White River National Forest Hanging Lake Transportation and Operations Study

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13. ABSTRACT (Maximum 200 words)

Hanging Lake is a recreation site located on land managed by the U.S. Forest Service (USFS) under the jurisdiction of the White River National Forest's Eagle-Holy Cross Ranger District. Due to its increasing popularity over the past few years, the USFS is working with the U.S. Department of Transportation John A. Volpe National Transportation Systems Center (Volpe Center) to develop transportation options that will assist in mitigating parking lot congestion, visitor dissatisfaction, trail crowding, and environmental degradation at the site. This Transportation and Operations Study, which analyzes four transportation and operations management options for Hanging Lake, is part of a series of reports that will assist the USFS and its stakeholders in finding a long-term, sustainable solution for these and other issues at Hanging Lake.

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Acronyms

CDOT: Colorado Department of Transportation
CNG: Compressed Natural Gas
FLAP: Federal Lands Access Program
GS: General Schedule
NEPA: National Environmental Policy Act
O&G: Outfitter and Guide
O&M: Operations and Maintenance
REA: Recreation Enhancement Act
RFP: Request for Proposals
RFTA: Roaring Fork Transportation Authority
USFS: United States Forest Service

Introduction

Hanging Lake is a recreation site located on land managed by the U.S. Forest Service (USFS) under the jurisdiction of the White River National Forest's Eagle-Holy Cross Ranger District. Due to its increasing popularity over the past few years, the USFS is working with the U.S. Department of Transportation John A. Volpe National Transportation Systems Center (Volpe Center) to develop transportation options that will assist in mitigating parking lot congestion, visitor dissatisfaction, trail crowding, and environmental degradation at the site. This Transportation and Operations Study, which analyzes four transportation and operations management options for Hanging Lake, is part of a series of reports that will assist the USFS and its stakeholders in finding a long-term, sustainable solution for these and other issues at Hanging Lake.

Management Strategies to Date

The USFS, Volpe Center, Colorado Department of Transportation (CDOT), and other Hanging Lake stakeholders have been working together since 2013 to discuss, analyze, and implement different solutions to the problems being experienced at Hanging Lake. The stakeholder group implemented short- and medium-term management strategies (Figure 1) to assist in the interim as the group works to finalize its long-term management options. This Transportation and Operations Study will provide background and guidance in the USFS decision-making process for determining long-term management solutions for Hanging Lake.

Figure 1 USFS Seasonal Ranger managing parking lot entrance; Source: Volpe Center, July 2015

Prior to implementation of any transportation and management options, the USFS will develop a Management Plan that will select a general management strategy for the site. Next, in accordance with National Environmental Policy Act (NEPA), the USFS will perform an Environmental Analysis that includes a full public process and opportunities for public comment. Public comments, findings in the EA, and availability of potential operators and/or related transportation equipment will help inform the USFS's final decision. The final decision may include an option described in this plan or a combination of options. Assumptions were made by the Volpe Center and the USFS in order to model a baseline for comparison and to inform the feasibility of the options presented in this report. Assumptions such as estimated costs and season of use may change in the process as the options are analyzed and refined to meet defined goals and objectives. Adaptive management actions are expected to be part of the final decisions for Hanging Lake. With an adaptive management approach, indicators and thresholds will be identified and utilized to ensure the sustainability of natural resources at the site in the future. Last, stakeholders will develop a transition plan to assist in outlining implement steps between all the partners.

There is a suite of implementation tools and methods that the USFS can utilize to implement a limited use permit system to manage a site to capacity. The following is a brief description of some methods that could be used alone or in combination, but it is not limited to the following:

1. Utilize Recreation.gov to issue reservations through the National Recreation Reservation Service. There is an administrative fee for this reservation system.
2. Manage capacity through the Outfitter and Guide (O&G) program via its permitting process using the O&G's reservation system.
3. Manage capacity through an alternative transportation provider's reservation system.
4. Provide enhanced services and experience to the visitor via instituting a Special Recreation Permit under the Recreation Enhancement Act (REA) that would generate revenue for sustainable on-site management. This would require following national and regional processes for a Regional Forester decision and would include a separate public participation process, documentation of responses, and Washington Office/Regional Office reviews throughout the process. This tool may be integrated into the above three options.

The following management strategies have been implemented to date:

- **Communication strategy (2013-present):** USFS and CDOT worked to update dynamic messaging and static signs; USFS and Glenwood Springs Chamber Resort Association updated website and Visitor Center information.
- **USFS seasonal staff (2014-present):** USFS, with financial support from the City of Glenwood Springs Tourism Promotion Board and Garfield County, hired one summer seasonal staff in 2014 and three summer seasonal staff in 2015 to be on-site Friday to Monday to assist in parking lot and trail management. In 2016, the USFS, the City of Glenwood Springs Tourism Promotion Board, Garfield County, and the Colorado Parks and Wildlife Recreational Trails Program (through a grant applied for by the USFS) partnered to hire six summer seasonal staff to continue managing the parking lot and trail.
- **Parking lot re-configuration, signage and gate installation (2015-present):** USFS and CDOT re-striped the entrance of the parking lot, installed new signage in the parking lot and on Interstate 70, and mounted a temporary gate. Summer seasonal rangers instituted a staging line to manage user's expectations and communicated with CDOT to close Hanging Lake exit ramp when needed.

Transportation and Management Goals and Objectives

The following goals were developed by the Hanging Lake multi-agency stakeholder group during its first meeting in fall 2013. Since then, the same goals have been presented and discussed several times throughout the life of the project. The objectives were added to help the USFS and its stakeholders refine the transportation and management options at the site. Additionally, a section is provided under each explaining how the goals and objectives are addressed in this study and/or will be addressed in the forthcoming Management Plan and Transition Plan as well. The options will each be weighed against these goals and objectives to better understand the advantages and disadvantages of each.

Goal: Protect the natural resources

Implementation Objectives:

- Mitigate negative environmental affects increased visitation has had on the trail, lake, and overall site at Hanging Lake.
- Maintain trail and site infrastructure to preserve resources while accommodating visitation to the desired capacity.
- Increase ranger presence to a financially sustainable level.
- Address deferred maintenance projects for the boardwalk, bridges, signage, and railing.
- Review use trends and related indicators every year to see if thresholds have been exceeded and management actions are needed.

How these objectives will be addressed in this study or the Management, Transition, or Annual Operation Plans:

- Define desired conditions, indicators, and thresholds to ensure sustainability of natural resources at the site.

Goal: Manage congestion at Hanging Lake parking lot

Implementation Objectives:

- Support multimodal access to Hanging Lake trailhead.
- Reduce need for USFS seasonal and overtime staff to manage the parking lot.
- Adapt messaging and public information to visitors based on selected management option.
- Increase and replace highway signs and infrastructure to reflect the selected management option, in coordination with CDOT.

How these objectives will be addressed in this study or the Management, Transition, or Annual Operation Plans:

- Include both the physical infrastructure and operational needs of managing the parking lot congestion.

Goal: Enhance public safety

Implementation Objectives:

- Identify potential infrastructure changes (e.g., gates, signage, ramp, turn-around) to the rest area which will better facilitate the administration of the selected management option.
- Continue to communicate safety messaging with CDOT thru Virtual Message Boards, website, etc.
- Enhance trail infrastructure, boardwalk, and railing systems as needed.

How these objectives will be addressed in this study or the Management, Transition, or Annual Operation Plans:

- Discuss safe ingress and egress to I-70.
- Address additional signing requirements along I-70.

Goal: Improve visitor experience

Implementation Objectives:

- Facilitate user access, while mitigating congestion and crowding on site.
- Provide visitors with the most accurate and up-to-date information on the new management system, rules, and regulations.
- Address deferred maintenance projects for improved and/or additional interpretive signage to enhance the visitor's experience.

How these objectives will be addressed in this study or the Management, Transition, or Annual Operation Plans:

- Enhance interpretive information and products at the site (both parking lot and trail).

Goal: Support local tourism

Implementation Objectives:

- Create a communication plan during the winter prior to implementation with partner organizations related to messaging the new management system.
- Meet annually with tourism promotion board(s) locally and on the front-range to discuss messaging, special projects, etc.
- Provide annual updates and Hanging Lake facts, interpretive messages, etc., to local tourism destination providers, as well as to Denver and the front-range.

How these objectives will be addressed in this study or the Management, Transition, or Annual Operation Plans:

- Discuss social and economic issues.

Base Operational and Capital Needs

There are base operational and capital needs that must be considered in order to implement a sustainable long-term plan. The project team estimated 20-year projected base costs using data provided by USFS and CDOT. CDOT provided costs for the portion of the Glenwood Recreation Path connecting to and in front of the trail, the parking lot, and the rest area facility maintenance (including the restrooms and picnic tables) (Table 1). According to CDOT's 2015 rest area facilities data, that cost is estimated to be $58,619 for the peak months of May through October. The cost estimates provided include labor, benefits, overtime, equipment, materials, and non-stock. Under each management option, it is assumed that the USFS or other potential management operator will perform light maintenance duties for the restroom facilities rather than CDOT during the peak season. The estimates vary annually depending on weather, rock slides, and other external factors that may occur.

Table 1 CDOT Estimated Costs for Hanging Lake Rest Area

Item/Project	Average Peak Season Operations and/or Maintenance Cost	Annual Total Operations and/or Maintenance Cost	5-10 Year Capital Replacement or Improvement Cost	10-20 Year Capital Replacement or Improvement Cost
Automatic Gate			$47,500	
Parking Lot				$300,000
Restrooms	$42,554	$60,949		$1,750,000
Water System Upgrade			$85,000	$100,000
Grounds (picnic tables, grass, vegetation)	$7,802	$17,336		
Trash/Litter Cleanup	$8,263	$12,570		
TOTAL	**$58,619**	**$90,855**	**$132,500**	**$2,150,000**

USFS provided estimated trail maintenance and capital costs as well as trail staffing costs (Table 2). The estimates below represent the cost of one full-time permanent General Schedule (GS)-7 employee and one full-time seasonal GS-5 employee. Each management option below requires a different amount of USFS staffing coverage, therefore a fuller discussion on staffing needs and costs is provided under each scenario.

Table 2 USFS Estimated Costs for Hanging Lake Recreational Trail

Item/Project	Annual Operations and/or Maintenance Cost	5-10 Year Capital Replacement or Improvement Cost	10-20 Year Capital Replacement or Improvement Cost
Trail Maintenance	$15,000		
Trail Staff Patrol (5 seasonal GS-5 based on summer 2016 expenses)[1]	$117,370		
Transportation Management Administrator (GS-7)	$52,000		
Trail Signage	$2,000	$10,000	
Trail Railings	$3,500	$200,000	$200,000
Boardwalk	$1,000	$100,000	$100,000
Bridges	$2,000	$60,000	$45,000
TOTAL	**$192,870**	**$370,000**	**$345,000**

The revenue generated by the transportation management system must cover the peak season operations and/or maintenance costs for the USFS as the seasonal rangers will be covering the light maintenance duties for CDOT. CDOT will be needed for heavier maintenance and large trash pick-up; the daily restroom cleaning will be done by the USFS during the peak months. The amount required for USFS management needs will vary based on the management option selected. The transportation management system may contribute to better preserving the infrastructure and environment since wear and tear may become less severe during peak times, but both the USFS and CDOT do not expect the transportation management system to cover the costs of all capital replacement and improvement needs since those needs are costly and difficult to predict. However, a deferred maintenance fund of $100,000 is created for the options that include a REA fee since REA fees can be saved to account for future deferred maintenance and large capital improvement projects.

Marketing Cost Estimates

The USFS and its partners will need to spread information about the new transportation operation and management option implemented so that visitors will be prepared for their experience at the site before they arrive. Marketing may include developing digital and print materials as well as website and social media updates. An estimated $5,000 per year in marketing cost is used for this plan[2].

Visitation and Ridership Estimates by Season

For the purposes of this study the slight restriction threshold which allows for a maximum of 780 visitors a day will be used as a starting point for the management of the site.[3] While 780 visitors per day is likely during the summer months, this threshold may not be reached during the shoulder months of May, September, and October. To more accurately capture costs, the project team is using the daily averages in 2015 for May, September, and October, and is using 780 visitors per day for June, July, and August since curbing demand on peak summer days will likely increase demand on non-peak summer days (Table 3). This makes the total visitation for the peak season 108,132 and this will be the visitation estimate used in cost estimates for the management options below.

[1] Assuming $145.27 daily rate for GS-5 Seasonal USFS Employee and $200 for a GS-7.
[2] Volpe Center Bus Lifecycle Cost Model for Federal Land Management Agencies User Guide (2011)
[3] http://ntl.bts.gov/lib/59000/59200/59238/USFS_Hanging_Lake_Capacity_Study.pdf

Table 3 Average Daily Visitation by Month in 2015; Source: TRAFx

Month	Hiker Count	Days Per Month	Daily Average	Managed Daily Average	Managed Monthly Totals
May	13,013	31	420	420	13,013
June	21,596	30	720	780	23,400
July	29,670	31	957	780	24,180
August	21,167	31	683	780	24,180
September	13,126	30	438	438	13,126
October	10,233	31	330	330	10,233
Total	**108,805**				**108,132**

Off-Season Management

The USFS will manage the Hanging Lake area year round to a daily capacity. Under an adaptive management approach, the off-season months may be altered if visitation patterns change and monitoring indicates it necessary to provide more management presence. Primarily due to weather, the off-season months see low visitation, though March and April can vary (Table 4). For reference, March and April in 2015 were (above normal) in average temperature. The USFS may assess a REA fee during the off-season months to cover ongoing operations and maintenance costs; the off-season fee is examined under each management scenario.

Table 4 Monthly Visitation during Off-Peak in 2015; Source: TRAFx

Month	Hiker Count	Day Per Month	Daily Average
January	1,591	31	51
February	1,816	28	65
March	8,650	31	279
April	8,493	30	283
November	2,974	30	99
December	360	31	12
Total	**11,942**		

During the off-hours (6:30 PM to 6:30 AM) at the site, the automatic gates will be closed and the site will be closed to entry. While visitors may find a way to hike the trail using the Glenwood Canyon Recreation Path, the closing of the parking lot will limit after-hours visitation. If nighttime visitation becomes an issue, the USFS may require staff during evenings to turn visitors around.

Transportation and Operations Options

This section outlines three potential transportation and operations options based on various management models for Hanging Lake. The sub-sections below outline the service characteristics and functionality as well as the estimated costs of each option. For the purposes of this study, all options cover the peak season, which is defined as May 1 to October 31. It is assumed that CDOT will operate and maintain the parking lot and rest area during the off-season.

Two of the options include shuttle service and one does not. As part of the Hanging Lake Visitor Transportation Survey conducted in July 2016, visitors were asked how likely they would be to use a

shuttle service to visit Hanging Lake again. Of 656 respondents, 58 percent responded "likely" and 21 percent responded "somewhat likely." A small portion of visitors (17 percent) responded "not likely" and only five percent were undecided about their shuttle use.[4] Also, three of the options include a Federal Lands REA standard amenity fee and one does not. The REA fee can only be charged to visitors over the age of 16. Since the July 2016 survey indicated that roughly 20 percent of visitors were under the age of 18, the subsequent analysis of costs and estimated ticket prices assumes that the REA fee would be collected from 80 percent of visitors.

The USFS can use REA fee proceeds to staff and maintain the site as well as set a portion aside to pay for capital replacements. REA requires a six-month public scoping period and then approval by a Recreation Advisory Committee, which is comprised of local residents. Additionally, the REA fee must be approved internally by various USFS administrative levels. The entire REA approval process can take up to one year. The funds generated from the REA fee are split between USFS headquarters and the recreation site: five percent goes to the USFS Regional Office and the remaining 95 percent is managed at the Forest level.

The shuttle service options presented below include the following assumptions as operational starting points:

- Mandatory: the Hanging Lake parking lot will be closed during the peak season except to authorized vehicles
- Peak (managed) Season: May 1 to October 31
- Operating Hours: 6:30 AM to 9:00 PM
- Visitors/riders: 108,132 per season; daily capacity will be set through a reservation system

Bicycle Accommodation

It is assumed that for Options 1 and 4 (those that do not already include an O&G), there is potential for guided hikes and bicyclists to be accommodated through an O&G permit. A sub-section is included in both of those options for bicycle accommodation; however, a variation may be added that bicyclists be accommodated through an O&G. Additionally, guided hikes may be offered through an O&G as well. This hybrid variation on the two options allows flexibility in the levels of services provided. The USFS would outline in its prospectus for the O&G bidding process that a maximum of 10 percent of hiker permits (approximately 80 per day; 40 bicyclists and 40-persons for guided hikes) are allotted to the O&G. The O&G can then determine how that can be split among bicyclists and guided hikes.

For those O&G permits, it is assumed that the O&G would provide transportation and therefore some revenues would not go directly to Roaring Fork Transportation Authority (RFTA) under Option 1 or to the USFS under Option 3. Under O&Gs, three percent of gross revenue goes to the USFS so those funds collected may go to offset the losses and cover baseline operational needs. With this in mind, if the O&G variation is determined more feasible and selected by the USFS (i.e., RFTA and USFS are unable to monitor bicycle accommodation, and/or there is increased visitor demand for guided hikes), then the costs outlined below may increase slightly.

[4] Publication of results from the Hanging Lake Transportation Visitor Survey 2016 are in progress.

Option 1: Roaring Fork Transportation Authority Agreement plus REA Special Permit Fee

RFTA is the transit service operator in Pitkin County, Garfield County, and portions of Eagle County. Under this option, RFTA would run a shuttle service to Hanging Lake from its West Glenwood Springs Park and Ride during the peak season. RFTA likely cannot provide shuttle service from November to April as it operates at capacity during the ski season. The USFS would receive funding through a REA Special Permit fee that would be collected in addition to the RFTA-charged shuttle ticket price since the shuttle ticket price would only cover shuttle operations. A REA fee would benefit the USFS because a majority of the funds collected would be invested in the site. A REA Special Permit fee would provide the funds necessary to cover the base operational needs as summarized in Table 1 and Table 2.

Under this option, visitation would be managed by the number of tickets sold per each RFTA trip. To start, in line with the findings of the capacity analysis, RFTA will be allowed to sell up to 78 tickets per hour, which must be done online or in Glenwood Springs. RFTA and the USFS would coordinate creating an online reservation system, perhaps through recreation.gov, to purchase tickets for specific shuttle departure times. To simplify payment for visitors, the final ticket price should be inclusive of the REA fee; therefore the visitor only has to make one transaction. RFTA may prefer to only sell tickets in-person at sites in Glenwood Springs. A wristband or other identifying permit would be provided to each shuttle rider to ensure only those permitted are on the trail. Additionally, RFTA may charge a parking fee at its new/expanded park and ride facility in Glenwood Springs to assist in paying for ongoing maintenance. This will need to be further examined during discussions with RFTA.

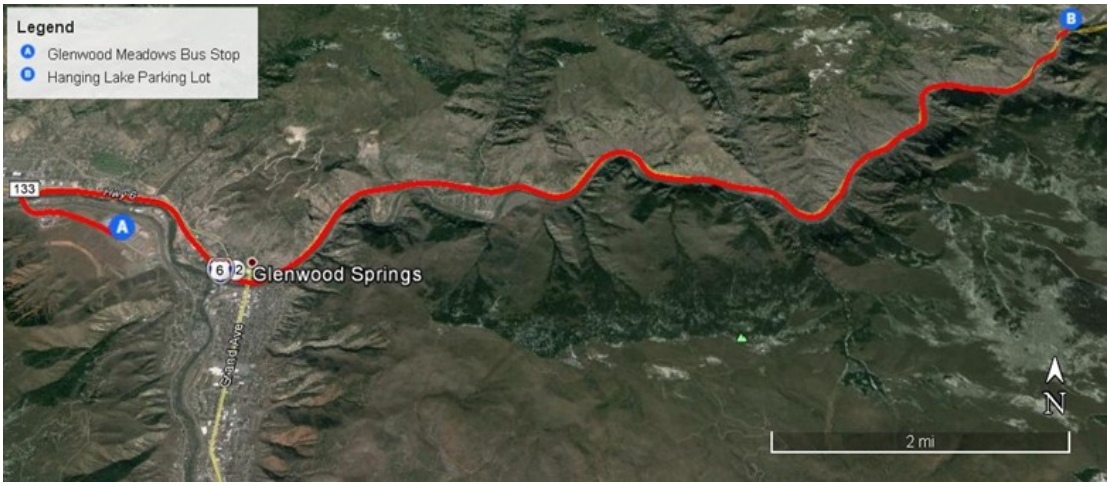
During discussions in the spring of 2016, RFTA staff expressed interest in providing service to Hanging Lake but acknowledged it would likely not be prepared to take on expanded service until 2018 for two reasons. First, the current expansion of the West Glenwood Springs Park and Ride facility will not be completed until late 2017 (greater detail about RFTA's parking facility expansion is provided in Appendix A). The expansion of this facility would be necessary for the commencement of a Hanging Lake shuttle for vehicle storage as well as visitor parking demand. Additionally, RFTA is providing extra service during the Grand Avenue Bridge closure in Glenwood Springs. This bridge closure will affect many residents and visitors as it is the primary access to Highway 82, which connects the communities to Glenwood Springs, Carbondale, Basalt, and Aspen, from and across the interstate. This closure not only affects the availability of RFTA vehicles and staff, it would also affect the proposed Hanging Lake shuttle route and cause significant delays in service if the shuttle service begins before the bridge is anticipated to re-open in June 2018.[5]

Shuttle Service Route

The Hanging Lake shuttle route, under an interagency agreement with RFTA, would run from the updated West Glenwood Springs Park and Ride facility, located near Glenwood Meadows Mall, to Hanging Lake rest area (Figure 2). There is the potential along this route for RFTA and the USFS to add stops to other existing RFTA stops in other parts of Glenwood Springs, such as downtown or closer to some hotels. However, additional stops would incur some extra costs as they would extend headways. No shuttle service would be provided east of Glenwood Springs, meaning hikers coming from the east would have to drive to Glenwood Springs to pick up the shuttle. As shown, this route would take approximately 25 minutes, providing time for a guide or taped narration on the bus to introduce visitors to Hanging Lake, provide environmental education, and re-iterate the rules and regulations on the trail.

[5] Grand Avenue Bridge Construction Factsheet

Figure 2 Potential Hanging Lake Shuttle Route run by RFTA; Source: Volpe Center



Vehicle Type

Two vehicles types are possible for this service with RFTA. Depending on future funding availability and how the initial service period performs, RFTA may choose to use its low-floor, 40-foot, 35 to 40 passenger buses the first one, two, or three years (Figure 3). If the service runs smoothly with those vehicles, then RFTA would purchase three additional vehicles to ensure that its older low-floor buses are replaced. These vehicles each cost $565,000 and include wheelchair access and electronic ticket boxes. Under this scenario, RFTA would need to have three of these vehicles circulating every 20 minutes to accommodate all of the Hanging Lake visitors (Table 5).

Figure 3 RFTA Low-Floor Transit Shuttle; Source: RFTA.com

Table 5 Example RFTA Hanging Lake Shuttle Service Schedule with 35-40 Passenger Buses

Departures	West Glenwood Park and Ride	Hanging Lake
Shuttle 1	6:40 AM	7:05 AM
Shuttle 2	7:00 AM	7:25 AM
Shuttle 3	7:20 AM	7:45 AM
Shuttle 1	7:40 AM	8:05 AM
Shuttle 2	8:00 AM	8:25 AM
Shuttle 3	8:20 AM	8:45 AM
Shuttle 1	8:40 AM	9:05 AM
Shuttle 2	9:00 AM	9:25 AM
Shuttle 3	9:20 AM	9:45 AM
Shuttle 1	9:40 AM	10:05 AM
Shuttle 2	10:00 AM	10:25 AM
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Shuttle 2	5:00 PM	5:25 PM
Shuttle 2		5:45 PM
Shuttle 3		6:05 PM
Shuttle 1		6:25 PM
Shuttle 2		6:45 PM
Shuttle 3		7:05 PM
Shuttle 1		7:25 PM
Shuttle 2		7:45 PM
Shuttle 3		8:05 PM
Shuttle 1		8:25 PM

If funding becomes available through grants or other sources in the future, RFTA would use heavy-duty, compressed natural gas (CNG) transit vehicles that seat 57 passengers (Figure 4). Unlike the low-floor buses, these vehicles are equipped with wifi. Although these vehicles are larger than potentially needed to serve 780 hikers per day at Hanging Lake, these vehicles align with the rest of the RFTA fleet and provide flexibility if larger than expected groups of hikers want to return to Glenwood Springs (e.g., due

to inclement weather). RFTA would need two additional vehicles to operate the Hanging Lake shuttle service. One vehicle costs approximately $740,000. RFTA and the USFS would work together to purchase these vehicles through future grant opportunities, as RFTA would be able to use the vehicles during the winter months elsewhere in their system when the Hanging Lake service is not running.

Figure 4 RFTA CNG 57-Passenger Transit Bus; Source: Volpe Center

A service with this shuttle would depart West Glenwood Springs every 30 minutes, for a total of 22 round-trips per day plus six return-only trips (Table 6). The first shuttle would depart at 6:30 AM and arrive at Hanging Lake at approximately 6:55 AM. The last shuttle would depart around 8:30 PM to bring back the final hikers of the day.

Table 6 Example RFTA Hanging Lake Shuttle Service Schedule

Departures	West Glenwood Park and Ride	Hanging Lake
Shuttle 1	6:30 AM	6:55 AM
Shuttle 2	7:00 AM	7:25 AM
Shuttle 1	7:30 AM	7:55 AM
Shuttle 2	8:00 AM	8:25 AM
Shuttle 1	8:30 AM	8:55 AM
Shuttle 2	9:00 AM	9:25 AM
Shuttle 1	9:30 AM	9:55 AM
Shuttle 2	10:00 AM	10:25 AM
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Shuttle 2	4:00 PM	4:25 PM
Shuttle 1	4:30 PM	4:55 PM
Shuttle 2	5:00 PM	5:25 PM
Shuttle 1		5:55 PM
Shuttle 2		6:25 PM
Shuttle 1		6:55 PM
Shuttle 2		7:25 PM
Shuttle 1		7:55 PM
Shuttle 2		8:25 PM

Bicyclist Accommodation

As parking lot congestion has grown over the past few years at Hanging Lake, an increasing amount of visitors are choosing to access Hanging Lake trail via bicycle along the Glenwood Canyon Recreation Path. Under this option, bicyclists would be accommodated under the same permit system and would reserve a time and purchase a permit through the same website as the shuttle. Bicyclists would only pay the REA Special Permit fee amount and not the entire shuttle ticket price. In keeping with past visitation patterns, only five percent of daily hikers would be allowed to purchase bicycle permits. It would be up to the visitor, or availability of permits that day, to determine how they would prefer to visit Hanging Lake trail, either by shuttle or bicycle.

Estimated Costs

RFTA provided operation and maintenance cost estimates that are all-inclusive with costs such as driver wage, parking lot maintenance, vehicle maintenance, and fuel incorporated. Table 7 shows the anticipated level of service characteristics and estimated costs for a shuttle service running three and two vehicles provided by RFTA assuming 102,735 riders (this is visitation minus five percent of bicyclists paying only the REA fee) per season. The project team selected the three-bus service plan option for

further analysis in the remainder of this report since it provides a greater frequency of service than the two-bus service.

Table 7 RFTA Estimated Costs; Source: RFTA and Volpe Center

Type of Service	Round Trip Distance	Round Trip Time	Annual Shuttle Operations and Maintenance (O&M) Costs (RFTA)	Estimated O&M Cost per Hiker
3 35-40 pax buses	26 miles	48 minutes	$1,066,000	$10.38
2 57-pax buses	26 miles	48 minutes	$716,000	$6.97

USFS Staffing Costs

In addition to the shuttle costs, the USFS will need to monitor the trail to ensure all visitors are permitted. For full coverage of the trailhead and trail during shuttle arrival times, the USFS will need three rangers on-site from 6:30 AM to 6:30 PM. This will require a total of four GS-3 or GS-5 seasonal rangers rotating daily shifts and working 40 hours per week during the peak season. In addition to the seasonal rangers, one full-time (or seasonal 18-8) permanent GS-7 will be required to manage the REA fee and the team of seasonal rangers. In addition to monitoring to ensure that only permitted hikers are on the trail, the five rangers will provide interpretation and environmental education when they are on-site during the peak season.

As shown in the Base Operational and Capital Needs section above, the cost of one GS-5 seasonal ranger is $23,474 and the cost of one full-time (or 18-8) permanent GS-7 is $52,000. This means that for the site to be staffed under Option 1, total annual costs would be $145,896. Additionally, an estimated $5,000 will be needed for marketing and $23,500 for USFS trail maintenance. With these costs included, and based on the cost estimate for operating three 35-40 passenger buses provided by RAFTA, Table 8 displays the total estimated costs for Option 1 and the estimated cost per visitor. With $10.38 per rider required to cover expenses related to the shuttle service, an additional $2.12 REA fee per hiker (over the age of 16) will be needed to cover the peak seasonal O&M costs for the parking lot facilities and trail as well as estimated marketing and maintenance costs for the service (heretofore referred to as base needs).

Table 8 Total Estimated O&M Costs for Option 1

Annual Shuttle O&M Costs (RFTA)	Peak Season Trail O&M Costs (USFS)	Marketing and Trail Maintenance Costs	Total Estimated O&M Costs
$1,066,000 ($10.38/rider)	$145,896 ($1.78/hiker over 16)	$28,500 ($0.34/hiker over 16)	$1,240,396 ($12.50/rider over 16; $10.38/rider under 16)

Since only 95 percent of the REA fee stays at the Forest, with the remaining five percent going to the USFS Regional Office, and to ensure $100,000 is saved for the deferred maintenance fund at the end of the season, the REA fee of $2.12 would need to be increased to $3.51 to cover all the expenses. Additionally, RFTA and the USFS may have to use recreation.gov to sell tickets. Currently, recreation.gov charges a $3.00 processing fee for each ticket sold through their website. This results in a total estimated shuttle ticket price of $16.89 for visitors over 16 and $13.38 for visitors under 16 (Table 9). Ticket prices for bicyclists would be $6.51 (this includes only the REA and Rec.Gov related fees, it does not include any fee for renting a bicycle) for visitors over 16 and $3.00 for visitors under 16 (this includes only the Rec.Gov fee).

Table 9 Estimated Ticket Price for Option 1

Estimated O&M Cost per Rider Over 16	Additional 5% REA Fee per Hiker Over 16	Deferred Maintenance Fund REA Fee per Hiker Over 16	Rec.Gov Processing Fee per Hiker	Estimated Total Ticket Price per Rider
$12.50	$0.17	$1.22	$3.00	$16.89 (over 16) $13.38 (under 16)

The USFS may assess a REA fee during the off-season months to cover ongoing operations and maintenance costs. Based on the 2015 data, there was a total of 23,884 visitors during the off-season months. If 40 percent of those visitors (50 percent of visitors over 16) deposit payments into the iron ranger, then the USFS will generate $33,533 in the off-season if visitors pay the REA fee of $3.51.[6] Those funds can be used to help pay for the GS-7 full-time (or 18-8) REA fee manager who will likely monitor the site periodically during the off-season or those funds can be deposited in the deferred maintenance fund.

Funding Sources

As mentioned above, for the RFTA service to operate, RFTA will require three additional low-floor vehicles or two additional 57-passneger CNG vehicles. With the ticket price covering shuttle and site operations and maintenance costs, additional funds will be required to purchase the new vehicles. To purchase the vehicles, the USFS and RFTA can work together on grant applications and potentially pull together various funding sources. Some grant opportunities that may be available include the Federal Lands Access Program; Federal Transit Administration grants; and local, county, or statewide grants. As mentioned previously, RFTA is considering charging a fee for parking in the park and ride facility to contribute to maintenance and repair costs (see Appendix A for more details). This will impact the total cost of visiting Hanging Lake for visitors if they park at the park and ride.

Option 2: Outfitter and Guide Permit

The USFS uses O&Gs to provide the public with opportunities for enhanced recreational services. Commercial transportation service could be provided and included in an O&G permit in addition to other hiking-related amenities, such as guided hikes, hiking equipment, bicycles, and bicycle tours. Many O&G companies currently operate under a USFS permit in this area and provide transportation in Glenwood Canyon for white water rafting on the Colorado River.

It is assumed under this scenario that the O&G would be responsible for bicycle access to Hanging Lake and it would initially be outlined in the prospectus that the O&G not exceed five percent of hikers arriving by bicycle since that is the historical estimation and would not place undue stress on the Glenwood Canyon Recreation Path.

Service Characteristics

Although most of the service characteristics would be determined by the O&G companies, such as vehicle type, schedule, and exact route, the USFS would outline the number of people per day that the O&G must serve, more formally called service days, in its request for proposals (RFP), also known as a "prospectus." Once the bids are received, the USFS would evaluate the bid package(s) and choose the best proposal that serves the needs of the USFS, stakeholders, visitors, and the Hanging Lake site as well. The USFS could select one O&G provider or multiple to fulfill the number of service days allotted as defined in the prospectus.

[6] We assume that half will not pay the fee to the iron ranger

The prospectus would include providing transportation services to Hanging Lake. The O&G providers may choose to pick-up individuals and groups from certain locations or develop a central/single information and parking facility. The type of vehicle used by the private companies could range in size from passenger vans to school buses or cutaway shuttles. The USFS would define the service expected through a list of evaluation criteria and mandatory and elective services. The O&Gs would address these in their bid packages responding to the prospectus.

Estimated Costs

Table 10 displays estimated low and high operating and maintenance costs of operating under an O&G permit. A range of cost estimates is provided as the vehicle type may vary depending on the proposals received from the O&Gs. For modeling purposes, the Volpe Center estimated costs based on using both 15-passenger vans (high estimate) and medium-duty cutaway shuttles (low estimate) that seat approximately 30 passengers. Although passenger vans are cheaper to purchase, they have a shorter service life and require more frequent trips, greater mileage, and increased driver labor. The assumed starting point for the O&G option was also West Glenwood Springs Park and Ride facility, although under the O&G business model the starting location could be elsewhere in the city.

Table 10 Option 2 O&G Estimated Costs; Source: Volpe Center

Vehicle Type	Round Trip Distance	Round Trip Time	Estimated Annual O&M Costs	Estimated O&M Cost per Rider
Passenger Van	26 miles	48 minutes	$377,852	$3.49
Cutaway	26 miles	48 minutes	$477,086	$4.41

Operational cost assumptions included a $30 driver wage, $2.50 per gallon of gasoline, and $0.60 for passenger vans or $1.00 for cutaway vehicle maintenance cost per mile. Driver wage and gasoline prices are based on average Colorado costs. The vehicle maintenance cost per mile is used in the Volpe Center's Bus Lifecycle Cost Model for Federal Land Management Agencies to account for on-going vehicle servicing and component renewal[7]. The Volpe Center used these assumptions to model estimated costs of carrying 108,132 visitors between May 1st and October 31st. No fee would be charged in the off-season under this scenario; however, service could be expanded to months beyond the peak season if use patterns change and resource issues continue.

Although these are lower costs than the estimates provided by RFTA, they do not include potential parking lot maintenance, dispatching, and profit. Additionally, it is expected that the O&G providers purchase their own transit vehicles as well as maintain the rest area facilities during those six months of operations. The cost of one cutaway vehicle and passenger van may be approximately $125,000 and $25,000, respectively. The provider may choose to pass on all or a portion of these costs to customers. For that reason, this option may be more cost effective from an operations and maintenance perspective, but with profit and the other costs mentioned above factored in, it will be more expensive for the visitor (see below). Additionally, marketing strategies will be at the discretion of the O&G with input and approval by USFS staff. Marketing costs will be incurred by the O&G. With these expenses in mind, it will be important to understand the socio-economic effects of a higher shuttle fare on people's decision to visit the area. The socio-economic impacts of a fare are examined in the Hanging Lake Visitor Transportation Survey conducted by the project team during July 2016.

Under O&G permits, three percent of the gross revenue will go back to the USFS for special use permit fee. The USFS would use this revenue to fund seasonal staff, trail maintenance, and assorted needs to

[7] Volpe Center Bus Lifecycle Cost Model for Federal Land Management Agencies User Guide (2011)

manage the trail. The price of the tickets will be determined by the O&G, depending on the type of amenities they provide. Preliminary ticket price estimates, based on brief conversations with a sample of O&G providers, may be between $10 or more (without a guided hike) and $25 or more (with a guided hike) per person.

For the purpose of comparison, the project team averaged the estimated ticket price to be $17.50 per person. With an estimated 108,132 hikers during the peak season, it is estimated that the O&G would collect $1,892,310 per season. The O&G would be responsible for light maintenance of the restroom facilities, thereby limiting the amount of work CDOT will have to do at the site. Beyond heavier maintenance and trash pickup, CDOT will not have to work at the site during the peak months. Of that revenue collected, the USFS would receive $56,769 (three percent). O&G fees are authorized under REA, therefore those funds are also subject to the 95/5 percent allocation to the site and regional office. With that split, $53,931 of the O&G revenue is available for the USFS management of Hanging Lake.

Since O&G staff will be on-site leading tours and indirectly monitoring the site, the USFS would not need to have a full team of five seasonal staff with rotating shifts on-site as they would under Option 1. Instead, the money could be used to support two GS-5 seasonal rangers to be on the trail to perform interpretation, environmental education, and enforcement duties as needed. Additionally, no GS-7 full-time permanent employee will be needed to coordinate the REA fee as it is not required under this option.

It is important to remember that O&G operators seek to make a profit off of these opportunities unlike RFTA, which is a quasi-public entity that cannot profit from its services. Though some people may find it too expensive to hike to Hanging Lake during the operating season, higher ticket prices would likely mean more amenities are included for the hiker. Additionally, if the O&G provides guided hikes, there will be guides on the trail and therefore greater enforcement of rules along the trail and at the lake.

Preliminary Hanging Lake Visitor Transportation Survey 2016 results showed a majority (85 percent) of visitors would not sign up for a guided hike. The USFS and its partners will want to consider how this input will be used to inform its transportation management options and the feasibility of each option.

Option 3: Outfitter and Guide Permit Shuttle plus REA

Option 3 functions similarly to Option 2; however, it does not include O&G guided hikes and adds a REA fee to the permit price for visitors over 16 years old. This alternative would entail an O&G providing transportation (shuttle and bicycle accommodation) to Hanging Lake parking lot and it does not require the O&G to be present on the trail or perform bathroom maintenance. A REA fee is added to the permit price to provide for the funding of USFS staff on-site to perform maintenance and outreach at the site as well as to cover the $100,000 deferred maintenance fund. Under this option, it is assumed that the same USFS staff costs would be incurred as in Option 1 where RFTA provides the transportation.

Estimated Costs

As with Option 2, the service characteristics would be determined and covered by the O&G. Therefore, this analysis uses the same assumption to provide a low and high estimate of costs dependent on the vehicle type the prospective company chooses to use for an average of $427,121 (Table 10).

The service costs would be covered by the O&G's ticket price. A small sample of O&Gs said the ticket price may range from $10 to $20 for shuttle-only service. In addition to the shuttle service ticket price, the USFS operations and maintenance costs would be added to the ticket price through a REA fee. The same USFS staffing (four GS-5s and a GS-7 to manage the contract and fee), marketing, and trail maintenance costs would be required as in Option 1 for a total of $174,396 or $2.12 per person. Table

11 adds the additional five percent and $100,000 deferred maintenance fund REA fees per person, which totals $3.51 per person. By adding this cost to the O&G average estimated shuttle ticket price of $15, the estimated ticket price would be approximately $18.50 for visitors over 16 (and remain $15 for visitors under 16).

Table 11 Total Estimated REA Fee for Option 3

REA Fee Needed to Cover Base Needs	Additional 5% REA Fee	Deferred Maintenance Fund REA Fee	Estimated Total REA Fee
$2.12	$0.17	$1.22	$3.51

This option also provides for the USFS to receive three percent of the O&G revenue. Using the same estimates as in Option 2 (because the REA fee is not included as O&G revenue), it is estimated the USFS would receive $53,931. This funding could be deposited into the deferred maintenance fund or used to hire additional USFS staff for the trail. By incorporating a REA fee into this option, the USFS may be able to charge the fee during the off-peak months, as in Option 1. Assuming that 50 percent of visitors over 16 pay the fee, the USFS would receive $33,533 in the off-season.

Option 4: REA Special Permit Fee without Shuttle

In addition to the three options that include providing a shuttle to Hanging Lake parking lot, the project team also analyzed an option with only a REA Special Permit fee and no shuttle. Under this option, the USFS would likely employ the Recreation.Gov online ticketing and reservation system, also known as a timed entry system, to implement the fee. Being a REA fee, it could only be assessed to visitors over 16 years old. The cost for visitors under 16 would be the cost of using Recreation.Gov, which is $3.00.

Fee collection at the site would be difficult if not impossible. Collecting a fee in the parking lot at the gate is not allowed as money cannot be collected on CDOT property nor in a rest area. Collecting a fee at the trailhead may not solve the primary issue of over-crowding and illegal parking in the parking lot as visitors may still park unaware of a fee that would otherwise dissuade them from visiting. Plus, it would be difficult for the USFS to create the infrastructure (electricity, telecommunications/internet for credit card sales, etc.) necessary to charge a fee at the site as well as provide for employee safety and security. CDOT expressed interested in changing the designation of the safety rest area to a recreational access point; discussions between USFS and CDOT will continue to determine the feasibility of that re-designation.

With an on-line ticketing system, which may have to be through recreation.gov, the USFS could install an electronic gate and each ticket would provide visitors a code that would allow them into the site during a certain period of time on a particular day. Issues of backing up may arise if visitors attempt to enter without a code, therefore USFS staff will likely need to monitor the entrance. Visitors would be able to select the period they would like to visit on-line, and if their ideal choice was already full, they would then have to select another period that worked for them. This would limit overcrowding in the parking lot and on the trail. The reservation system provides a period of time that would allow hikers to arrive and exit. Historically, the average length of stay per visitor is approximately three hours, so a similar time frame may be provided. This option would require a considerable presence by USFS staff on-site and in the parking lot to ensure the system is running smoothly. The gate would need to operate in such a way (i.e., open and close quickly enough in both directions) so that queuing would be minimized.

As the Hanging Lake Capacity Study showed, the selection of a maximum of 780 visitors per day would not cause congestion at the site or in the parking lot. An estimated maximum of 78 vehicles per hour

parked in the parking lot would result if 78 visitors are allowed per hour.[8] Reservations, which could be made anytime on-line, would be booked for times between 6:30 AM and 6:30 PM so the USFS staff would be on-site while visitors are arriving. However, this would mean that there may be some hikers coming down after USFS staff leave. If the electronic gate is working properly though, no other cars would be let in after 5:00 PM unless it is an emergency vehicle.

For initial implementation, the project team recommends managing to a reduced daily capacity under a reservation system during the off-season (November to April). The lower capacity level is due to reduced parking availability on account of snow storage in the lot.

Bicyclist Accommodation

As with Option 1, for modeling purposes it is assumed that bicyclists would be accommodated under the same permit system and would reserve a time and purchase a permit through the same website as the shuttle. The five percent of visitors allowed by bicycle would pay the REA Special Permit fee amount, which in this scenario is the same amount at hikers coming with private vehicle.

Estimated Costs

The USFS would require at least twelve seasonal, full-time staff to manage the parking lot and trail. This would mean that there are two four or five-ranger crews covering the site from 6:30 AM to 6:30 PM every day of the week from May 1st to October 31st. This option will also require the full-time GS-7 permanent employee to manage the REA fee year-round as well as be one of the on-site rangers during the peak months. During the peak season the staff will need to monitor the parking lot entrance to greet visitors and ensure the gate is working properly. Additionally, staff will be needed at the trailhead to check the permits of the hikers and along the trail for interpretation and rules enforcement. This brings total labor charges for the crew to approximately $333,688 using the same assumptions as in the Base Operational Needs section (Table 12).

Table 12 REA Fee without Shuttle Estimated Costs; Source: USFS and Volpe Center

Estimated O&M Cost	Marketing and Trail Maintenance Costs	Total Estimated O&M Costs	Estimated O&M Cost per Visitor
$333,688	$28,500	$362,188	$4.41

By using Recreation.Gov, the USFS does not have to set up or create its own reservation website, which can have high costs. However, Recreation.Gov requires users pay $3.00 per each timed entry reservation. To cover operations and maintenance costs at the site, the USFS would then add a REA fee to the reservation fee. An analysis of the O&M costs for Option 4 show that the REA fee would have to be $5.92 per visitor (Table 13). The REA fee would also be required by hikers in the off-season. If 50 percent of hikers pay in the off-season, an estimated $56,557 additional revenue could be generated.

Table 13 Estimated Ticket Price for Option 4

Estimated O&M Cost per Visitor	Additional 5% REA Fee	Deferred Maintenance Fund REA Fee	Rec.Gov Processing Fee	Estimated Total Ticket Price
$4.41	$0.29	$1.22	$3.00	$8.92 (over 16) $3.00 (under 16)

[8] Hanging Lake Capacity Study, Volpe Center, May 2016

Evaluation of Options

Based on the above information and financial analysis, as well as input from the USFS and stakeholders, the following is an analysis of the pros and cons of the proposed options that includes looking at cost considerations, timing considerations, and using the set of goals and objectives as selection criteria. At the end of this section, the project team provides a recommendation on a preferred option based on the outcome of the evaluation. As stated earlier, all costs in this plan are estimated and are subject to change. It is important to note that the evaluation of options provided in this report precede the EA public comment period and thus the evaluation of options may differ following that input.

Estimated Costs

Not only are the costs to the USFS and its partners important to evaluate, but also the cost to the visitor. The table below displays the various estimated costs and anticipated ticket prices of each option (Table 14). As the table displays, the USFS receives the most returns (to be used on deferred maintenance and O&M) from Option 4: REA without Shuttle. This is due to the fact that Option 4 is operated by the USFS and therefore no money is needed for a third-party operator. Additionally, the lowest ticket price is anticipated under Option 4, as it does not require operating a shuttle. However, the other options provide a shuttle with the parking lot closed to private vehicles, thereby ensuring vehicles would not back up onto the off-ramp, that emergency vehicles would not have to contend with private vehicles in the parking lot, and that tailpipe emissions would decrease in the canyon since one bus trip would replace multiple car trips.

Table 14 Cost Considerations for Hanging Lake Transportation Management and Operations

Option	Total Estimated O&M Costs	Anticipated Ticket Price (Average)*	Est. Returns to Cover USFS Staff	Est. Contribution to Marketing and Trail Maintenance	Est. Contribution to Deferred Maintenance Fee	Number of USFS Staff Covered	Off-Season Returns Generation
1: RFTA + REA	$1,240,396 ($12.50 >16, $10.38 <16)	$16.89 >16, $13.38 <16	$145,896	$28,500	$100,000	5	$33,533
2: O&G permit (average)	$427,121 ($3.95 each)	$17.50	$53,931			2	$0
3: O&G permit + REA (average)	$601,517 ($6.07 >16, $3.95 <16)	$18.50 >16, $15 <16	$145,896	$28,500	$100,000	5	$33,533
4: REA without Shuttle	$362,188 ($4.41 >16)	$8.92 >16, $3 <16	$333,688	$28,500	$100,000	12	$56,557

* Includes all fees (O&M plus REA, deferred maintenance, Rec.gov, and/or O&G profit)

Implementation Timing Considerations

The USFS would like to have a transportation management system in place as soon as possible. Each of the scenarios require time before they can be fully implemented by the start of the season. Table 15 displays the estimated time it may take for each option to be fully implemented and the steps to get there. Due to the NEPA process that the USFS must undertake, it is expected that each of the options

would not be able to begin until May 2018 at the earliest. Additionally, each option has different pieces that must be timed correctly to ensure a summer 2018 start date.

Table 15 Review of Implementation Timing Considerations

Option	Reasons for Timing	Anticipated Start Date
1: RFTA + REA	• Completion of new RFTA Park and Ride Facility expected late 2017 • Completion of Grand Avenue Bridge Construction Project expected June 2018 • Funding availability to purchase two new vehicles • REA fee approval process can take up to one year (6-month public scoping, USFS headquarters approval) • Setting up a ticketing process through recreation.gov	May 2018
2: O&G Permit (average)	• O&G RFP prospectus process • Issue permit to selected O&G	May 2018
3: O&G Permit Shuttle + REA	• O&G RFP prospectus process • Issue permit to selected O&G • REA fee approval process can take up to one year (6-month public scoping, USFS headquarters approval)	May 2018
4: REA without Shuttle	• REA fee approval process can take up to one year (6-month public scoping, USFS headquarters approval) • Setting up a ticketing process through recreation.gov	May 2018

Hanging Lake Goal and Objectives Criteria

As stated at the beginning of this document, the USFS and its partners developed goal areas that have helped guide the project team in developing long-term transportation management solutions for the site. The goals and objectives are outlined below with each option evaluated as to how well it addresses each goal and its objectives (Table 16).

Table 16 Analysis of Transportation Management Options by Goal and Consideration Area

Goals and Considerations/Options	Option 1: RFTA + REA	Option 2: O&G Permit	Option 3: O&G Permit Shuttle + REA	Option 4: REA without Shuttle
Protect the Natural Resources	Yes – limits visitation during peak months; raises funds for USFS rangers and trail projects	Yes – limits visitation during peak months; raises funds for USFS rangers and trail projects	Yes – limits visitation during peak months; raises funds for USFS rangers and trail projects	Yes – limits visitation during peak months; raises funds for USFS rangers and trail projects
Manage Congestion at Hanging Lake Parking Lot	Yes – supports multimodal access; reduces need for ranger presence in parking lot; requires coordination with CDOT for infrastructure (gate, striping, long-term changes to rest area)	Yes – supports multimodal access; reduces need for ranger presence in parking lot; requires coordination with CDOT for infrastructure (gate, striping, long-term changes to rest area)	Yes – supports multimodal access; reduces need for ranger presence in parking lot; requires coordination with CDOT for infrastructure (gate, striping, long-term changes to rest area)	Somewhat – does not support multimodal access; does not reduce need for high level of ranger presence in parking lot; requires additional staffing; manages parking lot, however, still potential congestion issues
Enhance Public Safety	Yes – reduces congestion for improved emergency vehicle access; rangers on trail	Yes – reduces congestion for improved emergency vehicle access; rangers on trail	Yes – reduces congestion for improved emergency vehicle access; rangers on trail	Somewhat – private vehicles will still be in the parking lot, therefore the path will not be as clear for emergency vehicles; rangers on trail
Improve Visitor Experience	Yes – improves ease of access; greater visitor contact and education opportunities; affords 4 on-site USFS seasonal rangers. The REA fee gives the USFS the potential to retain funds for needed deferred maintenance needs.	Yes – improves ease of access; greater visitor contact and education opportunities; affords 2 on-site USFS seasonal rangers; increased options for visitors to experience the trail but may be more expensive	Yes – improves ease of access; greater visitor contact and education opportunities; affords 4 on-site USFS seasonal rangers. The REA fee gives the USFS the potential to retain funds for needed deferred maintenance needs.	Somewhat – maintains private vehicle access; greater visitor contact and education; affords 12 on-site USFS seasonal rangers; requires a parking/vehicle management plan to ensure traffic moves smoothly and parking is available for each permitted visitor during their timeslot. The REA fee gives the USFS the potential to retain funds for needed deferred maintenance needs.
Support Local Tourism	Yes – uses local transit hub in Glenwood Springs; employs RFTA employees full-time	Yes – provides high quality visitor experience, however at a slightly higher cost to visitors; benefits local businesses	Yes – provides high quality visitor experience, potentially at a slightly higher cost to visitors; benefits local businesses	Somewhat – maintains access to Hanging Lake as a tourist destination. Visitors do not drive into Glenwood Springs for other tourism based services.

Goals and Considerations/Options	Option 1: RFTA + REA	Option 2: O&G Permit	Option 3: O&G Permit Shuttle + REA	Option 4: REA without Shuttle
Other Considerations	Marketing for this service may be combined with the Maroon Bells service; visitors may be familiar and comfortable with using a RFTA service as it provides shuttle service in the area and to Maroon Bells. The business plan for the REA Permit System will need to factor in incremental fee increases to keep up with inflation and cost of providing services and USFS rangers. Provides future growth opportunities for transit in the Roaring Fork Valley area.	The socio-economic impacts will have to be evaluated once the visitor transportation survey results are tabulated as this option has potentially a higher ticket price for visitors as it provides a high level of service/amenities to visitors. Provides opportunity for USFS to expand service beyond the peak months.	The profit potential of this option will have to be discussed with O&G providers. Provides opportunity for USFS to expand service beyond the peak months.	The project team will have to examine willingness to pay from the visitor transportation survey to understand how paying for the parking lot may assist in managing the number of visitors each day. The business plan for the REA Permit System will need to factor in incremental fee increases to keep up with inflation and cost of providing services and USFS rangers. Staff turnover may be an issue due to demanding peak season schedule.

Appendix A: RFTA Additional Considerations

RFTA staff communicated the following considerations to the Volpe Center on December 15, 2016:

- Using its Carbondale Station Park and Ride facility as a proxy, the anticipated maintenance and repair costs of the West Glenwood Park and Ride facility are estimated to be $39,800 annually. RFTA mentioned additional expenses that would be added to that amount, such as, "… some number for staff to clean the station on a daily basis and a number for capital items like striping, sweeping, and any preventive maintenance that is needed over time such as crack sealing." Those costs would be either included in the ticket price for parking at the RFTA facility or charged at the parking lot; further discussion is needed between the USFS and RFTA about how these costs will be addressed.

- Although all of the available parking in the Park and Ride is not currently being used, RFTA is expanding service to the west. Therefore a more formal agreement between the USFS and RFTA will need to be agreed upon for using the parking space. Additionally, a future parking area will need to be identified for the Hanging Lake service as RFTA's regular service expands.

    - One possibility is RFTA's plan for developing an expansion of the maintenance facility across the street from the West Glenwood Park and Ride facility and turning it into a larger "Regional Transit Center." The project is designed for two decks of parking, and the second deck could be used for Hanging Lake shuttle parking. However, the second deck of parking is considered a low need due to cost considerations. If funding is identified for its construction, then the second deck is a possibility for the Hanging Lake service.

    - To construct/expand the current Park and Ride would take around 6 months. RFTA would need to add 2-4 months to this for the procurement and contract negotiation process. The construction season in that part of the valley typically runs from March 15 until October 31 so the timing of the funds it critical to the planning process and the opening date of the service. Accordingly, the lot would probably not be ready for use until the summer of 2019.

Transportation and Operations Study 2017 Addendum

June 9, 2017

This addendum provides additional analysis and results that the project team undertook after the Capacity Study was completed in early 2016 and the Transportation and Operations Study was largely completed in 2016. Because the parameters of how the Forest Service will manage Hanging Lake were and are frequently changing and evolving, the project team decided to present the Transportation and Operations Study as a snapshot of parameters in 2016 and the Addendum as a snapshot of parameters in early 2017.

The Resource-Conscious Scenario

Table 1 is an updated version of Table 1 in the *White River National Forest Hanging Lake Capacity Study* on page 3 of that document. This version of the table includes an additional capacity scenario termed the "Resource-Conscious" scenario, which splits the difference of the "Slight Restrictions" (30 percent reduction) and "Environmentally Sensitive" (60 percent reduction) scenarios with a 45 percent reduction in visitation during peak months (May 1 to October 31) compared to the "Original Capacity" scenario. The project team developed this scenario since Forest Service staff, stakeholders, and the public (as expressed in survey responses summarized in the *White River National Forest Hanging Lake Visitor Transportation Survey: Summary of Results*) felt that the Slight Restrictions scenario did not reduce visitation to a sustainable level and that the Environmentally Sensitive scenario reduced visitation too drastically. Figure 1 presents a distribution of visitors and cars at Hanging Lake over time under the Resource-Conscious scenario.

Table 17 Carrying Capacity Scenarios, Daily Averages

Carrying Capacity Scenario	Operating Hours	Capacity per Hour	Total Hikers per Day	Max Hikers on Trail/Lake	Max Hikers on Trail	Max Hikers at Lake	Max Hikers per 100ft (both ways)	Max Vehicles in Lot	Average # of Passings	Average Distance between Groups (ft.)
Actual Conditions (95th Percentile Week)	24	n/a	1,050	355	293	62	4.31	113[9]	211 (at peak times)	80 (at peak times)
Actual Conditions Unmanaged (Mon. to Wed.)	24	n/a	979	371	309	69	4.81	136[10]	n/a	n/a
Actual Conditions Managed (Thurs. to Sun.)	24	n/a	1,108	341	285	58	4.07	113[11]	n/a	n/a
Original Capacity	10	111	1,110	332	278	56	3.85	112	198	110
Slight Restrictions	10	78	780	234	195	39	2.71	78	134	150
Resource-Conscious	10	61.5	615	183	153	30	2.14	62	110	185
Environmentally-Sensitive	10	45	450	134	112	22	1.56	43	87	250

[9] June 13-19, 2015, CDOT vehicle counter data
[10] June 15-17, 2015, CDOT vehicle counter data
[11] June 13-14,18-19, 2015, CDOT vehicle counter data

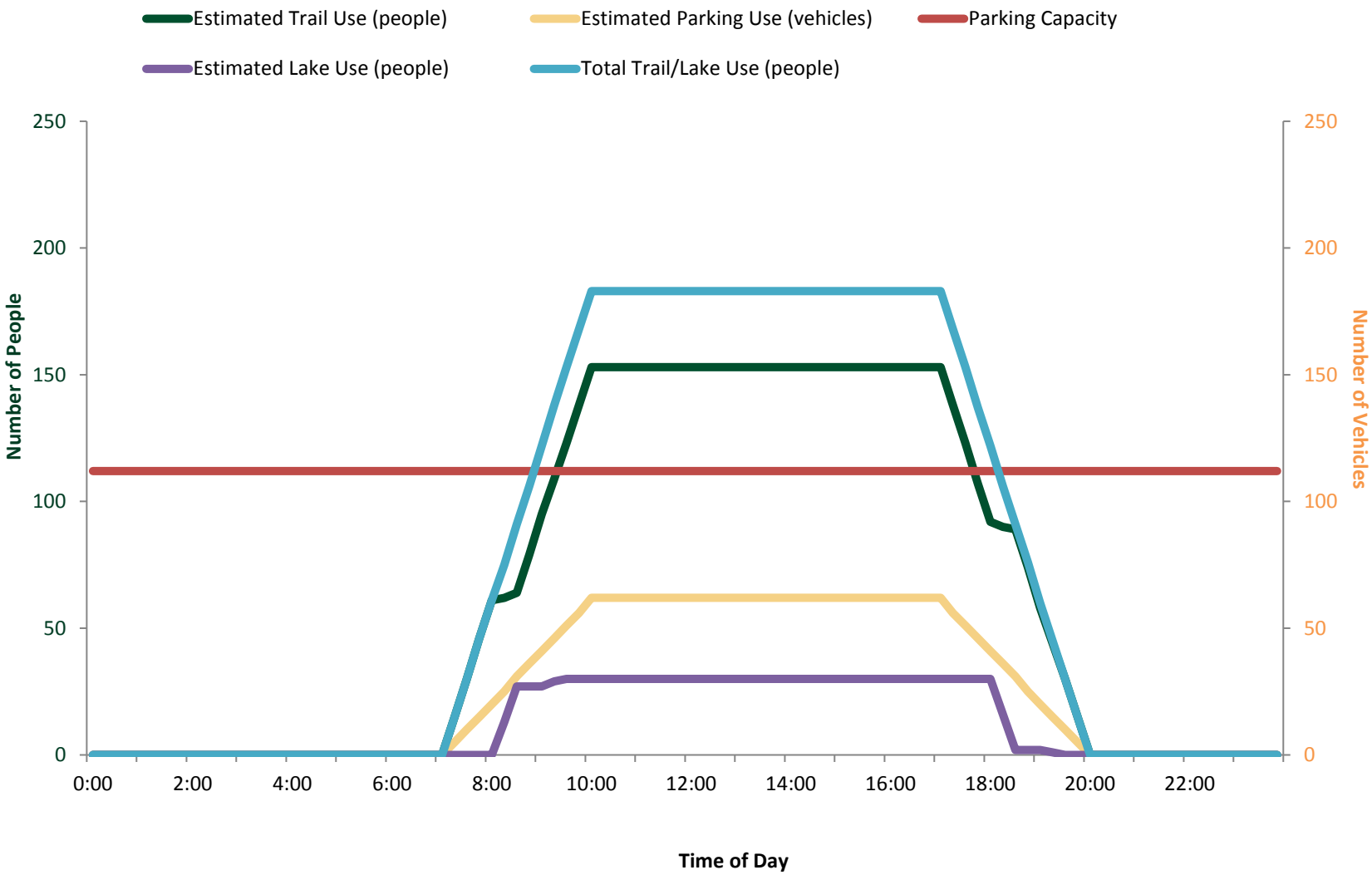

Figure 5: Distribution of Visitors under Resource-Conscious Scenario

Updated Costs under Each Scenario

Table 14 on page 20 of the Transportation and Operations Study shows estimated costs for each service option presented in the study under the Slight Restrictions scenario. Table 2, Table 3, and Table 4 in the addendum show what updated costs would be under the Slight Restrictions, Resource-Conscious, and Environmentally Sensitive scenarios, respectively, given 221 days of service (seven months) for Option 1 and 183 days of service (six months) for Options 2-4. This difference in days of service reflect the differences in the O&M estimates and service plans that these entities provided to the project team. In addition to the fixed O&M costs and estimated returns to cover USFS staff, these figures also include estimated amounts to cover marketing, trail maintenance, and deferred maintenance. Additionally, Option 1 includes a non-recreation.gov reservation system and Option 4 does not.

Table 18: Costs Per Option under Slight Restrictions Scenario (780/day)

Option	Total Estimated O&M Costs	Anticipated Ticket Price (Average)*	Est. Returns to Cover USFS Staff	Est. Contribution to Marketing and Trail	Est. Contribution to Deferred Maintenance Fee	Number of USFS Staff Covered	Off-Season Returns Generation
1: RFTA + REA (3 35-40 pax buses)	$1,183,675	$8.96 >16 $6.87 <16	$145,896	$28,500	$100,000	5	$31,288
2: O&G permit (average)	$427,121 ($2.99 each)	$11.50	$53,931			2	$0
3: O&G permit + REA (average)	$601,517 ($5.52 >16) ($2.99 <16)	$15 >16 $12.50 <16	$145,896	$28,500	$100,000	5	$31,288
4: REA without Shuttle	$362,188	$7.26 >16 $3.00 <16	$333,688	$28,500	$100,000	12	$53,043

* Includes all fees (O&M plus REA, Rec.gov, and/or O&G profit)

Table 19: Costs Per Option under Resource-Conscious Scenario (615/day)

Option	Total Estimated O&M Costs	Anticipated Ticket Price (Average)*	Est. Returns to Cover USFS Staff	Est. Contribution to Marketing and	Est. Contribution to Deferred Maintenance	Number of USFS Staff Covered	Off-Season Returns Generation
1: RFTA + REA (3 35-40 pax buses)	$1,183,675	$11.37 >16 $8.71 <16	$145,896	$28,500	$100,000	5	$31,288
2: O&G permit (average)	$427,121 ($3.80 each)	$12.50	$53,931			2	$0
3: O&G permit + REA (average)	$601,517 ($7.00 >16) ($3.80 <16)	$16 >16 $13.50 <16	$145,896	$28,500	$100,000	5	$31,288
4: REA without Shuttle	$362,188	$8.40 >16 $3.00 <16	$333,688	$28,500	$100,000	12	$53,043

* Includes all fees (O&M plus REA, Rec.gov, and/or O&G profit)

Table 20: Costs Per Option under Environmentally-Sensitive Scenario (450/day)

Option	Total Estimated O&M Costs	Anticipated Ticket Price (Average)*	Est. Returns to Cover USFS Staff	Est. Contribution to Marketing and Trail Maintenance	Est. Contribution to Deferred Maintenance Fee	Number of USFS Staff Covered	Off-Season Returns Generation
1: RFTA + REA (3 35-40 pax buses)	$1,183,675	$15.53 >16 $11.90 <16	$145,896	$28,500	$100,000	5	$31,288
2: O&G permit (average)	$427,121 ($5.19 each)	$13.50	$53,931			2	$0
3: O&G permit + REA (average)	$601,517 ($9.57 >16) ($5.19 <16)	$17.50 >16 $15.00 <16	$145,896	$28,500	$100,000	5	$31,288
4: REA without Shuttle	$362,188	$10.38 >16 $3.00 <16	$333,688	$28,500	$100,000	12	$53,043

* Includes all fees (O&M plus REA, Rec.gov, and/or O&G