Garden of the Gods
Shuttle Study
Visitation Trends and Service Planning

December 2017
Prepared for:
City of Colorado Springs

Cyclist at Balanced Rock, Garden of the Gods. Source: Volpe
### ABSTRACT (Maximum 200 words)

This study for the City of Colorado Springs Parks, Recreation and Cultural Services Department, provides a preliminary analysis and set of recommendations to support the city’s work moving forward to implement a shuttle system at Garden of the Gods, which experiences heavy congestion. This report provides an analysis on recent visitation trends, a visitor survey responses, and a presentation of shuttle concepts for consideration. Concepts include a vehicle recommendation and preliminary cost estimates. The report concludes with considerations and proposed next steps.

### SUBJECT TERMS

Shuttle, Alternative Transportation, Congestion, Parks

### SECURITY CLASSIFICATION OF REPORT

Unclassified

### SECURITY CLASSIFICATION OF ABSTRACT

Unclassified

### DISTRIBUTION/AVAILABILITY STATEMENT

Public Distribution/Availability
Overview
Located within Colorado Springs, CO, Garden of the Gods (GoG) Park is owned and managed by the City of Colorado Springs with support from the GoG Foundation. GoG was designated a National Natural Landmark by the National Park Service in 1971 and is characterized by vertical red rock geological formations of different shapes, sizes, and colors. Visitors coming to the park frequent its many attractions and services, including the GoG Visitor and Nature Center, the Trading Post, or a variety of tours and excursions offered with Adventures Out West and other providers. Attracting upward to six million visitors each year, it is the region’s most popular destination.

In recent years, as visitation has risen, the City has witnessed high congestion, particularly on summer weekends. This congestion has led to vehicle queueing outside the entrance gate to the main parking lot, a distance of about one mile. Concerned about safety and visitor experience, the City is interested in managing the rising congestion by exploring the feasibility of implementing a shuttle system during the peak season.

The City of Colorado Springs Parks, Recreation, and Cultural Services Department requested the assistance of the U.S. Department of Transportation Volpe Center (Volpe) to develop preliminary concepts for a shuttle system to be implemented as early as 2018. Between July 12 and 13, 2017, Volpe traveled to Colorado Springs to conduct a site visit of GoG and meet with a core project team and key stakeholders to gather important information on visitation, congestion issues, and priorities for developing a shuttle system and managing parking. Volpe had periodic meetings with both groups over the ensuing five months as it developed this report.

This report provides an analysis on visitation trends followed by a presentation of three shuttle concepts for consideration, including a vehicle recommendation and preliminary cost estimates. This report is the deliverable for Task 1 of 3 outlined in the Statement of Work for this project.

Existing Conditions
Visitation Trends
At the Visitor Center, visitation throughout the 2000s remained fairly constant at around 600,000 visitors/year, but visitation jumped beginning in 2014. Between 2013 and 2016, in fact, visitation rose by 82 percent, from 560,000 to 1,018,000 people; this high degree of growth is a trend throughout the state, including at nearby Pikes Peak. Because visitation recorded at the Visitor Center is a fraction of the number of people exploring the sites within the park, it is likely that total park visitation exceeded the City’s estimation of two million. Figure 1: GoG Visitor Center Visitor Counts by Year, 1999 to 2017 illustrates this trend, including a comparison of monthly counts within this timeframe. All months generally follow the same pattern from year to year, but 2017 is on pace to be a record year, with some monthly counts nearly doubling the 18-year average.

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1 Visitation data was collected from the GoG Visitor and Nature Center
2 Visitation data collected from the City of Colorado Springs shows that visitation at Pikes Peak rose 20 percent each year between 2013 to 2015. Source: https://ntl.bts.gov/lib/59000/59100/59125/DOT-VNTSC-USDA-16-02.pdf
The City does not have historic visitation data for the park itself (i.e., roads, trails). This is partially due to the fact that the roads running through GoG provide multiple access points that can be used for local traffic, therefore making it difficult to understand true visitation to the park. However, beginning in January 2017, the City installed car counters at each of the four park entrances to count daily vehicle traffic coming into the park; accordingly, pedestrian data on the park’s busiest trail is available back through mid-2016 and reflects overall trends (see Figure 2: Monthly GoG Jaycee Plaza Pedestrian Counts, June 2016 to November 2017).

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3 2014 data was not included because the Visitor Center was closed for 117 days due to construction.
Unsurprisingly, data in Figure 3: *Weekly GoG Entrance Vehicle Counts, January 20 to July 19, 2017*, shows an increase in visitation between January and July 2017 based on vehicle counts placed at each of the park’s four unique entrances. Except for a spike in March, likely caused by Spring Break travelers, visitation steadily increased throughout this timeframe. This growth is consistent with other attractions in the area that experience peak visitation during the summer months, beginning in late May and lasting through the summer.

![Figure 3: Weekly GoG Entrance Vehicle Counts, January 20 to July 19, 2017](image)

Figure 4: *Average Vehicle Counts by Day of Week, January 20 to July 19, 2017* shows similar trends in daily visitation as seen at neighboring Pikes Peak. Of the weekdays, Mondays and Fridays are the highest, dipping slightly Tuesday through Thursday, and spiking on Saturdays and Sundays with an average of around 5,700 vehicles each weekend day. During the summer months, daily visitation is 25 to 40 percent higher than average, with the highest days seeing between 7,000 and 8,000 vehicles. If estimating about 2.5 persons per vehicle, this translates to about 17,500 to 20,000 visitors in one day.
Looking at an average day, Figure 5: Average Vehicle Counts by Hour of Day, January 20 to July 19, 2017 shows that peak visitation occurs between 11:00am and 3:00pm, with vehicle counts ranging from 420 to 460 per hour. During a summer weekend day, however, peak visitation can rise to over 650 vehicles per hour, quickly causing congestion along the park’s roads, parking areas, and popular sites and creating a strain on the park’s unique ecology, as well as the overall visitor experience. Using the estimate of about 2.5 persons per vehicle, this translates to about 1,625 visitors per hour on a peak weekend. Volpe used summer 2017 data to design a shuttle system that can manage peak visitation.
The main entrance to the park is across from the Visitor Center, at 30th Street and Gateway Road, and sees four to eight times more traffic than the other three entrances. Vehicles commonly stop illegally at the entrance to the park to take photos with the GoG Park sign; this causes congestion to escalate, particularly during peak visitation times, and has raised concerns of public safety. Not only are pedestrians competing with vehicles at the entrance of the park, which is oftentimes a bottleneck, but many pedestrians and cyclists use Gateway Road to access the Central Garden, the park’s main attraction. Further, outfitters regularly lead guided Segway and Jeep tours from the Visitor Center that also use Gateway Road and Juniper Way Loop. Multiple users on heavily trafficked roads can be dangerous, and with visitation increasing, solutions to increase public safety is a priority for the City. Figure 6: *Congestion at GoG on July 12 to 13, 2017* shows some examples of congestion at GoG.

Figure 6: *Congestion at GoG on July 12 to 13, 2017*. Source: Volpe

**Parking**

Given the remote location of GoG several miles from the center of Colorado Springs, visitors are highly dependent on driving to the park. The 15 parking areas within the park total 335 available parking spaces with the Main Parking Lot being the biggest with 128 spaces. In addition, visitors may use the parking lots at the Visitor Center (208 spaces), Rock Ledge Ranch (60 spaces), and the Trading Post (125 spaces). Combined, this equals 728 parking spaces available for visitors. Figure 7: *Map of Garden of the Gods Park* provides an overview of the main parking areas, entrance points, and other key park sites.
Garden Of The Gods Park

Park Hours: May 1 to October 31: Sun-Sat 11 am / November 1 to April 30: Sun-Sat 9 am
Call (719) 385-5640 for picnic reservations, and (719) 578-6146 or (719) 578-6147 for park information

Park Programs:
Nature Walks: Daily 10 am and 2 pm. Park naturalists will take you on a 45-minute walk exploring the geology, history, flora and fauna of the Park. Walks are conducted on various trails throughout the park. Check at the Visitor Center for more information.

Nature Talks: Park naturalists also present short interpretive programs. Check at the Visitor Center for times and locations, or call 219-9100 for more information.

Living History Tours: The Rock Ledge Ranch offers a tour that introduces the history and people of the Pikes Peak Region. (See reverse for more information.)

Enjoy One of the Many Trails:
Hiking, biking, and horseback riding offer unique views and experiences of the Garden. Please keep in mind that due to the highly erosive soils in the western portion of the Park, mountain biking is permitted off-road ONLY within the designated mountain bike area (generally east of Tripoli Rd and south of Gateway Rd). For everyone’s safety, please remember trail etiquette on any trail system.

Garden Rock Formations:
1. Balanced Rock
2. Cathedral Spires
3. Giant Footprints
4. Gray Rock (Cathedral Rock)
5. Keyhole Window
6. Kissing Camels
7. North Gateway Rock
8. Pulpit Rock
9. Scotsman
10. Serrata Rock (Serrata Rock)

Enjoy the Rocks from the ground. Serious and fatal rock climbing accidents have occurred during the Park’s history. It is easier to climb up than to climb down. Save yourself from a dangerous predicament by staying on the ground!

Technical climbers are required to register at the Visitor Center. Technical climbing is permitted in groups of two or more with proper climbing equipment. ALL OTHER CLIMBING OVER 100 FOOT GROUND IS ILLEGAL, and may result in a fine of up to $500 and/or 90 days in jail.

Figure 7: Map of Garden of the Gods Park. Source: City of Colorado Springs
According to the City, as well as findings from GoG Visitor Survey (survey highlights included below), visitors spend 2.5 hours at GoG on average. When relating this to parking, this means that 2.5 hours of vehicles are in the park at one time and most are looking for a parking space. On an average day during peak visitation hours, this could amount to as much as 1,100 to 1,200 vehicles in the park at any one given time. With 728 total parking spaces, this leaves a gap of about 350 to 450 parking spaces. On a peak summer weekend, this can rise to a potential gap of over 600 parking spaces.

Visitor Survey Highlights

Over the course of three weeks in August 2017, the Friends of GoG collected about 350 survey responses at three park destinations: Visitor Center, Balanced Rock, and the Central Garden. For most visitors, this was their first time to GoG (54 percent). As illustrated in Figure 8: Visitors Planned Length of GoG Visit, most visitors spend between two and three hours at the park, including a stop at the Visitor Center (60 percent said they visited the Visitor Center when they first arrived). While a large number of visitors during this time were local or from the Denver area (33 percent total), the majority of visitors surveyed are from elsewhere across the country, with about five percent visiting from international locations.

<table>
<thead>
<tr>
<th>Time Range</th>
<th># of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-0.99 hours</td>
<td>8</td>
</tr>
<tr>
<td>1-1.99 hours</td>
<td>51</td>
</tr>
<tr>
<td>2-2.99 hours</td>
<td>135</td>
</tr>
<tr>
<td>3-3.99 hours</td>
<td>82</td>
</tr>
<tr>
<td>4-4.99 hours</td>
<td>26</td>
</tr>
<tr>
<td>5-5.99 hours</td>
<td>12</td>
</tr>
<tr>
<td>6-6.99 hours</td>
<td>4</td>
</tr>
<tr>
<td>7+ hours</td>
<td>3</td>
</tr>
</tbody>
</table>

Figure 8: Visitors Planned Length of GoG Visit

When asked about their experience arriving and traveling through GoG, most people were pleased with their experience, particularly as it related to their expectations for some amount of congestion moving through the park. Some visitors provided some specific feedback based on why they chose not to “absolutely recommend” GoG to a friend; most of the responses related to traffic and issues with parking. Specific responses include the following:

- “more parking!”
- “traffic is terrible & there are so many people in the park”
- “better parking”
- “more pull offs for people to view and take pictures”

4 During August 2017, the City worked with stakeholders and Volpe to design and administer a survey to collect information from visitors related to their goals, expectations, and overall experience at GoG. The survey also gathered visitors’ impressions on the possibility of a future shuttle system to improve the visitor experience.
In an effort to understand the potential benefit of shuttle service, visitors were asked about their likelihood to use such a service at a future visit to GoG. Of those surveyed, 75 percent said they would be either very likely or likely to use this shuttle service. Further, about 60 percent said they would be willing to spend up to $5.00 for the service.

Shuttle Concepts

After collecting and analyzing data and holding a series of meetings with the City and key stakeholders to discuss goals, ideas, and solicit feedback to initial drafts, Volpe developed three distinct route options that can be organized under three different concepts. Table 1: Shuttle Route Options displays these options followed by a description of the three concepts.

Table 1: Shuttle Route Options

<table>
<thead>
<tr>
<th>Route</th>
<th>Roundtrip Distance</th>
<th>Roundtrip Travel Time*</th>
<th>Stops</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1: Juniper Way Loop</td>
<td>3.8 miles</td>
<td>30 minutes</td>
<td>10 (Visitor Center, Rock Ledge, Gateway/Juniper Intersection, P2, P4, Garden/Juniper Intersection, P9, P10, Gateway/Juniper Intersection, Rock Ledge, Visitor Center)</td>
</tr>
<tr>
<td>A2: Barbell Route</td>
<td>6.5 miles</td>
<td>50 minutes</td>
<td>12 (Trading Post, P16, P13, Garden/Juniper Intersection, P9, P10, Gateway/Juniper Intersection, P2, P4, Garden/Juniper Intersection, P14, P15, Trading Post)</td>
</tr>
<tr>
<td>B1: Gateway Road Circulator</td>
<td>1.2 miles</td>
<td>10 minutes</td>
<td>5 (Visitor Center, Rock Ledge, Gateway/Juniper Intersection, Rock Ledge, Visitor Center)</td>
</tr>
</tbody>
</table>

* Includes passenger stops and buffers

Based on the routes outlined above, Volpe packaged these under the following concepts for consideration.

A. Two Overlapping Routes (Figure 9)
B. **Barbell + Circulator** (Figure 10)
   - B1: Circulator between the Visitor Center – Rock Ledge – Juniper Way Loop/Gateway Road Intersection
   - A2: Juniper Way Loop – Garden Dr. – Balanced Rock – Trading Post
C. Phased Approach

- Step 1 is to implement a circulator between the Visitor Center – Rock Ledge – Juniper Way Loop/GateWay Road Intersection (see B1 above)
- Step 2 is to implement a circulator along Juniper Way Loop (see A1 above) or alternate B1 and A1 routes from the Visitor Center
- Step 3 is to add a circulator to Balanced Rock (A2) or alternate B1, A1, and A2 routes (with a route extension to Rock Ledge and the Visitor Center) from the Visitor Center

Design Day Description

Volpe used a 95th percentile design day to develop its conceptual shuttle service plan. This turned out to be Tuesday, July 4, 2017, which brought in 7,188 vehicles, or about 29,000 individuals. A 95th percentile design day is an industry standard for shuttle planning. This standard means that the service will meet demand 95 percent of the days the service is in operation. For the remaining five percent, service will be able to meet the demand during some of the operating hours, but there will be periods where the demand for the system exceeds capacity. While not ideal, these periods are rare enough to make this an acceptable practice. Planning for service to meet demand closer to 100 percent of the time would be more costly.

Assumptions

Beyond planning for a voluntary service, GoG presents some unique variables that make it challenging to predict ridership. This includes having four different entry points spread out across the park as well as there being relatively long distances between parking areas and popular sites. To create a more accurate picture of ridership, Volpe developed the following assumptions:

- Parking within the park will remain open during service, but people would have to pay for parking in the park
- 15 percent of vehicles will drive through the park without stopping/parking
- Estimated number of passengers per vehicle is 2.5
- Parking at the Trading Post will expand to 205 parking spaces
- Parking at Rock Ledge Ranch will expand to at least 400 parking spaces
- 50 percent of visitors to the park will use the shuttle
- Visitors will evenly utilize both shuttle options offered (e.g., 50/50 split between Concept A1 and A2 or B1 and A2)
- Calculations for vehicle trips per hour and fleet needed are based on average peak visitation (between 10:00am and 4:00pm)
- Shuttles have 35 person capacity

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5 The Trading Post has been approved to expand its parking from 125 to 205 parking spaces. Additionally, there is space in an adjacent parcel that could likely fit around 100 additional parking spaces.
6 Current parking capacity at Rock Ledge Ranch is around 60 parking spaces. A few years ago, the City commissioned a study of potential parking capacity at Rock Ledge Ranch, and found that the open area abutting 30th Street could technically hold between 1,200 and 1,400 additional spaces.
7 Where the vehicle parks and which sites the visitors desire to see will likely distribute the demand evenly across the shuttle routes. For example, though the Trading Post parking capacity is lower than the Visitor Center and Rock Ledge Ranch, Volpe assumes that almost all visitors parking at the Trading Post will utilize shuttle A2 in order to access the Central Garden, which abuts P2. Volpe also assumes most visitors parking at the Visitor Center and Rock Ledge Ranch will choose to ride the shuttle in order to see Balanced Rock.
Vehicle Recommendation
Due to the high number of hills, sharp turns, and narrow sections of road, GoG requires a vehicle with power and a good turning radius. At the same time, a higher capacity vehicle would be ideal to support the volume of visitors on a 95th percentile day. At this initial stage of the study, Volpe recommends the vehicle in Figure 11: Arboc Spirit of Liberty\(^8\) to meet the demands at GoG.\(^9\) The Spirit of Liberty has exceptional maneuverability for a midsize vehicle around 35 feet long and is built to be heavy duty and last around 10 years. It can hold around 35 people each (sitting) and its two doors and low floors can help accelerate boarding and alighting speeds. Compared to cutaways, which may have a similar capacity but less maneuverability and lifespan, the Spirit of Liberty is fairly expensive, listed between $220,000 and $280,000 per vehicle.

Figure 11: Arboc Spirit of Liberty

Shuttle Route Characteristics
Using the Spirit of Liberty’s capacity, Table 2: Shuttle Route Fleet and Service Cost Estimates, shows the estimated fleet size and costs to operate and maintain the three routes independently. The Barbell Route, which is the longest distance and requires the largest fleet, is the also the most expensive to operate at over $341,000. On the other hand, the Gateway Road Circulator would just require four vehicles and cost $85,406 each year, making this the most affordable option. As illustrated under the shuttle concepts described earlier, any expansion in service could entail a combination of route options below, therefore increasing the overall fleet and O&M costs.

Table 2: Shuttle Route Fleet and Service Cost Estimates

<table>
<thead>
<tr>
<th>Route</th>
<th>Roundtrip Distance</th>
<th>Roundtrip Travel Time</th>
<th>Vehicles Needed</th>
<th>O&amp;M Cost/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1: Juniper Way Loop</td>
<td>3.8 miles</td>
<td>30 minutes</td>
<td>10</td>
<td>$251,913</td>
</tr>
<tr>
<td>A2: Barbell Route</td>
<td>6.5 miles</td>
<td>50 minutes</td>
<td>13</td>
<td>$341,585</td>
</tr>
<tr>
<td>B1: Gateway Road Circulator</td>
<td>1.2 miles</td>
<td>10 minutes</td>
<td>4</td>
<td>$85,406</td>
</tr>
</tbody>
</table>

\(^8\) More information on the Arboc Spirit of Liberty can be found at http://www.arbocs.com/liberty.php.

\(^9\) Task 3 in the Statement of Work tasks Volpe with performing an in-depth shuttle selection analysis once the route(s) have been selected.
Parking Demand
Having sufficient parking can prevent vehicles from queueing and contributing to the overall congestion on the roadways and in the parking lots throughout GoG. Table 3: Parking Demand for 95th Percentile Day illustrates the parking need to meet the demand on a 95th Percentile Day. During the peak hours of the day, 517 vehicles are expected to enter the park looking for a parking space. Given that the average stay per vehicle is 2.5 hours, the park can have close to about 1,388 vehicles in need of a parking space at any one given time. Considering the park’s total supply of 728 parking spaces, this leaves a gap (or additional need) for 660 parking spaces.

Table 3: Parking Demand for 95th Percentile Day

<table>
<thead>
<tr>
<th>Current Parking Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>95th Percentile (total)</td>
</tr>
<tr>
<td>Less 15% (Total)</td>
</tr>
<tr>
<td>95th Percentile (hourly average peak)</td>
</tr>
<tr>
<td>Less 15% (Total)</td>
</tr>
<tr>
<td>Average Visit</td>
</tr>
<tr>
<td>95th Percentile, less 15% (2.5 hr visit)</td>
</tr>
<tr>
<td>Parking Available</td>
</tr>
<tr>
<td>Additional Parking Need (at peak)</td>
</tr>
</tbody>
</table>

Peak, 10:00am-4:00pm  
High visitation, Peak 10:00am-4:00pm

2.5 hour average visit

If the Trading Post adds 80 parking spaces and the City has a total of 400 parking spaces at Rock Ledge Ranch, a need of 240 parking spaces would remain. Potentially, this difference can be added to the Rock Ledge Ranch expansion or at one of the off-site parking options listed in Figure 12: GoG Potential Additional Parking Considerations, all subject to availability and negotiations. When meeting to discuss possible solutions with the core project team and key stakeholders, the City identified several potential off-site parking locations that could relieve congestion within the park. While a combination of these parking areas would meet the parking need identified in Table 3, utilizing off-site parking would require the City to support an additional shuttle service to transfer visitors to and from GoG. Such a service is not ideal, as it could be expensive and may negatively impact the visitor experience. However, it is an option for the City to consider in the future.
Next Steps and Future Considerations

Beginning in time for the start of the peak season (late May), the City and its stakeholders would like to implement a pilot shuttle service to measure the impact it would have on congestion. Depending on the findings, the City can then modify and expand the pilot as needed in future years to provide service that enhances the visitor experience. Several considerations for shuttle service development include the following: 10

- Test potential vehicles to determine how they perform, how much time they need to serve the route, and if they are the appropriate size; select vehicles based on test results
- Analyze the costs and benefits for different operating models and choose the best for GoG:
  - Leasing vs. purchasing vehicles
  - Sharing vehicles, such as with local ski resorts, during the off-season
  - Run by concessionaire/service contract
  - Run by outfitter and guide
- Analyze different revenue models to support the ongoing shuttle service operation. This includes:
  - Charging vehicles to park, but offering the shuttle for free, and
  - Charging visitors to ride the shuttle, but parking is free
- Particularly if charging vehicles to park, consider strategies to communicate parking availability and better determine when vehicles can enter a parking lot
- Develop a strong marketing plan to promote the use of the shuttle service and provide notification of any changes to the parking process
- Depending on the scope of service, consider developing an interpretive service that would enhance the visitor experience by providing a guided tour of the park when aboard the shuttle

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10 The first two of these considerations will be discussed and addressed in Task 3.
• Consider working with other area destinations, including Mountain Metro Transit, to develop a regional shuttle service to connect visitors to other local attractions. Developing a partnership like this would enable participating agencies to share the costs.
Appendix: Stakeholders

- Adventures Out West
- City of Colorado Springs – Parks, Recreation, and Cultural Services
- City of Colorado Springs – Traffic Engineering
- City of Colorado Springs – Stormwater/Water Resources Engineering
- Colorado Springs Fire Department
- Colorado Springs Police Department
- Convention and Visitors Bureau
- Friends of Garden of the Gods
- Garden of the Gods Foundation
- Garden of the Gods Trading Post
- Garden of the Gods Visitor and Nature Center
- Glen Eyrie
- Gray Line Corporation
- Mountain Metropolitan Transit
- Pleasant Valley Neighborhood Association
- Rock Ledge Ranch Living History Association
- Rocky Mountain Field Institute
- Trails and Open Space Coalition
- U.S. Forest Service
- U.S. Department of Transportation, Volpe Center