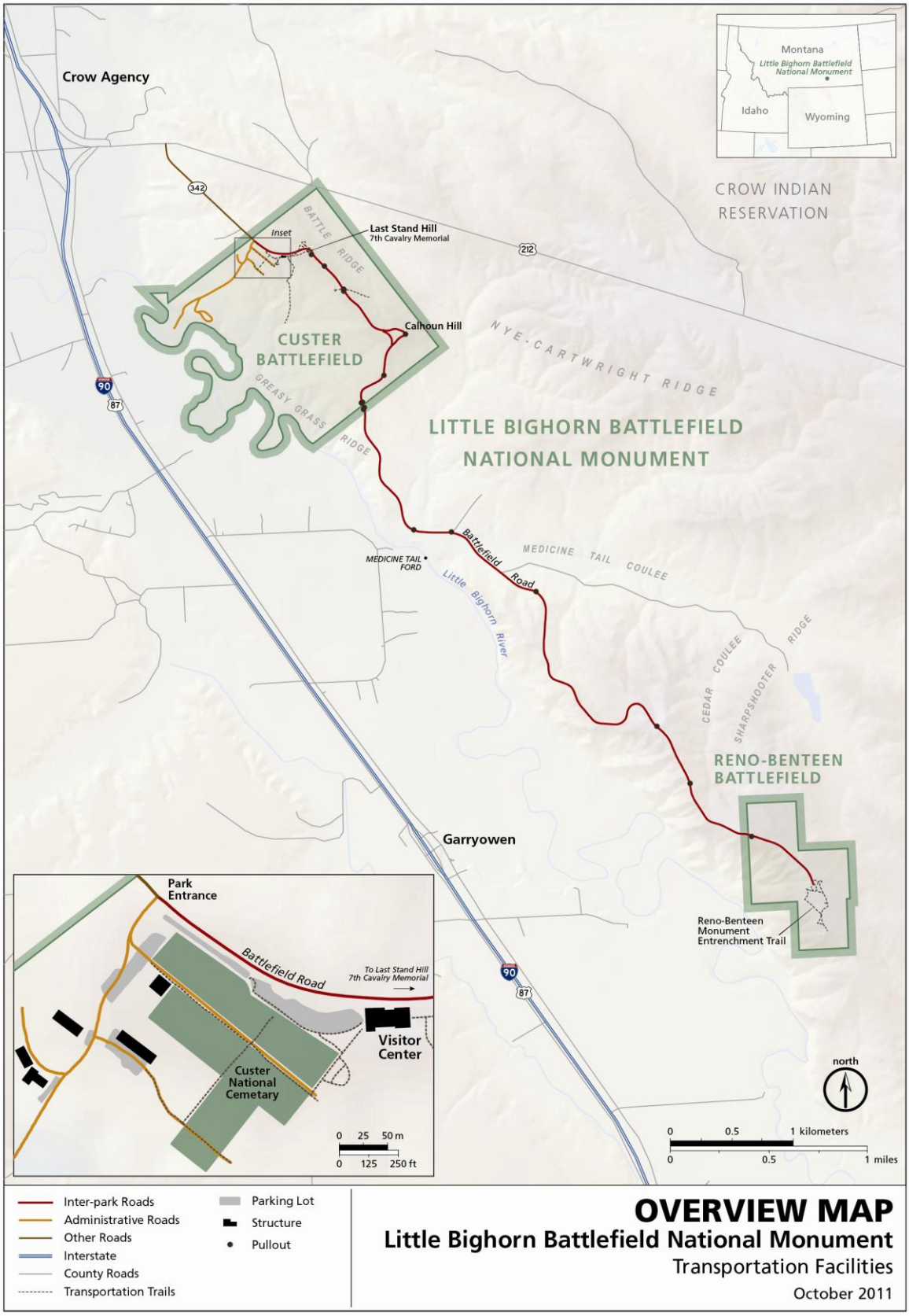
- Determine whether AT can solve the Park's transportation issues
- Determine whether AT is financially feasible at the Park. If AT is feasible, then recommend the AT type and level of service and identify source(s) of sustainable funding
- Share information with stakeholders

2.0 EXISTING TRANSPORTATION SYSTEM

Little Bighorn Battlefield National Monument is located in Big Horn County, southeastern Montana, approximately 61 miles southeast of Billings, Montana and 70 miles north of Sheridan, Wyoming (**Figure 1**). The Park is located in a rural area southeast of Crow Agency within the Crow Indian Reservation area. The closest city to the Park is Hardin, the county seat of Big Horn County, located approximately 16 miles northwest of the Park. The population of Hardin was 4,522 according to the 2010 census [Reference 1].

As shown in **Figure 1**, Interstate 90 (I-90) runs generally in the north-south direction west of the Park and provides visitors regional access to the Park via an interchange with U.S. Highway 212. Two-way frontage roads extend parallel to and on both sides of I-90. Montana State Route 342 connects U.S. Highway 212 on the north and the Park's entry station on the south via an approximately 0.6 mile roadway segment.

Figure 1. An Overview Map of Little Bighorn Battlefield National Monument



Little Bighorn Battlefield National Monument encompasses approximately 765 acres of federal land in two separate units (**Figure 1**) – Custer Battlefield on the north and Reno-Benteen Battlefield on the south. The Custer Battlefield unit consists of the park entry station, visitor center, Last Stand Hill, and Custer National Cemetery. An approximately 5.2-mile long Battlefield Road (Tour Road), from the entry station to the parking lot in Reno-Benteen Battlefield, connects the two units. Both park units are surrounded by Crow Indian Reservation land, and the Tour Road traverses through Crow Indian Reservation and other private lands.

The Tour Road consists of two travel lanes, one in each direction, and has a pavement width varying between 17 feet and 20 feet without shoulders. The typical section is 18 feet wide. Outside of the park units, the Tour Road has a 60-foot right-of-way [Reference 5]. The alignment of the Tour Road consists of many horizontal and vertical curves and some steep grades as the road traverses the rolling territory. South of the Last Stand Hill, the posted speed limit on the Tour Road is 30 miles per hour (mph). Between the visitor center and Reno-Benteen parking lot, the Tour Road has white edge lines on both sides but does not have any center line striping.

Parking spaces are provided in both park units and approximately 17 wayside pullout areas along the Tour Road [Reference 2]. The aerial images (dated September 2010) in **Figure 2** and **Figure 3** display parking areas in the Custer Battlefield and Reno-Benteen Battlefield units, respectively.

Figure 2. Google Earth Aerial Photograph near the Visitor Center

Copyright by Google. Imagery Date: September 2010.
Map north points vertically to top of the page. Not to scale.

Figure 3. Google Earth Aerial Photograph of the Reno-Benteen Parking Lot

Copyright by Google. Imagery Date: September 2010.
Map north points vertically to top of the page. Not to scale.

The Custer Battlefield unit has three general parking areas: the visitor center parking lot consists of 57 regular parking spaces, two handicapped parking spaces, and four parking spaces reserved for government vehicles; the Main Road parking lot includes 34 regular parking spaces; the Stone House parking lot consists of 34 regular parking spaces and one handicapped parking space. In total these three areas provide 128 parking spaces for use by the general public (including three handicapped parking spaces).

In addition, parallel parking spaces are provided along the southwest curb of Main Road across the splitter island from the visitor center parking lot, and on the northeast shoulder of Main Road leading to exit of the entry station [Reference 2]. These spaces are intended for use by oversize vehicles and had an original design capacity of 21 oversize vehicles. According to the 2010 Traffic and Parking Conditions report [Reference 2]; many of these spaces are often occupied by regular size vehicles. Due to increasing sizes of oversize vehicles, currently the parallel parking areas can fit approximately 16 oversize vehicles.

The Reno-Benteen Battlefield unit provides 13 regular-size plus two oversize parking spaces at the end of road parking and turnaround area. The 17 wayside pullouts along the Tour Road consist of a total of 59 parking spaces, most of which are unmarked. **Table 1** displays a breakdown of parking spaces at each wayside [Reference 2].

Table 1. Wayside Pullouts along Park Tour Road
(Reproduced from 2010 Traffic and Parking Conditions Report [Reference 10])

Wayside number (in north to south order)	Wayside name	Distance from Visitor Center (miles)	Side of Road (east or west)	Configuration (simple pullout or other)	Number of parking spaces	
					marked	unmarked
1	Last Stand Hill	0.1	west	diagonal parking - 3 handicapped spaces	3	
2	Deep Ravine	0.2	east	pullout		3
3	unnamed	0.3	west	pullout - unpaved		2
4	Keogh - Crazy Horse Fight	0.4	east	pullout		2
5	Cheyenne Warrior Markers	0.4	west	pullout		6
6	Calhoun Hill	0.7	east	one-way loop road		4
7	Lame White Man Charge	0.9	east	pullout		3
8	Greasy Grass Ridge	1.1	east	pullout		2
9	Greasy Grass Ridge	1.1	west	pullout - unpaved		2
10	Indian Encampment	1.1	east	pullout		2
11	Indian Encampment	1.1	west	pullout		3
12	Deep Coulee	1.8	east	pullout		2
13	Medicine Tail Ford	2.0	east	pullout separated from road by narrow island		4
14	Medicine Tail Coulee	2.6	east	pullout		5
15	Weir Point	3.8	east	pullout		4
16	Sharpshooter Ridge	4.1	east	pullout		5
17	Custer's Advance Reno's Valley Fight Reno's Retreat	4.5	west	pullout		7

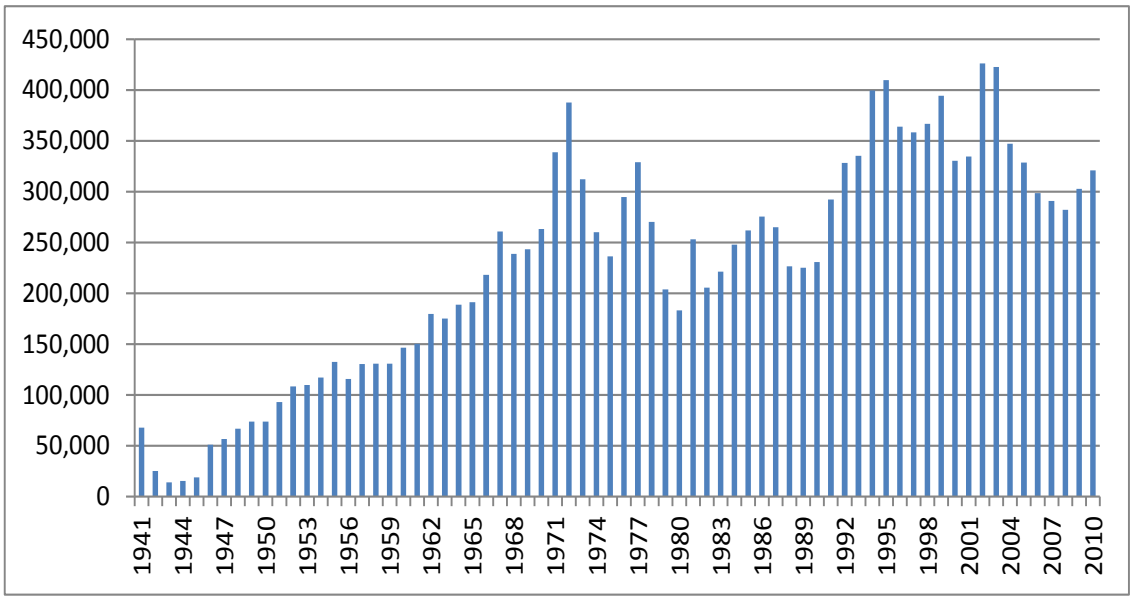
A Park concessionaire offers guided interpretive motorized tours, a one-hour guided tour on the Tour Road. The tours operate from Memorial Day to Labor Day weekend and leave five times a day. In addition to the park admission fee, visitors pay $8.00 (adults), $2.00 (children), or $5.00 (seniors) per person for the guided tour. The concession is held by Little Bighorn College doing business as Apsaalooke Tours. On average, six to seven percent of park visitors took the bus tour. The recorded largest number of passengers on a single day is 131 visitors [Reference 2].

3.0 Visitor Volumes and Trend

The NPS Public Use Statistics Office has provided existing and historical visitation data. **Figure 4** illustrates variation of annual park visitation from 1941 to 2010. As shown in **Figure 4**, over the last decade park visitation declined, but started increasing in the last several years. From 2002 to 2008, annual visitors decreased from approximately 426,000 to 282,200, or by 34%; from 2008 to 2010, annual visitors increased to 321,000, or by 14%. In addition, as of August 2011, the year-to-date (YTD) recreational visitors are 251,782 (January – August, 2011), a 3.5% decrease from the same months in 2010 [Reference 3].

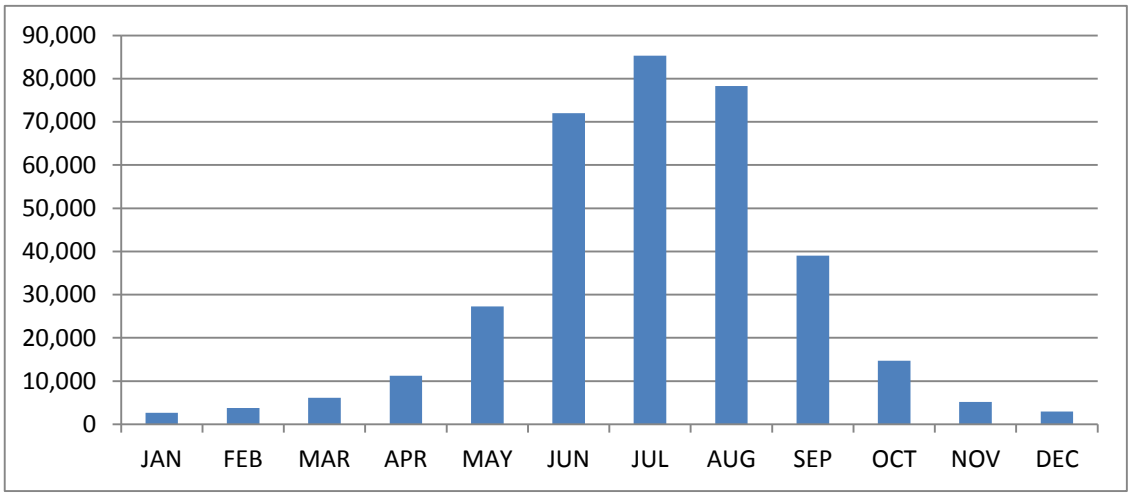
As with many other national parks, visitation to Little Bighorn Battlefield National Monument is highly seasonal due to climate. **Figure 5** shows that the summer months from June to August account for approximately 68% of annual visitors to the Park. It should be noted that the vertical scale (visitor volume) in **Figure 5** is exaggerated compared to **Figure 4,** and therefore the two figures should be evaluated individually.

Figure 4. Annual Recreational Visitors



Source: NPS Public Use Statistics Office [Reference 3].

Figure 5. Monthly Average Recreational Visitors (1995-2010)



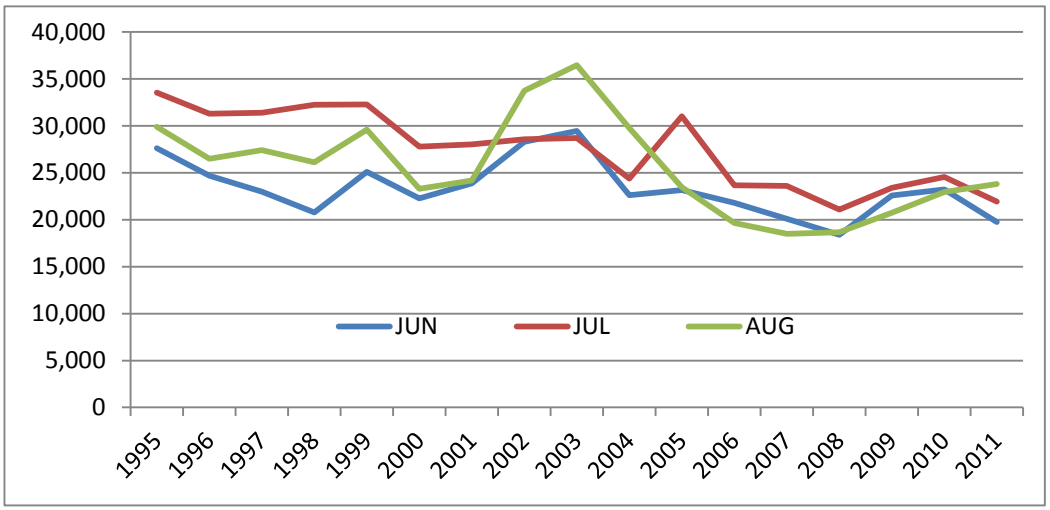
Source: NPS Public Use Statistics Office [Reference 3].

4.0 Traffic Circulations and Parking

Vehicular traffic counts, in terms of vehicles entering the Park via the entry station each month, are available from the NPS Public Use Statistics Office [Reference 3]. Because park visitation concentrates in the three summer months June, July, and August; it is expected that traffic and parking issues are most significant in these months. **Figure 6** illustrates year-by-year variation in traffic volumes during the three summer months. In recent years, between 20,000 and 25,000 vehicles per month entered the Park in June, July, and August.

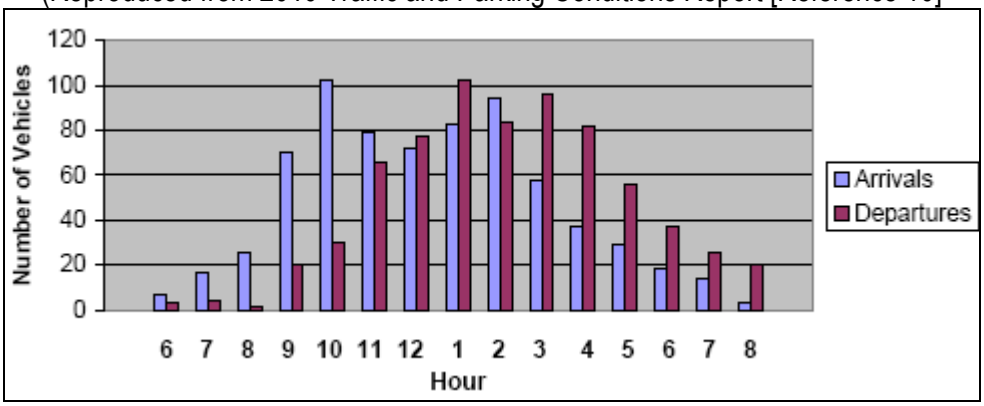
The 2010 Traffic and Parking Conditions report analyzed daily traffic volumes entering and circulating in the Park during the peak summer months, using 2009 and 2010 daily traffic counts generated from the Park's traffic counter at the entry station and new tube counts (presented in 15-minute intervals) conducted from June 24 to July 8 and from July 21 to July 29, 2010. The 2010 report identified July 22, 2010 as the "Design Day", which lies between the fifth and tenth highest visitation days in both 2009 and 2010. During the 2010 Design Day, 660 vehicles enter the Park, and their arrivals and departures by hour are illustrated in **Figure 7**. Arrival rates reached the peak at 10:00 AM with more than 100 vehicles arriving at the gate during the hour. With two fee booths open at the entry station, each booth needed to process over 50 vehicles, or close to one vehicle per minute on average. The highest departure rate occurred at 1:00 PM, with slightly over 100 vehicles leaving during the hour, and then decreased steadily until 8:00 PM. It should be noted that since the gate opens at 8:00 AM and closes at 9:00 PM, vehicles arriving or departing beyond this time frame are mostly non-recreational, including park staff and other official vehicles.

Figure 6. Vehicle Traffic Volumes during the Summer Months



Source: NPS Public Use Statistics Office [Reference 12].

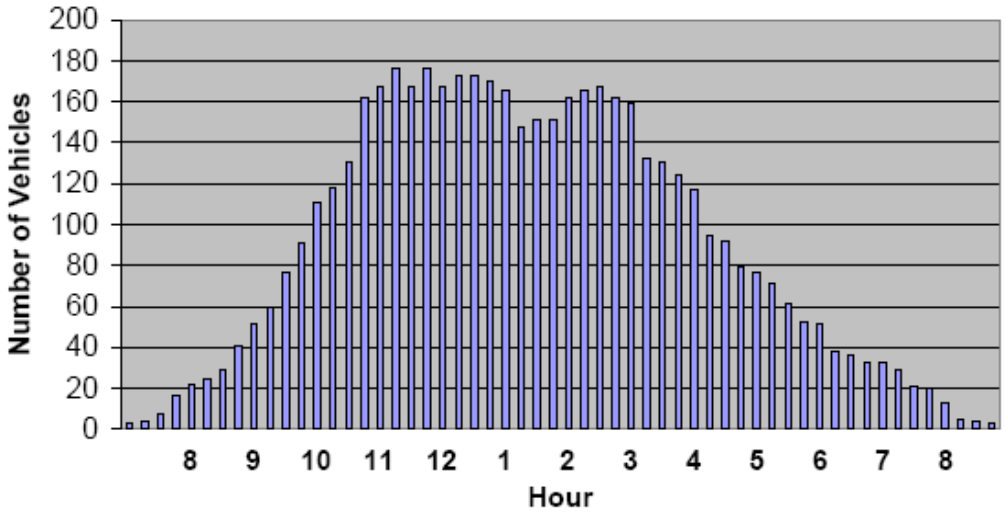
Figure 7. Arrivals and Departures by Hour – July 22, 2010
(Reproduced from 2010 Traffic and Parking Conditions Report [Reference 10]



Throughout the day, the accumulation of vehicles inside the Park is of particular interest since it serves as an indicator of potential parking and traffic congestion problems. **Figure 8** illustrates

such accumulation by 15-minute intervals on the 2010 Design Day. During the peak periods around noon, close to 180 vehicles are inside the Park at the same time. These vehicles include both visitors and non-visitors, mainly park staff who typically account for approximately 16 vehicles in the Park. The 2010 Traffic and Parking Conditions report further stated that during the peak periods approximately 140 vehicles were in the visitor center parking areas compared with 144 total parking spaces (128 regular-size spaces plus 16 oversize spaces), indicating the parking areas are near or at capacity. Field observations performed for the 2010 Traffic and Parking Conditions report corroborate the above analysis. The report also stated the highest number of vehicles on the Park Tour Road, at any time point during the Design Day, is close to 50. Overall about 50 to 55 percent of visitor vehicles would drive on the Tour Road, while an additional six to seven percent of visitors take the concession-operated tour buses on the Tour Road. Approximately 75-81% of the visitor vehicles can fit into the regular-size parking spaces and the rest 19-25% are oversize vehicles. On the Tour Road, approximately 11% of the vehicles are oversized, lower than the percentage of oversize vehicles entering the Park [Reference 10].

Figure 8. Vehicle Accumulation Inside the Park by 15-Minute Intervals – July 22, 2010
(Reproduced from 2010 Traffic and Parking Conditions Report [Reference 10]



5.0 CRITICAL TRANSPORTATION ISSUES

This section summarizes traffic and parking issues in the Park that have been identified and documented in previous planning and study documents, including those described in Section 6.0, Bibliography of Previous Planning and Projects; and listed in Section 7.0, References.

- There is an overall shortage of parking spaces, particularly for oversize vehicles. The parking areas in the Custer Battlefield unit are near or at capacity during the 2010 Design Day which lies between the fifth and tenth highest visitation days of both 2009 and 2010. It should be noted that June 25, the Park's anniversary, is typically the highest visitation day and could have 50% more visitors than the Design Day. Visitors also tend to stay longer in the Park on June 25 than other days.
- The narrow Tour Road with no shoulders; compound with high volume of traffic, rugged surfaces, deep drop-offs, steep grades, and horizontal and vertical curves; presents serious

safety concerns. Large vehicles often have to drive off the road, or scrape off each other's mirror while passing, creating aggravated safety hazards and negative resource impact.

- The majority of parallel parking spaces designated for oversize vehicles are located on the outbound side of the Main Road, forcing oversize vehicles to exit the Park on State Route 342, find somewhere to turnaround, and reenter the Park if they want to continue on the Tour Road.
- Near the visitor center, the tour road is divided into two one-way lanes by an island which is also the site of a restroom building. The inbound (southbound) lane also serves as the regular size parking aisle, while the outbound (northbound) lane has oversize vehicle parking on both sides. Frequent pedestrian-vehicle and vehicle-vehicle conflicts have been observed, mainly due to high volume of traffic in the area, parked oversize vehicles blocking views, and oversize vehicles making difficult turning maneuvers. As a result, this area sometimes experiences traffic congestions and raises safety concerns.

6.0 Annotated Bibliography of Previous Planning and Projects

This section summarizes, in a chronological order, previous major planning efforts and projects related to the transportation system of the Little Bighorn Battlefield National Monument.

1995 Final General Management and Development Concept Plans (GMP) (Update to the 1986 GMP).

The GMP noted overall inadequate parking capacity in the Park, in particular for oversized vehicles, and suggested relocating the visitor center to a site outside the current park boundaries. A potential location for the new visitor center/administrative facility is at the junction of I-90 and U.S. Highway 212. In conjunction with the new visitor/administrative facility, the GMP recommended extending the Park Tour Road from Reno-Benteen Battlefield to I-90 so that it would form a one-way loop with the existing Frontage Road. The GMP also suggested a transit system to provide visitor with tour bus services on the new one-way loop road. Note that the 1995 GMP Update also suggested an additional potential VC location near Garryowen.

For various political reasons, the visitor center and its parking lots have not been relocated, nor has the Park Tour Road been extended.

1998 Traffic Safety Study for Little Bighorn Battlefield National Monument.

This study examined traffic safety issues in the Park and developed a set of short- and long-term recommendations to improve the transportation system. The study noted that according to NPS records and park staff, no motor vehicle accidents had been reported in the Park during the previous 20 years. The traffic safety problems described in this study are derived from field observations and should be considered as representing potential safety issues.

Short-term recommendations from this safety study included minor changes to the road system and parking area. Some of them, such as signing, striping, and parking lot reconfiguration have been implemented. Long-term recommendations included constructing a remote parking area at the corner of State Route 342 and U.S. Highway 212, providing a transit system between the remote parking and the Park and throughout the Park Tour Road, and prohibiting private vehicles from entering the Park during the peak summer season (from May 15th to September 15th). These long-term recommendations have not been implemented.

2001 Field Report of Little Bighorn Battlefield National Monument.
This FHWA & FTA Field Report noted that the Park could be a strong candidate for the introduction of an alternative transportation system due to high levels of summer visitation; a single constrained ingress and egress point; inadequate parking at the visitor center and the interpretive wayside pullouts; a narrow Park Tour Road connecting the visitor center, Custer Battlefield, and Reno-Benteen Battlefield; and NPS' reluctance to further impact natural and cultural resources by widening the Tour Road and expanding parking areas.

The Field Report acknowledges traffic safety issues and recommendations from the 1998 Traffic Safety Study, as well as other planning efforts such as the 1995 GMP updates and the 1999 Resources Management Plan. In addition, The Field Report suggested a range of long-term alternative transportation improvements, several of which would only be required during the peak summer season. These include restricting access to the Park Tour Road to vehicles over a certain length during the summer season, establishing a visitor reservation system, a transit system in conjunction with a remote parking area, relocation of the visitor center jointly with a Crow cultural center to the Garryowen area, and a new roadway segment and road improvements to connect the new visitor center to the Reno-Benteen Battlefield. These recommended long-term improvements have not been implemented.

2001 Federal Lands Alternative Transportation Systems Study, Volume III, Summary of National ATS Needs.
The goal of this nationwide study undertaken by the FHWA and FTA was to:

> "*….identify opportunities for application of Alternative Transportation Systems (ATS), or transit, to relieve traffic congestion and parking shortages; enhance visitor mobility and accessibility; preserve sensitive natural, cultural, and historic resources; provide improved interpretation, education, and visitor information services; reduce pollution; and improve economic development opportunities for surrounding communities*" [Reference 4].

The Field Report as described above is part of the nationwide study efforts. Along with 117 other sites in the nation, Little Bighorn Battlefield was identified as needing an ATS.

2002 Construction Project of the Park Tour Road.
The 3R (rehabilitate, restore, resurface) construction project was completed in 2002 in order to address tour road safety concerns. The project purpose was to rehabilitate poor pavement and drainage conditions and widen the road without any earthwork. However, upon completion of the project additional safety concerns arose due to steep drop-offs that were created and pavement rutting resulting from inadequate thickness. This construction project did not address parking safety or capacity issues.

2005 Environmental Assessment / Assessment of Effect: Rehabilitate Tour Road.
The park staff, led by then Superintendent Cook, worked with the Denver Service Center to develop an FHWA project to mitigate immediate and deteriorating safety problems related to parking and the narrow Park Tour Road. This EA study examined three alternatives of this FHWA project: No-Action, Road Widening – 24-foot Width, and Road Widening – 22-foot Width. As a result, the Road Widening – 24-foot Width was identified as the Preferred Alternative which

includes rehabilitating, restoring, restoring, and reconstructing the Tour Road, the visitor center parking area, and the Reno-Benteen parking lot to improve the condition of the pavement and its underlying structure. The Tour Road would be widened to have two 11-foot travel lanes, one in each direction, and a one-foot shoulder on both sides. The visitor center and Reno-Benteen parking lots would be reconstructed to increase capacity and improve traffic flow.

The EA and a resulting Finding of No Significant Impact (FONSI) were completed in 2005. Design of the Preferred Alternative followed and the project was scheduled for construction in 2011. The construction has been postponed indefinitely as concerns remain among park staff, Superintendent Hammond, some stakeholders, and some regional staff about whether there is any other viable option that can effectively address safety and parking issues without increasing the project's footprint on the landscape.

2007 Resources Management Plan.
This Resources Management Plan identified several transportation related issues as current threats. These include safety concerns with the Park Tour Road, interim visitor center expansion, and pedestrian safety and access to cultural resources. The plan noted long-term goals as part of the five-year program strategy. In relation to parking and traffic operation, one of the goals states "By September 30, 2011, 96% of visitors to LIBI are satisfied with appropriate park facilities, services, and recreational opportunities."

2010 Preliminary Feasibility Study – Alternative Transportation
This report documents several transit and transportation options, which have been discussed or brainstormed for the Park in recent times, and their order of magnitude costs at the Park. The study followed the decision to indefinitely postpone the previously approved FHWA roadway and parking construction project in lieu of potential controversies about the project. The report recognizes previous planning efforts and projects undertaken to address parking and roadway deficiencies, many of which are discussed in this section, and identifies remaining transportation issues at the Park.

A total of eight transit and transportation options were discussed in this preliminary feasibility study, including five main ideas (Options A through E) and three less feasible options. The five main ideas include [Reference 5]:

Option A – *Expand Existing Parking Lots & Widen Road (4R project)*

Option B – *Off-site Oversize Vehicle Parking & Shuttle. Seasonal Oversize Vehicle Restrictions Possible*

Option C – *Oversize Vehicle Demand Management (No Build)*

Option D – *Close Battlefield Road to Motorized Vehicles*

Option E – *One-way Road (from GMP)*

The three additional options include No Action, a Permit System that requires visitors to call ahead and only allows a certain number of visitors/vehicles in the Park at one time, and Private Vehicle Restrictions on Battlefield Tour Road. Finally, this report recommends an in-depth transportation

study be completed that includes collecting data specific to the Park, using this preliminary feasibility study as a springboard.

2010 Existing Traffic and Parking Conditions and Implications for Transportation Alternatives: Little Bighorn Battlefield National Monument.

This study examined existing traffic and parking conditions at Little Bighorn Battlefield National Monument and gathered traffic data in anticipation of an alternative transportation feasibility study. It also evaluated possible transportation alternatives in the context of study findings. The study noted that under existing conditions, there is a shortage of parking space for oversize vehicles and overall parking demand is near or at capacity. It also stated that visitation to the Park is seasonal and that traffic and congestion problems occur only during several weeks of the summer. The study concluded that a shuttle bus system appears to be necessary, but would be needed only from mid-June through the third week in August, a period of approximately 10 weeks.

2010 Public Engagement on Management Issues and "Next Steps"

Through this pubic engagement process, the NPS asked the public to share its thoughts about four management issues that have significantly impacted Little Bighorn Battlefield National Monument for three decades, including [Reference 14]:

- The Park's inadequate and undersized visitor center
- Insufficient museum collection storage
- Narrow and failing roads and insufficient parking
- Significant portions of the battlefield remaining unprotected and inaccessible

This extensive public engagement process included a series of 32 pre-briefings with NPS officials, representatives from the Park's 17 historically associated tribes, elected officials, and stakeholder groups; a formal government-to-government multi-tribal consultation meeting; public meetings in Billings and Hardin, Montana, and in Golden, Colorado; and two virtual webinars. Approximately 170 comments were received by the NPS. As results from this public involvement process, NPS recommended the following next steps [Reference 14]:

- Negotiations with the Crow Tribe, the Custer Battlefield Preservation Committee, and other interested parties aimed at an agreement that would allow for the construction of a new visitor center, museum collection storage, and parking area outside of the current Park boundaries, as called for in the 1986 GMP.
- Protecting the museum collection by temporarily moving it to the NPS Western Archeological and Conservation Center in Tucson, Arizona. The NPS will pursue ways to return the collection to the Park when proper facilities are available
- Implementation of short-term, partial solutions to the parking issues, including moving employee parking and improving signage. The Park will commence an alternative transportation feasibility study in 2011 to help determine midterm and long-term solutions
- Inviting stakeholders to participate in focused discussions regarding whether a modest boundary expansion is feasible for the purpose of addressing the visitor center, museum collection, and parking issues. To protect the entire battlefield, more conversation and exploration of land-protection options will be required

7.0 REFERENCES

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3. *National Park Service, Public Use Statistics Office, http://www.nature.nps.gov/stats/park.cfm?parkid=310, website accessed October 2011.*
4. *Federal Lands Alternative Transportation Systems Study – Summary of National ATS Needs*. Cambridge Systematics, Inc. and BRW Group, Inc. for Federal Highway Administration and Federal Transit Administration. August 2001.
5. *Preliminary Feasibility Study – Alternative Transportation (**Draft**)*. Little Bighorn Battlefield National Monument, National Park Service - Denver Service Center, and National Park Service – Intermountain Region; February 2010.
6. *Final General Management and Development Concept Plans.* Little Bighorn Battlefield National Monument. Original August 1986, Updated May 1995.
7. *Traffic Safety Study – Little Bighorn Battlefield National Monument.* Robert Peccia & Associates for National Park Service. October 1998.
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10. *Interim Visitor Center Plan – Environmental Assessment / Assessment of Effect.* Little Bighorn Battlefield National Monument. June 2006.
11. *Crow Nation Technical Assistance, Final Report.* LSC Transportation Consultants, Inc. for Community Transportation Association of America. December 13, 2007.
12. *Resources Management Plan.* Little Bighorn Battlefield National Monument. July 2007.
13. *Visitor Survey Card Data Report – Little Bighorn Battlefield National Monument*. University of Idaho Park Studies Unit for the National Park Service. 2010.
14. *Public Engagement on Management Issues and Next Steps Brochure*. Little Bighorn Battlefield National Monument. March 2011.
15. *Critical Issues and Opportunities for the 21st Century*. Little Bighorn Battlefield National Monument. October 2010.

Appendix B:
Synthesis of Project Kickoff Workshop Results – Memorandum

URS

MEMORANDUM

To: Jenny Staroska, NPS DSC – Transportation Division

From: David Cooper, URS Corporation

Date: November 1, 2011

Re: Summary of Project Kickoff Workshop (October 24-26, 2011)

Alternative Transportation Feasibility Study, Little Bighorn Battlefield National Monument, LIBI – 163914

URS Project No. 22242502

This memorandum summarizes the results of the Project Kickoff Workshop (October 24-26, 2011) that was held at the Little Bighorn Battlefield National Monument (Park). The workshop was conducted in three parts: (1) Monday afternoon was used to introduce the project and teams, followed by a site tour; (2) Tuesday was devoted to the planning workshop that included a discussion of project issues, goals and objectives, and formulation of preliminary Alternative Transportation System (ATS) options; and (3) Wednesday included the Tribal Consultation meetings and follow-up work related to preliminary ATS options.

The descriptions in the following sections follow a chronological order consistent with the **Workshop Agenda, Attachment A**. Other attachments include sign-in sheets for each of the meetings and sketch diagrams illustrating the basic concepts that were discussed.

Participants of the Monday and Tuesday meetings included (note that some attended one but not both):

- Kate Hammond, Superintendent (Park)
- Rene Laya, Facility Manager, Park Point of Contact (Park)
- Melana Stichman, Biological Technician (Park)
- Abigail Buchin, Facility Services Assistant (Park)
- Ken Woody, Chief of Interpretation (Park)
- Michael Stops, Chief Ranger (Park)
- Debra Frye, Alternative Transportation Program Coordinator (Intermountain Region – IMR)
- Patrick Shea, Project Manager (NPS Denver Service Center – DSC)
- Jenny Staroska, Project Specialist, Contracting Officer's Representative (DSC)
- David Cooper, Facilitator (URS)
- Freddy He, URS Project Manager (URS)

1.0 MONDAY – PROJECT AND TEAM INTRODUCTIONS (1:00 – 5:00 PM)

Introduction

Superintendent Hammond oversaw the introduction of team members; reviewed the project charter; and began a preliminary discussion of Park staff goals for the project, project issues, and parameters. Mrs. Staroska summarized the three-day agenda. After the introductions and discussion, a smaller group embarked on a tour of the Park, led by Mr. Laya.

Superintendent Hammond summarized previous planning efforts and their relevance to ATS. The Park has experienced increasing visitor volumes and faces challenges presented by oversize vehicles, lack of parking, and a narrow Tour Road. Although some of the issues present themselves mostly during the summer season, the narrow Tour Road presents year-round challenges. These issues have been the subject of several studies and plans since the mid-1990s. The 1986 General Management Plan (GMP) identified a one-way loop system to solve and/or mitigate the transportation issues. This proposed project involved a significant extension of the Tour Road and a new Visitor Center at the Garryowen area, and was never constructed. Currently, the extension of the Tour Road is considered to be non-viable due to cost and resource concerns. A construction project to widen the Tour Road to 24 feet and create an oversize vehicle turnaround and parking area near the Visitor Center was slated for construction in 2011, but was put on hold while the NPS considered other options. This project is not off the table but awaits the results of the ATS study, and might be broken down or phased into smaller components.

The 2010 public engagement process sought input on four critical management issues at the Park: (1) Visitor Center is inadequate, (2) museum collections are not adequately protected, (3) parking and roads are inadequate and at times, unsafe, and (4) the park boundaries are not sufficient to protect park resources. The ATS study is intended to address #3 and the concurrent Visitor Center and museum collections study is to address #1 and #2. Superintendent Hammond hopes to see the ATS study present a continuum of options that do not require large changes and expense (such as the Visitor Center relocation and one-way loop road), some of which may be implemented directly by park management and staff.

Mr. Shea provided background on ATS as it relates to NPS planning and this project. The key question is: What can NPS do to move visitors through the Park, while enhancing the visitor experience and protecting Park resources? The feasibility of an ATS depends on many factors, but special consideration should be given to the costs of ATS including buying, maintaining, replacing, and operating vehicles. The scope of ATS needs to be based on the specific needs, visitation patterns, and other factors of the Park. In addition to transit solutions, the ATS study should identify management practices and lower-cost physical improvements to relieve congestion and improve

circulation within the Park. These strategies will become especially important if transit is determined to be infeasible.

The team also discussed declining visitation patterns and how they might impact demand for ATS.

- Mr. Stops: 12:30 to 1:15 is the typical peak parking period. After that, parking areas start flowing much better
- Mr. Woody: visitation had been decreasing during the past 10 years, but recently it appears to be increasing. Reasons for this are not clear.
- Mr. Shea: NPS is concerned about the trend. Will visitation come back and even grow? How will the trend affect the ATS study? The historical trend in visitor volume variation provides insight and essential input for estimating future visitor volumes, which will largely determine key factors of an ATS, such as shuttle ridership, financial sustainability, and resource impacts.

Initial Park Goals for the AT Study

1. Options should not require big moves (for example - Visitor Center relocation).
2. Some options should be low cost management-only solutions.
3. Deferred pavement maintenance should be incorporated into the options
4. Options should avoid concentrating visitors in one place ("packed prairie") – this is a poor visitor experience.

Sideboards

- Park boundaries cannot be changed w/o Congressional action.
- Changes in physical footprint of developed areas within the Park concern historical stakeholders (planned expansion for 4R road and parking project was on "prime real estate" with high resource values)
- Making the Tour Road a one-way loop is not very viable due to cost and resource concerns.
- Smaller shuttles may be better because they disperse visitors in time and space.
- If we take people to Reno-Benteen we could have ranger talks; but how would this affect tours? Currently visitors stop at the waysides and use cellphone tours.
- Existing contract with the interpretive tour concessionaire, Little Bighorn College, is 5-6 years into a 10 year contract. This contract requires a good deal of management by NPS; Little Bighorn College is looking to transfer the tour contract to another party, potentially the Crow Tribe.
- Alternative transportation system options must be financially sustainable.
- The Custer Battlefield unit is more visited than Reno-Benteen Battlefield unit. Reno-Benteen is five miles out, but private

Reno-Benteen Battlefield Parking Lot

vehicle parking is usually not an issue there. Data suggests 50-55% of visitors drive on the Tour Road, while an additional six to seven percent of visitors take the concession-operated tour buses on the Tour Road.

- Economics - potential to use the Park's operations budget for ATS is zero probability. There has not been an increase in the operations budget since 2002.
- Grasslands at the Park are "pristine" and "intact", so the 4R road widening project of several feet would have significant impacts.

Other Issues

- Mrs. Frye: the Visitor Center/Museum Collection planning process could take a few years, so the AT study will have parallel tracks with or without the new Visitor Center
- Mr. Laya: Any options that increase footprint could be uphill efforts
- Road is not designed for oversize vehicles of today

Visitor Center

- Mr. Stops: historical values of the park (e.g., expanding parking may affect historical values/boundaries)
- Ms. Stichman: dispersing the crowd is important.
- Mr. Shea: Pulses adjusting visitor movements. Avoid creating new problems by solving one problem
- Mr. Cooper: Marvin mentioned using website as a tool to attract visitors to the Park. Mr. Shea: "visitation starts from home"
- Financially sustainability is the key
- Superintendent Hammond: at the end of this study, we would like to have the financial data to back up the "favorable" options
- Current concession provides interpretive motorized coach tours (not a shuttle)
- Mr. Woody: current interpretive tour service operates one large bus (25-30 passengers), two middle-size buses, and two or three vans. Tours operate from Memorial weekend through Labor Day. The service originally provided opportunities for Little Bighorn College student training, but it fell through several years ago
- Mr. Stops: current interpretive tour service has potential to be profitable.
- The Park charges an entrance fee of $100 for large tour buses (commercial) and $40 for small buses.
- Restricting RVs on the Tour Road may not work if it results in more congested parking.
- Superintendent Hammond: ONPS flexibility financially is almost zero. Relying on ONPS dollars contributing to AT operations is not viable
- Mr. Stops: intact vegetation landscape. Target pristine.

2.0 TUESDAY – PLANNING WORKSHOP (9:00 AM – 5:00 PM)

David Cooper led the workshop discussion that was planned in the following segments: (1) Introduction, (2) Issues, (3) Goals and Objectives, and (4) Conceptual ATS planning options. The following are highlights that were recorded on the easel tablet. Sketch diagrams developed subsequently are attached to this memorandum to help clarify ATS concepts.

Issues Discussion

The workshop group brainstormed issues for consideration of ATS at the Park, organized in the following categories:

Infrastructure, Operations, and Management

- Vehicular and pedestrian conflicts in parking areas
- Deferred pavement maintenance
- Lack of guardrails on tour road
- No pavement shoulder and steep drop-off
- Narrow pavement (18 feet is typical width)
- Oversize vehicles (narrow lanes 9-10 feet wide)

Park Tour Road

Transportation Modes

- Bicycle safety on the Tour Road
- Potential for accidents (near misses)
- 4R road and parking project should be reviewed for relevance to the ATS. Potential to modify or narrow the scope of the 4R project
- Lack of parking capacity, especially for oversize vehicles
- Differences in the visitor experience of "readers" compared with "listeners", and how this contributes to vehicle congestion

Public and Community

- Proposed RV parking expansion (in the 4R project) was stopped due to local opposition
- The boundaries of the Park and developed "footprint" within the Park are sensitive issues
- Stakeholder concerns about the 4R road and parking project
- Potential impact of remote (off-site) parking

Visitor experience issues

- Visitor safety is an important part of the visitor experience
- Visitor needs are different
- Visitor pre-planning (using internet and other media)
- Rewards at Reno-Benteen (why is the trip worth it?)
- Lack of turnaround opportunities on the Tour Toad

- Remote parking (how to attract visitors to use remote parking and move them into the Park)
- Differences in "readers", "listeners" and "drivers" visitor experiences
- Parking lot layouts affect visitor experiences
- Parking and vehicle access requirements have changed over time
- Vehicles waiting for parking block traffic
- Wayside exhibit locations require visitors to cross the road at times
- In some cases no parking is provided at access to a recognized trail

Cultural and environmental issues

- Preservation of the historic and cultural landscape is paramount
- Footprint expansion will cause significant effects
- High historic and cultural character and integrity
- Historic patterns of use
- Parking and access requirements have changed over time
- Redistribute pavement to result in "no net increase"
- Access routes and points have changed over time
- The physical development of the Park occurred in stages. Key dates (approximate) that figured in the physical development are: 1879, 1940, 1946, 1952 and 1966. Lack of recent development has resulted in negative impacts on park resources

Management practices issues

- Confusion in pavement marking for "no parking allowed"
- Oversize vehicle parking (numbers and size of vehicles)
- Proportion of cars and RV parking is dynamic
- RV access is sometimes handled on a "case-by-case" basis
- There are advantages/disadvantages of management policies that are objective vs. discretionary

Parallel Parking for Oversize Vehicles

- Stone House parking is underused
- Should parking supply equal demand at all times? The answer is no. (NPS Management Policies, 9.2.4 Parking Areas: "Permanent parking areas will not normally be sized for the peak use day, but rather for the use anticipated on the average weekend day during the peak season of use".)
- Restrict vehicle load limit to manage use
- Manage employee parking
- Identify "thresholds" of intervention options
- Special events management
- Devil's Tower National Park experience and examples may be informative
- Holidays + reenactments+ special events are high visitation times

URS

Goals and Objectives Discussion

The workshop group formulated the following draft goals and objectives to help guide the development and evaluation of ATS options at LIBI:

Goal #1: Reduce Operation and Management requirements through asset management

- Reduce impacts on pavement shoulders, adjacent facilities, and resources.
- Contribute to sustainable maintenance practices and funding.
- New construction projects must be sustainable
- Identify both short-term (easier) and long-term projects

Goal #2: Exercise management practices to solve short-term transportation problems

- Improve signs and information ("way-finding")
- "Manage" way out instead of "building" your way out
- Rework patterns within existing paved footprint
- Better manage existing visitor parking inventory. Park staff can adapt improved private vehicle parking practices (16-20 parking spaces currently used by Park staff during peak use)
- Rework RV circulation and parking.
- Use combination of incentives and enforcement to implement new management practices

Goal #3: Develop transportation alternatives that enhance visitor experience and protect resource values

- Reduce noise impacts and air emissions
- Protect resources by limiting expansion of parking and vehicle "footprint"
- Recognize a continuum of resource significance at the Park
- Examine appropriate technical alternative transportation system options

Goal #4: Enhance visitor experience and understanding through use of alternative transportation system

- Reduce parking frustrations for visitors
- Improve "waysides" experience
- Consider Intelligent Transportation Systems (ITS) applications
- Use trip planning and the Park website as a tool
- Improve visitor safety

Goal #5: Recognize opportunities to improve public and community support

- Public and community input and communication.
- Engage in identifying and evaluating solutions.
- Consider options outside the Park boundaries.
- Utilize and enhance local concession capability.

Unordered ideas to consider when developing for ATS options

The workshop group brainstormed a list of ideas that might be useful in developing preliminary concepts later in the workshop.

- Develop management plans for special events and times
- Improve signs and way-finding

- Improve website to aid in pre-trip planning
- Intelligent Transportation System
- Provide a towed vehicle drop-off area
- Develop strategies to better manage RVs
- Daily interpretive program alternatives and management
- Remote parking with shuttle
- Rework vehicle circulation at Visitor Center and reconfigure the parking area
- Expand parking supply to the area west of the entry station
- Widen roads
- Separate parking expansion from road expansion in the 4R project
- Impose vehicle load and/or size limits
- Define numbers and limits for roads and parking
- Permit reservations system
- Encourage car pooling
- Encourage visits to Reno-Benteen to spread out the traffic
- Make Reno-Benteen more of an attraction
- Adjust messages to manage parking (timing)
- Use parking spaces as a reward during congested periods
- When visitors first arrive at the Park, they often times use the restroom facilities. This "bathroom stop" phenomenon has been one of the critical contributing factors of parking congestion and vehicle-pedestrian conflicts in the visitor center area.
- Consider bicycles as a component of ATS?
- Off-site staging for visitors and vehicles – will moving the entrance farther away reduce congestion?
- Can we co-relocate some facilities off-site with others?

Preliminary ATS Options Discussion

The workshop group convened as three subgroups to develop preliminary concepts for multi-model ATS, transit-only ATS, and non-transit options. These are summarized below and illustrated in the attached diagrams.

Multi-Modal Options (Group A)

Group A developed three approaches to providing multi-modal options at the Park. These included the one-way loop in the GMP, a detached multiuse path for pedestrians and bicyclists, and multi-modal use of the roadway. The latter two included transit and assumed that the Tour Road would be closed to private vehicles and RVs during peak periods when multiple modes were operating. The workshop group recognized that the multi-modal options should be considered for comparison purposes, but that there might not be sufficient visitor demand for bicycles, hikers, and other modes to justify this option.

1. One-way multi-modal loop – based on the 1986 GMP recommendation. Advantages of working with the existing road cross section (12 foot travel lane for cars and RVs and an 8 foot bike lane = 20 feet) and reducing vehicle to vehicle conflicts. This option would expand footprint of the park and requires unusual infrastructure costs (i.e. new bridge and new roads).

2. Two-way tour road with detached hiker/bike trail – provides for alternative modes which may reduce vehicular traffic. Requires additional paved area on Park land and within right-of-way on Tribal land which may be problematic. Potential use/demand for alternative mode is not known, given weather conditions. Addresses a problem that might not exist?
3. Two-way tour road for bikes, transit, and possibly other modes – introduce transit and alternative modes during periods of high visitation, and close tour road to private vehicles to ensure visitor safety. Provide bicycles for free or small rental charge at Visitor Center to encourage use. Bicyclists and hikers could pick up shuttle any stop along the route to offset the long (9-10 mile) round-trip. Potential demand for bicycle tours is not known.
4. Please refer to the three attached sketch diagrams

Transit Options (Group B)

Group B focused on transit-only options. They presented an overview of elements of a single prototypical transit concept that can be refined later in the project, including developing a number of sub-alternatives for the Park.

1. Off-site parking for all visitors.
2. Shuttle system provides transportation to all sites in the Park.
3. Operates only during busy season (Memorial Day to Labor Day/end of September).
4. Shuttle system is staged outside of park.
5. Operation options: (a) NPS partners with local business to operate shuttle (maybe the Tribe Casino?), (b) NPS contracts for shuttle service with shuttle or transportation concession operation (Little Bighorn College which holds the current interpretive tour contract or Crow Nation Transit).
6. Dual shuttle system segments: (a) remote parking to Visitor Center, and (b) Visitor Center to Reno-Benteen turnaround.
7. Partner and locate transit staging area at new Visitor Center/Curatorial Building located off Highway 212.
8. Provide incentives for visitors to use the shuttle.
9. Special events transit operations.
10. Financial factors question – Do we have the visitation to support a system?
11. Short-term parking, possibly using pervious pavement, on Park site for special events only.
12. Direct cemetery visitors to park near the Stone House.
13. Solicit partners to help with operations and/or funding of the shuttle system during special events (to reduce costs).
14. Potential for temporary satellite parking area at Custer Battlefield Preservation Committee property during special events (partnership with Park).
15. Guided commercial shuttle tour begins outside of the Park.
16. Please refer to attached sketch diagram (Attachment C).

Non Transit Options (Group C)

Group C came up with a menu of different management and construction strategies to address vehicular congestion and RV parking, assuming that a transit system would not be implemented.

They were further characterized as a "no build" option (meaning management options only), and a "light build" options (which included smaller construction projects to alleviate congestion, relocating RV parking, improving vehicular circulation on the Tour Road, and providing basic visitor amenities at the Reno-Benteen turnaround).

1. Pre-trip planning and pre-arrival planning – internet, ITS (I-90 access), Dial 511 information, changeable message signs.
2. Additional welcoming/arrival media – signs, interpretive materials. RVs with trailers staging area outside of Park - partnership with local organizations to promote and provide additional staffing during peak visitation periods in summer/weekends.
3. Improve efficiency of entrance station by expanding to three inbound lanes and three fee booths.
4. Parking management – RV and regular size vehicle parking areas. Relocate RV parking and provide additional RV parking.
5. Park access road has in the past been used to expand the inventory of peak period parking, and this could be a useful tool in the future.
6. Whether or not there is a convenient turnaround for oversize vehicles affects how parking is managed. The location of the turnaround is also important.
7. Create different visitor experiences - For example, typical summer visitor experience: film (12 minutes), ranger talk (40 minutes), museum and Last Stand Hill (40 minutes), tour loop (40 minutes) = total 120 minute visitor experience. Potential for shorter stays to reduce parking demand: 75-105 minutes.
8. Incentive parking on road – an idea is to provide a "reward" and reopen Last Stand parking area (5 – 10 spaces, approx.) for those who agree to park farther from the Visitor Center.
9. Relocate concession tour parking and pickup to near the Visitor Center thereby gain parking.
10. Provide additional turnarounds on the tour road to allow shorter site visits that do not extend as far as the Reno-Benteen Battlefield.
11. Please refer to attached sketch diagrams in Attachment C.

Entrance Station

"Long List" of Alternative Transportation System Options

The workshop group discussed the various options developed in the breakout groups and identified the following list of preliminary ATS options for further consideration. There will need to be additional discussion of how to get from the "long lost" to the "short list", and where the loop road in the GMP and the 3R/4R projects will be evaluated in the ATSFS:

1. Seasonal transit (with and without private vehicles)
2. Special event transit (with and without private vehicles)
3. One-way loop multi-modal and transit (from GMP)

4. Two-way road with private vehicles plus detached hiking/bike trail
5. Seasonal transit on a two-way road with bicycle lane(s) (no private vehicles)
6. Pre-trip and pre-arrival actions
7. Limited build (without transit)
8. Private vehicle and RV management actions only (no build and without transit)
9. Road and parking 4R project

3.0 WEDNESDAY – TRIBAL CONSULTATION (9:00 AM – 3:00 PM)

This meeting was scheduled as two sessions: a morning session on the Museum Collection/Visitor Facility Planning project and an afternoon session on the AT Feasibility Study project. Seventeen tribes as historical stakeholders, including the Crow Nation, were invited to this consultation meeting. The attendance sheet (see Attachment B) lists those who attended and some tribal affiliations are indicated.

Morning Session – New Museum Collection/Visitor Center

Superintendent Hammond started the meeting with opening remarks on background of both projects and reasons for this consultation meeting. Christine Landrum made a presentation on the Museum Collection/Visitor Facility Planning project. The following items were discussed during the presentation:

- The current Visitor Center was built in 1952. The facility is small, outdated, and located in the middle of Battlefield resources
- The 1986 GMP calls for construction of a new visitor facility on a different site and demolition of the existing Visitor Center
- The Park does not own the land needed for the new visitor facility
- There is no room within the Park that is suitable for a new visitor facility
- Park areas are over capacity. During peak periods in the summer season, vehicles have to park on the shoulders of the Park Access Road, outside of the entrance
- The number and size of oversize vehicles is increasing
- Parking areas have a tight turning radius or oversize vehicles
- The GMP calls for a shuttle system to relieve congestion, expand the Tour Road, and increase parking capacity
- The early public engagement process in 2010 reached several conclusions, or “next steps”. One of them is that the NPS will recommend negotiations with the Crown Nation, the Custer Battlefield Preservation Committee, and other interested parties to see if an agreement can be reached to allow for construction of a new visitor center, museum collection storage, and parking area outside of current park boundaries, as called for in the 1986 GMP
- The purpose of this consultation meeting is to provide information on both projects, which are at very early stages, and to have open and honest discussions between the Tribes and the Park
- Extending the Tour Road as called for in the 1986 GMP would have significant impacts on landscape, traverse Tribal lands, and would be expensive. Therefore, it is unlikely to be implemented
- Project schedules were discussed

- Changes to current Park boundaries requires an Act of Congress
- Current negotiations between Crow Nation and Custer Battlefield Preservation Committee on outstanding issues need to be completed before taking a project to Congress
- Spring to summer 2012 seems to be a good time to schedule another consultation meeting to discuss study alternatives
- Tribal representatives expressed concerns about land issues and the location of the new museum collection/visitor facility

Afternoon Session – Alternative Transportation Feasibility Study

After the lunch break, Tribal representatives requested for an internal session among Tribes which lasted for about an hour. When the consultation meeting (afternoon session) resumed, Conrad Fisher on behalf the Tribes announced that due to remaining concerns about land issues, locations, and negotiation status between Crown Nation and Custer Battlefield Preservation Committee, that this consultation not be continued. The scheduled afternoon session on the Alternative Transportation Feasibility Study project was therefore cancelled.

4.0 Synthesized Summary of Workshop Results

The purpose of this multi-day Kick-off Workshop is to provide the URS study team with enough information about and familiarity with the site to complete all tasks. The NPS and URS staff participating in this workshop had extensive discussions, conducted field tours and additional observations, and collected necessary information including photos and additional documents.

The following categorical issues in relation to transportation challenges facing the Park were identified:

1. Deficiencies in Park infrastructure (such as visitor center, parking, and roads), operations (such as vehicle-pedestrian conflicts in parking areas), and asset management (such as deferred maintenance)
2. Lack of alternative transportation (private vehicles being the only realistic mode to enter the Park and travel through the Tour Road)
3. Stakeholder and community concerns on potential expansion of parking, roads, and Park boundaries
4. Visitor experience issues, such as safety, information, mobility, access, and connectivity
5. Cultural and environmental issues, including challenges in preservation of cultural and historic landscape and natural resources
6. Management practice issues, such as policies and regulations regarding RV access, parking, signing, and pavement markings

The following draft goals, around each of which several objectives were organized, were developed to help guide development and evaluation of AT options in this study:

1. Reduce Operation and Management requirements through asset management
2. Exercise management practices to solve short-term transportation problems
3. Develop transportation options that enhance visitor experience and protect resource values
4. Enhance visitor experience and understanding through use of alternative transportation system
5. Recognize opportunities to improve public and community support

Based on identified issues and established draft goals and objectives, workshop participants worked to identify a variety of ideas that may be useful in solving specific issues and achieving some of the objectives. These ideas provide initial input in options development and were further developed into preliminary ATS options in three categories: multi-modal, transit-oriented, and non-transit options. Accordingly, a number of preliminary options were formulated including those described under the "Long List" of Alternative Transportation System Options between page 9 and page 10. Some of the options were initially developed in previous studies and planning efforts, such as the 1986 GMP.

Built upon the results from this productive Kickoff Workshop, the study team will conduct options development and evaluation in two major steps. First, a broad range of initial options that may be capable of solving some or all of the transportation issues will be formulated, followed by an initial screening process to evaluate the options. The list of preliminary options identified through this workshop will be analyzed for possibly inclusion into the initial set of options. Options from previous studies and planning efforts, such as the one-way loop and 4R project, may also be included in the initial set of options. Criteria to be used in the initial screening process will be able to qualitatively test each option against the goals and identify "fatal flaws". For example, if an option is anticipated to have significant negative impacts on visitor experience, it may be considered as not being able to meet the goal of enhancing visitor experience, and therefore, have a fatal flaw. Options surviving the initial screening will be carried forward into the second step, as described below.

The second step involves a detailed screening process and refinement of options. Only options that survive the initial screening plus a No Build option will be considered in this step. A set of weighted criteria will be identified for this evaluation purpose, including both quantitative and qualitative measures. Compared with initial screening criteria which are organized around the goals, detailed screening criteria reflect measurable elements of critical objectives, such as total lifecycle costs and extent of footprint changes. Instead of identifying a preferred option, the anticipated results from this detailed screening process will include a small number of options that can be further studied in a future planning or design process.

5.0 ATTACHMENTS:

A. Workshop Agendas
B. Workshop Sign-In Sheets
C. Sketch Diagrams of Preliminary Options
    a. Multi-Modal, One-way w/RVs/PVs/Bicycles/Other
    b. Multi-Modal, Two-way w/Detached Hiking/Bike Trail
    c. Multi-Modal, Two-way w/Transit/ /Bicycles/Other
    d. Transit, Two-way (no RVs/PVs during peak)
    e. Non-Transit (structural and management improvements)
    f. Land Use
    g. Parking + Circulation
    h. RV parking Concept

ATTACHMENT A

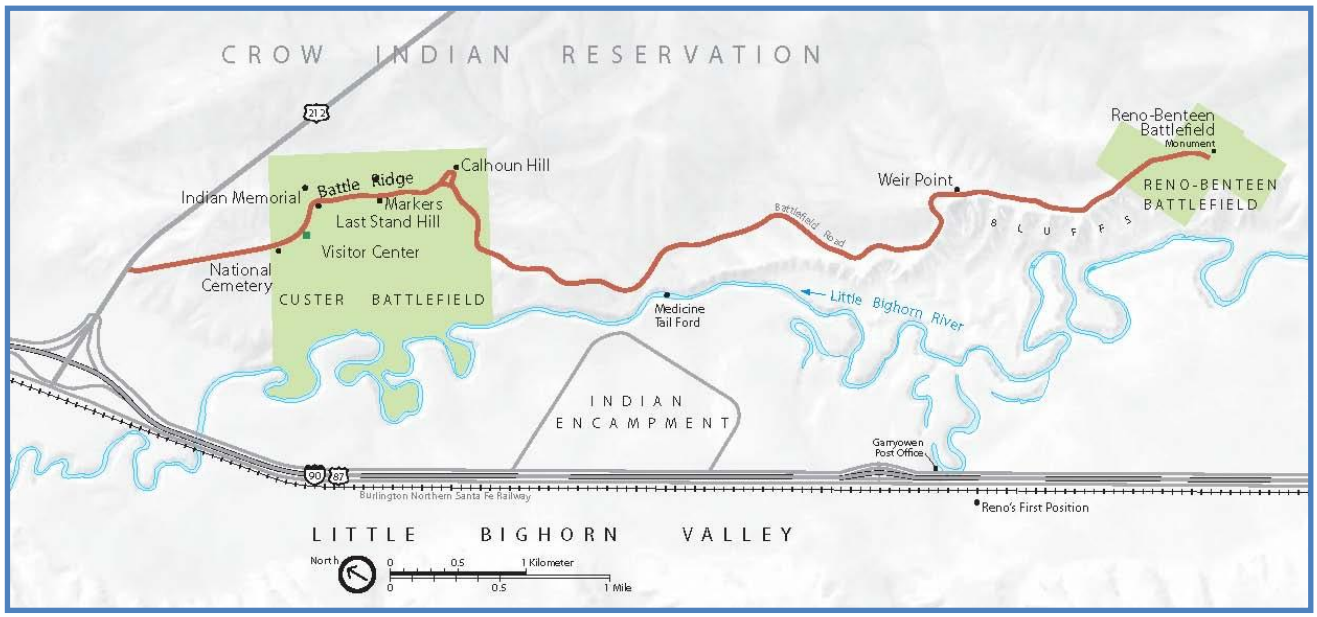
Workshop Agendas

LITTLE BIGHORN BATTLEFIELD NATIONAL MONUMENT

PROJECT KICKOFF WORKSHOP

ALTERNATIVE TRANSPORTATION FEASIBILITY STUDY

October 24 – October 26, 2011



AGENDA

Monday, October 24

Morning	Team Travel, Lunch on the way
1:00 pm	Meet @ LIBI Administration Building, 2nd floor conference room (turn right after park entrance gate, building is at the bottom of the hill) -Opening comments from Superintendent -Team introductions -Project charter -Project goals, sideboards
2:00 pm	Tour park / key sites -via automobile / walking
4:00 pm	Daily Debrief @ LIBI Administration Building, 2nd floor conference room
4:30 pm	Park Gate closes

Note: LIBI Administration Building, 2nd floor conference room is equipped with a large screen monitor (with laptop connection capability), easels, flipcharts, markers, and tape. Contractor team will bring other supplies as necessary including scaled base maps, charrette drawing supplies (trace paper, graphic pens…), presentations, laptop, camera, etc.

Tuesday, October 25, 8:00 AM - 4:30 PM

8:00 am — Meet @ LIBI Administration Building, 2nd floor conference room
- Charrette (detailed agenda provided by URS)

Note: Park team is not available in the morning, URS and DSC/IMR team will work together

11:30 pm — Lunch (sack lunch recommended)

12:30 pm — Continue charrette with Park staff

4:00 pm — Daily Debrief & Closeout with Superintendent @ LIBI Administration Building, 1st floor conference room

4:30 pm — Park Gate closes

Wednesday, October 26, 8:00 AM - 4:30 PM

8:30 am — Meet @ LIBI Administration Building, 2nd floor conference room
-Tribal Consultation Meeting *(*detailed agenda provided by Park*)*
-Coordination with Museum Collection/Visitor Facility team
-Continued charrette activities

4:00 pm — Daily Debrief & Kickoff Closeout @ LIBI Administration Building, 1st floor conference room

4:30 pm — Park Gate closes, DSC team departs

Thursday, October 27

URS team continues field work for additional observations, etc.

Participant Contact Information

Kate Hammond	LIBI Superintendent	406.638.3201 (o)
Rene Laya	LIBI Facility Manager/POC	406.638.3210 (o)
Melana Stichman	LIBI Biological Technician	406.638.3225 (o)
Ken Woody	LIBI Chief of Interpretation	406.638.3216 (o)
Michael Stops	LIBI Chief Ranger	406.638.3215 (o)
Les Frickle	LIBI Maintenance	406.638.3212 (o)
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Jenny Staroska	DSC Project Specialist/COR	303.969.2297 (o)
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David Cooper	URS Architect and Planner	303.740.3982 (o) 303.810.2420 (c)

-End of Agenda-

Workshop #1 - October 25, 2011
Agenda

8:30 am Setup by URS

9:00 am Introduction to the Workshop #1

- Review workshop agenda, process and logistics
- Recap Monday results – study purpose, observations, background, etc.
- Coordination with other studies
- Other input

9:30 am Issues

- Identify and record relevant issues (from site tour, NPS staff, others, and URS data gathering)
- Sort/arrange the issues by category (large group discussion)

10:30 am Goals and Objectives

- Do we need to set a high target? (mission or vision statement)
- Identify/discuss goals from previous studies relevant to ATFS
- Formulate draft goals/objectives for ATFS
- Discuss and prioritize (large group exercise)

12:00 noon Lunch (individual)

12:30 Recap Morning Results (LIBI staff in attendance)

- Summarize morning results for benefit of LIBI staff

1:00 pm Conceptual Planning Options

- Concepts and projects from previous studies
- New ideas and discussion
- Create a “long list” of options
- Small group exercise to develop draft options (ie – multi-modal, transit options, non-transit, other), use matrix handout to guide discussion
- Small groups report back and discussion with URS diagrams
- Develop “short list” of options for further refinement by URS (name, purpose, key features, benefits, issues, etc.)

3:30 Preliminary Evaluation Criteria

- Discuss goals, objectives and other inputs to evaluation criteria
- Develop preliminary list of evaluation criteria/performance measures

4:00 pm Debrief and next steps

- Review results from the workshop
- Identify action items
- Review Wednesday agenda

4:30 Workshop complete (LIBI closes)

Little Bighorn Battlefield National Monument

Government-to-Government Tribal Consultation Meeting

Wednesday October 26, 2011

DRAFT AGENDA

8:30 am	Check-in; Coffee available
9:00 am	Welcome – Kate Hammond, Superintendent
	Blessing
	Introductions – meeting participants
	Meeting purpose – Kate
9:30	Introduction to Museum Collection/Visitor Center Conceptual Study/EA
	Why is a new facility needed?
	Proposed location of a new facility
	What the study will address
	Possible complications for the study
	Discussion of the study – thoughts, input, opinions
12:00 noon	Lunch on-site
1:00 pm	Further discussion of Museum Collection/Visitor Center Conceptual Study/EA
2:00 pm	Alternative Transportation Feasibility Study
	Why is the study needed?
	What the study will address
	Discussion of the study – thoughts, input, opinions
4:00 pm	Next steps and expected schedule
	Closing remarks

ATTACHMENT B

Sign-In Sheets

B-1

ATFS
LIBI
Meeting 10.24.11 1:00PM

Name	Org	Email	Telephone
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SIGN-IN, 10/25/2011 (TUESDAY) B-2

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Little Bighorn Battlefield National Monument
Environmental Assessment Museum Collection Storage Facility/Visitor Center
An Alternative Transportation Plan
October 26, 2011

SIGN IN SHEET

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Little Bighorn Battlefield National Monument
Environmental Assessment Museum Collection Storage Facility/Visitor Center
An Alternative Transportation Plan
October 26, 2011

SIGN IN SHEET

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Karen Wurzburger	NPS - IMR	karen-wurzburger@nps.gov.	303-969-2148
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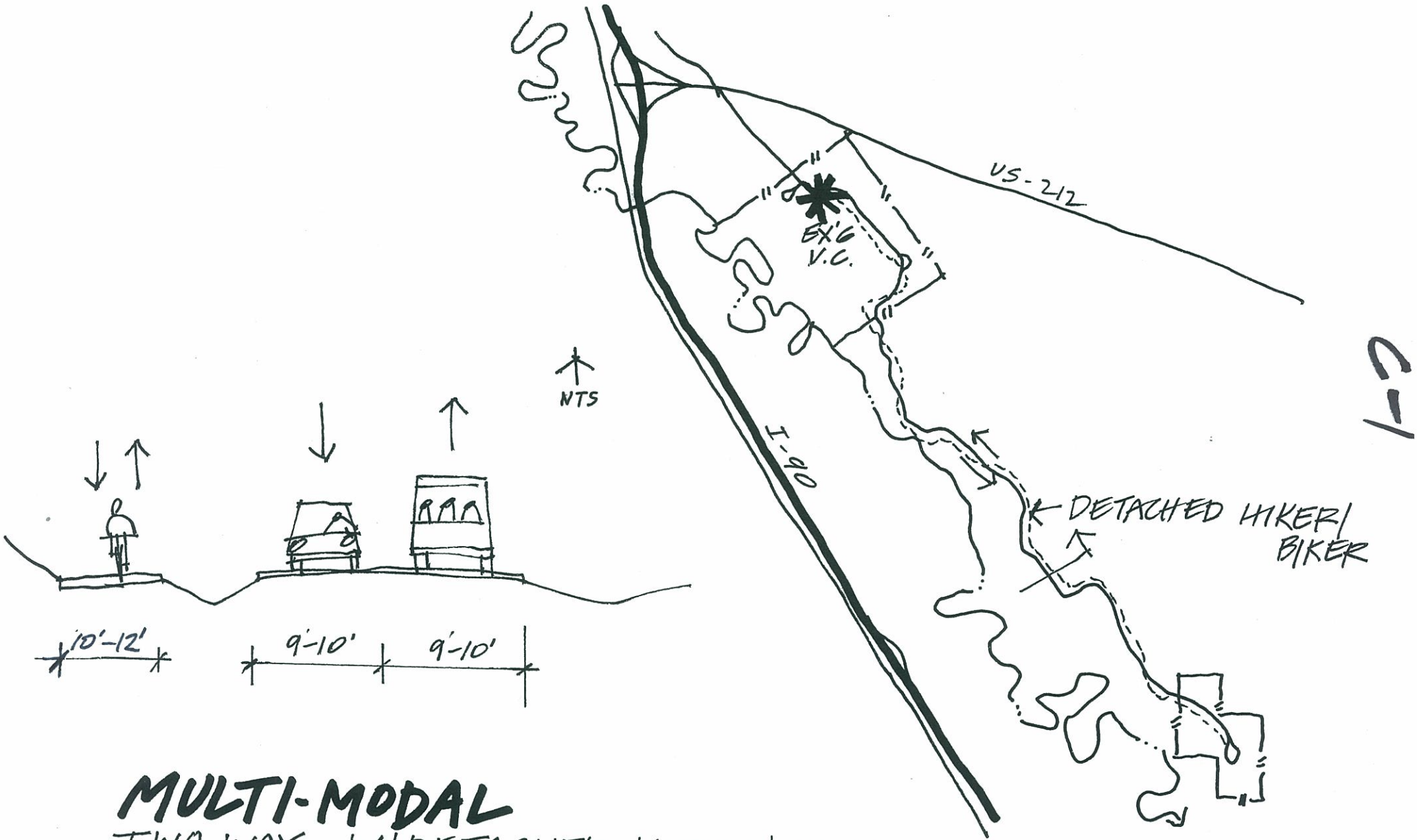
Conrad Fisher	N. Chey	Conrad.fisher@cheyennenation.com	406 477-4839
Gilbert Whitedirt	N Chey		
Bill Coffell	TAT	preffey@mhanation.com	701.862.2424
Russell Eagle Bear	Rosebud Sioux	rstthpo@yahoo.com	605-747-4255
Sharon Small	NPS - LIBI	Sharon_Small@nps.gov	406.638.3213

ATTACHMENT C

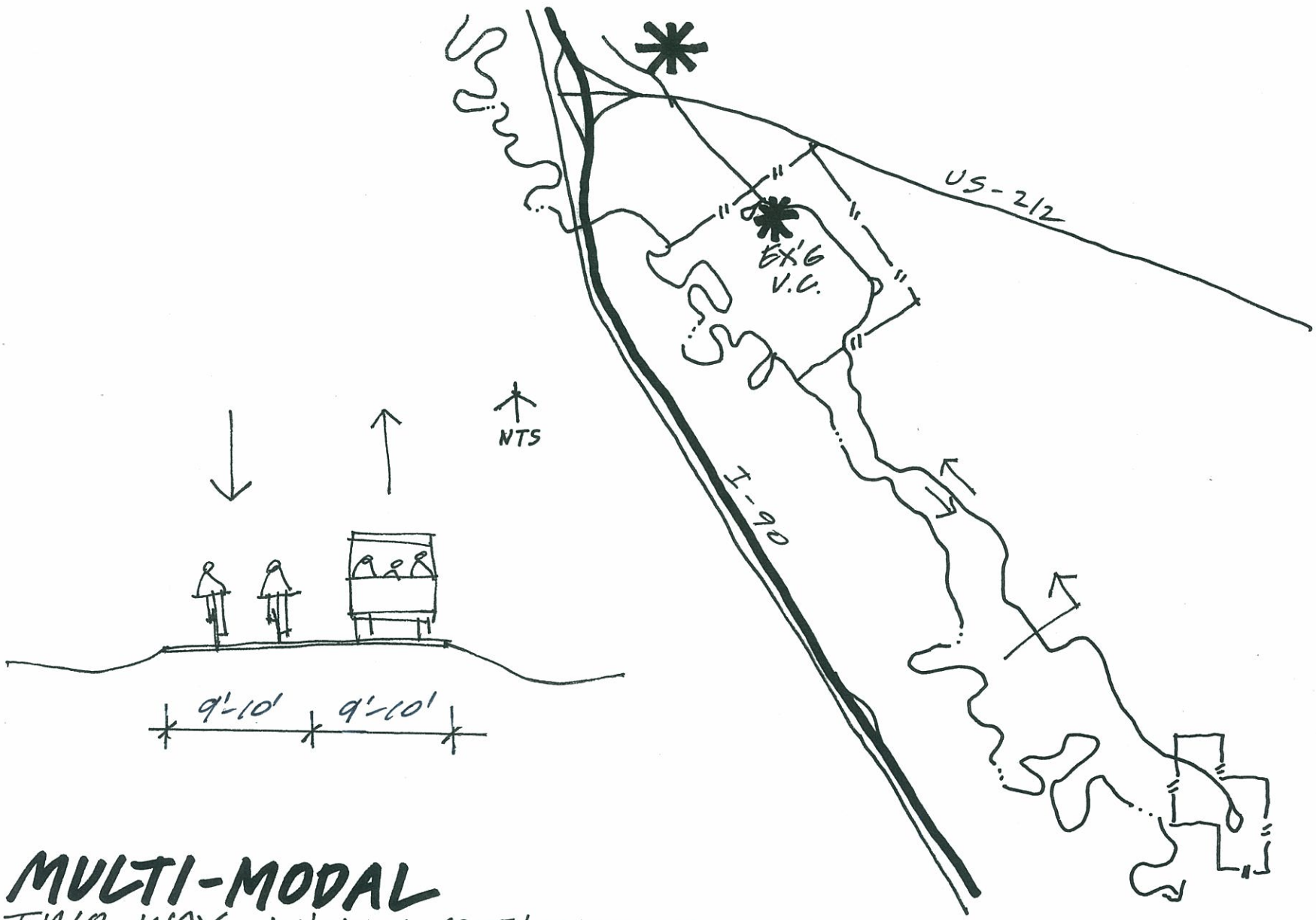
Sketch Diagrams of Preliminary Options



C-1

MULTI-MODAL

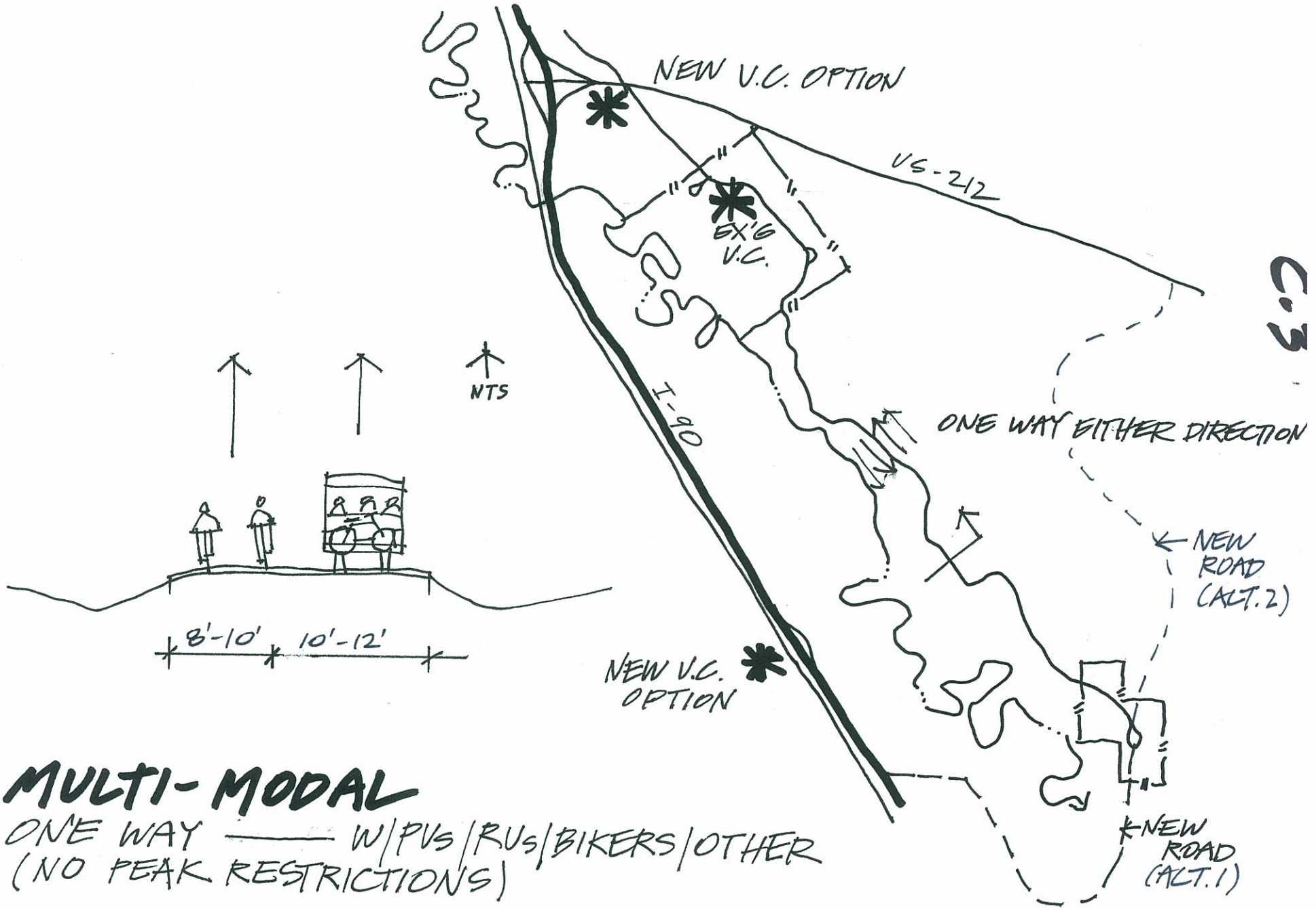
TWO WAY W/DETACHED HIKER/BIKER
(NO PVs/RVs DURING PEAK)



C.2

MULTI-MODAL

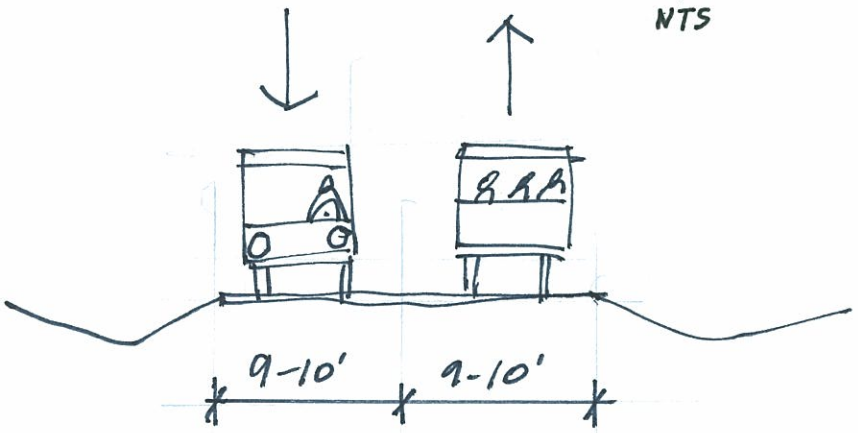
TWO WAY W/ TRANSIT/BIKER/OTHER
(NO PUs/RVs DURING PEAK)

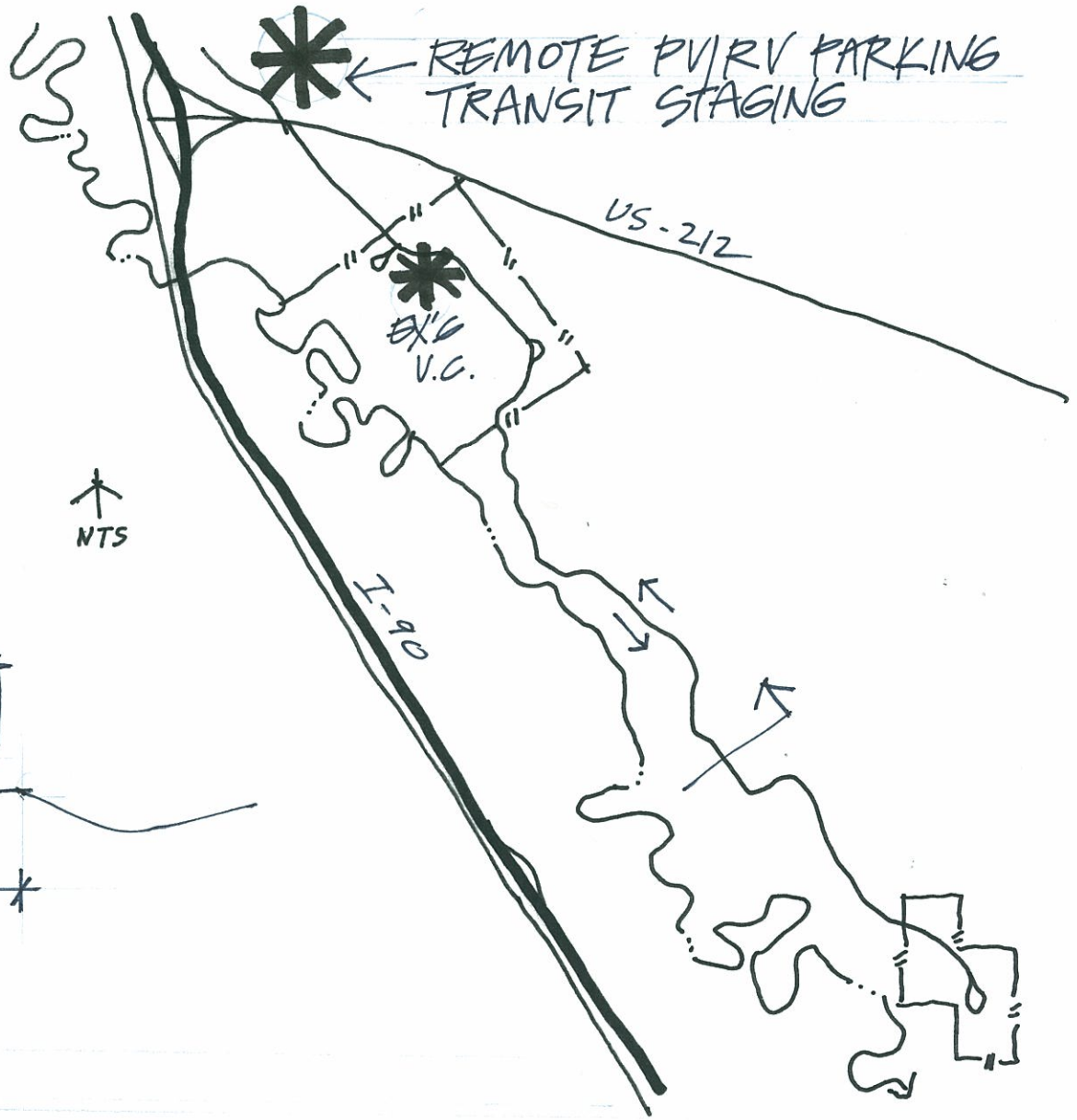


C.3

MULTI-MODAL

ONE WAY —— W/PVs/RVs/BIKERS/OTHER
(NO PEAK RESTRICTIONS)



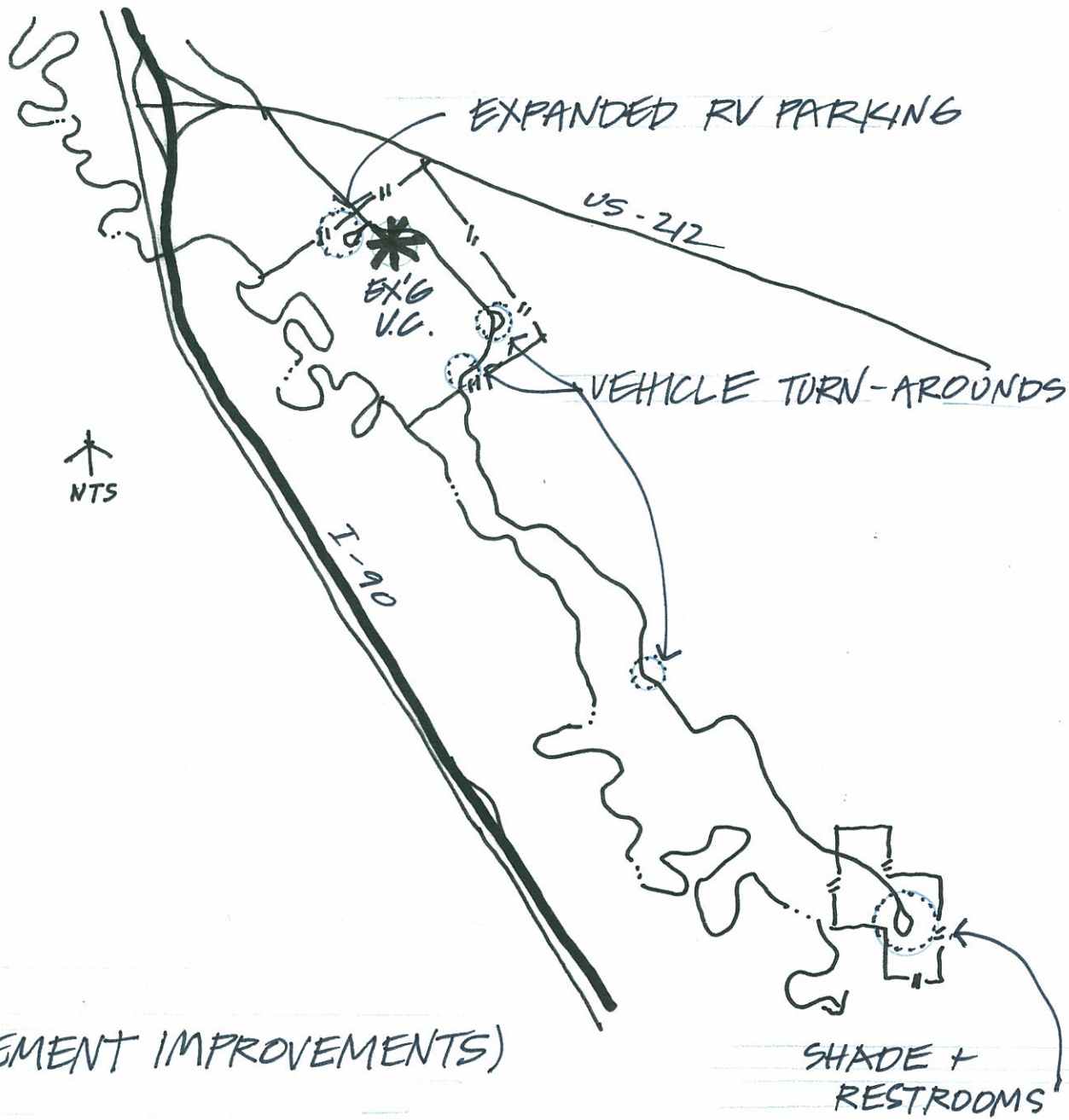


TRANSIT

TWO-WAY

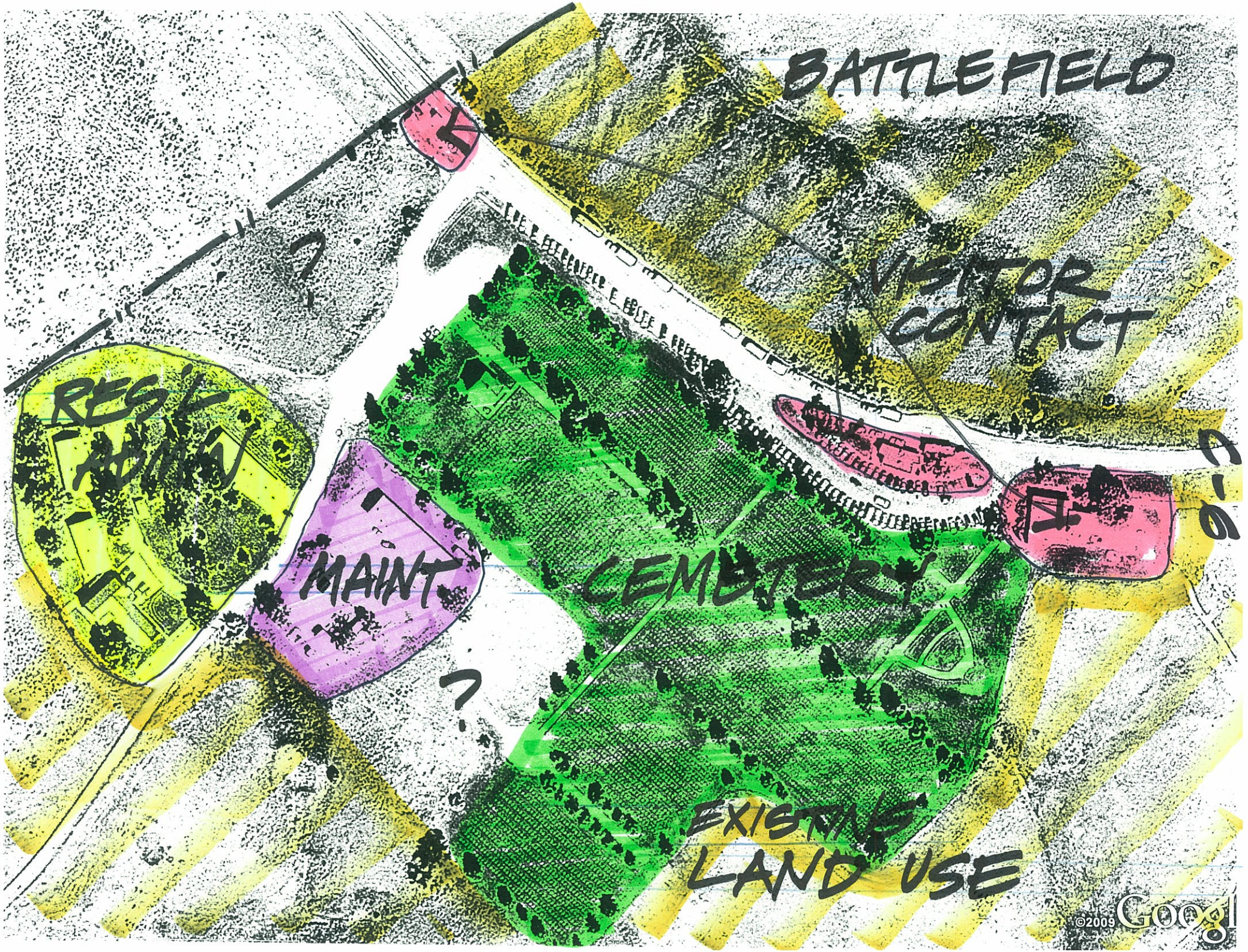
(NO PVs/RVs DURING PEAK)

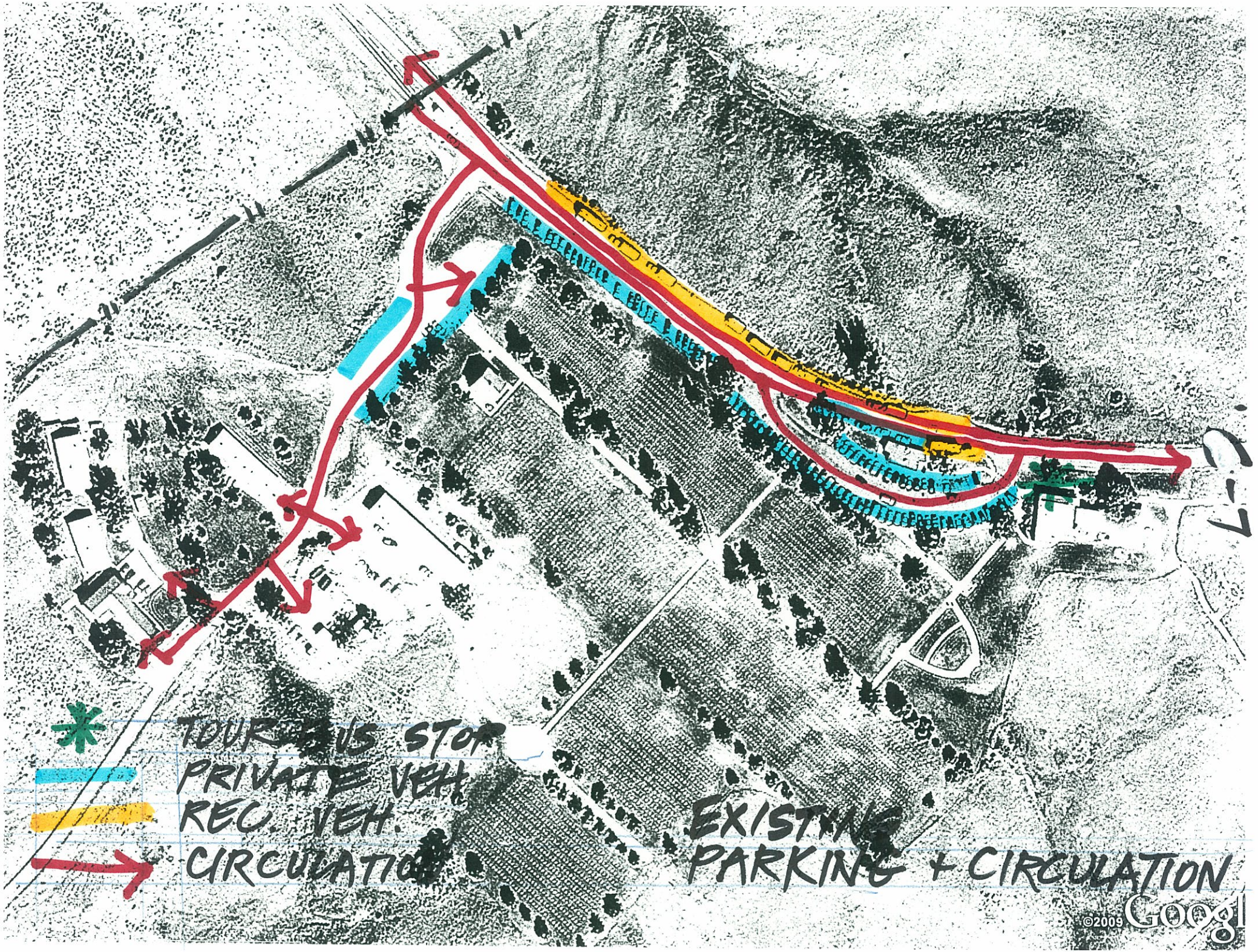
C-4

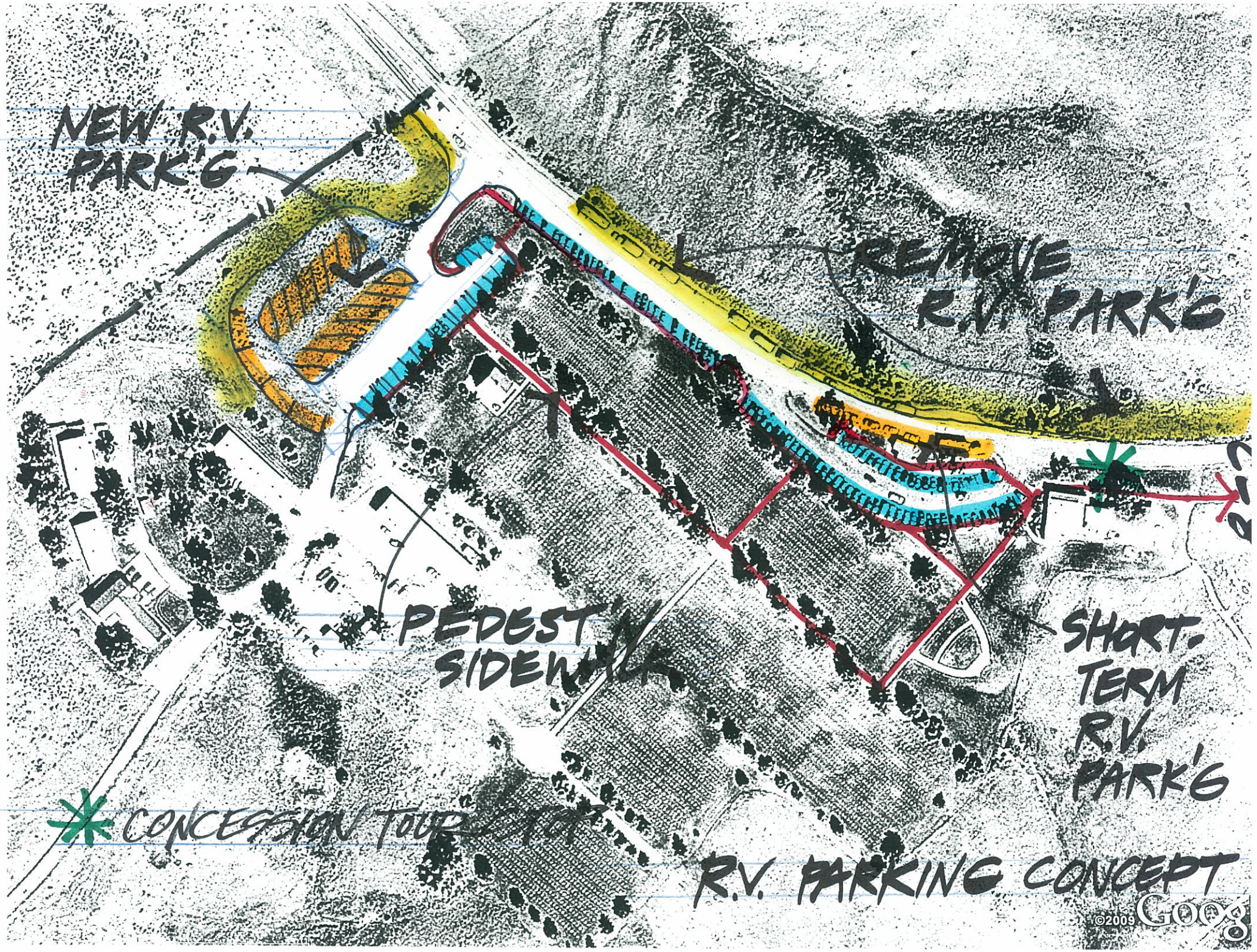


NON-TRANSIT

(STRUCTURAL + MANAGEMENT IMPROVEMENTS)


BATTLEFIELD
VISITOR CONTACT
RESIDENTIAL
MAINT
CEMETERY
?
?
EXISTING LAND USE
©2009 Google


TOUR BUS STOP
PRIVATE VEH.
REC. VEH.
CIRCULATION
EXISTING
PARKING + CIRCULATION
©2009 Google


NEW R.V. PARK'G
REMOVE R.V. PARK'G
PEDEST SIDEWALK
SHORT-TERM R.V. PARK'G
CONCESSION TOUR
R.V. PARKING CONCEPT
©2009 Gogg

Appendix C:
Evaluation of Options Workshop – Synthesized Results

MEMORANDUM

To: NPS DSC – Transportation Division

From: URS Corporation

Date: October 15, 2012

Re: Evaluation of Options Workshop (May 7, 2012) – Synthesized Results
Alternative Transportation Feasibility Study, Little Bighorn Battlefield National Monument, LIBI – 163914
URS Project No. 22242502

This memorandum summarizes the results of the Evaluation of Options Workshop that was held at the Little Bighorn Battlefield National Monument (LIBI) on May 7, 2012. The purpose of this workshop was to:

- review the five transportation options that were carried forward from the initial screening process and refine or modify these options, if necessary;
- review and refine a set of detailed screening criteria and associated weighting factors, and use these criteria to evaluate the transportation options; and
- gather input and viewpoints from National Park Service (NPS) personnel and primary stakeholders.

Figure 1. Evaluation of Options Workshop, May 7, 2012

Participants of this workshop included the following:

- Gus Sanchez, Acting Superintendent (LIBI)
- Rene' Laya, Facility Manager (LIBI)
- Melana Stichman, Biological Technician (LIBI)
- Ellen Waldhart, Natural Resources and Compliance Assistant (LIBI)
- Jerry Jasmer, Ranger (LIBI)
- Ken Woody, Chief of Interpretation (LIBI)
- Marvin Dawes Sr., Interpretive Ranger (LIBI)
- Michael Stops, Chief Ranger (LIBI)
- Jerry Case, BICA Superintendent (Bighorn Canyon National Recreation Area [BICA])
- Debra Frye, Alternative Transportation Program Coordinator (Intermountain Region [IMR])
- Patrick Shea, Project Manager (NPS Denver Service Center [DSC])
- Jennifer Orozco, Planner/Urban Designer (URS)
- Freddy He, URS Project Manager (URS)

1.0 STUDY OVERVIEW

Major study activities prior to this workshop include the kickoff workshop held at the park on October 24 – 26, 2011; data collection and compilation; existing conditions analysis; review and syntheses of previous studies and planning documents; and development and screening of transportation options. Major transportation issues in the park were identified as the following:

- There is an overall shortage of parking spaces in the visitor center area, in particular for oversized vehicles. During busy days in the summer season, parking lots in the visitor center area are full. During these busy times, park staff is sometimes deployed to direct visitors to drive the tour road and then return to the visitor center once parking spaces are available.
- The existing two-way tour road is narrow (pavement width varies between 17- and 20-feet), has no shoulders, and has structural deficiencies. Over the last several decades, multiple pavement layers have been added without strengthening the foundation. These road conditions are ineffective at handling modern oversized vehicles.
- Due to lack of parking spaces, deficiencies in roadway and parking configuration, sight distance issues, and tight turning radius; there is potential for pedestrian-vehicle and vehicle-vehicle conflicts in the visitor center area. These conflicts further aggravate safety concerns.

Participants at the workshop acknowledged that these transportation issues typically occur only on the busiest days during the summer months (from Memorial Day to Labor Day). No vehicle collisions have been reported in the park, although minor incidents such as side mirrors broken by passing vehicles traveling on the tour road have been reported. There is a strong consensus among the workshop participants that these issues have substantial negative impacts on visitor experience and park resources. Transportation improvements are needed to address these issues and improve visitor safety.

The study team initially formulated 13 transportation options in three categories – construction options, no-build options, and transit options. A set of screening criteria was developed by the study team to include (1) enhance visitor experience, (2) minimize impacts to resources, (3) reduce traffic congestion and parking shortage, (4) manage transportation assets to maintain acceptable conditions, and (5) improve visitor safety. The study team derived the initial screening criteria from the project goals and objectives developed during the kickoff workshop, taking into consideration the park's transportation issues, park mission, and balance of short-term and long-term transportation needs. This set of five initial screening criteria was then applied to assess the 13 options in order to identify which options have "fatal flaws", i.e., failed against one or more criterions.

Results from the initial screening process were presented in the Evaluation of Options Workshop and are shown in Table 1. Five transportation options (marked with a star in Table 1) were carried forward from the initial screening, while the other eight options failed the initial screening and were eliminated from further evaluation. It should be noted that, per NPS' guidance, the following two options (previously cleared for environmental compliance in prior planning efforts) were carried forward for further evaluation, even though each of them initially failed against the criterion "minimize impacts to historical, cultural, and natural resources":

- Widen Road and Expand Existing Parking Lots (Resurfacing, Restoration, Rehabilitation, and Reconstruction [4R] Project)
- One-Way Loop via I-90 Frontage Road (General Management Plan (GMP) Option)

The environmental impacts of the 4R project have been evaluated for compliance in the *2005 Environmental Assessment / Assessment of Effect: Rehabilitate Tour Road (EA)*, and a resulting *Finding of No Significant Impact (FONSI)* was completed in the same year. The National Park Service considers the GMP option as the long-term solution and will continually work toward its eventual implementation.

Table 1. Initial Screening Matrix

Initial Set of Options	Initial Screening Criteria				
	A	B	C	D	E
	Enhance visitor experience	Minimize impacts to historical, cultural, and natural resources	Reduce traffic congestion and parking shortage in the Park	Manage transportation assets to maintain acceptable conditions	Improve visitor safety
CONSTRUCTION OPTIONS					
1) Repair Tour Road and Reconfigure Parking	Pass	Neutral	Neutral	Pass	Neutral
2) Widen Road and Expand Existing Parking Lots (4R Project)	Pass	Fail	Pass	Neutral	Pass
3) One-Way Loop via I-90 Frontage Road (GMP Option)	Pass	Fail	Pass	Neutral	Pass
4) One-Way Loop via U.S. 212	Pass	Fail	Pass	Neutral	Pass
5) Detached Multiuse Trail Paralleling Road	Pass	Fail	Fail	Fail	Neutral
6) Alternate Infrastructure Improvements	Pass	Neutral	Neutral	Pass	Fail
NO-BUILD OPTIONS					
7) Management Improvements and Parking Reconfiguration	Neutral	Neutral	Neutral	Neutral	Neutral
8) Seasonal Reservation/ Permit System	Fail	Neutral	Pass	Neutral	Neutral
9) Permanently Close Tour Road to Motorized Vehicles and Maintain it as a Trail	Fail	Pass	Fail	Neutral	Neutral
TRANSIT OPTIONS					
10) Voluntary Transit	Pass	Pass	Neutral	Neutral	Pass
11) Mandatory Peak/Seasonal Transit for All Visitors with Motorized Vehicles	Fail	Pass	Pass	Fail	Pass
12) Mandatory Transit for Visitors with Oversized Vehicles	Fail	Pass	Neutral	Neutral	Pass
13) Mandatory Year-round Transit for All Visitors with Motorized Vehicles	Fail	Pass	Pass	Fail	Pass

Source: URS Corporation

Note: ☆ = option carried forward from initial screening

The second step of the options evaluation process was detailed screening. The study team conducted preliminary evaluation of the five options using a set of weighted screening criteria. Visitor and traffic forecast, transit ridership forecast, financial analysis, and calculation/estimation of criterion values were performed during this evaluation. The workshop participants built on the results from the preliminary evaluation.

It is emphasized that the purpose of this study was not to make a decision or recommendation on a preferred option; instead, the expected final results from this study represent a short list of feasible options to assist the park in managing visitation, traffic, and parking.

2.0 ISSUES DISCUSSION

The items/issues discussed during the workshop were as follows:

1. The GMP option should stress that the long-term plan is working toward the implementation of the GMP. However, in the interim, measures need to be implemented to mitigate congestion and visitor safety issues.
2. Following the completion of this study, the National Park Service will consider one or more of the options for transportation improvements in the park.
3. The concession-operated (by Little Big Horn College) interpretive tour shuttle typically runs five times a day from Memorial Day to Labor Day, although in the past the tours have sometimes continued into September past Labor Day.
4. The park previously contracted (more than 10 years ago) with a local Hardin firm to run school buses during a few busy days between an off-site parking area and the visitor center. The agreement lasted a few years during the park's visitation peak of around 400,000 annually; visitation has since fallen to around 300,000. The requirements for park staff to manage the contractual obligations for this minimal service proved too time-consuming to be worthwhile.
5. There is the possibility of engaging the Apsaalooke Tour, Crow Nation Transit, or a local school district to provide assistance during busy days or special events.
6. In April 2011, the Crow Nation Transit started transporting passengers, via two minibuses, throughout the Crow Indian Reservation and Big Horn County between Billings and Fort Smith, connecting the towns and communities that include Hardin, Crow Agency, Lodge Grass, Pryor, and Wyola.

Figure 2. Crow Nation Transit Bus

7. Some park employees expressed concerns over whether a voluntary transit system is needed and can work in the park, given the moderate visitation in recent years and potential impacts on park management in terms of staffing and paperwork to manage the contract or operate the voluntary transit. Detailed analysis will be included with the Options and Criteria for Evaluation Report.
8. Other national parks, such as Zion and Bryce Canyon, have been contracting with national or regional transit providers for shuttle services in and around the park. Their experience and lessons learned should be taken into consideration while evaluating transit options for the park. In addition, consideration needs to be given for transit options to work with existing transit services, including the Apsaalooke Tour and Crow Nation Transit.
9. Wayside pullouts along the tour road technically do not have any parking spaces. The extra pavement by travel lanes is merely for "pull-through" instead of parking. Visitors are not supposed to step out of their vehicles, nor should they park their vehicles. The cell phone audio tours were developed so that the visitor would stop the car and then listen to the audio tour.
10. The percentage of oversized vehicles (19-25% based on the *2010 Existing Traffic and Parking Conditions and Implications for Transportation Alternatives* by Jonathan Upchurch), in

particular buses, appears to be higher than usual. Park employees feel a lower percentage, such as 15-18%, would be closer to their observations in a common year.

11. Park employees have noticed visitation changes in the last few years, including more tour buses and more international visitors.
12. Prior to 2004, during an approximately three-year timeframe, oversized vehicles were not allowed to drive on the tour road between the visitor center and Reno-Benteen Battlefield. Travel by oversized vehicles on the damaged and narrow road was considered too dangerous. This restriction was lifted after a pavement rehabilitation project improved the sub-structure and surface of the tour road; however, the road continues to be damaged by oversized vehicles and the safety problems on the narrow road have not been addressed.
13. Repeated pavement treatments on the tour road have resulted in a de-facto 24-foot or wider footprint in spots where the bottom layer(s) pavement has been installed wider than the original roadway. This has created unofficial and non-standard paved, but not maintained, shoulders. The traveled way varies from 17- to 20-feet in width, averaging about 18-feet.
14. The construction options, including the 4R project and GMP option, should be considered as proactive safety improvements that would effectively improve visitor safety.
15. A series of low-cost, low-impact improvements included in the options, such as flip and portable signs, pavement markings at parking areas and main road, and sign modifications, could be implemented this year to help park management. The Intermountain Region can assist the park in developing signing and striping that conform to Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices* (*MUTCD*) and NPS standards.

Figure 3. Example Customized and MUTCD Signs

3.0 REVIEW AND REFINEMENT OF TRANSPORTATION OPTIONS

The five options carried forward from the initial screening were discussed for refinement. All participants agreed to keep the first four options and to modify *Option V – Voluntary Transit* into two new transit options. The resulting six options are described below.

Option I) Repair Existing Road

Option I is a reconstruction project that would repair, but not substantially increase, the footprint of the existing tour road. The option is illustrated in Figures 4 and 5.

Proposed Features:

- Repairs to the road should be properly engineered and may widen the road slightly for standardization and proper construction.
- The current road width varies from 17- to 20-feet. The improved tour road would have a consistent 20-foot cross-section.
- The tour road improvements would work with existing cattle guards and box culverts.
- Parking lots would be reconfigured or restriped without enlarging the footprint.
- Shoulders would not be provided; however, proper roadside treatment, such as side slopes, would be created to improve safety.

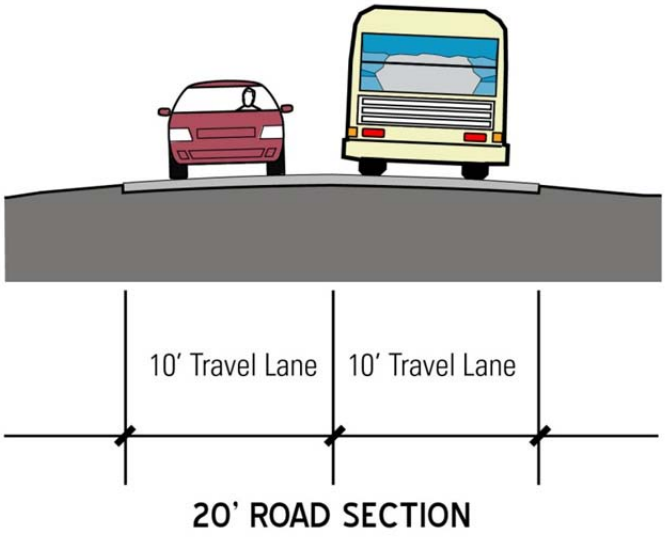


Figure 4. Proposed Cross-section for Option I

Figure 5. Option I: Repair Existing Road

Option II) 4R Road Widening and Parking Expansion

This option consists of a resurfacing, restoration, rehabilitation, and reconstruction (4R) project that would widen the tour road from an average 18-foot width to 24-feet wide, correct structural deficiencies of the pavement, and improve horizontal and vertical alignment.

This option is described in the *2010 Preliminary Feasibility Study* and was the preferred alternative in the *2005 Environmental Assessment/Assessment of Effect: Rehabilitate Tour Road*. This option would not preclude transit; the widened road could support future shuttle service with larger transit vehicles and the improved visitor center parking lot could serve as a staging area for transit.

Proposed Features:

- The tour road would be widened to 24-feet in order to accommodate safe passing for oversized vehicles and to correct structural deficiencies in the road.
- The tour road cross-section would consist of two 11-foot travel lanes with one-foot shoulders on both sides.
- Parking at the visitor center and Reno-Benteen Battlefield would be modified and expanded to include bus pull-outs, motorcycle parking, better accommodations for oversized vehicles, and improved traffic flow.

This option is illustrated in Figures 6 and 7.

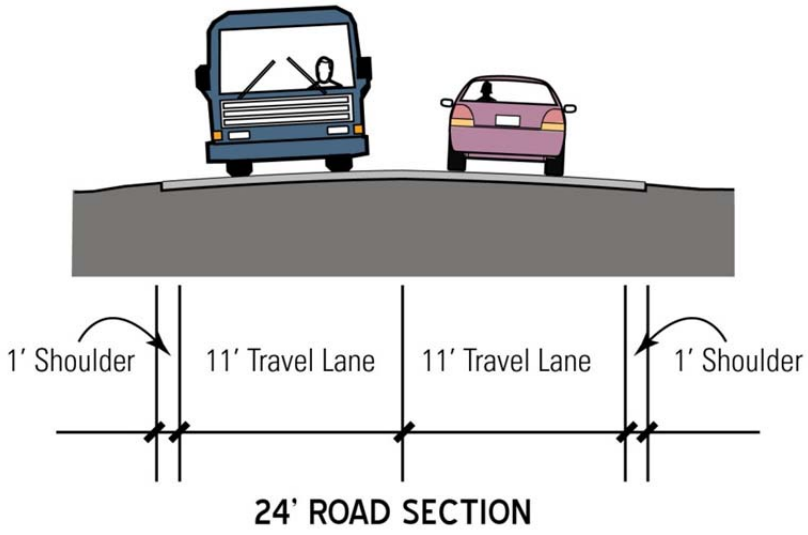


Figure 6. Proposed Cross-section for Option II

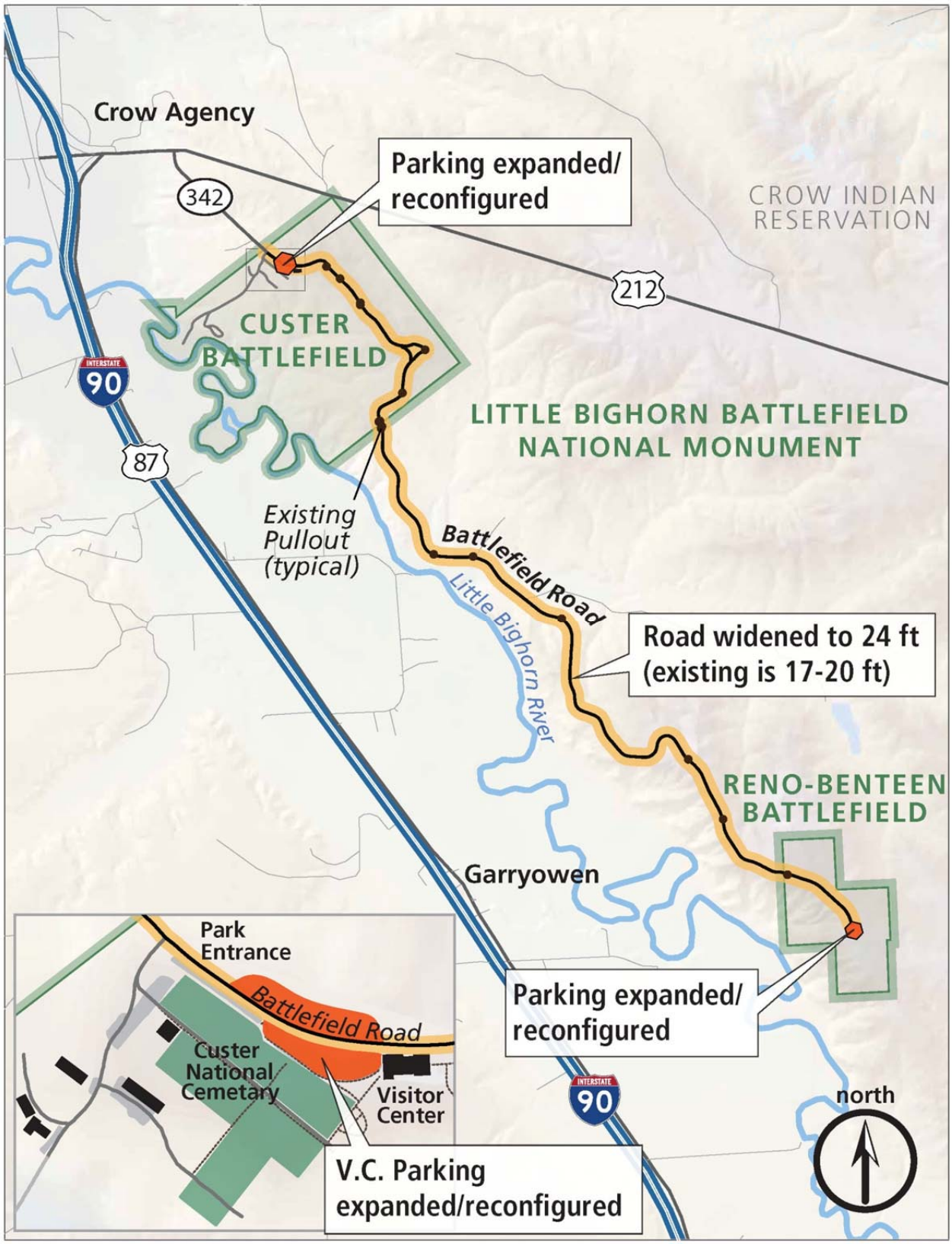


Figure 7. Option II: 4R Road Widening and Parking Expansion

Option III) GMP One-Way Tour Loop

This option would extend the tour road from Reno-Benteen Battlefield south to the I-90 frontage road, forming a counter-clockwise one-way tour loop. This option was first presented in the 1986/1995 *General Management Plan* and again in the 2010 *Preliminary Feasibility Study*. It was also revisited during the ATFS Project Kick-off Workshop in October 2011. This option would not preclude transit service on the tour road.

Proposed Features:

- A proposed tour road extension from Reno-Benteen Battlefield south to the I-90 frontage road would form a counter-clockwise one-way tour loop.
- The one-way tour road would allow visitors to experience the historic sites in the chronological sequence of the battle.
- The beginning of the one-way tour road would consist of a new visitor orientation/administration facility and parking area, presumably located adjacent to the US 212/MT 342 intersection.
- The tour road extension would require a bridge over Little Bighorn River.
- Additional parking has been proposed west of the Little Bighorn River, at the beginning of the one-way tour road segment.
- Under this option, Option I – Repairing Tour Road and Reconfiguring Parking will be included as one element.
- A seasonal, voluntary transit service will be provided to all visistor, which will operate along the entire one-way loop from Memorial Day to Labor Day, 9:00 a.m. to 5 p.m.

This option is illustrated in Figures 8 and 9.

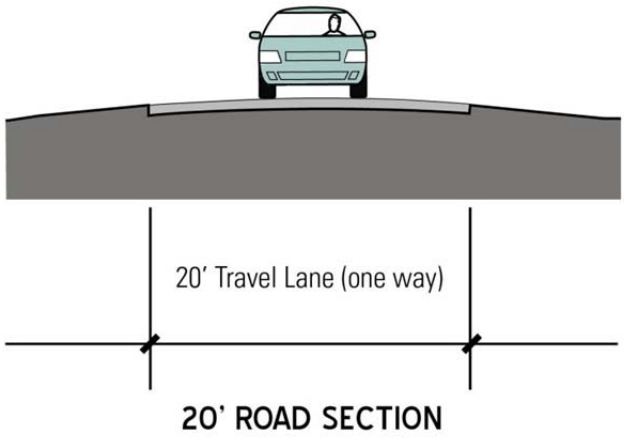


Figure 8. Proposed Cross-section for Option III

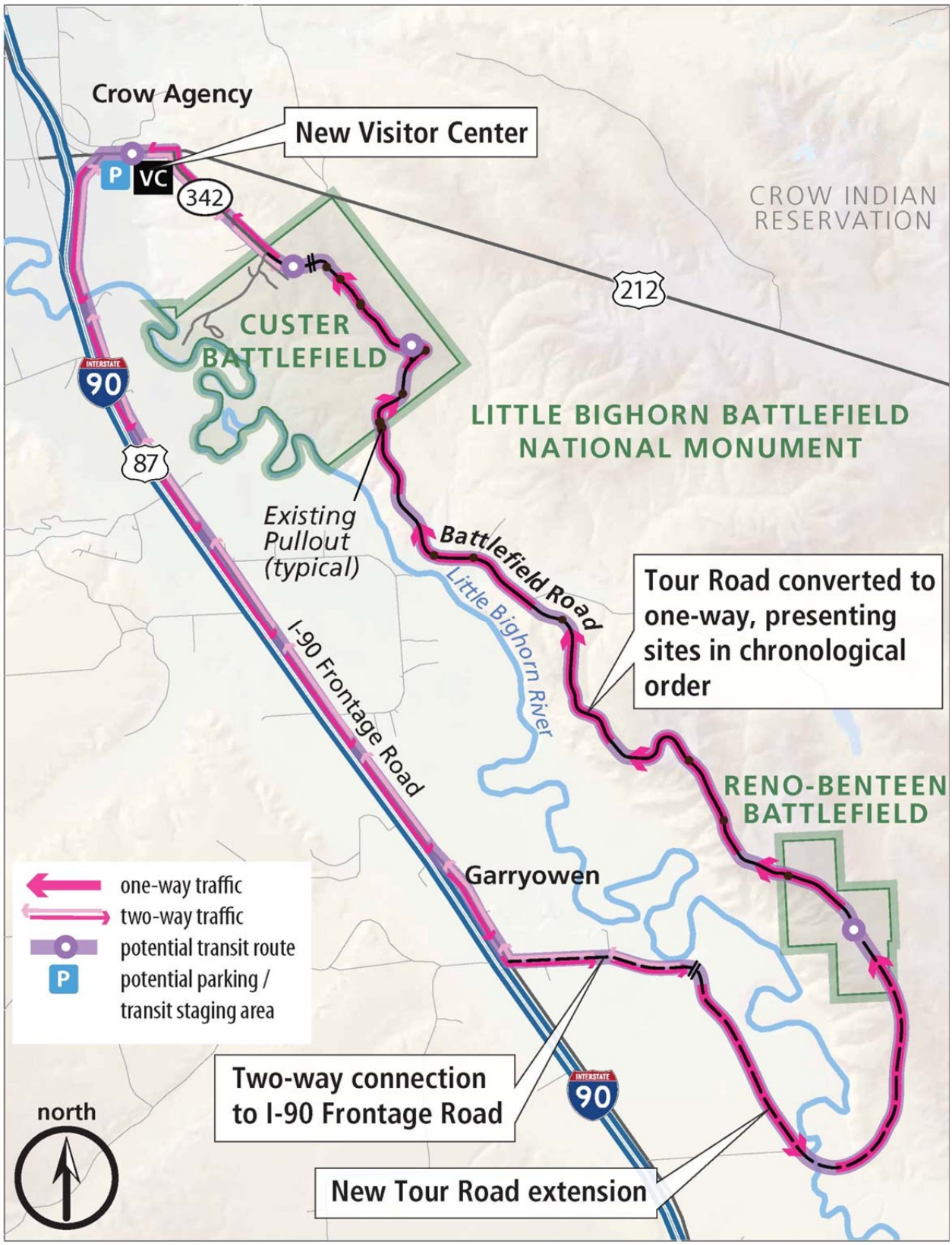


Figure 9. Option III: GMP One-way Loop Tour

Option IV) Management Improvements

This option is a collection of lower-cost and lower-impact operations/management changes to enhance visitor experience. This option utilizes existing facilities, but seeks to improve the parking experience with better signage and striping. It also seeks to provide better communications with visitors, with efficient directions to areas of interest. Many of these changes were suggested in the *2010 Preliminary Feasibility Study – Alternative Transportation* and the *2010 Existing Traffic and Parking Conditions and Implications for Transportation Alternatives* by Jonathan Upchurch.

Option IV includes various elements that could be implemented at the discretion of park management, including seasonal, peak time, and trial applications.

Proposed Features:

- Variable message signs could be added on I-90 and on the entrance road before the entrance station. The message signs could alert visitors to parking options and restriction, including oversized vehicles, and provide information about special events such as times or special limitations.
- The park's internal signage/striping could be improved. The following recommendations from the 2010 Upchurch report have been retained:
    - New signage would direct visitors to additional parking areas located by the Stone House and the visitor center.
    - Change "Towed Vehicle Parking Only" to "Oversized Vehicle Parking Only." Supplement with pavement markings adjacent to the edge line that read, "Oversized Vehicles Only."
    - New signage on the west side of the oversized vehicle parking area (the curb north and south of the restrooms) to indicate oversized vehicles only.
    - "Additional Car Parking" directional signing at both the beginning and end of the island (north and south of the restrooms) to direct regular sized vehicles to main road parking area.
    - Signing for pedestrian wayfinding from Stone House parking lot to visitor center.
    - New "No Parking" signs and yellow, cross-hatched pavement marking, and a solid white line that separates the travel lane from the shoulder parking to deter parallel parking in unsafe locations at the north and south ends of the island in visitor center parking lot.
    - Increase handicapped parking spaces near the visitor center from two to four to comply with American's with Disabilities Act.
- Visitor Use Assistants (VUA) could be employed on a seasonal basis to assist with managing visitors and congestion. The VUAs would proactively direct visitors to available parking and provide other critical information to entering visitors to help mitigate congestion, especially during peak events. The use of volunteers to assist with parking management is not included due to staff impacts in arranging for and managing the volunteers. The seasonal employee could perform the following duties:
    - be stationed or float around inside the entrance station and parking areas to assist visitors with wayfinding and parking;
    - help reduce regular vehicle parking in the oversized vehicle parking area;
    - discourage parking in non-designated locations; and
    - promote use of the park's audio tour at peak times when parking is unavailable at visitor center.

- Alternatively, existing park staff could continue to carry out these duties as part of their "collateral duties." The use of existing staff would be more flexible, only requiring deployment at peak times. However, this variation takes staff time away from other important duties.
- The visitor center parking area could be signed with time limits to encourage turnover. Additional turnover could be encouraged by shortening the length of the visitor orientation movie and program.
- The park could provide cemetery tours to attract parking into the Stone House lot. While this element requires additional programming, this management strategy does not require significant construction and redistributes parking activities away from the visitor center parking lots.
- No significant changes are proposed for the tour road.
- An offsite parking lot should be provided, via partnership with existing land owners, for towed vehicle drop-off and recreational vehicles that tow a smaller automobile. Potential locations include the old casino parking lot and other underutilized parking areas adjacent to the junction of US 212 and MT 342.

This option is illustrated in Figure 10.

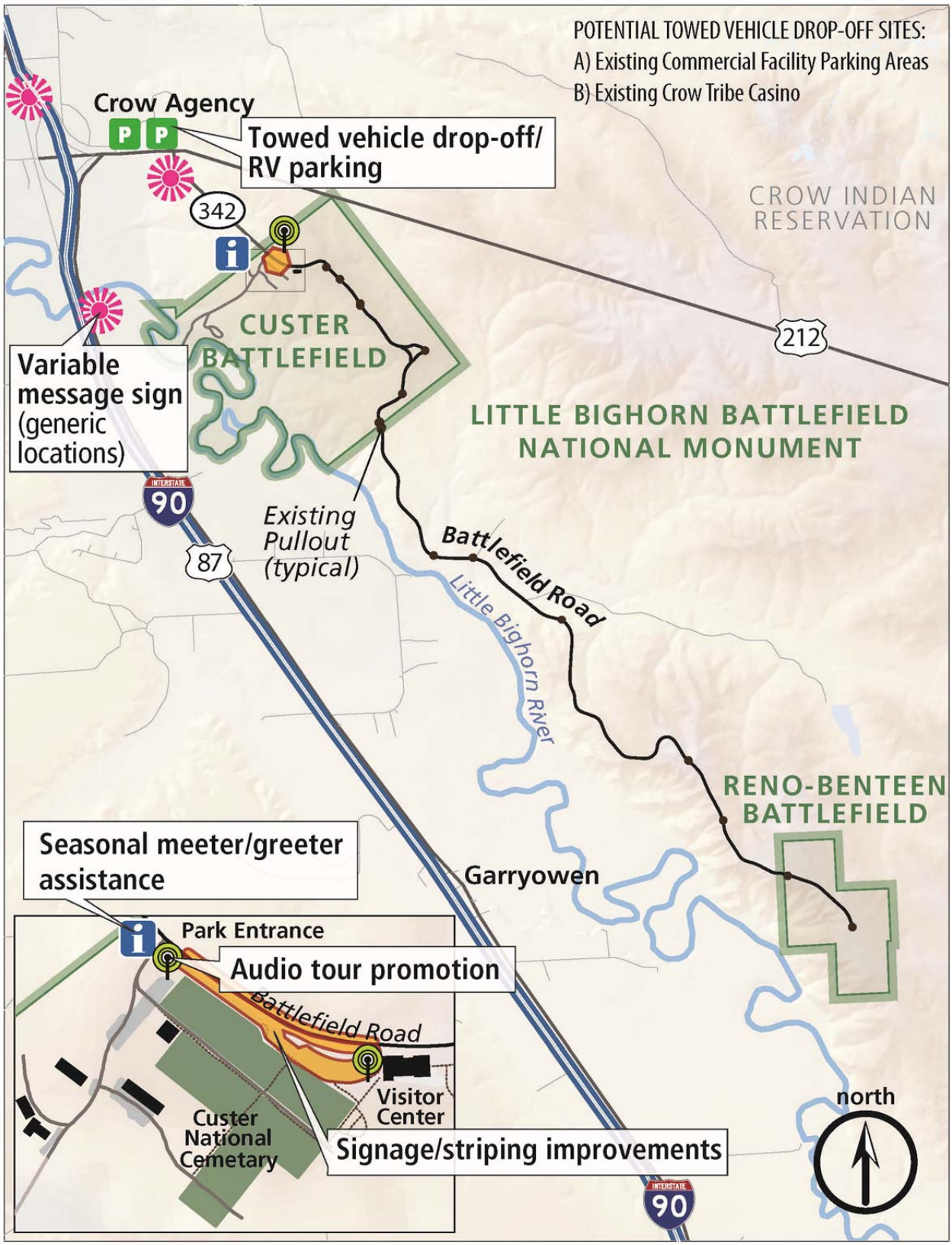


Figure 10. Option IV: Management Improvements

Option V) Transit from Offsite Staging/Parking to Visitor Center

This option would provide a seasonal shuttle service for visitors to access the park.

Proposed Features:

- A shuttle service will be provided between an offsite staging/parking area and the visitor center during the summer season. No intermediate shuttle stops will be provided.
- The operating season/time would be Memorial Day to Labor Day (approximately 14 weeks), 9 a.m. to 5 p.m.
- Visitors can choose to take the shuttle or use their own vehicles, and they are allowed to use designated visitor parking inside the park, at the visitor center area, and at Reno-Benteen Battlefield.
- Deploy variable messaging signs, as well as traditional signs and pavement markings, to notify visitors of the available shuttle, parking locations and limitations, and options to access the park.
- Under this option, Option I – Repairing Tour Road and Reconfiguring Parking will be included as one element.

Option VI) Transit from Offsite Staging/Parking to Reno-Benteen Battlefield

This option would provide a seasonal shuttle service for visitors to access the park and see sights along the tour road.

Proposed Features:

- A shuttle service will be provided between an offsite staging/parking area, the visitor center, and Reno-Benteen Battlefield.
- Three shuttle stops are recommended: visitor center, Last Stand Hill, and the Reno-Benteen parking lot. Each stop will have a bus pull-out, a bench, and a bus sign with a supplemental plaque of appropriate schedule information. Rest facilities will not be included at the remote sites due to significant visual impacts on the sensitive battlefield landscape.
- Shuttle stops outside of the park boundaries along the tour road are not recommended, since the Park discourages parking or walking outside of the park boundaries, which are mostly private properties.
- Visitors can choose to take the shuttle or use their own vehicles, and they are allowed to use designated visitor parking inside the park, at the visitor center area, and at Reno-Benteen Battlefield.
- The operating season/time would be Memorial Day to Labor Day (approximately 14 weeks), 9 a.m. to 5 p.m.
- Deploy variable messaging signs, as well as traditional signs and pavement markings, to notify visitors of the available shuttle, parking locations and limitations, and options to access the park.
- Under this option, Option I – Repairing Tour Road and Reconfiguring Parking will be included as one element.

Workshop participants discussed possible variations to these two transit options; in particular, restrictions to oversized vehicles. Under these restrictions, oversized vehicles would be prohibited

from parking at the visitor center area; however, oversized vehicles will be allowed to drive on the tour road, as well as use the parking lot at the Reno-Benteen Battlefield. The NPS staff directed that the study team should further analyze the viability of these restrictions on oversized vehicles under the transit options.

The study team recognizes that the proposed restrictions to oversized vehicles would help relieve parking shortage at the visitor center area and still allow oversized vehicles to be on the improved tour road, which would have a consistent pavement width (20-feet) and be capable of accommodating the load of oversized vehicles. However, the restrictions would also cause the following negative impacts on visitor experience and park management:

- For oversized vehicle users who want to visit both the visitor center and Reno-Benteen Battlefield, they would have to first take the shuttle to the visitor center, get back on the shuttle bus to get their vehicles from the offsite parking lot, and then drive into the park throughout the tour road. This seems to be a major inconvenience and could discourage these oversized vehicle users from visiting the park.
- These restrictions could shift parking congestion and shortage at the visitor center area to the tour road and Reno-Benteen parking lot.
- It would be difficult to clearly communicate the restrictions to visitors, especially oversized vehicle users, even with additional signage and staffed visitor use assistance.
- Many oversized vehicle users only intend to visit the visitor center area, including the Last Stand Hill, but not drive on the tour road. For them, riding a shuttle bus becomes the only way to fullfill their visit to the park.

Due to these negative impacts, the study team determined that such parking restrictions to oversized vehicles should not be imposed.

Both Options V and VI are illustrated in Figure 11.

Figure 11. Options V and VI: Transit from Offsite Staging to the Park

4.0 REVIEW AND REFINEMENT OF DETAILED SCREENING CRITERIA

Participants of the workshop discussed the set of detailed screening criteria and their associated weighting factors. A consensus was reached to move forward with the criteria shown in Table 2 for detailed screening.

Table 2. Detailed Screening Criteria

Category	Criteria	Measure/Unit	Effects/ Impacts	Weighting Factor	Sub Total
General Impacts to Park Resources, Visitor Experience, and Management	Reduction in vehicle miles traveled	VMT	Direct	7%	60%
	Reduction in vehicle emissions	tons, cubic feet	Indirect and Cumulative	10%	
	Footprint for additional transportation infrastructure	square feet	Direct and Cumulative	10%	
	Changes in delay and congestion	0-10 with 10 being best		7%	
	Parking availability	0-10 with 10 being best		7%	
	Safety improvement	0-10 with 10 being best		7%	
	Convenience and comfort	0-10 with 10 being best		7%	
	Impacts to park staff and management	0-10 with 10 being best		5%	
Financial Analysis	Total Cost of Ownership	US Dollars		18%	40%
	Revenue	US Dollars		10%	
	Funding Sources and Cost Sharing	0-10 with 10 being best		12%	

Source: URS Corporation

Notes: Estimated values (measure/unit) of each criterion are converted proportionally to a rating score of 0-10 (0 = worst, 10 = best) before multiplying the assigned weighting factor.

The total of weighting factors of all criteria is 100%.

5.0 REVIEW AND REFINEMENT OF SCORE MATRIX

Participants of the workshop reviewed and discussed the preliminary results from detailed screening, in particular the score matrix, presented by URS. The refined detailed screening criteria were then used to score the modified set of six transportation options. Only the qualitative criterions, such as safety improvement and parking availability, were considered for scoring options during the workshop. After the workshop, the study team recalculated or estimated the quantitative criterions, such as vehicle emissions and total cost of ownership, and completed the score matrix as shown in Table 3.

Table 3. Detailed Screening Score Matrix

Criteria	Options						Weighting Factor
	I) Repair Existing Road	II) 4R Road Widening/ Parking Expansion	III) GMP One-Way Tour Loop	IV) Management Improvement	V) Transit Offsite to Visitor Center	VI) Transit Offsite to Reno-Benteen	
Vehicle miles traveled (VMT)	5	5	0	5	6	10	7%
Vehicle emissions	5	5	0	5	8	10	10%
Footprint	8	3	0	10	8	8	10%
Delay and congestion	0	7	10	4	8	9	7%
Parking availability	0	7	8	4	9	10	7%
Safety improvement	0	8	10	5	7	9	7%
Convenience and comfort	0	8	10	4	6	7	7%
General impacts to park staff/ management	0	10	8	6	4	2	5%
Total Cost of Ownership	9	6	0	10	9	8	18%
Revenue	0	0	0	0	10	10	10%
Funding Sources and Cost Sharing	10	8	0	2	5	6	12%
Weighted Score	**4.5**	**5.8**	**3.1**	**5.4**	**7.5**	**8.2**	

Notes: Rows highlighted in light blue represent qualitative criterions, while others are quantitative.

This table presents preliminary screening results immediately following the Evaluation of Options Workshop, May 7th, 2012. The most updated screening results, which may vary substantially from this table, are recorded in the Options and Criteria for Evaluation Report

6.0 SUMMARY OF RESULTS AND NEXT STEPS

Results from the workshop are summarized as following:

1. The long-term plan is working toward the implementation of the GMP.
2. Any transit options will need to make efforts to work with the existing park and regional transit services, in particular the concession-operated Apsaalooke Tour and Crow Nation Transit.
3. A consensus was reached to move forward with six transportation options for detailed evaluation, including three construction options, one non-construction/management improvement, and two transit options.
4. Preliminary results from the scoring during the workshop (by all workshop participants) and immediately after the workshop (by the study team) indicated that the two transit options rank relatively high, while the GMP option (one-way tour loop via I-90 frontage road) scores the lowest among the six options.

Participants of the workshop agreed on the following next steps:

1. The study team will prepare a newsletter for the National Park Service to distribute to the public. This newsletter will inform stakeholders and the public of the study progress and transportation options that have been developed, and solicit public comments.
2. The study team will document the results from this workshop for the National Park Service to review.
3. The study team will address NPS comments on the second draft of the Options and Criteria Evaluation Report.
4. The study team will complete a draft feasibility study and recommendations report for NPS review.

7.0 ALTERNATIVES REFINEMENT

After the conclusion of the Evaluation of Options Workshop, the study team continued to refine the alternatives with clarifications, minor changes to components, more detailed quantitative and qualitative analysis, and more detailed cost estimates. The resulting set of final alternatives will remain substantially the same as previously evaluated, but will provide additional information for consideration. The scores for each alternative will be reevaluated and shown in the Options and Criteria for Evaluation Report.

Table 4. Additional Considerations for Alternatives Refinement

Additional Considerations	Discussion
Vehicle Miles Traveled (VMT)	Increases or decreases to VMT under the various options will be quantified
Cost Estimate Adjustments	Class C Construction Cost Estimates will be completed for the construction and included in the scoring of alternatives.
Special Event Shuttle	A special events shuttle will be added as a variation of Option 6.
Resource Impacts	Air Quality – Air quality impacts as a result of tailpipe emissions will be considered for each option. Cultural and Historic Impacts will be considered at a general level and included in the options and Criteria report.
Visitor Experience / Wayfinding	Potential impacts to the visitor experience and wayfinding will be considered at a general level.
Repair Tour Road as Element of GMP and Transit Options	Repairs for the existing tour road will be included as an element of the GMP and both transit options.

ATTACHMENT A

Workshop Agenda

Evaluation of Options Workshop

AGENDA Revised 05.02.12

Meeting Date: **Monday, May 7, 2012**

Meeting Purpose:
Conduct an evaluation of the five options that were carried forward from the previous initial screening process. Refine and use a set of detailed screening criteria for this evaluation. Gather input and viewpoints from a variety of NPS personnel and primary stakeholders.

SUNDAY, MAY 6

NPS Staff and URS Staff from Denver arrive.

MONDAY, MAY 7

8:30am – 8:55am **URS setup**

9:00am – 9:30am **Background overview**

- Project purpose and expected outcome (park)
- What we have accomplished (DSC/IMR)
  - Data collection & analysis
  - Review/synthesis of previous documents: GMP, Upchurch report, 2005 EA, etc.
  - Existing conditions
  - Kick-off workshop
  - Development and initial screening of options
  - Options and criteria for evaluation – 1st & 2nd draft
  - Newsletter #1
- What we are going to accomplish (DSC/IMR)
  - Evaluation of options using detailed screening criteria (this workshop)
  - Refine options/criteria and complete evaluation of options
  - Feasibility study and recommendations report – draft and final
  - Newsletters #2 and #3

9:30am – 10:15am **Project status** (URS - PowerPoint)

- Brief review of existing conditions
  - Major findings
  - Design day concept
- Project goals and objectives
- Options development process
- Initial set of options

- Initial screening criteria
- Initial screening results: five options were moved forward for detailed screening
- Detailed screening process
- Detailed screening criteria (preliminary)
- Group discussion, Q&A

10:15am – 10:30am **Break**

10:30am – 12:00pm **Refine the five options for detailed screening** (group activity)
- Components to be added, deleted, or changed
- Did we miss any potentially feasible options?

12:00pm – 1:00pm **Break for Lunch**

1:00pm – 2:20pm **Refine detailed screening criteria** (group activity):
- Are the criterions necessary and sufficient?
- Weighting factors: do they need to be adjusted? How?

2:20pm – 2:30pm **Break**

2:30pm – 3:30pm **Evaluate options using detailed screening criteria** (group activity)
*(**Note:** with changes in options and criteria resulting from previous group activities, this evaluation will be mostly qualitative and no recommendations are expected from this exercise. URS will gather feedbacks and complete the evaluation)*
- Review the evaluation matrix
- Identify scores that need to be adjusted
- Discuss feasibility of increasing the entrance fee in order to add revenue for a possible transit option

3:30pm – 4:00pm **Debrief and next steps**
- Review results from the workshop
- Identify action items
- Review schedule

TUESDAY, MAY 8

NPS Staff and URS Staff travel back to Denver

ATTACHMENT B

Sign-In Sheet

National Park Service
U.S. Department of the Interior

Alternative Transportation Feasibility Study
Little Bighorn Battlefield National Monument

Evaluation of Options Workshop. May 7, 2012.

SIGN IN SHEET

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