



Arches Alternative Transportation System and Congestion Management Study

FINAL FEASIBILITY STUDY

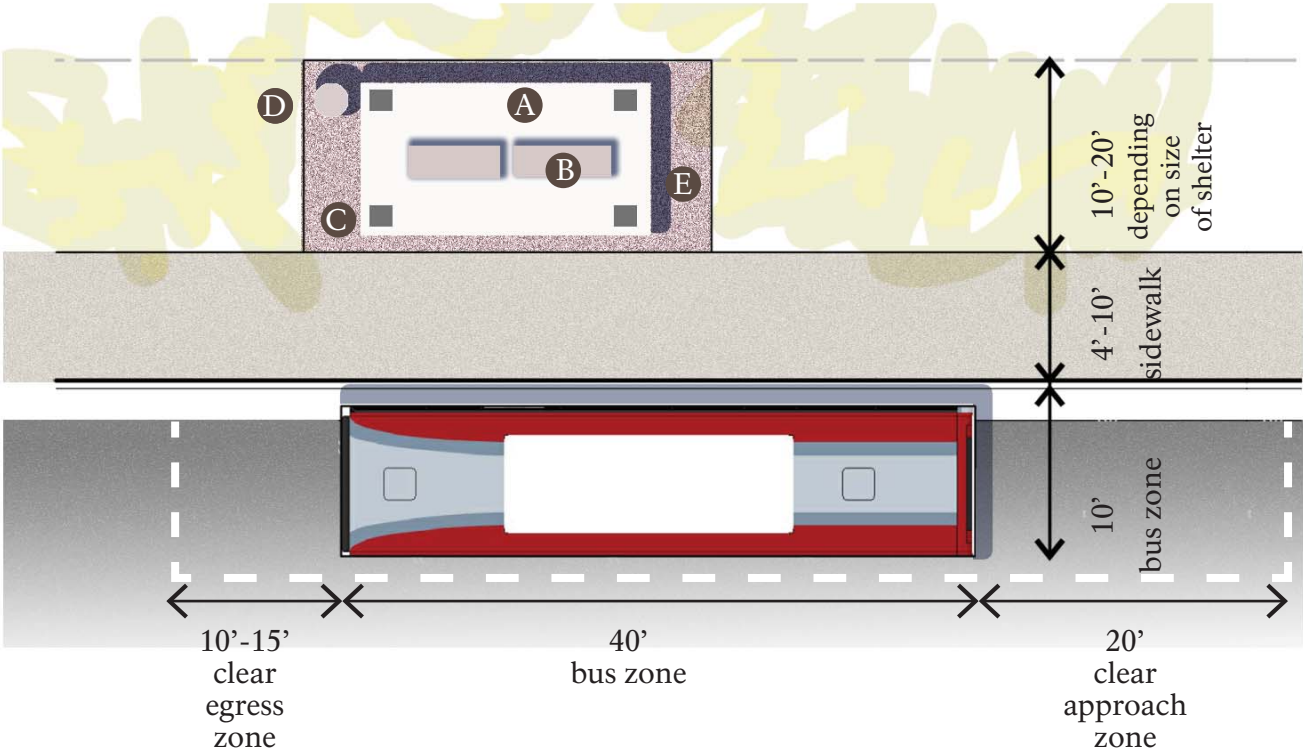
Volume II: Appendices

September 2012



APPENDIX A

Shuttle Stop Designs



Single Shuttle Stop

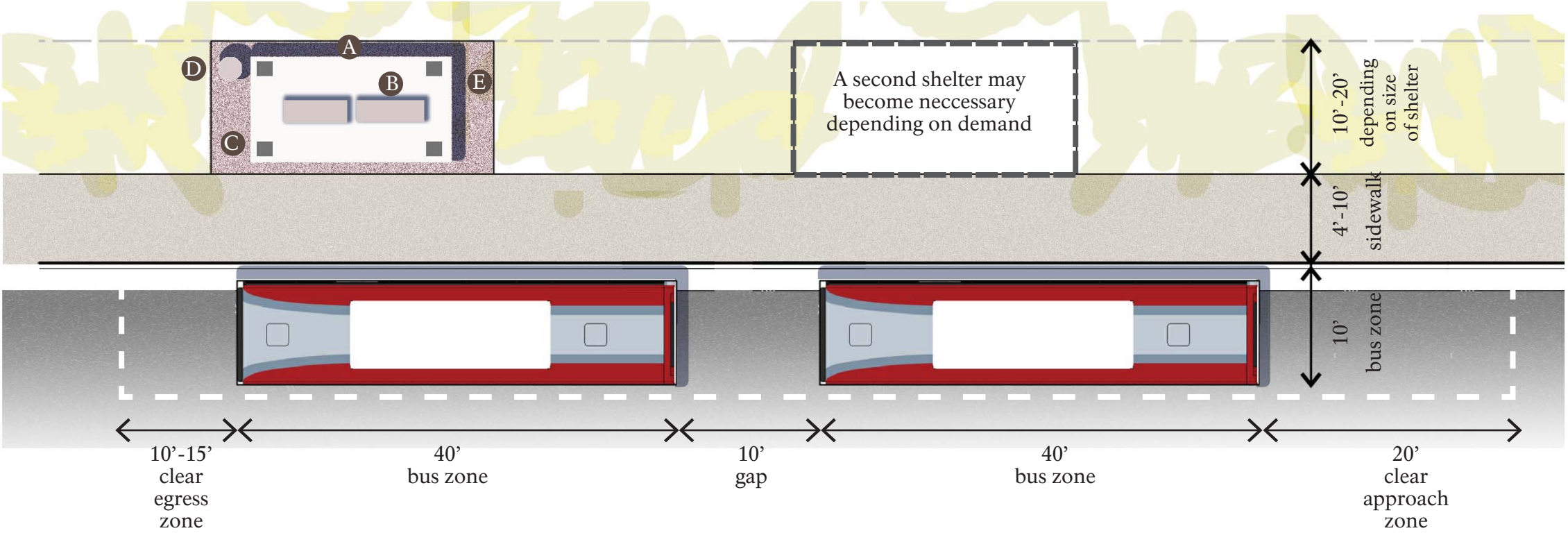
Shelter is located behind sidewalk and away from pedestrian thoroughfare, but may have to be located in private property (in town) or on existing vegetation (in Park). Exact locations should be determined in field to minimize impact.

Recommended stops do not take the place of private automobile parking where possible. Wide shoulders or RV parking spaces are utilized in some locations.

It is assumed that shelters and pedestrian areas are located out of the roadway and parking area, which means that some localized removal of vegetation or existing fences may be necessary to construct a pedestrian area and shelter. Alternatively, shelters could be located in the roadway, however this would likely require the removal of additional parking spaces.

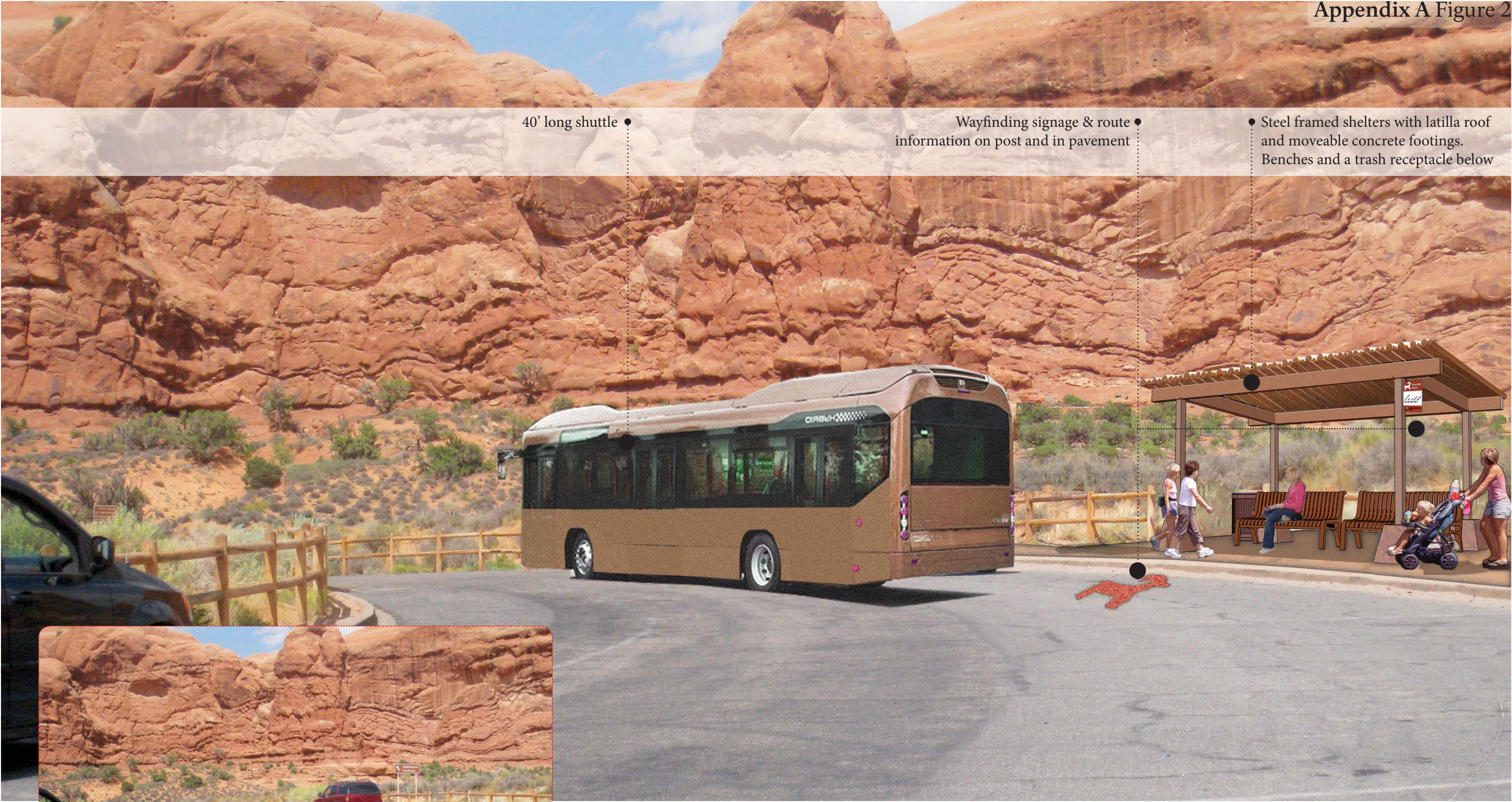
Proposed bus stops where no curb currently exists may require additional infrastructure to accommodate wheelchairs entering and exiting bus. Ramps installed on a 40' bus typically only extend far enough to meet a 6" concrete curb.

- A Shelter (Appendix A Figure 3)
- B Seating -benches (Appendix A Figure 4)
- C Wayfinding signage (Appendix A Figure 4)
- D Trash Receptacle (Appendix A Figure 4)
- E Concrete pad or stabilized decomposed granite



Double Shuttle Stop

Shuttle Stop Arches National Park



Existing

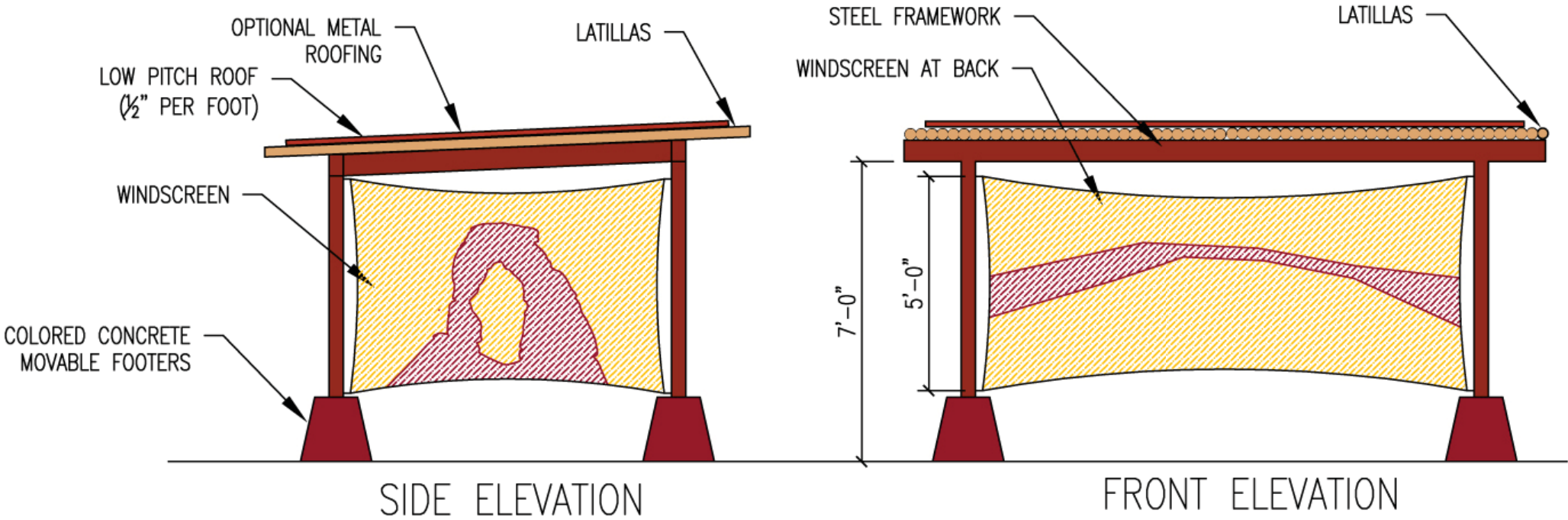
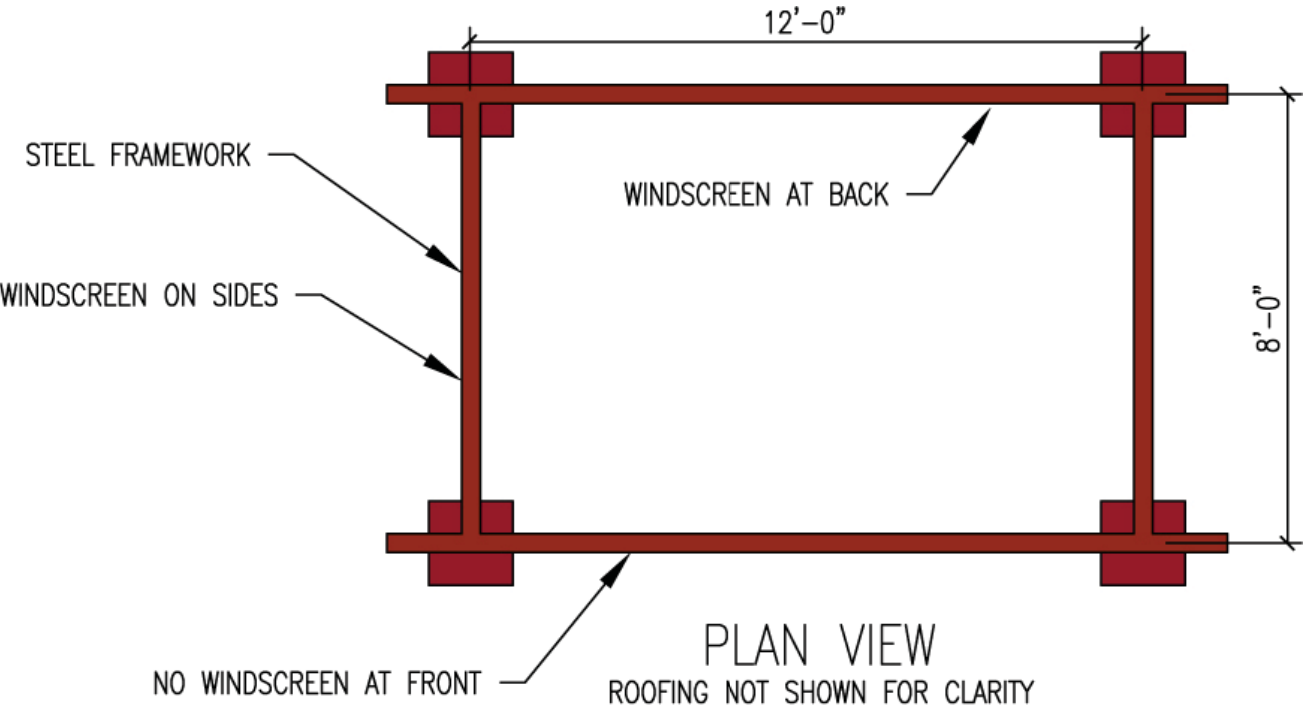
Proposed

Shuttle Stop Visualization

Arches National Park

BUS STOP SHADE STRUCTURES

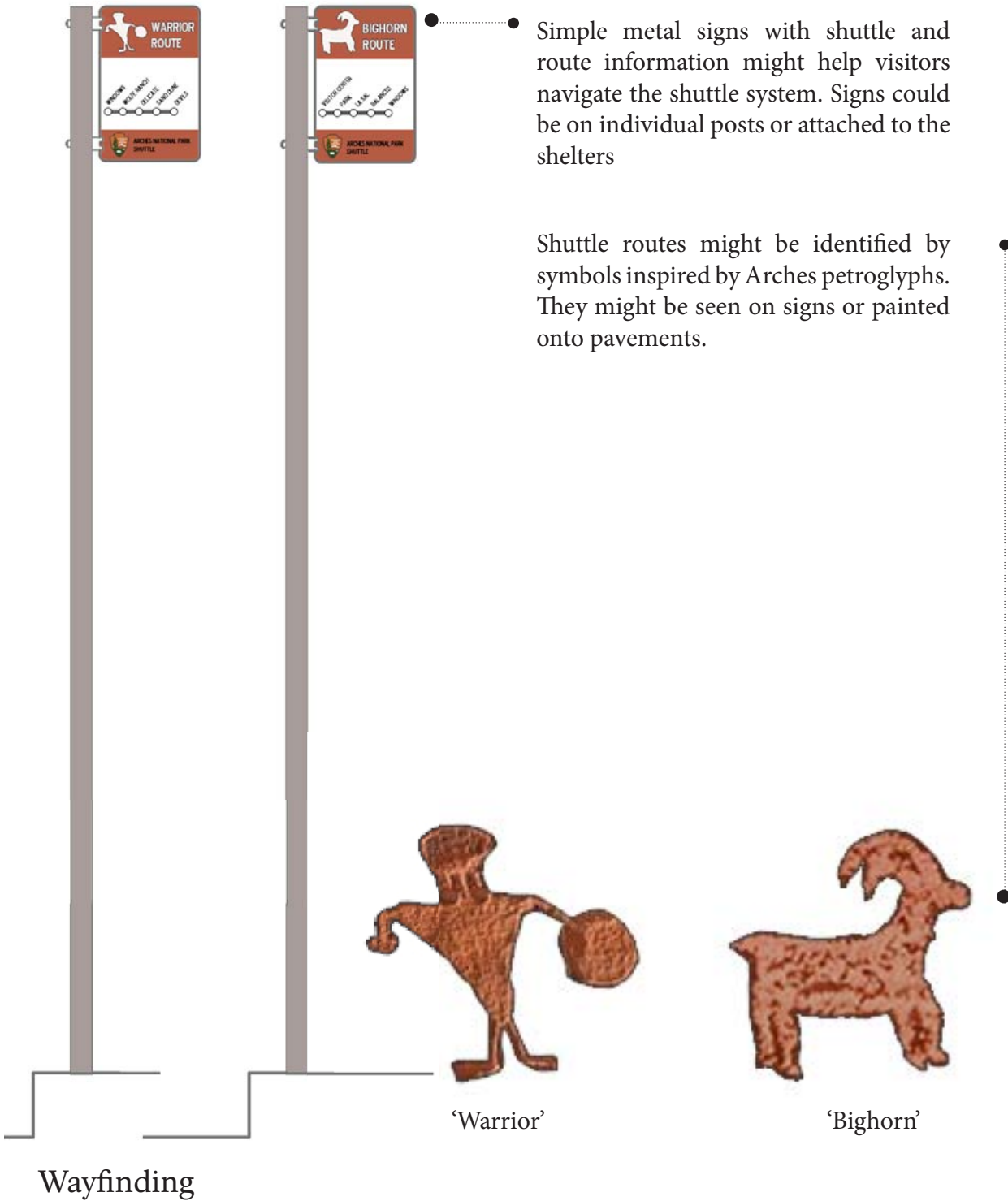
ARCHES N.P.
Contact: John Lewis
435.719.2152



- Windscreen Material Suggestions:
- 1. Coated finely woven wire mesh (transparent material, maintains views) OR
 - 2. Polyethylene fabric with reinforced stitching and perimeter edging (opaque material, ultimate protection from wind/sun) OR
 - 3. Nylon/polyester fabric mesh fixed to a wire or metal frame (transparent material, maintains views)

Shelter

Shuttle Stop Amenities
Arches National Park



Simple metal signs with shuttle and route information might help visitors navigate the shuttle system. Signs could be on individual posts or attached to the shelters

Shuttle routes might be identified by symbols inspired by Arches petroglyphs. They might be seen on signs or painted onto pavements.

Park Family

Bench Suggestions:
Belson Thermoplastic Expanded Steel Park Bench (pictured) or Victor Stanley Model PRSNA-10: Production Series with recycled plastic slats



Bench

Trash Receptacle

Trash Receptacle Suggestion:
Park Approved Wildlife-Safe Trash Can

Town Family



Bench

Trash Receptacle

Bench Suggestions:
Landscapeforms Village Green (pictured) or Victor Stanley Model PRSNA-10: Production Series with recycled plastic slats

Metal Trash Receptacle Suggestions:
Victor Stanley Model NSDC-36

Shuttle Stop Amenities
Arches National Park

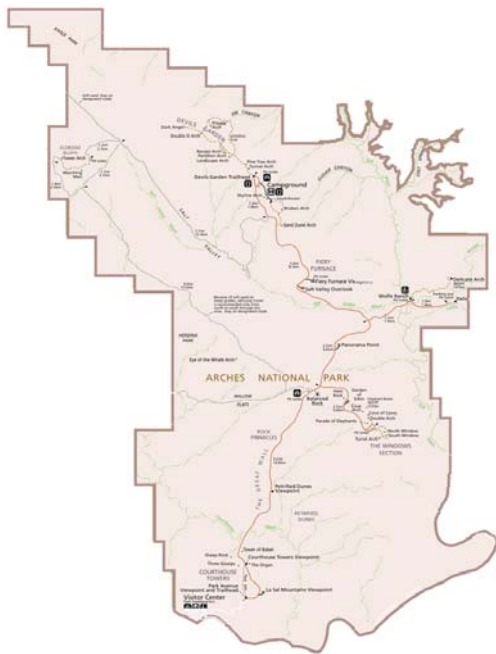
APPENDIX B

Shuttle Stop Locations



NOTES : Shuttle Stop Opportunities

1. Recommended stops are an easy walk to/from trailhead, but are typically not so close as to potentially overcrowd the trailhead with people waiting for or exiting the bus.
2. Recommended stops do not take the place of private automobile parking where possible. Wide shoulders or RV parking spaces are utilized in some locations.
3. It is assumed that shelters and pedestrian areas are located out of the roadway and parking area, which means that some localized removal of vegetation or existing fences may be necessary to construct a pedestrian area and shelter. Alternatively, shelters could be located in the roadway, however this would likely require the removal of additional parking spaces.
4. Final stop locations should be determined after more on-site testing to determine appropriate bus turning radii and egress and approach distances.
5. Depending on demand and routes, more than one bus loading zone may need to be provided and this may further reduce the number of parking spaces for private vehicles.
6. Proposed bus stops where no curb currently exists may require additional infrastructure to accomodate wheelchairs entering and exiting bus. Ramps installed on a 40’ bus typically only extend far enough to meet a 6” concrete curb.
7. See Appendix A Figure 1 for spatial requirements.



General Notes Shuttle Stop Opportunities
Arches National Park



Visitor Center



Parking Lot at Visitor Center



Visitor Center



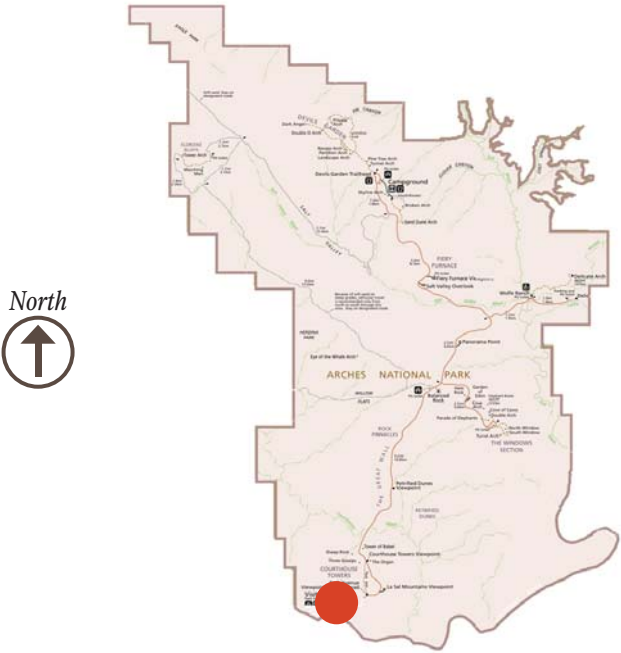
Drop off zone



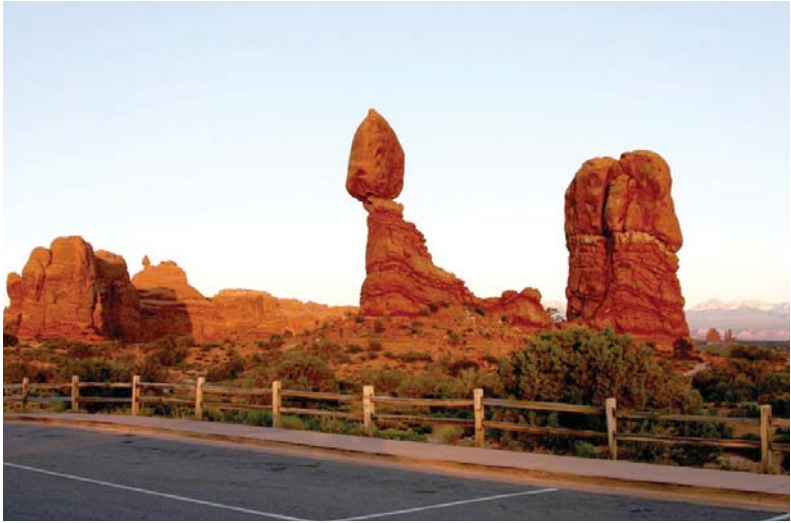
See Notes in Appendix B Figure 1

SHUTTLE STOP OPPORTUNITIES

- Recommended Stop Location
- Bus Dropoff/Pickup Location Option - At Visitor Center building entrance (Will fit 1-2 buses at a time)
- Bus Dropoff/Pickup Location Option - Near parking lot entrance (Modifications to curbs for approach and egress would be necessary)
- Bus Dropoff/Pickup Location Option - At rear of parking lot (Curb alignment would need to be altered me accommodate 1 or more buses)



Visitor Center Parking Lot
Arches National Park



Parking lot at Balanced Rock



Example of oversized vehicles at Balanced Rock



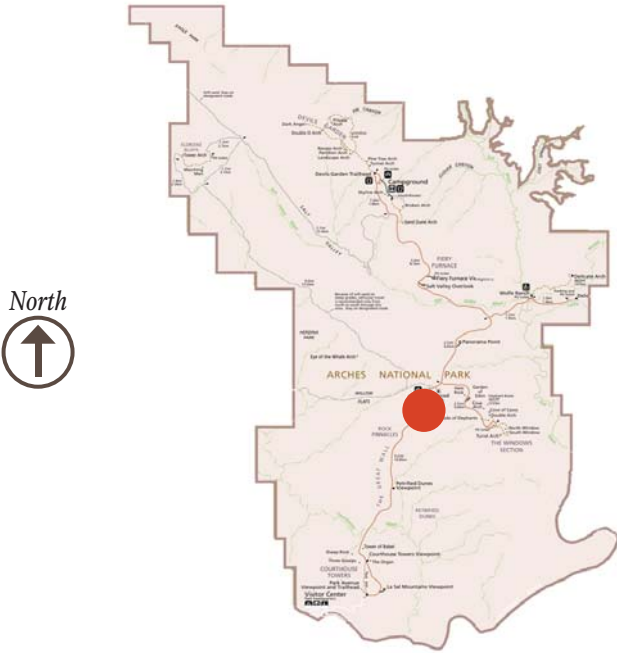
See Notes in Appendix B Figure 1

EXISTING CONDITIONS

- Significant Views
- T Trailhead
- 1 Angled parking stalls
- 2 Oversized /Parallel parking stalls
- 3 Crosswalk

SHUTTLE STOP OPPORTUNITIES

- A Recommended Stop Location
- A Bus dropoff/Pickup location option (Would require the removal of parking spaces)
- B Bus dropoff/Pickup location option (Would require the removal of parking spaces, but is clear of trailhead congestion. Shelter/pedestrian area may require removal/relocation of fence and some vegetation)



Balanced Rock Parking Lot
Arches National Park



4 Sightlines to trailheads lost behind parked cars



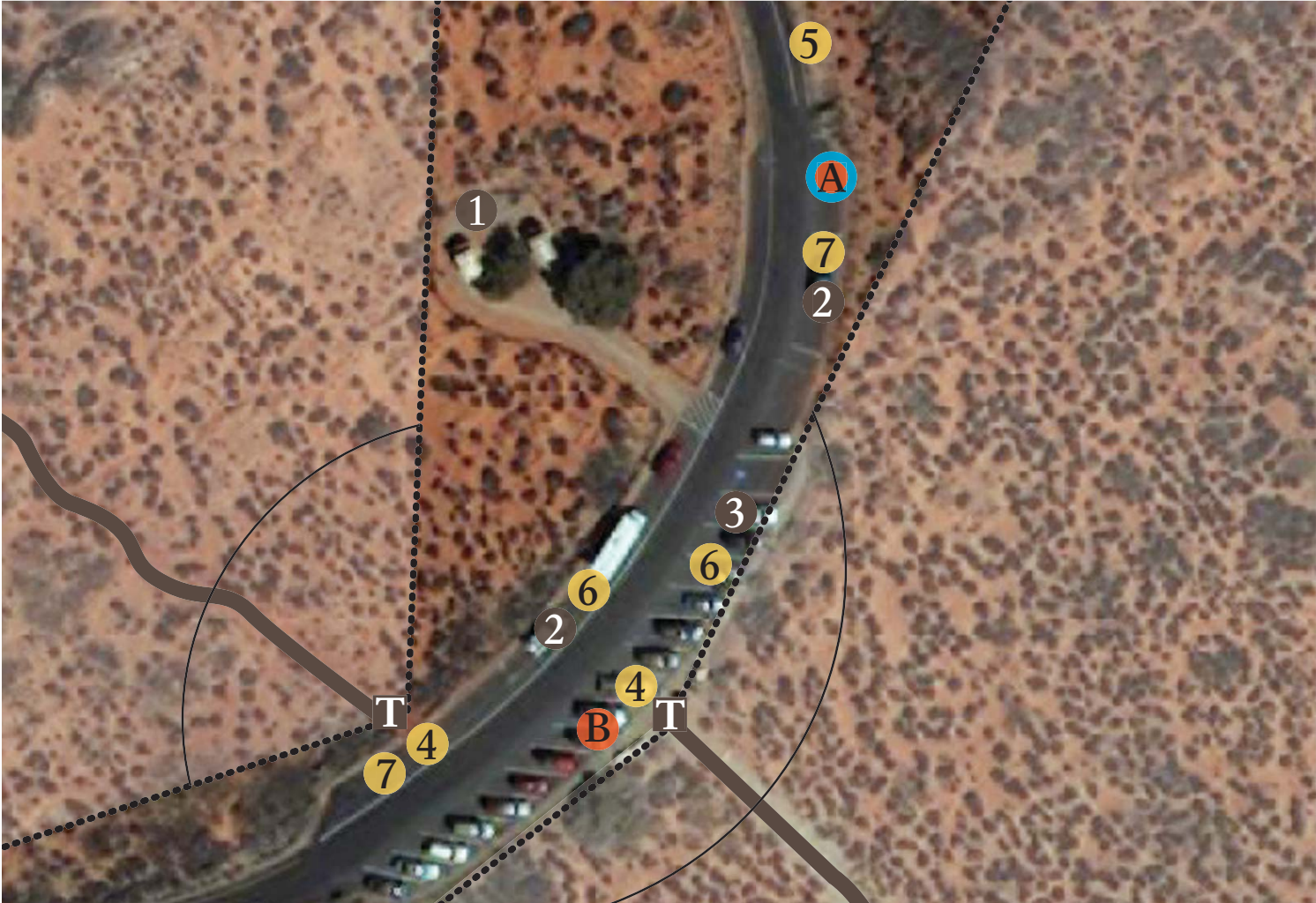
6 Wide parking stalls create confusion about how to park



6 Parking confusion



5 Sign in wrong location



See Notes in Appendix B Figure 1

EXISTING CONDITIONS

- Significant Views
- 1 Trailhead
- 1 Restrooms
- 2 Parallel Parking (13' wide)
- 3 Angled Parking (12'-13' wide)

SITE SPECIFIC PROBLEMS

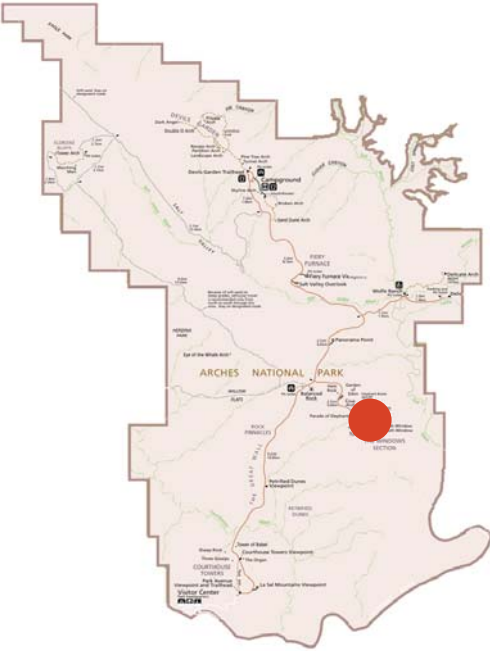
- 4 View to trailheads lost behind parked cars
- 5 'Additional Parking' sign location is too far into parking lot
- 6 Parking stalls wider than necessary
- 7 Recreational vehicles blocking views and parking lot sightlines

SHUTTLE STOP OPPORTUNITIES

- A Recommended Stop Location
- A Bus dropoff/Pickup location option (Would replace RV parking spaces. Could be expanded to accommodate more than 1 bus which would require the removal of additional parking spaces. Shelter/pedestrian area may require removal/relocation of fence and some vegetation)
- B Bus dropoff/Pickup location option

OTHER OPPORTUNITIES

- Remove parking stall at trailheads
- Make car parking stalls a consistent 9' wide
- Convert parallel parking bays on western side of road to angled parking
- Relocate RV parking to lower parking lot



Upper Windows Parking Lot
Arches National Park



6 Excessive asphalt in driving lanes



5 Social trails have damaged vegetation and direct pedestrians away from the designated sidewalk



7 Parking lot stalls are large and may not be the most efficient configuration



See Notes in Appendix B Figure 1

EXISTING CONDITIONS

- T Trailhead
- 1 Restrooms
- 2 90° parking stalls
- 3 Oversized/angled parking stalls
- 4 Existing ADA ramp

SITE SPECIFIC PROBLEMS

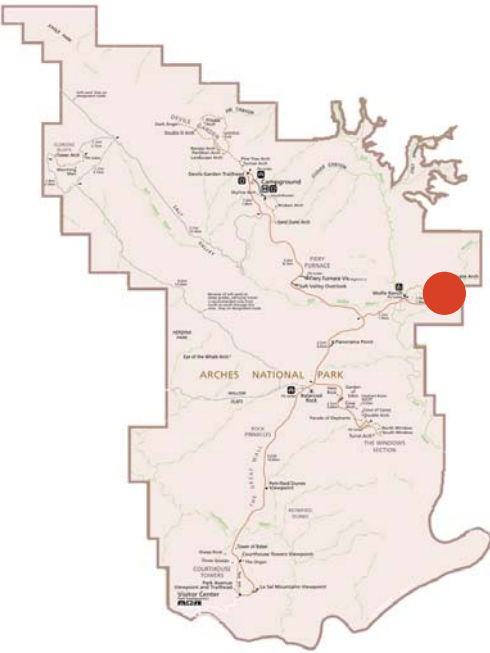
- 5 Social trails from parking lot to trailhead damaging vegetation
- 6 Excess asphalt (driveway is wide enough for 2-way vehicular movement, but it essentially functions as a 1-way loop)
- 7 Large parking stalls do not encourage drivers to park efficiently

SHUTTLE STOP OPPORTUNITIES

- C Recommended Stop Location
- A Bus dropoff/Pickup location option (Would require the removal or relocation of some parking spaces)
- B Bus dropoff/Pickup location option (Would require the removal or relocation of some parking spaces. Shelter/pedestrian area may fit on existing sidewalk without requiring the removal/relocation of fence or vegetation)

OTHER OPPORTUNITIES

- Restripe large parking stalls for more efficient parking
- Use excess roadway width for additional parking
- Restore planting damaged by social trails



Delicate Arch Parking Lot
Arches National Park



Recent improvements have created a clearly defined pedestrian zone



7 Social trails have damaged vegetation and direct pedestrians away from the designated crosswalk



6 Safety issue? Pedestrians walk along road shoulder to get to trail head



5 Clearer crosswalk demarcation?



EXISTING CONDITIONS

- Significant Views
- T Trailhead
- 1 Restrooms
- 2 90° parking stalls
- 3 Oversized vehicle parking stalls
- 4 Oversized parallel parking stalls

SITE SPECIFIC PROBLEMS

- 5 Pedestrian safety at road crossing
- 6 Pedestrian safety along driveway shoulder leading to trail head
- 7 Social trails through planted island have damaged vegetation & direct pedestrians away from designated crosswalk
- 8 View to Restrooms too obvious from trail

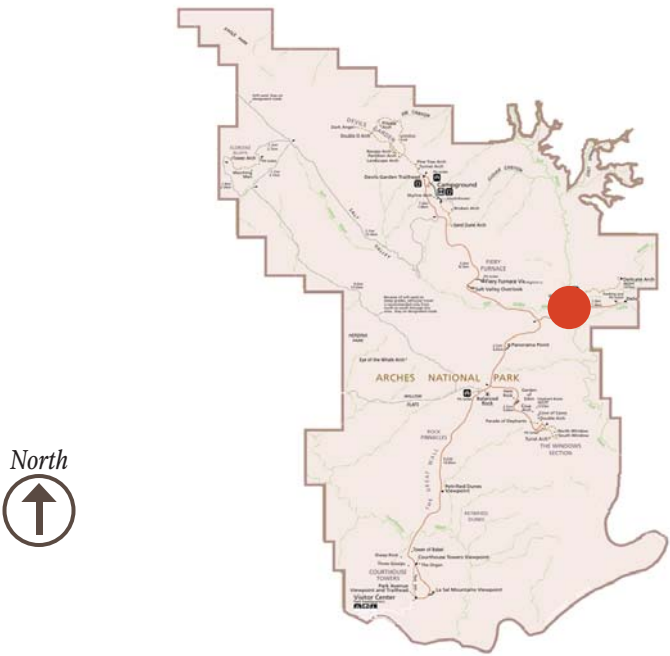
SHUTTLE STOP OPPORTUNITIES

- Recommended Stop Location
- A Bus dropoff/Pickup location option
Would require removal of parking spaces
- B Bus dropoff/Pickup location option
Turnaround radius may be too tight for buses
- Bus dropoff/Pickup location option
Could be expanded to accommodate more than 1 bus. Passengers would be entering/exiting bus into parking lot rather than a paved sidewalk. Shelter/ pedestrian area may require removal of some vegetation)

OTHER OPPORTUNITIES

- Add a colored concrete crosswalk with additional signage
- Better demarcate pedestrian walkway on driveway shoulder at parking lot entrance
- Revegetate social trails on planted island & better demarcate pedestrian walkway to existing crosswalk
- Add screening vegetation around restrooms

See Notes in Appendix B Figure 1



Wolfe Ranch Parking Lot
Arches National Park



5 Trailhead obscured by parked cars



6 View to restrooms too prominent



7 Asphalt edge showing damage



View from parking lot



EXISTING CONDITIONS

- Significant Views
- T Trailhead
- 1 Restrooms
- 2 90° parking stalls
- 3 Angled parking stalls
- 4 Oversized /Parallel parking stalls

SITE SPECIFIC PROBLEMS

- 5 Trailhead obscured by parked vehicles
- 6 View to restrooms too prominent
- 7 Asphalt edge shows some damage

SHUTTLE STOP OPPORTUNITIES

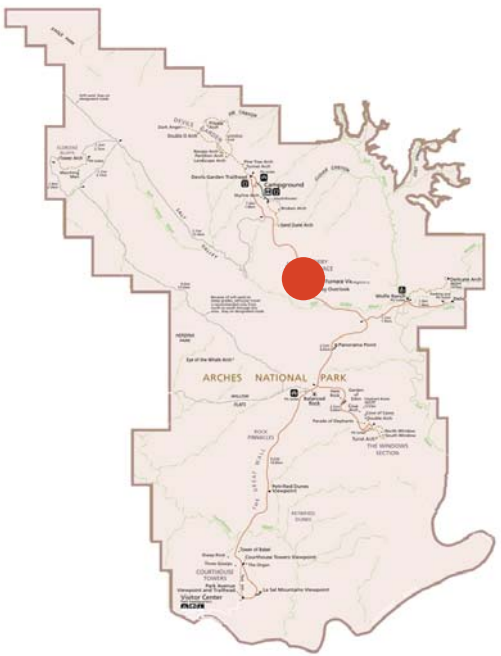
- Recommended Stop Location
- A Bus dropoff/Pickup location option (May require paving existing shoulder. Shelter/pedestrian area may require removal of some vegetation)
- B Bus dropoff/Pickup location option (Would require removal of parking spaces)

OTHER OPPORTUNITIES

- Remove parking spaces at trailheads
- Add markings on roadway to alert visitors to location of trailheads
- Add screening vegetation around restrooms



See Notes in Appendix B Figure 1



Fiery Furnace Parking Lot Arches National Park



New parking lot at Sand Dune Arch



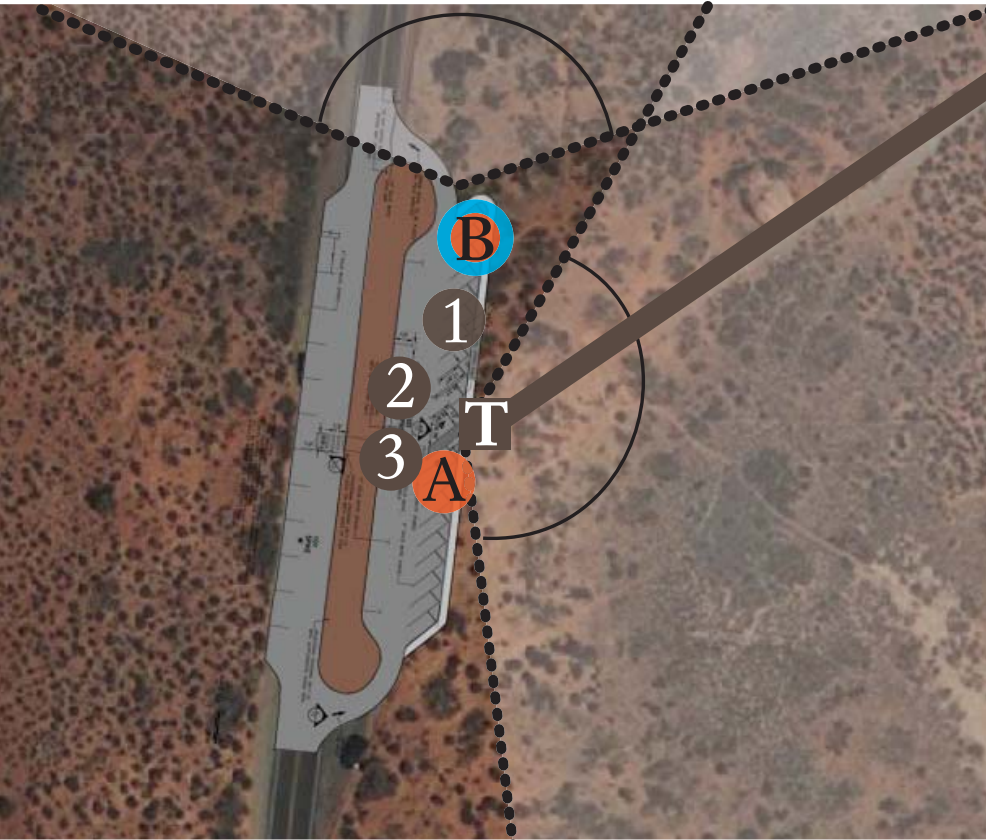
Pedestrian walk at Sand Dune Arch



View from Sand Dune Arch trail

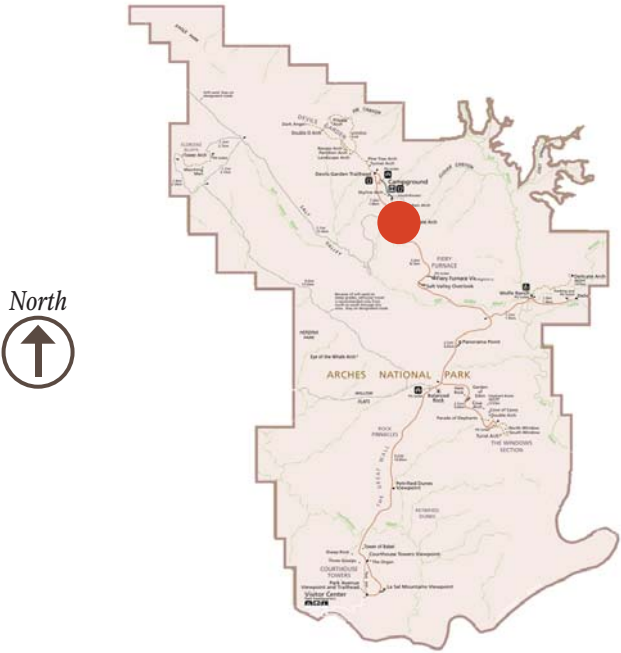


New trail edge to Sand Dune Arch



See Notes in Appendix B Figure 1

- EXISTING CONDITIONS**
- Significant Views
 - T Trailhead
 - ① Angled parking stalls
 - ② Oversized /Parallel parking stalls
 - ③ Crosswalk
- SHUTTLE STOP OPPORTUNITIES**
- Recommended Stop Location
 - A Bus dropoff/Pickup location option
(Would require removal of parking spaces)
 - B Bus dropoff/Pickup location option
(Would require removal of parking spaces. Shelter/pedestrian area may require removal/relocation of fence and some vegetation)



Sand Dune Arch Parking Lot

Arches National Park



8 View to spectacular rock formations with vehicles in foreground



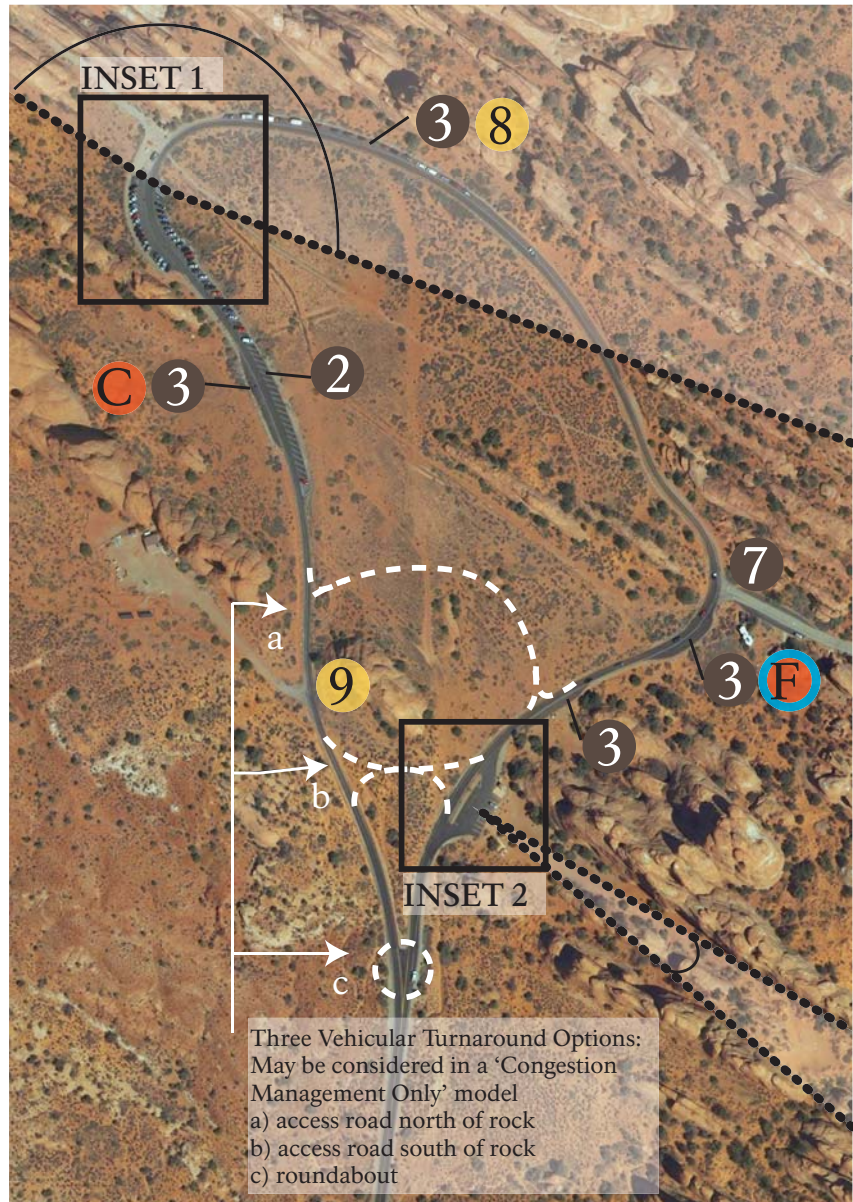
8 View to spectacular rock formations without vehicles



10 Existing trailhead. Shade? Screening of toilets? Better bike racks?



High quality detailing along trail to Landscape Arch



OVERALL MAP Devils Garden



INSET 1 Trailhead



INSET 2 Picnic Area

EXISTING CONDITIONS

- Significant Views
- 1 Trailhead
- 1 Restrooms
- 2 Angled parking
- 3 Parallel parking (also accommodates oversized vehicles)
- 4 90° parking at picnic area
- 5 Drinking water
- 6 Picnic Area
- 7 Campground Turn

SITE SPECIFIC PROBLEMS

- 8 View to dramatic rocks obscured by parked vehicles
- 9 Difficult for vehicles to turn around once in the Devils Garden loop and prior to arriving at the loop
- 10 Problems with trailhead e.g. no screening around toilets, ineffective bike racks, no shade

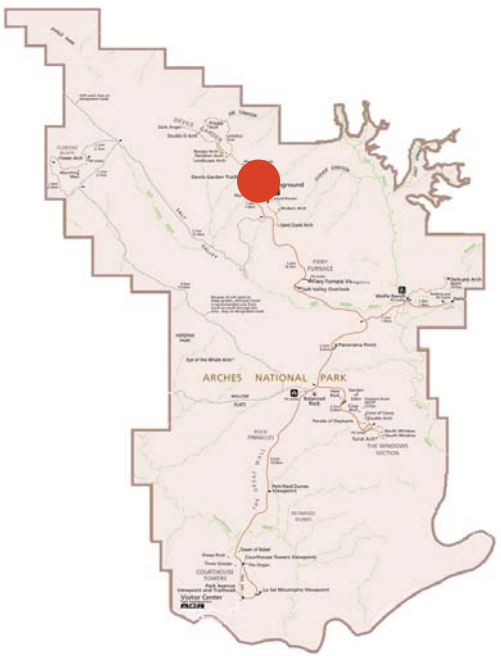
SHUTTLE STOP OPPORTUNITIES

- Recommended Stop Location
- A Bus dropoff/Pickup location option - Nearside Trailhead (May require paving existing shoulder. Shelter/pedestrian area may require removal of some vegetation)
- B Bus dropoff/Pickup location option - Farside Trailhead
- C Bus dropoff/Pickup location option - Beyond Trailhead
- D Bus dropoff/Pickup location option - Picnic Area
- E Bus dropoff/Pickup location option - Picnic Area (May require paving existing shoulder. Shelter/pedestrian area may require removal of some vegetation)
- F Bus dropoff/Pickup location option - Campground Turn

OTHER OPPORTUNITIES

- Relocate some parking to improve views to dramatic scenery
- Consider adding 2 vehicular turnarounds at southern end of site to allow:
 - a. Vehicles arriving from the south to turnaround before reaching Devils Garden
 - b. Vehicles in the Devils Garden loop to loop around again. (These options might only be considered as part of a 'Congestion Management Model' i.e., a strategy without a shuttle)
- Reorganize trailhead elements -use high quality materials at trailhead similar to what is seen along the trail to Landscape Arch

See Notes in Appendix B Figure 1



Devils Garden Parking Lot
Arches National Park

Parking congestion is the overwhelming problem at Arches National Park. Solutions for this problem are being developed separately. Here, solutions to some of the physical problems at each of the parking lots within the Park are considered.



Add clearer markings on roadways to more safely direct pedestrians to trailheads and alert motorists to the presence of pedestrians



Remove parking stalls at trailhead entrance to improve visibility to trailhead



Add strategic directional signage to help motorists understand parking options and availability



Add clearer pedestrian markings on roadways to better direct pedestrians to trailheads and away from habitat areas



Screen restrooms to better integrate them into the Arches landscape



Restripe (and reduce size of) parking stalls to park vehicles more efficiently

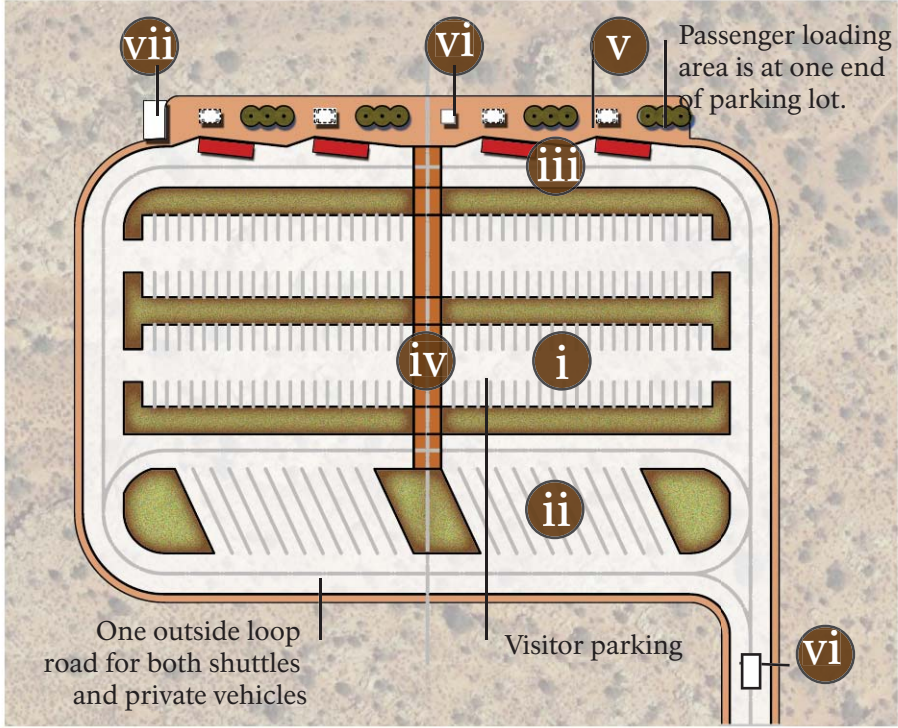


Add amenities at trailheads that may encourage alternative means of transportation (e.g. higher quality bike racks)

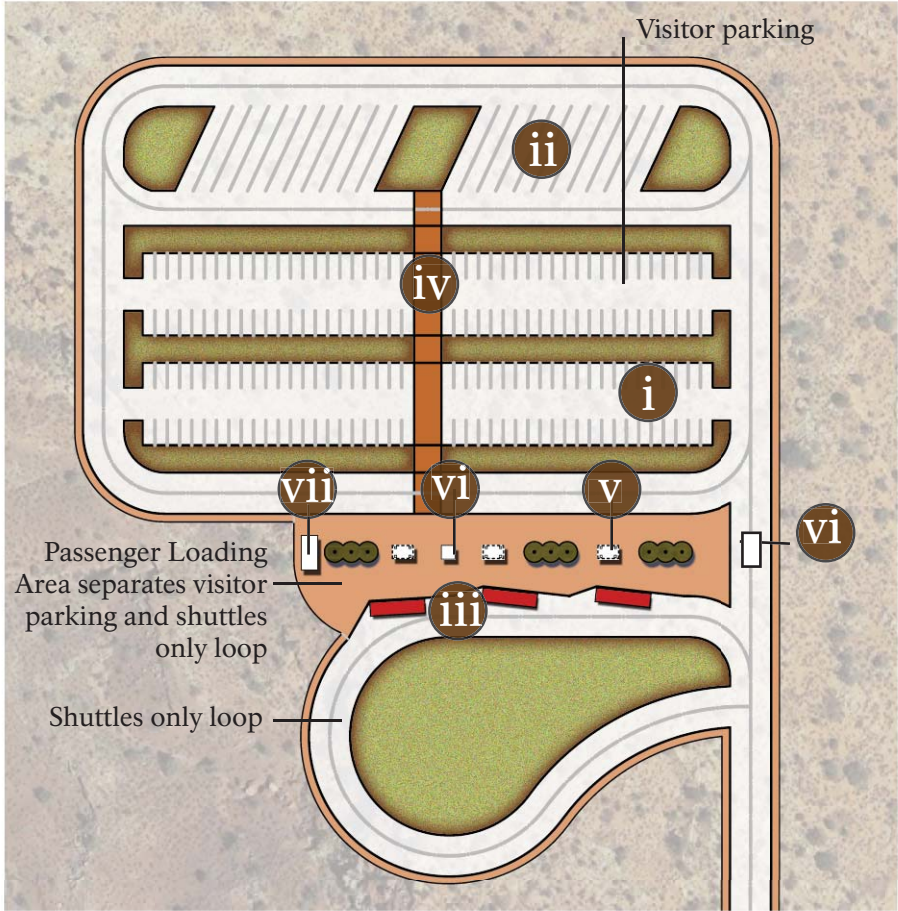
Summary of Parking Lot Opportunities Arches National Park

APPENDIX C

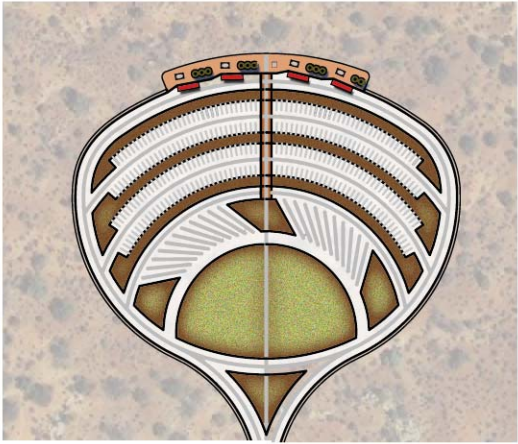
Park-and-Ride Lot Designs



Prototypical Parking Lot Model 1
Shuttle Stops and Passenger Loading Area are on outside loop of parking lot



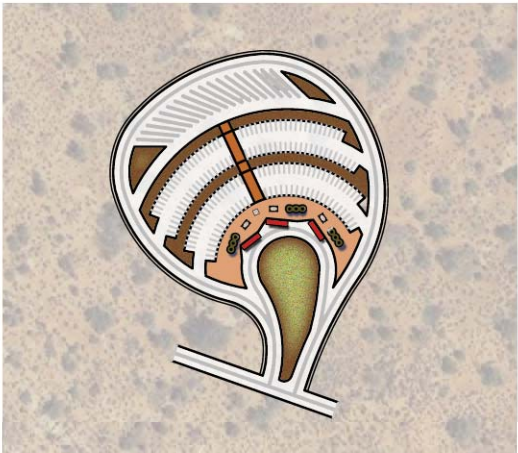
Prototypical Parking Lot Model 2
Shuttle stops and visitor parking are on separate circulation loops. Passenger loading area is located between the two.



Model 1 can be modified to respond to specific site conditions and broader landscape context. The curved pattern of this model builds upon the curves in many of the parking lots in Arches National Park.



Model 1 at Mt. St. Helens Visitor Center



Model 2 can be modified to respond to specific site conditions and broader landscape context



Model 2 at Zion National Park

LEGEND

- Parking Lot Requirements**
- i 180 automobile parking spaces
 - ii 20 recreational vehicle parking spaces*
 - iii 3 shuttle stops
 - iv Pedestrian crossings

Also required but not shown:
Signage, Concrete wheel stops, Speed humps, Buffer planting and bio-retention areas (long term)

- Passenger Loading Area Requirements**
- v Shelters
 - vi Fee payment facility (kiosk/booth) (Two alternative locations are shown)
 - vii Restrooms

Also required but not shown:
Drinking water, Wayfinding signage, Informational/Educational signage

*As deemed necessary a portion of landscape area could be absorbed to provide additional recreational vehicle parking or the number of automobile parking spaces could be reduced to provide additional recreational vehicle parking.

Park-and-Ride Facility
Arches National Park

APPENDIX D

Greenhouse Gas Emissions Analysis

GREENHOUSE GAS EMISSIONS ANALYSIS

INTRODUCTION AND BACKGROUND

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs), such as carbon dioxide (CO₂), in our atmosphere. An increase in GHG emissions is believed to result in an increase in the Earth's average surface temperature, which is commonly referred to as global warming or climate change. Climate change is expected to affect weather patterns, average sea level, ocean acidity, chemical reaction rates, precipitation rates, etc. The Intergovernmental Panel on Climate Change best estimates are that the average global temperature rise between 2000 and 2100 could range from 0.6 degrees Celsius (°C) (with no increase in GHG emissions above year 2000 levels) to 4.0°C (with substantial increase in GHG emissions) (IPCC 2007). Even small increases in global temperatures could have considerable detrimental impacts on natural and human environments.

GHGs include water vapor, CO₂, methane, nitrous oxide, ozone, and several hydrocarbons and chlorofluorocarbons. Each GHG has an estimated Global Warming Potential (GWP), which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. A gas's GWP provides a relative basis for calculating its Carbon Dioxide Equivalent (CO₂e), which is a metric measure used to compare the emissions from various greenhouse gases based upon their GWP. Carbon Dioxide has a GWP of 1, and is therefore the standard to which all other GHGs are measured.

Arches efforts to reduce congestion in the park, and therefore overall GHG emissions, are designed to be in compliance with the park's *Transportation Implementation Plan and Environmental Assessment* (NPS 2006a), and Executive Order 13514: *Federal Leadership In Environmental, Energy, and Economic Performance* (Federal Register 2009), which requires agencies to measure, manage, and reduce greenhouse gas emissions toward agency-defined targets, including a 30 percent reduction in vehicle fleet petroleum use by 2020. Additionally, Executive Order 13423: *Strengthening Federal Environmental, Energy, and Transportation Management* also sets as a goal for all federal agencies the improvement of energy efficiency and the "reduc[tion] of greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline to the agency's energy use in fiscal year 2003" (Federal Register 2007).

Grand County, which includes Arches National Park, is in attainment for all other criteria pollutants regulated under the Clean Air Act's National Ambient Air Quality Standards. In 1977, Arches National Park was designated as a Class I air quality area, which requires the highest protection under the Clean Air Act (NPS 2006b). While major sources located in both Colorado and Utah, such as power plants, impact the park's air quality, vehicle emissions are the biggest source of emissions within the park. The park contains air quality related values (AQRVs), including vegetation, wildlife, visibility, and night skies. Currently, visibility is the most sensitive AQRV within the park (NPS 2006b).

Therefore, in addition to reducing congestion and providing for a better visitor experience at Arches National Park, the pilot shuttle also aims to reduce the amount of GHGs emitted within the park to ensure the park retains its Class I status and to adhere to federal executive orders.

ARCHES CLIMATE FRIENDLY GOALS

- Reduce overall emissions from private vehicles within the park by diverting 25% of visitor trips to the shuttle during the pilot project.

- Reexamine fuel and shuttle choices whenever shuttle procurement is reconsidered (either during the pilot project, or for long-term implementation) to determine if lower emission options are available.
- Double emission reductions in long-term shuttle by expanding capacity to 50% of visitors and diverting additional private vehicle trips. Expanding capacity will also help the park achieve the 30% emissions reduction required by Executive Order 13423.
- Consider limiting RV use within the park.
- Implement idling restrictions to reduce emissions from shuttle.

ASSUMPTIONS

The Feasibility Study predicts that the shuttle would divert approximately 430 – 530 cars per day within the park by encouraging use of the shuttle. This GHG analysis assumes that each of these cars would have driven approximately 28 - 54 miles within the park, depending on their destinations. Based on the targeted visitor market segments, this analysis assumes that half of the riders would have visited only Balanced Rock and Windows, traveling approximately 28 miles total. The other half of shuttle riders would be visiting all main sections of the park (Windows, Delicate Arch, and Devil’s Garden), traveling 54 miles total. Using these assumptions, it is anticipated that 17,630 – 21,730 private vehicle miles would be eliminated within the park daily. Additional visitors, and therefore an additional reduction in private vehicle mileage, could be captured using the Hiker Express and Sunset shuttles, but for a conservative analysis, those numbers were not included in this report.

The pilot shuttle would run from mid-May through late-September, a total of 110 days each year.

The reduction in emissions from fewer private vehicles must be balanced against the emissions resulting from shuttle operations. The Feasibility Study analyzes several potential fuel types that the shuttle could use. The air modeling program used to determine the vehicle emission rates only provides numbers for standard diesel fuel. This analysis assumed clean diesel or low-sulfur diesel (15 parts per million sulfur content) and is used as a worst-case scenario. If cleaner fuels, like propane, are chosen for implementation, the reduction in GHG emissions could be greater.

GREENHOUSE GAS EMISSIONS

Using the U.S. Environmental Protection Agency’s (EPA) *MOBILE6* air modeling program, private vehicle emission rates were determined for the average national fleet for the year 2013, the projected first year of the pilot shuttle. The emission rate for all vehicles takes into account the distribution of vehicle types. For instance, in 2013, it is estimated that 32 percent of vehicles on the road would be light duty gas vehicles, or passenger cars. Another 40 percent of vehicles would be light duty gas trucks, which includes pick-up trucks and sport utility vehicles. The remaining mix includes motorcycles as well as heavier duty vehicles, such as recreational vehicles that are commonly used by park visitors.

Overall, the average CO₂ emission rate for private vehicles in 2013 is 558.65 grams per mile (g/mi).

MOBILE6 also provided the CO₂ e mission rate for the shuttle bus, which falls under the classification of diesel transit and urban buses. The emission rate for the diesel shuttle bus would be 2,337.4 g/mi.

The Feasibility Study estimates that the entire shuttle system would run approximately 1,370 miles each day while reducing private vehicle miles driven by 17,630 – 21,730 miles per day.

The example calculation below shows how to use the emission rates to calculate the total tons of CO₂ produced by each vehicle type:

$$(\text{Daily Vehicle Miles Traveled}) * (\text{Days per Year}) * (\text{Emission Rate}) = \text{Total Emissions in Grams}$$

$$(\text{Emissions [g]}) * (435.59 \text{ g/lb}) * (2000 \text{ lb/ton}) = \text{Total Emission in Tons}$$

Using these calculations, the total GHG emissions from the shuttle and private vehicles are provide in table 1. Private vehicle emissions are estimated for both the high and low range of the trips diverted estimate.

Table 1: Greenhouse Gas Emissions by Vehicle Type

Vehicle Type	Daily Miles (assumes 33 miles per trip diverted)	Days per year	Emission rate (g/mi)	Total Emissions (tons)
Personal Vehicles (430 trips)	17,630	110	558.7	916.51
Personal Vehicles (530 trips)	21,730	110	558.7	1,184.76
Shuttle Bus	1,300	110	2,337.4	388.26

RESULTS

Using table 1, it is estimated that by diverting 430 - 530 personal vehicle trips daily, the park would eliminate 916.51 to 1,184.76 tons of CO₂ during the months the shuttle is in operation. The shuttle itself, however, would produce 388.26 tons of CO₂, assuming a worst-case scenario. Therefore, the total reduction in CO₂ emissions within the park during operation of the pilot shuttle would range from 528.22 to 796.47 tons annually. These numbers would be expected to increase with the implementation of cleaner fuels for the shuttle.

REFERENCES

Intergovernmental Panel on Climate Change

2007 Fourth Assessment Report: Climate Change 2007.
http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#1

Federal Register

2009 Executive Order 13514: Federal Leadership In Environmental, Energy, and Economic Performance. 5 October 2009.

2007 Executive Order 13423: Strengthening Federal, Energy, and Transportation Management. 24 January 2007

National Park Service

2006a Arches National Park Transportation Implementation Plan and Environmental Assessment. September 2006.

2006b Arches National Park Air Quality Information. Overview. Accessed January 20, 2011. Updated February 21, 2006.

United States Environmental Protection Agency (U.S. EPA)

2009 *MOBILE6.2* Mobile Source Emission Factor Model for 2013 Vehicle Emissions. Model Run January 2012.

APPENDIX E

Environmental Screening Form

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

This form should be attached to all NEPA documents sent to the regional director's office for signature. Sections A and B should be filled out by the project initiator (may be coupled with other park project initiation forms). Sections C, D, E, and G are to be completed by the interdisciplinary team members. While you may modify this form to fit your needs, you must ensure that the form includes information detailed below and must have your modifications reviewed and approved by the regional environmental coordinator. To access this form and other compliance project information, go to <http://pepc.nps.gov>.

A. PROJECT INFORMATION

Park Name Arches National Park Project/PMIS Number 163739

Project Type (Check): ☐ Cyclic ☐ Cultural Cyclic ☐ Repair/Rehab ☐ ONPS
☐ NRPP ☐ CRPP ☐ FLHP
☐ Line Item ☐ Fee Demo ☐ Concession Reimbursable
☐ Other (specify) _____

Project Location Moab, UT

Project Originator/Coordinator Patricia Sacks

Project Title Alternative Transportation System and Congestion Management Study

Contract # B200010xx, Call Order No. P11PD21445 Contractor Name The Louis Berger Group, Inc.

Administrative Record Location N/A

Administrative Record Contact N/A

B. PROJECT DESCRIPTION/LOCATION *(To begin the statutory compliance file, attach to this form, maps, site visit notes, agency consultation, data, reports, categorical exclusion form (if relevant), or other relevant materials.)*

Preliminary drawings attached? ☐ Yes ☒ No Background info attached? ☐ Yes ☐ No

Date form initiated _____ Anticipated compliance completion date _____

Projected advertisement/Day labor start _____ Projected construction start _____

Is project a hot topic (controversial or sensitive issues that should be brought to attention of Regional Director)?
☐ Yes ☒ No

C. RESOURCE EFFECTS TO CONSIDER *(Please see section F, Instructions for Determining Appropriate NEPA Pathway, prior to completing this section. Also use the process described in DO-12, 2.9 and 2.10; 3.5(G) to (G)(5) and 5.4(F) to help determine the context, duration, and intensity of effects on resources.)*

	Identify potential effects to the following physical, natural, or cultural resources	No Effect	Negligible Effects	Minor Effects	Exceeds Minor Effects	Data Needed to Determine
1	Geological resources – soils, bedrock, streambeds, etc.			Limited impacts to soil from disturbance from installation of temporary shade structures, parking lot		Note: Also beneficial impacts from fewer vehicles parking on informal pull off areas.

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

	Identify potential effects to the following physical, natural, or cultural resources	No Effect	Negligible Effects	Minor Effects	Exceeds Minor Effects	Data Needed to Determine
				reconfiguration, and increased wayfinding		
2	From geohazards	X				
3	Air quality					Note: Beneficial Impacts from fewer car emissions in the park, replaced by shuttle operations (diverting 410-530 vehicles per day)
4	Soundscapes		Temporary impacts during any minimal construction. Introduction of shuttles into park, but would vary based on engine/fuel type chosen.			
5	Water quality or quantity	X				
6	Streamflow characteristics	X				
7	Marine or estuarine resources	X				
8	Floodplains or wetlands	X				
9	Land use, including occupancy, income, values, ownership, type of use					To be determined. Potential for impacts, depending on park and ride location.
10	Rare or unusual vegetation – old growth timber, riparian, alpine	X				
11	Species of special concern (plant or animal; state or federal listed or proposed for listing) of their habitat	X				
12	Unique ecosystems, biosphere reserves, World Heritage Sites	X				
13	Unique or important wildlife or wildlife habitat	X				
14	Unique, essential or important fish or fish habitat	X				
15	Introduce or promote non-native species (plant or animal)	X				
16	Recreation resources, including supply, demand, visitation, activities, etc.					Note: Potential for beneficial impacts on demand, which may currently be impacted by congestion in the park.
17	Visitor experience, aesthetic resources					Note: Potential for beneficial impacts on visitor experience, which is currently being adversely impacted by congestion.
18	Archeological resources	X				Note: Park please confirm that no cultural resources would be disturbed with

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

	Identify potential effects to the following physical, natural, or cultural resources	No Effect	Negligible Effects	Minor Effects	Exceeds Minor Effects	Data Needed to Determine
						any parking lot redesigns/configuration
19	Prehistoric/historic structures	X				
20	Cultural landscapes	X				
21	Ethnographic resources	X				
22	Museum collections (objects, specimens, and archival and manuscript collections)	X				
23	Socioeconomics, including employment, occupation, income changes, tax base, infrastructure					Note: Potential for beneficial impacts from increased employment opportunities (shuttle drivers, maintenance, etc).
24	Minority and low income populations, ethnography, size, migration patterns, etc.	X				
25	Energy resources	X				
26	Other agency or tribal use plans or policies	X				
27	Resource, including energy, conservation potential, sustainability					Note: Beneficial impacts from reduction in gasoline, and sustainable transportation system, depending on engine type.
28	Urban quality, gateway communities, etc.					Potential Beneficial Impacts, similar to socioeconomic benefits and the potential for a reduction in traffic.
29	Long-term management of resources or land/resource productivity	X				
30	Other important environmental resources (e.g., geothermal, paleontological resources)?	X				

Comments _____

D. MANDATORY CRITERIA

Mandatory Criteria: If implemented, would the proposal:	Yes	No	Comment or Data Needed to Determine
A. Have significant impacts on public health or safety?		X	
B. Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation, or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); and other ecologically significant or critical areas?		X	

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

C. Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources (NEPA section 102(2)(E))?		X	
D. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?		X	
E. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?		X	
F. Have a direct relationship to other actions with individually insignificant, but cumulatively significant, environmental effects?		X	
G. Have significant impacts on properties listed or eligible for listing on the National Register of Historic Places, as determined by either the bureau or office?		X	
H. Have significant impacts on species listed or proposed to be listed on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species?		X	
I. Violate a federal law, or a state, local, or tribal law or requirement imposed for the protection of the environment?		X	
J. Have a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898)?		X	
K. Limit access to and ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007)?		X	
L. Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112)?		X	

For the purposes of interpreting these procedures within the NPS, any action that has the potential to violate the NPS Organic Act by impairing park resources or values would constitute an action that triggers the DOI exception for actions that threaten to violate a federal law for protection of the environment.

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

E. OTHER INFORMATION *(Please answer the following questions/provide requested information.)*

Are personnel preparing this form familiar with the site? ☒ Yes ☐ No

Did personnel visit site? ☒ Yes ☐ No *(If yes, attach meeting notes re: when site visit took place, who attended, etc.)* Meeting notes from Kick-off meeting attached.

Is the project in an approved plan such as a General Management Plan or an Implementation Plan with an accompanying NEPA document? ☐ Yes ☒ No If so, plan name The GMP explored the idea of a shuttle but deferred the planning effort. A 2006 Transportation EA approved the implementation of congestion management strategies.

Is the project still consistent with the approved plan? ☐ Yes ☐ No

(If no, you may need to prepare plan/EA or EIS.)

Is the environmental document accurate and up-to-date? ☐ Yes ☐ No

(If no, you may need to prepare plan/EA or EIS.)

FONSI ☐ ROD ☐ *(Check one)* Date approved _____

Are there any interested or affected agencies or parties? ☒ Yes ☐ No

Did you make a diligent effort to contact them? ☒ Yes ☐ No ☐ NA

Has consultation with all affected agencies or tribes been completed? ☒ Yes ☐ No ☐ NA *(If yes, attach additional pages re: consultations, including the name, dates, and a summary of comments from other agencies or tribal contacts.)* Meetings with local Utah agencies have been on-going regarding the pilot shuttle.

Are there any connected, cumulative, or similar actions as part of the proposed action (e.g., other development projects in area or identified in GMP, adequate/available utilities to accomplish project)? ☐ Yes ☐ No *(If yes, attach additional pages detailing the other actions.)* projects not yet identified.

F. INSTRUCTIONS FOR DETERMINING APPROPRIATE NEPA PATHWAY

First, always check DO-12, section 3.2, "Process to Follow," in determining whether the action is categorically excluded from additional NEPA analyses. Other sections within DO-12, including sections 2.9 and 2.10; 3.5; 4.5(G) and (G)(5); and 5.4(F), should also be consulted in determining the appropriate NEPA pathway. Complete the following tasks: conduct a site visit or ensure that staff is familiar with the site's specifics; consult with affected agencies, and/or tribes, and interested public; and complete this environmental screening form.

If your action is described in DO-12, section 3.3, "CEs for Which No Formal Documentation is Necessary," follow the instructions indicated in that section.

If your action is not described in DO-12, section 3.3, and IS described in section 3.4, AND you checked YES or identified "data needed to determine" impacts in any block in section D (Mandatory Criteria), this is an indication that there is potential for significant impacts to the human environment, therefore you must prepare an EA or EIS or supply missing information to determine context, duration, and intensity of impacts.

If your action is described in section 3.4 and NO is checked for all boxes in section D (Mandatory Criteria), AND there are either no effects or **all** of the potential effects identified in Section C (Resource Effects to Consider) are no more than minor intensity, usually there is no potential for significant impacts and an EA or EIS is not required. If, however, during internal scoping and further investigation, resource effects still remain unknown, or are at the minor to moderate level of intensity, and the potential for significant impacts may be likely, an EA or EIS is required.

In all cases, data collected to determine the appropriate NEPA pathway must be included in the administrative record.

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

G. INTERDISCIPLINARY TEAM SIGNATORIES *(All interdisciplinary team members must sign.) By signing this form, you affirm the following: you have either completed a site visit or are familiar with the specifics of the site; you have consulted with affected agencies and tribes; and you, to the best of your knowledge, have answered the questions posed in the checklist correctly.*

Interdisciplinary Team Leader Name	Discipline/Field of Expertise	Date
Technical Specialists Names	Discipline/Field of Expertise	Date

H. SUPERVISORY SIGNATORY

Based on the environmental impact information contained in the statutory compliance files and in this environmental screening form, environmental documentation for the subject project is complete. If the project involves hot topics or sensitive issues, I have briefed the deputy or regional director.

Recommended:

Compliance Specialist	Telephone Number	Date

Approved:

Superintendent	Telephone Number	Date

APPENDIX F

Detailed Cost Estimates for Cost and Cost Benefit

					Base-Year Estimate				Annualized Costs																																	
					Unit of Measurement	Unit Price	Quantity	Estimate	Startup	Pilot Project				Full Build																												
					2013	2014	2015		2016	2017	2018	2019		2020	2021	2022	2023	2024	2025	2026	2027	2028																				
Administrative																																										
TDM Coordinator (GS 7)					FTE	\$	64,000.00	0.29	\$	18,667	\$	-	\$	20,398	\$	21,009	\$	21,640	\$	22,289	\$	22,958	\$	23,646	\$	24,356	\$	25,086	\$	25,839	\$	26,614	\$	27,413	\$	28,235	\$	29,082	\$	29,955	\$	30,853
Transportation Manager (GS 11)					FTE	\$	96,000.00	0.75	\$	72,000	\$	76,385	\$	78,676	\$	81,037	\$	83,468	\$	85,972	\$	88,551	\$	91,207	\$	93,944	\$	96,762	\$	99,665	\$	102,655	\$	105,734	\$	108,906	\$	112,174	\$	115,539	\$	119,005
Ticket Sales People (Frontline Staff)					FTE	\$	49,000.00	0.88	\$	42,875	\$	-	\$	46,851	\$	48,256	\$	49,704	\$	51,195	\$	52,731	\$	54,313	\$	55,942	\$	57,620	\$	59,349	\$	61,129	\$	62,963	\$	64,852	\$	66,798	\$	68,802	\$	70,866
Parking Enforcement (Frontline Staff)					FTE	\$	49,000.00	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Subtotal											\$	76,385	\$	145,925	\$	150,302	\$	154,811	\$	159,456	\$	164,239	\$	169,167	\$	174,242	\$	179,469	\$	184,853	\$	190,398	\$	196,110	\$	201,994	\$	208,054	\$	214,295	\$	220,724
Operations and Maintenance																																										
Purchased Shuttle Service																																										
Main Shuttle - Year 1					Hours	\$	94.88	12,690.00	\$	1,203,964	\$	-	\$	1,277,285	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-		
Main Shuttle Variant 1 - Years 2 & 3					Hours	\$	94.88	13,959.00	\$	1,324,360	\$	-	\$	-	\$	1,490,579	\$	1,535,296	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-		
Hiker Shuttle - Year 3					Hours	\$	94.88	856.00	\$	81,213	\$	-	\$	-	\$	-	\$	94,148	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-		
Sunset Shuttle Year 3					Hours	\$	94.88	423.00	\$	40,132	\$	-	\$	-	\$	-	\$	46,524	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-		
Long-Term Operations - Years 4 - 16					Hours	\$	82.50	13,959.00	\$	1,151,618	\$	-	\$	-	\$	-	\$	-	\$	1,375,092	\$	1,416,344	\$	1,458,835	\$	1,502,600	\$	1,547,678	\$	1,594,108	\$	1,641,931	\$	1,691,189	\$	1,741,925	\$	1,794,183	\$	1,848,008	\$	1,903,448
Hiker Shuttle - Years 4 - 16					Hours	\$	82.50	856.00	\$	70,620	\$	-	\$	-	\$	-	\$	-	\$	84,324	\$	86,854	\$	89,459	\$	92,143	\$	94,907	\$	97,755	\$	100,687	\$	103,708	\$	106,819	\$	110,024	\$	113,324	\$	116,724
Sunset Shuttle Years 4 - 16					Hours	\$	82.50	423.00	\$	34,898	\$	-	\$	-	\$	-	\$	-	\$	41,669	\$	42,920	\$	44,207	\$	45,533	\$	46,899	\$	48,306	\$	49,755	\$	51,248	\$	52,786	\$	54,369	\$	56,000	\$	57,680
Variable Message Signs - Annual Maintenance					Each	\$	1,400.00	3.00	\$	4,200	\$	-	\$	4,456	\$	4,727	\$	4,869	\$	5,015	\$	5,165	\$	5,320	\$	5,480	\$	5,644	\$	5,814	\$	5,988	\$	6,168	\$	6,353	\$	6,543	\$	6,740	\$	6,942
Park and Ride Lot - Annual Maintenance Years 1 - 3					Per Season	\$	2,500.00	1.00	\$	2,500	\$	-	\$	2,652	\$	2,814	\$	2,898	\$	2,985	\$	3,075	\$	3,167	\$	3,262	\$	3,360	\$	3,461	\$	3,564	\$	3,671	\$	3,781	\$	3,895	\$	4,012	\$	4,132
Park and Ride Lot - Annual Maintenance Years 4 - 16					Per Season	\$	5,000.00	1.00	\$	5,000	\$	-	\$	5,305	\$	5,628	\$	5,796	\$	5,970	\$	6,149	\$	6,334	\$	6,524	\$	6,720	\$	6,921	\$	7,129	\$	7,343	\$	7,563	\$	7,790	\$	8,024	\$	8,264
Portable Bathrooms					Weeks	\$	40.00	303.33	\$	12,133	\$	-	\$	12,872	\$	13,656	\$	14,066	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Subtotal											\$	-	\$	1,302,570	\$	1,517,404	\$	1,703,598	\$	1,515,055	\$	1,560,507	\$	1,607,322	\$	1,655,542	\$	1,705,208	\$	1,756,364	\$	1,809,055	\$	1,863,327	\$	1,919,227	\$	1,976,804	\$	2,036,108	\$	2,097,191
Capital																																										
40' Heavy Duty Transit Buses					Each	\$	400,000.00	14.00	\$	5,600,000	\$	-	\$	-	\$	-	\$	-	\$	6,686,693	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Variable Message Signs (Portable)					Each	\$	23,200.00	2.00	\$	46,400	\$	-	\$	50,703	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Upgrade wayfinding signs					Each	\$	200.00	8.00	\$	1,600	\$	-	\$	1,748	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Standard 1-Shuttle Stop					Each	\$	20,300	10.00	\$	203,000	\$	-	\$	221,824	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Standard 2-Shuttle Stop - Year 1					Each	\$	33,100	1.00	\$	33,100	\$	-	\$	36,169	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Standard 2-Shuttle Stop - Year 2					Each	\$	33,100	1.00	\$	33,100	\$	-	\$	-	\$	37,254	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Allownace for Site Improvements - Year 1					Each	\$	10,200	3.00	\$	30,600	\$	-	\$	33,437	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Allownace for Site Improvements - Year 2					Each	\$	10,200	2.00	\$	20,400	\$	-	\$	-	\$	22,960	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Phase 1 Park and Ride Lot Improvements					Lump Sum	\$	874,645	1.00	\$	874,645	\$	-	\$	955,748	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Shuttle Priority Lane					Lump Sum	\$	60,050	1.00	\$	60,050	\$	-	\$	65,618	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Phase 2 Park and Ride Lot Improvements					Lump Sum	\$	1,095,055	1.00	\$	1,095,055	\$	-	\$	-	\$	-	\$	-	\$	1,307,553	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Engineering & Design					% Const. Cost			15%			\$	196,920	\$	9,032	\$	-	\$	196,133	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Contingency					% Const. Cost			10%			\$	-	\$	131,280	\$	6,021	\$	-	\$	130,755	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Subtotal											\$	196,920	\$	1,505,560	\$	66,236	\$	196,133	\$	8,125,001	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
Grand Total											\$	273,304	\$	2,954,054	\$	1,733,942	\$	2,054,542	\$	9,799,512	\$	1,724,746	\$	1,776,489	\$	1,829,783	\$	1,884,677	\$	1,941,217	\$	1,999,454	\$	2,059,437	\$	2,121,221	\$	2,184,857	\$	2,250,403	\$	2,317,915

	Base-Year Estimate			
	Unit of Measurement	Unit Price	Quantity	Estimate
Detailed Cost Estimates - Shuttle Infrastructure				
Standard 1-Shuttle Stop				
Site preparation and clearing	SF	\$ 2.50	200.00	\$ 500
Grading and erosion control	SF	\$ 5.00	200.00	\$ 1,000
Stabilized Decomposed Granite	SF	\$ 5.00	200.00	\$ 1,000
Shelter	Each	\$ 12,000.00	1.00	\$ 12,000
Bench	Each	\$ 1,800.00	2.00	\$ 3,600
Trash Receptacle	Each	\$ 1,400.00	1.00	\$ 1,400
Wayfinding signage (with posts)	Each	\$ 300.00	1.00	\$ 300
Restoration and finished grading	SF	\$ 2.50	200.00	\$ 500
Subtotal				\$ 20,300
Standard 2-Shuttle Stop				
Site preparation and clearing	SF	\$ 2.50	200.00	\$ 500
Grading and erosion control	SF	\$ 5.00	200.00	\$ 1,000
Stabilized Decomposed Granite	SF	\$ 5.00	200.00	\$ 1,000
Shelter	Each	\$ 12,000.00	2.00	\$ 24,000
Bench	Each	\$ 1,800.00	2.00	\$ 3,600
Trash Receptacle	Each	\$ 1,400.00	1.00	\$ 1,400
Wayfinding signage (with posts)	Each	\$ 300.00	2.00	\$ 600
Restoration and finished grading	SF	\$ 2.50	400.00	\$ 1,000
Subtotal				\$ 33,100
Allowance for Site Improvements				
Restriping & removing old stripes	LF	\$ 2.00	700.00	\$ 1,400
Extend compacted gravel sidewalk	SF	\$ 5.00	400.00	\$ 2,000
Relocate post and rail fence 3'	Allow	\$ 2,000.00	1.00	\$ 2,000
Add new portions of post and rail fence	LF	\$ 60.00	80.00	\$ 4,800
Subtotal				\$ 10,200
Phase 1 Temporary Park & Ride Lot (Module 1)				
Site preparation and clearing	SY	\$ 2.50	24,050	\$ 60,125
Grading and erosion control	SY	\$ 5.00	24,050	\$ 120,250
Compacted gravel parking lot (pilot project only)	SF	\$ 1.50	169,000	\$ 253,500
Asphaltic concrete paving	SF	\$ 3.75	48,000	\$ 180,000
Curb and Gutter	LF	\$ 22.00	2,210	\$ 48,620
Pedestrian Area pavement	SF	\$ 7.00	15,000	\$ 105,000
Restoration and finished grading	SY	\$ 2.50	4,500	\$ 11,250
Temporary Ticket Kiosk	Allow	\$ 10,000.00	1	\$ 10,000
Temporary Bathroom Screen	LF	\$ 40.00	60	\$ 2,400
Shelters	Each	\$ 12,000.00	3	\$ 36,000
Benches	Each	\$ 1,800.00	12	\$ 21,600
Trash Receptacles	Each	\$ 1,400.00	6	\$ 8,400
Wayfinding signage	Each	\$ 300.00	25	\$ 7,500
Informational signage	Each	\$ 2,000.00	5	\$ 10,000
Subtotal				\$ 874,645
Phase 2 Permanent Park & Ride Lot (Module 1)				
Site preparation and clearing	SY	\$ 2.50	24,050.00	\$ 60,125
Grading and erosion control	SY	\$ 5.00	24,050.00	\$ 120,250
Asphaltic concrete paving	SF	\$ 3.75	121,000.00	\$ 453,750
Curb and Gutter	LF	\$ 22.00	3,640.00	\$ 80,080
Wheel Stops	Each	\$ 85.00	180.00	\$ 15,300
Painted pavement markings (4"wide)	LF	\$ 0.50	9,100.00	\$ 4,550
Mulching and planting	SY	\$ 10.00	4,500.00	\$ 45,000
Stormwater drainage and biofiltration	Allow	\$ 26,000	1.00	\$ 26,000
Utility Connections	Allow	\$ 65,000	1.00	\$ 65,000
Permanent ticketing kiosk	SF	\$ 250.00	300.00	\$ 75,000
Restroom building	SF	\$ 250.00	600.00	\$ 150,000
Subtotal				\$ 1,095,055
Shuttle Priority Lane				
Demolition of existing curb and gutter	LF	\$ 4.00	700.00	\$ 2,800
Site preparation and clearing	SY	\$ 2.50	780.00	\$ 1,950
Grading and erosion control	SY	\$ 5.00	780.00	\$ 3,900
Asphaltic concrete paving (permanent)	SF	\$ 3.75	7,000.00	\$ 26,250
Curb and Gutter	LF	\$ 22.00	700.00	\$ 15,400
Restoration and finished grading	SY	\$ 2.50	780.00	\$ 1,950
Mulching and planting	SY	\$ 10.00	780.00	\$ 7,800
Subtotal				\$ 60,050

	Base-Year Estimate				Annualized Costs														
	Unit of Measurement	Unit Price	Quantity	Estimate	Pilot Project			Full Build											
					2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Administrative																			
Supplemental Park Staff	FTE	\$ 64,000.00	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Sub Total					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Operations and Maintenance																			
DSL Line	Annual	\$ 1,200.00	3.00	\$ 3,600	\$ 3,819	\$ 3,934	\$ 4,052	\$ 4,173	\$ 4,299	\$ 4,428	\$ 4,560	\$ 4,697	\$ 4,838	\$ 4,983	\$ 5,133	\$ 5,287	\$ 5,445	\$ 5,609	\$ 5,777
Sub Total					\$ 3,819	\$ 3,934	\$ 4,052	\$ 4,173	\$ 4,299	\$ 4,428	\$ 4,560	\$ 4,697	\$ 4,838	\$ 4,983	\$ 5,133	\$ 5,287	\$ 5,445	\$ 5,609	\$ 5,777
Capital																			
Ticket Printer	Each	\$ 1,600.00	5.00	\$ 8,000	\$ 8,487	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,134	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 12,101	\$ -	\$ -
Computers	Each	\$ 2,500.00	5.00	\$ 12,500	\$ 13,261	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 15,835	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 18,907	\$ -	\$ -
Sub Total					\$ 21,748	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 25,969	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 31,008	\$ -	\$ -
Grand Total					\$ 25,568	\$ 3,934	\$ 4,052	\$ 4,173	\$ 4,299	\$ 4,428	\$ 30,529	\$ 4,697	\$ 4,838	\$ 4,983	\$ 5,133	\$ 5,287	\$ 36,453	\$ 5,609	\$ 5,777

	Base-Year Estimate					Pilot Project			Annualized Costs													
	Unit of Measurement	Unit Price	Quantity	Estimate					Full Build													
						2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
Administrative																						
TDM Coordinator (GS 7)	FTE	\$ 64,000.00	0.58	\$ 37,333		\$ 39,607	\$ 40,795	\$ 42,019	\$ 43,280	\$ 44,578	\$ 45,915	\$ 47,293	\$ 48,712	\$ 50,173	\$ 51,678	\$ 53,228	\$ 54,825	\$ 56,470	\$ 58,164	\$ 59,909		
Subtotal						\$ 39,607	\$ 40,795	\$ 42,019	\$ 43,280	\$ 44,578	\$ 45,915	\$ 47,293	\$ 48,712	\$ 50,173	\$ 51,678	\$ 53,228	\$ 54,825	\$ 56,470	\$ 58,164	\$ 59,909		
Operations and Maintenance																						
Seasonal Parking Coordinators	Hours	\$ 16.80	480.00	\$ 8,064		\$ 8,555	\$ 8,812	\$ 9,076	\$ 9,348	\$ 9,629	\$ 9,918	\$ 10,215	\$ 10,522	\$ 10,837	\$ 11,162	\$ 11,497	\$ 11,842	\$ 12,198	\$ 12,563	\$ 12,940		
Variable Message Signs - Annual Maintenance	Each	\$ 1,400.00	2.00	\$ 2,800		\$ 2,971	\$ 3,060	\$ 3,151	\$ 3,246	\$ 3,343	\$ 3,444	\$ 3,547	\$ 3,653	\$ 3,763	\$ 3,876	\$ 3,992	\$ 4,112	\$ 4,235	\$ 4,362	\$ 4,493		
Highway Advisory Radio - Annual Maintenance	Each	\$ 900.00	1.00	\$ 900		\$ 955	\$ 983	\$ 1,013	\$ 1,043	\$ 1,075	\$ 1,107	\$ 1,140	\$ 1,174	\$ 1,210	\$ 1,246	\$ 1,283	\$ 1,322	\$ 1,361	\$ 1,402	\$ 1,444		
Subtotal						\$ 12,480	\$ 12,855	\$ 13,240	\$ 13,638	\$ 14,047	\$ 14,468	\$ 14,902	\$ 15,349	\$ 15,810	\$ 16,284	\$ 16,773	\$ 17,276	\$ 17,794	\$ 18,328	\$ 18,878		
Capital																						
Variable Message Signs (Portable)	Each	\$ 23,200.00	3.00	\$ 69,600		\$ 73,839	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
Highway Advisory Radio	LS	\$ 40,600.00	1.00	\$ 40,600		\$ 43,073	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
Parking Coordinator Radios	Each	\$ 250.00	5.00	\$ 1,250		\$ 1,326	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
Upgrade wayfinding signs	Each	\$ 200.00	8.00	\$ 1,600		\$ 1,697	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
Subtotal						\$ 119,935	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
Grand Total					Total	\$ 172,022	\$ 53,650	\$ 55,259	\$ 56,917	\$ 58,625	\$ 60,384	\$ 62,195	\$ 64,061	\$ 65,983	\$ 67,962	\$ 70,001	\$ 72,101	\$ 74,264	\$ 76,492	\$ 78,787		

	Revenue, Subsidy & Cost Benefit Estimates															
	Startup	Pilot Project			Full Build											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Trip Diversion Estimate																
Shuttle Season Visitors*	742,630	764,909	787,856	811,492	835,837	860,912	886,739	913,341	940,741	968,964	998,033	1,027,974	1,058,813	1,090,577	1,123,295	1,156,993
Trip Diversion Rate	0%	23%	25%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%
Total Shuttle Season Visitor Trips Diverted	-	175,929	196,964	227,218	234,034	241,055	248,287	255,736	263,408	271,310	279,449	287,833	296,468	305,362	314,522	323,958
Revenue & Subsidy Estimates																
Assumptions																
Shuttle Season Vehicles	275,048	283,300	291,799	300,553	309,569	318,856	328,422	338,275	348,423	358,875	369,642	380,731	392,153	403,917	416,035	428,516
Transportation Fee per Group (includes shuttle and vehicle groups & individuals)	\$ -	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00
Percent who pay fee	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Total Annualized Cost	\$ 273,304	\$ 2,954,054	\$ 1,733,942	\$ 2,054,542	\$ 9,799,512	\$ 1,724,746	\$ 1,776,489	\$ 1,829,783	\$ 1,884,677	\$ 1,941,217	\$ 1,999,454	\$ 2,059,437	\$ 2,121,221	\$ 2,184,857	\$ 2,250,403	\$ 2,317,915
Less Annual Transportation Fee Revenue	\$ -	\$ (849,899)	\$ (875,396)	\$ (901,658)	\$ (928,707)	\$ (956,569)	\$ (985,266)	\$ (1,014,824)	\$ (1,045,268)	\$ (1,076,626)	\$ (1,108,925)	\$ (1,142,193)	\$ (1,176,459)	\$ (1,211,752)	\$ (1,248,105)	\$ (1,285,548)
Less Capital Grant Revenue (80%)	\$ (157,536)	\$ (1,204,448)	\$ (52,989)	\$ (156,906)	\$ (6,500,001)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Annual Financial Liability to Arches NP	\$ 115,769	\$ 899,708	\$ 805,557	\$ 995,978	\$ 2,370,804	\$ 768,178	\$ 791,223	\$ 814,960	\$ 839,409	\$ 864,591	\$ 890,529	\$ 917,245	\$ 944,762	\$ 973,105	\$ 1,002,298	\$ 1,032,367
Breakdown of Annual Financial Liability to Arches NP																
Administration	\$ 76,385	\$ 145,925	\$ 150,302	\$ 154,811	\$ 159,456	\$ 164,239	\$ 169,167	\$ 174,242	\$ 179,469	\$ 184,853	\$ 190,398	\$ 196,110	\$ 201,994	\$ 208,054	\$ 214,295	\$ 220,724
Operations and Maintenance	\$ -	\$ 452,671	\$ 642,008	\$ 801,940	\$ 586,348	\$ 603,938	\$ 622,057	\$ 640,718	\$ 659,940	\$ 679,738	\$ 700,130	\$ 721,134	\$ 742,768	\$ 765,051	\$ 788,003	\$ 811,643
Capital	\$ 39,384	\$ 301,112	\$ 13,247	\$ 39,227	\$ 1,625,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Subsidy	\$ 115,769	\$ 899,708	\$ 805,557	\$ 995,978	\$ 2,370,804	\$ 768,178	\$ 791,223	\$ 814,960	\$ 839,409	\$ 864,591	\$ 890,529	\$ 917,245	\$ 944,762	\$ 973,105	\$ 1,002,298	\$ 1,032,367
Cost/Benefit Analysis																
Total Cost per Visitor Trip Diverted	N/A	\$ 16.79	\$ 8.80	\$ 9.04	\$ 41.87	\$ 7.15	\$ 7.15	\$ 7.15	\$ 7.15	\$ 7.15	\$ 7.15	\$ 7.15	\$ 7.15	\$ 7.15	\$ 7.15	\$ 7.15
Cost minus Capital Grants per Visitor Trip Diverted	N/A	\$ 5.11	\$ 4.09	\$ 4.38	\$ 10.13	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19
Net Operating Subsidy/Trip Diverted	N/A	\$ 3.40	\$ 4.02	\$ 4.21	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19	\$ 3.19

	Revenue, Subsidy & Cost Benefit Estimates														
	Pilot Project			Full Build											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Trip Diversion Estimate															
Shuttle Season Visitors*	991,942	1,021,700	1,052,351	1,083,921	1,116,439	1,149,932	1,184,430	1,219,963	1,256,562	1,294,259	1,333,086	1,373,079	1,414,271	1,456,700	1,500,401
Trip Diversion Rate	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
Total Shuttle Season Visitor Trips Diverted	247,985	255,425	263,088	270,980	279,110	287,483	296,108	304,991	314,140	323,565	333,272	343,270	353,568	364,175	375,100
Revenue & Subsidy Estimates															
Total Annualized Cost	\$ 25,568	\$ 3,934	\$ 4,052	\$ 4,173	\$ 4,299	\$ 4,428	\$ 30,529	\$ 4,697	\$ 4,838	\$ 4,983	\$ 5,133	\$ 5,287	\$ 36,453	\$ 5,609	\$ 5,777
Less Capital Grants (80%)	\$ (17,399)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (20,775)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (24,806)	\$ -	\$ -
Total Annual Financial Liability to Arches NP	\$ 8,169	\$ 3,934	\$ 4,052	\$ 4,173	\$ 4,299	\$ 4,428	\$ 9,754	\$ 4,697	\$ 4,838	\$ 4,983	\$ 5,133	\$ 5,287	\$ 11,647	\$ 5,609	\$ 5,777
Breakdown of Annual Financial Liability to Arches NP															
Administration	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Operations and Maintenance	\$ 3,819	\$ 3,934	\$ 4,052	\$ 4,173	\$ 4,299	\$ 4,428	\$ 4,560	\$ 4,697	\$ 4,838	\$ 4,983	\$ 5,133	\$ 5,287	\$ 5,445	\$ 5,609	\$ 5,777
Capital	\$ 4,350	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,194	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 6,202	\$ -	\$ -
Total	\$ 8,169	\$ 3,934	\$ 4,052	\$ 4,173	\$ 4,299	\$ 4,428	\$ 9,754	\$ 4,697	\$ 4,838	\$ 4,983	\$ 5,133	\$ 5,287	\$ 11,647	\$ 5,609	\$ 5,777
Cost/Benefit Analysis															
Total Cost per Visitor Trip Diverted	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Cost minus Capital Grants per Visitor Trip Diverted	\$ 0.03	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.03	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.03	\$ 0.02	\$ 0.02
Net Operating Subsidy/Trip Diverted	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02

	Revenue, Subsidy & Cost Benefit Estimates														
	Pilot Project			Full Build											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Trip Diversion Estimate															
Shuttle Season Visitors*	991,942	1,021,700	1,052,351	1,083,921	1,116,439	1,149,932	1,184,430	1,219,963	1,256,562	1,294,259	1,333,086	1,373,079	1,414,271	1,456,700	1,500,401
Trip Diversion Rate	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Total Shuttle Season Visitor Trips Diverted	9,919.42	20,433.99	21,047.01	21,678.43	22,328.78	22,998.64	23,688.60	24,399.26	25,131.24	25,885.17	26,661.73	27,461.58	28,285.43	29,133.99	30,008.01
Revenue & Subsidy Estimates															
Total Annualized Cost	\$ 172,022	\$ 53,650	\$ 55,259	\$ 56,917	\$ 58,625	\$ 60,384	\$ 62,195	\$ 64,061	\$ 65,983	\$ 67,962	\$ 70,001	\$ 72,101	\$ 74,264	\$ 76,492	\$ 78,787
Less Capital Grants (80%)	\$ (95,948)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Annual Financial Liability to Arches NP	\$ 76,074	\$ 53,650	\$ 55,259	\$ 56,917	\$ 58,625	\$ 60,384	\$ 62,195	\$ 64,061	\$ 65,983	\$ 67,962	\$ 70,001	\$ 72,101	\$ 74,264	\$ 76,492	\$ 78,787
Breakdown of Annual Financial Liability to Arches NP															
Administration	\$ 39,607	\$ 40,795	\$ 42,019	\$ 43,280	\$ 44,578	\$ 45,915	\$ 47,293	\$ 48,712	\$ 50,173	\$ 51,678	\$ 53,228	\$ 54,825	\$ 56,470	\$ 58,164	\$ 59,909
Operations and Maintenance	\$ 12,480	\$ 12,855	\$ 13,240	\$ 13,638	\$ 14,047	\$ 14,468	\$ 14,902	\$ 15,349	\$ 15,810	\$ 16,284	\$ 16,773	\$ 17,276	\$ 17,794	\$ 18,328	\$ 18,878
Capital	\$ 23,987	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total	\$ 76,074	\$ 53,650	\$ 55,259	\$ 56,917	\$ 58,625	\$ 60,384	\$ 62,195	\$ 64,061	\$ 65,983	\$ 67,962	\$ 70,001	\$ 72,101	\$ 74,264	\$ 76,492	\$ 78,787
Cost/Benefit Analysis															
Total Cost per Visitor Trip Diverted	\$ 17.34	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63
Cost minus Capital Grants per Visitor Trip Diverted	\$ 7.67	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63
Net Operating Subsidy/Trip Diverted	\$ 5.25	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63	\$ 2.63

Annualized Costs																			
	Startup	Pilot Project				TOTAL PILOT	Full Build											TOTAL 10-Year	Total 13-Year
	2014	2015	2016	2017		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027				
Purchased Vehicles 2018-2027 (Contracted Vehicles Pilot)																			
Administrative	\$ 78,676	\$ 150,302	\$ 154,811	\$ 159,456	\$ 543,246	\$ 164,239	\$ 169,167	\$ 174,242	\$ 179,469	\$ 184,853	\$ 190,398	\$ 196,110	\$ 201,994	\$ 208,054	\$ 214,295	\$ 1,882,821	\$ 2,426,067		
Operations and Maintenance	\$ -	\$ 1,381,115	\$ 1,562,926	\$ 1,754,706	\$ 4,698,747	\$ 1,560,507	\$ 1,607,322	\$ 1,655,542	\$ 1,705,208	\$ 1,756,364	\$ 1,809,055	\$ 1,863,327	\$ 1,919,227	\$ 1,976,804	\$ 2,036,108	\$ 17,889,464	\$ 22,588,211		
Capital	\$ 202,827	\$ 1,550,726	\$ 68,223	\$ 202,017	\$ 2,023,794	\$ 8,368,751	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,368,751	\$ 10,392,545		
Grand Total	\$ 281,503	\$ 3,082,144	\$ 1,785,960	\$ 2,116,179	\$ 7,265,786	\$ 10,093,498	\$ 1,776,489	\$ 1,829,783	\$ 1,884,677	\$ 1,941,217	\$ 1,999,454	\$ 2,059,437	\$ 2,121,221	\$ 2,184,857	\$ 2,250,403	\$ 28,141,036	\$ 35,406,822		
Total Cost Discounted to 2012\$	\$ 264,867	\$ 2,812,989	\$ 1,581,098	\$ 1,817,235	\$ 6,476,188	\$ 8,407,601	\$ 1,435,372	\$ 1,434,081	\$ 1,432,790	\$ 1,431,500	\$ 1,430,212	\$ 1,428,925	\$ 1,427,639	\$ 1,426,354	\$ 1,425,070	\$ 21,279,545	\$ 27,755,733		
	Startup	Pilot Project				TOTAL PILOT	Full Build											TOTAL 10-Year	Total 13-Year
	2014	2015	2016	2017		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027				
Contracted Vehicles 2015-2027																			
Administrative	\$ 78,676	\$ 150,302	\$ 154,811	\$ 159,456	\$ 543,246	\$ 164,239	\$ 169,167	\$ 174,242	\$ 179,469	\$ 184,853	\$ 190,398	\$ 196,110	\$ 201,994	\$ 208,054	\$ 214,295	\$ 1,882,821	\$ 2,426,067		
Operations and Maintenance	\$ -	\$ 1,381,115	\$ 1,562,926	\$ 1,754,706	\$ 4,698,747	\$ 1,792,425	\$ 1,846,197	\$ 1,901,583	\$ 1,958,631	\$ 2,017,390	\$ 2,077,911	\$ 2,140,249	\$ 2,204,456	\$ 2,270,590	\$ 2,338,708	\$ 20,548,140	\$ 25,246,886		
Capital	\$ 202,827	\$ 1,550,726	\$ 68,223	\$ 202,017	\$ 2,023,794	\$ 1,481,457	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,481,457	\$ 3,505,251		
Grand Total	\$ 281,503	\$ 3,082,144	\$ 1,785,960	\$ 2,116,179	\$ 7,265,786	\$ 3,438,122	\$ 2,015,364	\$ 2,075,825	\$ 2,138,100	\$ 2,202,243	\$ 2,268,310	\$ 2,336,359	\$ 2,406,450	\$ 2,478,643	\$ 2,553,003	\$ 23,912,418	\$ 31,178,204		
Total Cost Discounted to 2012\$	\$ 264,867	\$ 2,812,989	\$ 1,581,098	\$ 1,817,235	\$ 6,476,188	\$ 2,863,859	\$ 1,628,380	\$ 1,626,914	\$ 1,625,450	\$ 1,623,987	\$ 1,622,525	\$ 1,621,065	\$ 1,619,606	\$ 1,618,148	\$ 1,616,692	\$ 17,466,626	\$ 23,942,814		
	Startup	Pilot Project				TOTAL PILOT	Full Build											TOTAL 10-Year	Total 13-Year
	2014	2015	2016	2017		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027				
COST DIFFERENCE (Contracted-Purchased)																			
Cost difference	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (6,655,376)	\$ 238,875	\$ 246,041	\$ 253,423	\$ 261,025	\$ 268,856	\$ 276,922	\$ 285,229	\$ 293,786	\$ 302,600	\$ (4,228,618)	\$ (4,228,618)		
Cost difference in 2012 \$	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (5,543,742)	\$ 193,007	\$ 192,833	\$ 192,660	\$ 192,486	\$ 192,313	\$ 192,140	\$ 191,967	\$ 191,794	\$ 191,622	\$ (3,812,919)	\$ (3,812,919)		
	Startup	Pilot Project				TOTAL PILOT	Full Build											TOTAL 10-Year	Total 13-Year
	2014	2015	2016	2017		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027				
COST - FEE REVENUE																			
Transportation Fee Revenue	\$ -	\$ (1,250,565)	\$ (1,288,082)	\$ (1,326,725)	\$ (3,865,372)	\$ (1,366,527)	\$ (1,407,522)	\$ (1,449,748)	\$ (1,493,240)	\$ (1,538,038)	\$ (1,584,179)	\$ (1,631,704)	\$ (1,680,655)	\$ (1,731,075)	\$ (1,783,007)	\$ (15,665,695)	\$ (19,531,067)		
Remaining Financial Liability - Purchased	\$ 281,503	\$ 1,831,578	\$ 497,878	\$ 789,454	\$ 3,400,414	\$ 8,726,971	\$ 368,966	\$ 380,035	\$ 391,437	\$ 403,180	\$ 415,275	\$ 427,733	\$ 440,565	\$ 453,782	\$ 467,396	\$ 12,475,341	\$ 15,875,755		
Remaining Financial Liability - Contracted	\$ 281,503	\$ 1,831,578	\$ 497,878	\$ 789,454	\$ 3,400,414	\$ 2,071,595	\$ 607,842	\$ 626,077	\$ 644,859	\$ 664,205	\$ 684,131	\$ 704,655	\$ 725,795	\$ 747,569	\$ 769,996	\$ 8,246,723	\$ 11,647,137		

Cost Escalation Assumptions	
Base-Year	2011
Growth	3.00%
Discount Year	2012
Discount	3.00%

Contractor Cost Assumptions	
Base Price	\$75.00
Remoteness: +10%	\$82.50
Vehicles: +15%	\$94.88

Fee Revenue Assumptions:	
1,000,000 annual visitors 2011	
2.7 visitors per vehicle	
30% paying fee	
\$10 fee	
\$ 1,111,111 est. 2011 revenue	
3% growth in annual visitation	
\$ 1,250,565 est. 2015 fee revenue	

SUMMARY Total Costs

	Startup	Total Pilot	Total 10-Year (post-pilot)	Grand Total 13-Year
Purchased Vehicles 2018-2027 (Contracted Vehicles Pilot)				
Administrative	\$ 78,676	\$ 543,246	\$ 1,882,821	\$ 2,426,067
Operations and Maintenance	\$ -	\$ 4,698,747	\$ 17,889,464	\$ 22,588,211
Capital	\$ 202,827	\$ 2,023,794	\$ 8,368,751	\$ 10,392,545
Grand Total	\$ 281,503	\$ 7,265,786	\$ 28,141,036	\$ 35,406,822
Total Cost Discounted to 2012\$	\$ 264,867	\$ 6,476,188	\$ 21,279,545	\$ 27,755,733
Contracted Vehicles 2015-2027				
Administrative	\$ 78,676	\$ 543,246	\$ 1,882,821	\$ 2,426,067
Operations and Maintenance	\$ -	\$ 4,698,747	\$ 20,548,140	\$ 25,246,886
Capital	\$ 202,827	\$ 2,023,794	\$ 1,481,457	\$ 3,505,251
Grand Total	\$ 281,503	\$ 7,265,786	\$ 23,912,418	\$ 31,178,204
Total Cost Discounted to 2012\$	\$ 264,867	\$ 6,476,188	\$ 17,466,626	\$ 23,942,814
COST DIFFERENCE (Contracted-Purchased)				
Difference	\$ -	\$ -	\$ (4,228,618)	\$ (4,228,618)
Difference in 2012\$	\$ -	\$ -	\$ (3,812,919)	\$ (3,812,919)
COST - FEE REVENUE				
Transportation Fee Revenue	\$ -	\$ (3,865,372)	\$ (15,665,695)	\$ (19,531,067)
Financial Liability to Arches w/Capital Grant - Purchased	\$ 281,503	\$ 3,400,414	\$ 12,475,341	\$ 15,875,755
Financial Liability to Arches w/Capital Grant - Contracted	\$ 281,503	\$ 3,400,414	\$ 8,246,723	\$ 11,647,137

Detailed Cost Estimates - Shuttle Infrastructure	Base-Year Estimate				
	Unit of Measurement	Unit Price	Quantity	Estimate	
Standard 1-Shuttle Stop					
Site preparation and clearing	SF	\$ 2.50	200.00	\$ 500	includes materials, fabrication, site preparation and installation Bench \$1,300, Shipping \$300, Installation \$200 Bench \$1,000, Shipping \$200, Installation \$200 Sign \$90, Post \$60, Installation \$100, brackets and hardware \$10, Shipping \$30
Grading and erosion control	SF	\$ 5.00	200.00	\$ 1,000	
Stabilized Decomposed Granite	SF	\$ 5.00	200.00	\$ 1,000	
Shelter	Each	\$ 12,000.00	1.00	\$ 12,000	
Bench	Each	\$ 1,800.00	2.00	\$ 3,600	
Trash Receptacle	Each	\$ 1,400.00	1.00	\$ 1,400	
Wayfinding signage (with posts)	Each	\$ 300.00	1.00	\$ 300	
Restoration and finished grading	SF	\$ 2.50	200.00	\$ 500	
Subtotal				\$ 20,300	
Standard 2-Shuttle Stop					
Site preparation and clearing	SF	\$ 2.50	200.00	\$ 500	includes materials, fabrication, site preparation and installation Bench \$1,300, Shipping \$300, Installation \$200 Receptical \$1,000, Shipping \$200, Installation \$200 Sign \$90, Post \$60, Installation \$100, brackets and hardware \$10, Shipping \$30
Grading and erosion control	SF	\$ 5.00	200.00	\$ 1,000	
Stabilized Decomposed Granite	SF	\$ 5.00	200.00	\$ 1,000	
Shelter	Each	\$ 12,000.00	2.00	\$ 24,000	
Bench	Each	\$ 1,800.00	2.00	\$ 3,600	
Trash Receptacle	Each	\$ 1,400.00	1.00	\$ 1,400	
Wayfinding signage (with posts)	Each	\$ 300.00	2.00	\$ 600	
Restoration and finished grading	SF	\$ 2.50	400.00	\$ 1,000	
Subtotal				\$ 33,100	
Allowance for Site Improvements					
Restriping & removing old stripes	LF	\$ 2.00	700.00	\$ 1,400	
Extend compacted gravel sidewalk	SF	\$ 5.00	400.00	\$ 2,000	
Relocate post and rail fence 3'	Allow	\$ 2,000.00	1.00	\$ 2,000	
Add new portions of post and rail fence	LF	\$ 60.00	80.00	\$ 4,800	
Subtotal				\$ 10,200	
Phase 1 Temporary Park & Ride Lot (Module 1)					
Site preparation and clearing	SY	\$ 2.50	24,050	\$ 60,125	Crushed 3/4" stone base compated 6" deep (includes preparation and rolling) Lot will be regraded and resurfaced each year although this price does not reflect that 6" stone base, 2" binder course, 1" topping; assume perimeter road is paved (1,600 LF @ 30' width)
Grading and erosion control	SY	\$ 5.00	24,050	\$ 120,250	
Compacted gravel parking lot (pilot project only)	SF	\$ 1.50	169,000	\$ 253,500	
Asphaltic concrete paving	SF	\$ 3.75	48,000	\$ 180,000	
Curb and Gutter	LF	\$ 22.00	2,210	\$ 48,620	concrete pavement (including excavation, compaction, grading)
Pedestrian Area pavement	SF	\$ 7.00	15,000	\$ 105,000	
Restoration and finished grading	SY	\$ 2.50	4,500	\$ 11,250	
Temporary Ticket Kiosk	Allow	\$ 10,000.00	1	\$ 10,000	Insulated tuff-shed type building with portable AC unit & generator
Temporary Bathroom Screen	LF	\$ 40.00	60	\$ 2,400	
Shelters	Each	\$ 12,000.00	3	\$ 36,000	
Benches	Each	\$ 1,800.00	12	\$ 21,600	
Trash Receptacles	Each	\$ 1,400.00	6	\$ 8,400	
Wayfinding signage	Each	\$ 300.00	25	\$ 7,500	
Informational signage	Each	\$ 2,000.00	5	\$ 10,000	
Subtotal				\$ 874,645	
Phase 2 Permanent Park & Ride Lot (Module 1)					
Site preparation and clearing	SY	\$ 2.50	24,050.00	\$ 60,125	6" stone base, 2" binder course, 1" topping; Pave remainder of visitor parking area visitor parking area
Grading and erosion control	SY	\$ 5.00	24,050.00	\$ 120,250	
Asphaltic concrete paving	SF	\$ 3.75	121,000.00	\$ 453,750	
Curb and Gutter	LF	\$ 22.00	3,640.00	\$ 80,080	
Wheel Stops	Each	\$ 85.00	180.00	\$ 15,300	
Painted pavement markings (4"wide)	LF	\$ 0.50	9,100.00	\$ 4,550	
Mulching and planting	SY	\$ 10.00	4,500.00	\$ 45,000	
Stormwater drainage and biofiltration	Allow	\$ 26,000	1.00	\$ 26,000	
Utility Connections	Allow	\$ 65,000	1.00	\$ 65,000	electricity? Water?
Permanent ticketing kiosk	SF	\$ 250.00	300.00	\$ 75,000	(approx. 15' x 15' -small office)
Restroom building	SF	\$ 250.00	600.00	\$ 150,000	8 cubicles and small storage room (approx. 25' x 25')
Subtotal				\$ 1,095,055	
Shuttle Priority Lane					
Demolition of existing curb and gutter	LF	\$ 4.00	700.00	\$ 2,800	Assumes 700 linear feet of widening at an average width of 10'
Site preparation and clearing	SY	\$ 2.50	780.00	\$ 1,950	
Grading and erosion control	SY	\$ 5.00	780.00	\$ 3,900	6" stone base, 2" binder course, 1" topping
Asphaltic concrete paving (permanent)	SF	\$ 3.75	7,000.00	\$ 26,250	
Curb and Gutter	LF	\$ 22.00	700.00	\$ 15,400	
Restoration and finished grading	SY	\$ 2.50	780.00	\$ 1,950	
Mulching and planting	SY	\$ 10.00	780.00	\$ 7,800	
Subtotal				\$ 60,050	

APPENDIX G

Moab Route Fare Collection and Ridership Considerations

APPENDIX G: MOAB ROUTE FARE COLLECTION AND RIDERSHIP CONSIDERATIONS

Fare Collection for a Moab Shuttle

Fare collection becomes more complex if a Moab shuttle is offered, especially if the Moab shuttle offers the option of going directly into the park without requiring a transfer at the park-and-ride lot. If a Moab route is offered, the park would have to provide a way to pay entrance fees and receive a shuttle ticket at the stops in Moab and/or on the shuttle itself.

Peer research was done to explore some options for fee payment on town shuttles.

- Yosemite Area Regional Transportation System (YARTS): Passengers are encouraged to purchase YARTS tickets before boarding the bus whenever possible, however tickets are also available from YARTS drivers. Tickets are sold at vendors in the towns such as hotels, campgrounds, chambers of commerce, visitor centers and restaurants. All YARTS fares to Yosemite National Park include the gate fees.
- Rocky Mountain National Park Hiker Shuttle: A park pass is required to board the Hiker Shuttle. Passes are sold at automated fee machines located at the Estes Park Visitor Center and the Beaver Meadows Visitor Center.

Establishing an automated fee machine at the Moab Information Center (MIC) should be relatively easy, but fee machines at other stops may be more problematic. This issue will have to be addressed if this Moab shuttle option becomes possible in the future.

Moab Shuttle Ridership

A Moab shuttle route, if offered, will attract some portion of the Arches shuttle riders and may also attract Moab residents to use the shuttle. Ridership will depend fundamentally on the design of this route and the amount and type of information available to visitors about the shuttle. As stated in the description of the route, the proposed shuttle stop locations are in easy walking distance to hundreds of hotel rooms in Moab. If the Moab route is actively promoted to these visitors, many of them might choose to leave their vehicles at their hotel and take the shuttle to the park.

Another important factor influencing ridership on the Moab shuttle is how well it serves local campgrounds and RV parks. Evidence from research of peer systems suggests patrons of RV parks prefer to leave large vehicles parked if a shuttle can provide a convenient alternative. Strong connections with local RV parks supported with proactive marketing and partnering with this sector of the local business community will push ridership higher on this range.

It is difficult to predict ridership on this shuttle due to lack of data and certainty on final design. For example, no data is available on the portion of Arches visitors staying downtown versus in hotels, campgrounds, and RV parks outside Moab.

The peer cases described above provide additional insight into ridership levels for the optional town connector shuttle service. The following town-connector services provide comparable, although not identical, operating environments as those found in Moab:

- The Estes Park Hiker Shuttle serves as a park feeder route connecting the town of Estes Park with the Beaver Meadows Visitor Center and the Beak Lake Park and Rider Lot. The route operates on a 30-minute headway during an 8-hour peak period and a 60-minute headway for the remaining 5.5-hours in the early morning and late afternoon. Total annual ridership is 12,023 (David Evans

and Associates, Inc. 2008). Using current schedules total annual hours is estimated to be approximately 1,500. Average productivity, therefore, is approximately eight passengers per hour. Actual ridership is likely higher and lower at different times of day and season.

- The Springdale town route serves as a feeder for Zion National Park. Springdale's town route operates on a 10 - 15-minute headway during peak periods and a 30-minute headway during off-peak hours. Annual ridership and hours are 120,000 and 4,700 respectively, yielding an average annual productivity of approximately 25 passengers per hour. Actual ridership likely fluctuates during different times of day and season.
- Bar Harbor's town route, Eden Street Route, serves as a feeder for the Island Explorer transit service connecting multiple town destinations with the main transit hub for the Acadia transit network. Productivity on this route is 47.6 riders per hour during summer months and 26.2 riders per hour during fall months (Tom Crikelair Associates 2007).

These productivity estimates can be compared to ridership in other rural resort communities in the intermountain west. Productivity rates in rural communities typically range between two and five passengers per hour. Communities with higher densities of destinations and more frequent transit service, such as Park City, Utah (LSC Transportation Consultants, Inc. 2011), and Glenwood Springs, Colorado (Nelson\Nygaard Consulting Associates 2011), exhibit productivity rates in the range of 10 - 25 passengers per hour. The Moab area exhibits a mix of attributes from each of these settings.

Taken together, these points of reference suggest that a ridership estimate ranging between 8 and 15 passengers per hour average over the course of the season is reasonable for the Moab shuttle. Assuming frequencies of 15-minutes during peak season and 30-minutes during the shoulder season, the Moab shuttle route is estimated to generate between 49,000 and 92,000 annual passengers.

During the peak season and peak hours, ridership could be far higher. If the Moab shuttle captured 25% of park shuttle ridership that would be 40-50 passengers per hour.

Park-and-Ride Considerations for Moab Shuttle Route

If implemented, the Moab shuttle would mitigate demand for parking at the park-and-ride lot. Above we predict the Moab shuttle will average between 8 – 15 passengers per hour over the course of the operating season. During peak hours, shuttle ridership will likely be significantly higher. The number of parking spaces provided is based on peak-hour visitation, so the number of stalls reduced by providing a city shuttle is similarly based on peak-hour ridership. Assuming 50 passengers per hour during the morning hours when the park-and-ride lot would be filling, the city shuttle would replace the need for approximately 70 - 80 parking spaces. Therefore, as an initial estimate, if a city-shuttle is implemented, it may be possible to reduce the size of the park-and-ride lot by as many as 70 - 80 spaces.

It is also important to note that the amount and convenience of parking available will affect the likelihood that visitors will walk to the downtown stop and take a Moab route instead of driving and parking at the park-and-ride lot.

Given the uncertainty in these numbers, if a Moab feeder route is offered in the future, the park should analyze the relationship between Moab shuttle ridership and parking needs.

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.