Chapter 4.0 – Environmental Consequences

Chapter 4.0 describes the direct, indirect, and cumulative impacts expected to occur as a result of implementing each alternative described in Chapter 2.0, Alternatives.

An environmental impact is defined as a modification or change in the existing environment as a result of actions taken. Impacts may be beneficial or adverse, may be assessed based on their duration, severity, or relation to the OTR project, and may vary in severity from only a slight discernable impact to significant impact.

The level of impact is based on regulatory standards, criteria and ordinances, available scientific documentation, and professional judgment of the evaluator. OTR Corp would implement certain environmental protection measures, design features, and procedures to avoid or reduce potential impacts from the action alternatives, as described in Chapter 2.0. The impact ratings presented in this chapter are based on application of the design features presented in Chapter 2.0.

Based on the impact analyses presented in the following resource discussion, additional mitigation measures were identified to minimize or offset potential adverse impacts. These mitigation measures are presented in Chapter 5.0. Mitigation measures may be included as conditions of the BLM Land Use Authorization or other state or local permits. The effectiveness of these mitigation measures in reducing the level of impact are presented on a case by case basis in the remainder of this chapter, and the resulting level of residual effects is noted.

Impact Terminology

This chapter uses the terms “impact” and “effect” interchangeably. Other terms used to describe impacts are defined as follows:

Impact Type

This EIS considers and analyzes three types of effects:

- **Direct**: Effect is caused by the action and occurs at the same time and place (e.g., removal of vegetation, soil disturbance for anchor drilling, machinery noise, etc.).
- **Indirect**: Effect is caused by the action but occurs later in time or is removed in distance, but is still reasonably foreseeable (e.g., economic benefits to communities outside of the Project Area as a result of visitation).
- **Cumulative**: Effect on the environment that results from the incremental contribution of the action when added to other past, present, and reasonably foreseeable future actions (e.g., combined effect of drilling disturbance and past rail, road, or grazing disturbance on noxious weed infestation); see Section 4.26 for more information.

In the resource impact analyses, direct and indirect effects are typically not differentiated unless necessary for emphasis or context. Cumulative effects are addressed separately from direct/indirect effects at the end of Chapter 4.0.

Beneficial and detrimental (adverse) effects, based on the desired resource condition, goals, and/or management objectives described in Chapter 3.0, are disclosed for all alternatives:

- **Beneficial:** Positive change that enhances the condition or appearance of the resource, or a change that moves the resource toward the desired condition or goals identified in Chapter 3.0.
- **Adverse:** Negative change that detracts from the condition or appearance of the resource, or a change that moves the resource away from the desired condition or goals identified in Chapter 3.0.

All impacts are assumed to be adverse, unless otherwise stated as beneficial.

Duration

Each impact is described in terms of its duration, short- or long-term:

- **Short-term**: Lasting no longer than the immediate 1-5 year implementation and restoration periods.
- **Long-term**: Lasting beyond the implementation period (beyond 5 years) or indefinitely.

All impacts are assumed to be long-term unless otherwise stated as short-term/temporary.

Intensity

The following terms are used to describe the degree, level, or significance of the effect:

- **No effect**: No discernable effect.
- **Negligible**: Effect is at the lowest level of detection and causes very little or no disturbance or improvement.
- **Minor**: Effect that is slight but detectable, with some perceptible effects of disturbance or improvement.
- **Moderate**: Effect is readily apparent and has measurable effects of disturbance or improvement.
- **Significant**: Effect is readily apparent and has measurable effects of disturbance or improvement that are of local, regional, or global importance; or sets a precedent for future project undertakings by federal agencies.

BIOLOGICAL RESOURCES

4.1 TERRESTRIAL WILDLIFE AND HABITAT

Environmental impacts to terrestrial wildlife within the Analysis Area would result primarily from construction activities, the presence of cable wires and fabric panels spanning the river, an expected increase in visitation, and the removal process. Measures to minimize and avoid resource impacts are included in the project description, but the increased presence of people, machines, rail cars, noise, dust,

trash, and cables are likely to result in residual impacts, which are described in the remainder of this section.

In considering the impacts of this unique project, there are some unknowns. There are no wildlife studies that address or document the impacts from a temporary art installation, such as the OTR project. Therefore, drawing conclusions on the expected impacts must be based on research of projects with similar impact mechanisms. For example, comparisons between this art installation and other activities, such as active construction sites or powerlines, can be made. There would be both similarities and differences. It is unprecedented to have over one thousand cables strung across a river for nearly 6.0 miles; therefore, this chapter will discuss impacts in a relative sense, quantifying the project's physical disturbance and potential zones of influence, but also acknowledging that certain types of impacts cannot be calculated with precision. A summary of impacts on terrestrial species is provided in Table 4-1 and each species is discussed separately in the remainder of this section.

Table 4-1. Summary of Terrestrial Species Impacts by Alternative*

Terrestrial Species	No Action	Alternative 1			Alt. 2	Alt. 3	Alt. 4
		1a	*1c*	*1d*			
Bighorn sheep (overall)	No effect	Moderate-Significant	Moderate-Significant	Moderate-Significant	Moderate-Significant	Moderate	Minor
Mule deer (overall)	No effect	Moderate	Moderate	Moderate	Moderate	Minor	Minor
Elk (overall)	No effect	Minor	Minor	Minor	Minor	Minor	Minor
Black bear	No effect	Minor	Minor	Minor	Negligible	Minor	Minor
Mountain lion	No effect	Minor	Minor	Minor	Minor	Minor	Minor
Bats	No effect	Moderate	Moderate	Moderate	Minor	Minor	Minor
Fossorial mammals	No effect	Minor	Minor	Minor	Minor	Minor	Minor
Reptiles	No effect	Minor	Minor	Minor	Minor	Minor	Minor
Amphibians	No effect	Minor	Minor	Minor	Minor	Minor	Minor

*Effects to bighorn sheep would be adverse and moderate-significant in both the short- and long-term. Effects to all other species or groups of species are anticipated to be short-term only.

As shown in Table 4-1, bighorn sheep is the only wildlife species anticipated to be impacted at a moderate to significant level. This determination is based on the overall effect of project activities during the installation, exhibition, and demobilization phases of the project. Although the activities and potential responses of bighorn sheep to those activities are described in detail in this section, the project is unique and unprecedented and impacts cannot be predicted with a high degree of precision. A moderate-significant impact determination reflects a conservative assessment of the project's scale, scope, and duration, and underscores the need for continuing efforts to explore mitigation measures and develop an effective monitoring plan.

4.1.1 No Action Alternative

Under the No Action Alternative, the OTR project would not be constructed or displayed. As a result, OTR actions would not occur and there would be no effects on terrestrial wildlife species or their habitat from the project. Habitat conditions in the Analysis Area would continue on current trends, assuming the same level of existing activities and management direction as described in Alternative 1a.

4.1.2 Alternative 1a

4.1.2.1 Installation

The installation of the Artists' proposal would effectively create a major construction site at various locations in the Analysis Area, complete with rail traffic, heavy equipment, and large rock drills to establish a network of cables spanning the river approximately every 24 feet over approximately 5.9 miles of river. The timing of installation purposely avoids bighorn lambing but would occur during other sensitive times, such as maternity roosting for bats, the bighorn breeding season or "rut", and the critical wintering period for ungulates. Additionally, since the first year of life is a critical period for bighorn lambs, disturbance after the lambing period, but before rearing is complete, could increase lamb mortality.

In total, the construction activities associated with panel installation would directly disturb approximately 6.0 acres spread over 5.9 miles of river. An additional 84.0 acres would be disturbed at staging areas and visitor sites. See Section 4.5 (Vegetation and Plant Communities) for additional information on the types of vegetation communities that would be disturbed.

A larger area would be affected by construction activities. In order to estimate the extent of the area where construction activities would have the potential to disperse or interrupt normal activities by big game and other species, the area within 0.25 mile of either side of the panels was calculated. The total area is 3,516 acres, including 1,812 acres on the north side of the river and 1,704 acres on the south side. For most species, the effects of noise and construction activities would be more pronounced on the north side of the river, an area further removed from the highway and less intensively visited. The level of effect within this area would vary by species. It is likely that impacts on terrestrial wildlife, especially bighorn sheep, would be greater on the north side of the river, which is removed from the highway and less subject to disturbance by existing activities, such as traffic and recreational uses.

Bare cables would span the river for up to 4 months, generally June through October. The full impacts of this design are hard to realize because there are no studies that have assessed the effects of this density of cables spanning a riparian zone. It is reasonable to assume that terrestrial wildlife foraging and drinking within the Analysis Area would be affected by rail traffic, construction crews (four, 4-person crews; 3,000 crew work days), noise, dust, and cable spans.

a. Bighorn Sheep

In 1999, Baker et al. wrote a report evaluating methods for assessing the effects of human disturbance that might result from this project on bighorn sheep in the Project Area, Baker et al. states:

> …The potential human disturbances associated with the construction and implementation of the proposed projects are clearly novel and unpredictable compared to 'normal' river-associated

activities. The novel activities associated with these projects could elicit acute and chronic stress in bighorn sheep and habituation to these activities may not occur.

Given that these disturbances are clearly novel and their effects largely unpredictable, the need for monitoring is paramount; mitigation and monitoring needs are discussed in Chapter 5.0.

Research is conclusive that stress caused by human contact, vehicles, dust, noise, and harassment is a factor in the susceptibility of bighorn sheep to disease (Spraker et al. 1984; see Chapter 3.0). The added stress of increased human presence can cause an increase of steroid secretion from the adrenal cortex. High levels of steroids inhibit the inflammatory process, resulting in susceptibility to bacterial pathogens. This, in concert with added dust from construction and drilling activities, can collectively contribute to upper and lower respiratory infections that may lead to pneumonia (Spraker et al. 1984). It is assumed that any additional human presence, especially with dust generated from installation vehicles, drilling, or other installation activities, would adversely impact sheep.

Thompson and Longshore (2007) found that general disturbance from recreation caused greater dispersal distance and expenditure of energy of desert bighorn. However, critical resources (mineral licks) are still used when people were not present (Hamilton et. al. 1982 as cited in Thompson et. al. 2007). Also, Keller and Bender (2007) found that human and road related disturbance negatively affected bighorn use of a mineral site. The impacts may appear short-term, such as a sheep fleeing to “escape terrain.” However, these apparent short-term stressors can lead to long-term disease and increased mortality.

Bighorn sheep impacts would also be related to the timing of construction (both time of year and time of day). The rutting season, when males compete for females, occurs in November through December in the Analysis Area. Additional stress during the rut has potential to lower the probability of ewe impregnation.

Severe winter habitat occurs from Texas Creek to MM 262 on the south side of the river, and Echo to Parkdale on the north side. During the coldest times of the year, with limited and low quality forage resources available, bighorn are arguably at their most vulnerable. The effects of construction activity to bighorn sheep in their critical refugia during harsh winter weather could result in additional stress on limited energy reserves when they have little to spare. The balance of energy is tight during winter weather and additional stress would have a high probability of raising the winter mortality rate in the canyon populations.

In addition, winter is a critical period for pregnant wild herbivores, such as bighorn sheep. Their nutritional state is generally poor at this time and they are attempting to develop a viable fetus – an additional drain on their protein and energy reserves. Any further reduction in nutritional state caused by disturbance could result in the development of a smaller than optimal fetus with lower probability of survival. The relationship between poor nutritional state of the gravid female, reduced neonatal size, and increased neonatal mortality has been shown very clearly for elk (Thorne et al 1976); and the domestic sheep literature is replete with evidence linking suboptimal lambing performance to inadequate nutritional levels. Gardner et al. (2007) analyzed two large data sets on the reproductive performance of ewes and showed that nutritional deprivation during the third trimester resulted in smaller sized lambs. Poor nutritional state of the ewe is likely to result in reduced milk production as well (Mavrogenis et al. 1980) and may delay or eliminate the subsequent estrous. (Cerqueira 1996, Montgomery et al. 1985)

The area of potential effect associated with construction disturbances was approximated by buffering the area surrounding each panel site by a distance of 0.25 mile (1,320 feet), which represents the area of

greatest concentration for bighorn sheep. More than 70% of sheep observations have been documented to occur within 300 meters (984 feet) of the Arkansas River (Baker et al. 1999). The majority of these observations occur on the north side of the river.

Table 4-2 quantifies the total area within 0.25 and 0.5 mile of each panel site that is also located within mapped bighorn sheep severe winter range.

Table 4-2. Panel Area Buffers Within Severe Winter Range

Panel Area	Acres within 0.25-mile buffer Severe Bighorn Sheep Winter Range	Acres within 0.5-mile buffer Severe Bighorn Sheep Winter Range
Texas Creek	<5	<10
Maytag	<1	<2
Three Rocks	178	356
Spike Buck	298	596
Parkdale	554	1,108
County Line	116	232
Total Acres	1,146	2,292

The number of sheep within the area of potential effect varies from year to year, but some indication is provided by the high one-day count data, which are shown below:

Texas Creek	36
Maytag	15
Three Rocks	35
Spike Buck	86
Parkdale	49
County Line	N/A
Total	**221**

The one-day count data records observations made within 0.5 mile of the panels and may represent an overestimation due to sheep moving from one location to another over the course of a year and being counted at more than one location. Count data from other locations is available but too sparse to be included in the analysis.

It is important to note that the duration of disturbance during the drilling period is relatively brief at any one location. It is estimated that drilling crews would operate at a pace of approximately 0.25 mile over a 5-day period (J. F. Sato 2007, p. 5-47). At a specific panel location, therefore, the noise and activity associated with drilling would remain within 0.25 mile during a 5-day period and then move beyond that distance, resulting in a diminishment of noise and other disturbances at any one location as drilling progresses to other locations.

Despite seasonal avoidance measures, increased activities related to other aspects of the OTR project during the period May through late June would have the potential to impact lambing. Construction activities occurring within the line of sight or in proximity to ewes with lambs would have the potential to cause ewes to abandon lambs by fleeing or to overtax the pair during a sensitive time. Added stress on lambs in particular may predispose them to disease or other forms of mortality. In addition, lactating ewes need to access water more often and the stress of activity near water sources could have an impact on

lactating ewes (Backstrand 2010, Forbes 1968). Stankowich (2008) found that ungulates have perceptions of risk when disturbed by humans on foot, especially in open habitats and when females or groups have young offspring. The ungulates pay attention to the behavior of people as they approach and often react with a flight response to escape terrain.

Wildlife crossings of US 50 to access the river or other resources present hazards for both wildlife and drivers. Bighorn have been hit on this section of US 50. Slower posted speeds and increased driver alertness may reduce the number of AVCs (Huijser et al. 2006). However, slower speeds and driver alertness do not entirely eliminate the potential for AVCs. Although drivers may modify behaviors during the installation period, Vokurka et al. (2007) stated that an increase in AVCs is likely when animals are presented with a new situation (e.g., increased crossing distances and speeds). New conditions and increased rail use would offset the benefits of modified driver behavior. Overall, it is essentially impossible to predict the effects that changes in vehicular traffic as a result of this project would have on the number of AVCs. There would be relatively slight increases in traffic during the installation phase; and the traffic associated with the installation itself should not occur at night or in the early morning or early evening hours, which are the peak times for wildlife activity. Thus, it is expected that there would be slight or no change in AVCs during this period. Overall, the risk of AVCs would remain unchanged or slightly increased during installation.

The bighorn sheep on the north side of the Arkansas River (County Line, Cotopaxi/Coaldale, and Arkansas River herds) are dependent on the river for water and habitat along the riverbanks within the Project Area. If these sheep are dispersed by Alternative 1a installation activities, individuals in this herd may have a higher than normal level of persistent stress due to continuous flight response (if they choose to stay near active panel sites), or a high energetic cost of moving out of the suitable habitat along the river into marginal habitat without reliable water sources. In either case, this impact may, in the long-term, lead to higher than normal mortality rates (directly caused by other factors such as predation and disease).

In contrast to the North herds, the bighorn sheep on the south side of the Arkansas River (Grape Creek and S-68 Cotopaxi herds) have alternative sources for water. Sheep on the extreme east end of the Project Area may use Grape Creek and sheep in the Texas Creek area can use Texas Creek as a water source. Although seeps and springs are dispersed along the south side of the river (shown on Map 3-55), sheep between these two locations would have a much harder time finding alternatives to the Arkansas River for water, particularly during dry periods. Permanent water sources between Grape Creek and Texas Creek may not be available, especially in the dry month of August or if drought conditions exist. If installation activities disperse sheep in these herds, they may still experience temporary stresses due to the flight response and the related energetic cost of moving to other suitable habitat or alternative reliable water sources. Bighorn sheep rely heavily on their vision to avoid predators and find suitable escape cover. If installation activities disperse sheep, they may be forced to move through undesirable habitat making them more susceptible to predators (McCarthy and Bailey 1994, Smith et al 1991). Bighorn sheep also have a high fidelity to their home range, making it likely they may stay in an area of disruption and suffer the given stress, dust, and other impacts. This has the potential to increase the probability of South herd mortality.

Although helicopter overflights would be excluded during exhibition, a potential exists they would be used for rescue evacuation or photography/videography during the installation period. There is evidence in the literature suggesting that low-level flights by either fixed or rotary wing aircraft are very disturbing to large mammals. Tracey and Fleming (2007) reported that in 31% of cases in which helicopter overflights were

made to observe feral goats (*Capra hircus*), the animals moved away from the helicopter – dispersing as far as 1.5 km. Any additional low-flying aircraft would have impacts to the large mammal herds in the canyon.

Rail traffic is out of the living memory of most, if not all, of the sheep in the Analysis Area. Under the current proposal, the railroad would be used regularly during installation by rail-mounted trucks. Vokurka et al. (2007) stated that an increase in AVCs is likely when animals are presented with a new situation; however, the animals adapt to the new conditions over time. Sheep not adapted to rail cars may disperse or potentially be hit by rail-mounted vehicles. Higher speeds of rail cars would have a direct relationship with the probability of an AVC (Huijser et al 2006). Bertwistle (2003) found that collision rates on highways and railways can both be statistically and biologically significant for wildlife species such as elk and bighorn sheep. Dispersal from the rail use could lead to a higher mortality rate due to flight stresses or loss of reliable water sources. Depending on rail car speed, an increased risk of collisions may also occur.

It is also possible that the sudden renewal of rail traffic might disturb the sheep to such an extent that they abandon the normally used riparian zone and retreat to higher ground to the north. If this were to occur, the impact could be more severe as a result of poorer foraging conditions, reduced water availability, and increased risk of predation.

An additional impact to bighorn sheep would be the change in the predator/prey balance from increased stress, making them easier prey for predators, especially mountain lions. This impact may potentially upset the population dynamics of the local Brown's and Arkansas River sheep herds.

Overall, installation activities have the potential to disperse sheep from primary habitat requirements such as water, cover, and forage within the Analysis Area. Based on observation data, the high counts suggest that up to 35 sheep at the Three Rocks panels, 15 at the Maytag panels, 27 at the eastern Spike Buck panels, 59 at the western Spike buck panels, 36 at the Texas Creek panels, and 49 at the Parkdale panels would potentially be displaced and unnaturally stressed. If in the short-term over 200 sheep are unable to adapt to installation activities and disturbances in the Analysis Area, population dynamics, fecundity, and survivorship of individuals, as well as the overall herd, may be significantly affected over the long-term.

Implementation of the mitigation measures presented in Chapter 5.0, particularly the habitat enhancement measures, could be expected to reduce the level of impact on bighorn sheep from moderate-significant to a low to moderate level depending on the specifics of the plan that is ultimately implemented.

b. Mule Deer

As with other ungulates, mule deer have the potential to be impacted by higher than normal human presence, construction, noise, dust, and low-flying aircraft. Sawyer et al (2006) found that mule deer moved away from well pad development to less preferred, less suitable habitat, with no evidence of well pad acclimation before and during a three-year natural gas field development. Stankowich (2008) found that ungulates have perceptions of risk when disturbed by humans on foot, especially in open habitats and when females or groups have young offspring. The ungulates pay attention to the behavior of people as they approach and often react with a flight response to escape terrain. The impacts of Alternative 1a installation activities would be heightened in the five general areas of critical winter refugia for deer (Map 3-14). Installation activities would result in additional stress and could cause dispersal to lower quality habitat without good access to water.

Mule deer are the primary species involved in AVCs on this section of US 50. Lower vehicle speeds could result in a reduction of AVCs (Huijser et al. 2006). However, decreased driver alertness during construction could negate or possibly even increase AVCs. Dispersal from increased rail use would be another source of potential effects.

An additional potential effect on mule deer would be a change in the predator/prey balance resulting from increased stress, making mule deer easier prey for predators, such as mountain lions.

Overall, installation activities have the potential to disperse mule deer from primary habitat requirements such as water, cover, and forage within the Analysis Area. This is expected to result in moderate, short-term impacts. If in the short-term deer are unable to adapt to installation activities and disturbances in the Analysis Area, population dynamics, fecundity, and survivorship of individuals, as well as the overall herd, may be moderately affected in the long-term.

c. Elk

Elk are not as abundant as bighorn or deer in the Analysis Area. However, elk, like other ungulates, would potentially be impacted by higher than normal human presence, construction, noise, dust, and low-flying aircraft during the Alternative 1a installation period. St. Clair and Forrest (2009) found that the presence and movement of vehicle traffic suggest that vehicle traffic exerted a measurable effect on the behavior but not distribution of elk. Stankowich (2008) found that ungulates have perceptions of risk when disturbed by humans on foot, especially in open habitats and when females or groups have young offspring. The ungulates pay attention to the behavior of people as they approach and often react with a flight response to escape terrain. The impacts would be increased in the three general areas of critical winter refugia for elk (Map 3-15). These impacts would add stress and could cause dispersal to lower quality habitat without good access to water.

Elk are rarely hit on this section of US 50, and it is not anticipated that the AVC rate would increase during the installation phase of the project.

Overall, installation activities are anticipated to have short-term, minor effects on elk within the Analysis Area.

d. Mountain Lion and Black Bear

With an increase in human presence, conflicts with mountain lions and black bear have the potential to increase. There have been conflicts with both of these species in the overall Project Area, and conflicts may potentially lead to direct mortality by wildlife control or law enforcement personnel euthanizing lions or bears post-conflict.

An additional potential effect on lions would be a change in the predator/prey balance from increased stress on mule deer and bighorn sheep. Because mountain lions regularly prey on deer and bighorn sheep, increased stress on these species could make prey more available to mountain lions. This could potentially alter the population dynamics of lions.

Bears would also have the potential to adapt to an increase in human presence, and continue this behavior after project completion. This would be a negative impact, and could result in ongoing human-bear conflicts after the project.

Bears have been hit on this section of US 50. The risk of AVCs would remain unchanged or slightly increased for both species during installation.

Overall, impacts on mountain lions and black bears are expected to be short-term and minor.

e. Small and Medium-Size Mammals

Direct mortality of bats due to collisions with the proposed project is expected to occur, though it is difficult to quantify the degree to which this would occur. Bat collisions with communication towers, powerlines, and wind turbines are well documented (Dedon et al. 1989). The largest body of research available for bat collisions with man-made objects pertains to wind power projects. In the Rocky Mountain Region, research indicates that a collision mortality rate of approximately 1.2 bats/turbine/year at wind power facilities (Johnson 2005). Research also indicates higher rates of bat activity and mortality at wind turbines to occur during migration season, from approximately mid-July through August (Johnson et al. 2004).

Bats have an advantage over avian species in conducting regular daily activities such as feeding, as they are equipped with highly refined wings that allow for intricate flight maneuvers and slower speeds (Hedenström et al. 2007), as well as echolocation capabilities that allow them to detect and avoid objects. However, research indicates that bats rely less on echolocation and more on visibility for navigation when traveling long distances, such as during migration (Crawford and Baker 1981), therefore leading to more collisions (Johnson et al. 2004). Increased collisions have also been associated with inclement weather (Van Gelder 1956) and bats' inability to detect finer-grain objects such as mist nets (Horn et al. 2008).

While the proposed project would be installed at lower heights than communication towers, powerlines, or wind turbines, installation, viewing, and demobilization activities would overlap with a period of bat migration. Not enough is known at this time to understand if the lower height would reduce the number of collisions, so it can be predicted that the presence of the panels, cables, and other associated equipment would lead to some degree of bat mortality. Marking wires is the most effective way to reduce the chance of avian wire strike mortality (Beaulaurier 1981), and based on the association with collisions and visibility, can also be assumed to be the best way to reduce the likelihood of bat mortality. If bats can detect and avoid the cables, there would be minor to moderate short-term impacts.

Fossorial mammals (e.g., gophers) use vibration for communication (Narins and Lewis 2000, Mason and Narins 2001). Heavy construction and drilling would have the potential to limit these species' ability to communicate and utilize resources. This would be a minor, localized, and short-term indirect impact, disorienting fossorial mammals during drilling or moving heavy equipment and leading to a potential increase in mortality rates.

Collision, trampling, or compaction from installation equipment would have the potential to cause direct mortality to small mammals or destruction of habitats, such as burrows or ground cavities. This would be a minor, localized, and short-term direct impact.

Although not formally tracked, it is assumed small mammals have been and are frequently hit on this section of US 50. Overall, the risk of AVCs would remain unchanged or slightly increased during installation. This would be a moderate but localized short-term direct impact from collision mortality.

f. Reptiles and Amphibians

Fossorial snakes are also sensitive to vibration (Cowles and Phelan 1958). Heavy construction and drilling has the potential to disrupt these species. This would be a minor, localized, and short-term indirect impact to fossorial snakes.

Collision, trampling, or compaction from installation equipment would have the potential to cause direct mortality to reptiles and amphibians or destruction of habitats, such as tunnels and burrows or ground cavities. This would be a minor, localized, and short-term direct impact.

4.1.2.2 Exhibition

Fabric panels would occupy an area of approximately 56.0 acres, which would limit access for some species to the river and its associated riparian habitat during the several weeks the panels remain in place. An additional 85.0 acres would be associated with the staging area at Texas Creek and visitor facilities at Parkdale and other sites along the river corridor. These locations would be the site of increased activity as would the US 50 corridor due to increased traffic associated with visitation. Collectively, these are the mechanisms that would contribute to wildlife impacts during the exhibition phase of the project.

a. Bighorn Sheep

It is unknown how bighorn sheep would respond to the physical presence of the panels. Although the panels would be elevated and sheep could pass under a panel to reach the river, it is possible that the panels would act as a barrier and sheep would be required to travel along the river corridor to find suitable locations for water. This effect would be most notable in the Parkdale section where approximately 4.0 miles of panel form a nearly continuous assemblage. A series of breaks are provided through this and other segments, typically with a width of 100 to 200 feet. However, it is also unknown if sheep would utilize these breaks to reach the river or avoid the area altogether.

Site-specific circumstances are discussed below:

- Parkdale panel site. Altogether, this section is nearly 4.0 miles long with no significant breaks. Tallahassee and Bootlegger draws are areas of critical importance for bighorn sheep; both are utilized by sheep that travel down to the river for water. If sheep avoid the panel area to reach water, a major displacement would occur during the period when panels are in place, requiring animals to travel 1.0 to 2.0 miles to reach water at a location where a larger gap occurs in the panel placement.
- Spike Buck panel site. The east end of the Spike Buck section gets a high amount of sheep use. A similar displacement would occur at the Lower Spike Buck panel section, though the distance required to reach the river at a location without panels would be reduced to less than a mile.
- Three Rocks panel site. This area is another high use area for sheep. The area directly across the river from MM 259.2 is a place sheep come to drink. As with the Spike Buck site, if the panels act as a barrier for sheep trying to reach the river, the distance required to reach the river at a location without panels would be reduced to less than a mile.
- Texas Creek panel site. This is a long (0.8 miles) section of panel without a larger break for sheep to come to the river. Panel segments at this location, combined with the increased activity at the Texas Creek Staging Area, would result in an extensive barrier to sheep seeking to reach water.

- County Line panel site. The area across from MM 225.7 is the most critical sheep utilization area along the river between Texas Creek and Salida. During a site visit in the summer of 2009, 5 bighorns with 1 new lamb from this year were spotted across the river. This panel location has very high bighorn use and is a location where increased stress and displacement of bighorn sheep is likely to occur.

A lack of breaks in the fabric panels in the design of Alternative 1a would increase the probability that sheep would disperse from their familiar home range they would typically utilize. The lack of large breaks in sections of panels is likely to limit where sheep can get to water without high levels of stress. Bighorn sheep tend to show stress when confronted with activities to which they are not well adapted.

The effects of limiting access to water would be reduced at other locations due to a combination of less extensive panel sections and fewer sheep in summer.

The increased human presence during exhibition would have the same impacts as described above for increased human activity during installation. The majority of visitation would take place on the south side of the river. Human activity on the north side of the river would occur, but would be limited by access and lack of amenities.

Visitor activities, such as viewers climbing to high vantage points to view or photograph panels or increased recreational use in the Analysis Area, would have the potential to harass bighorn sheep in their escape terrain. An increase in the number of people hiking for better vantage points to view the art project (presumably higher up on the canyon walls) would impact bighorn sheep.

During the viewing period, vehicular traffic would substantially increase. The effect of this increase on AVCs is impossible to predict, however. If it is sufficient to cause the sheep to completely avoid the road, it could result in reduced AVCs. There are other factors, as well, that could have an impact on the number of AVCs. It is probable that drivers would be driving more slowly, which could reduce AVCs, but that they would probably be less attentive to wildlife – and each other, which could act to increase AVCs.

Implementation of the mitigation measures presented in Chapter 5.0, particularly the habitat enhancement measures and the potential of providing supplemental water sources on the north side of the river, could be expected to reduce the level of impact on bighorn sheep from moderate-significant to a low to moderate level depending on the specifics of the plan that is ultimately implemented.

b. Other Species

It is unknown if the fabric panel material would be detected by bat echolocation or if it would go undetected, not unlike a mist net. If it goes undetected, bat mortality from direct strike could occur. Depending on bat detection and avoidance, this would be a minor to moderate impact. If bats detect the panels but are unwilling to fly under them to feed or obtain water, the impact would be moderate as bats would either be displaced or perish.

Visitor activities, such as viewers climbing to high vantage points to view or photograph panels or increased recreational use in the Analysis Area, would have the potential to harass bat maternity roosts and other terrestrial wildlife. Although occasional cross-country recreation likely occurs in the overall Project Area, these species are likely not well adapted to steady or repeat occurrences of people

scrambling up slopes and cliffs near the river. An increase in the number of people hiking for better vantage points to view the art project (presumably higher up on the canyon walls) would impact other terrestrial wildlife. Depending on the effectiveness of access and visitor control measures, this could be a minor to moderate short-term impact.

There would be a higher probability of medical helicopter evacuation with additional people and traffic on US 50. Depending on frequency, altitude, and duration of medical flights, this would be a moderate but localized short-term direct impact. Overflights for viewing purposes are expected to be heavily restricted during the exhibition period and are therefore not anticipated to affect terrestrial wildlife species in the Analysis Area.

During the viewing period, vehicular traffic would substantially increase. The effect of this increase on AVCs is impossible to predict, however. If it is sufficient to cause terrestrial wildlife to completely avoid the road, it could result in reduced AVCs. There are other factors, as well, that could have an impact on the number of AVCs. It is probable that drivers would be driving more slowly, which could reduce AVCs, but that they would probably be less attentive to wildlife – and each other, which could act to increase AVCs.

4.1.2.3 Demobilization

The effects of demobilization activities would be similar to those described for the installation period, but they would occur over a much reduced time period (3 months). New areas of disturbance would not result from this phase of the project; the primary effect of this project phase would be a continuation of the noise and other disturbances that would add to the stress of bighorn sheep and other terrestrial wildlife species.

Following completion of official demobilization activities, an additional 3 to 5 years would be necessary to restore the habitat to its existing condition and treat any exotic species resulting from the soil disturbance. During that timeframe, there would be additional short-term, minor impacts to wildlife from restoration teams stabilizing soils, treating weeds, and replanting impacted areas, and from lower quality habitat conditions that could exist while native forage species are being reestablished.

4.1.3 Alternative 1c

4.1.3.1 Installation

Impacts on wildlife would be the same as described for Alternative 1a.

4.1.3.2 Exhibition

Extending the exhibition period by one week would increase the length of time that bighorn sheep and other wildlife would be displaced from portions of their habitat. The overall type and level of impacts would be very similar to those described for Alternative 1a. However, the addition of one week to the viewing period would result in increased impacts to wildlife, but the specific increment of additional impacts is very difficult to quantify.

New, temporary rations would allow for limited boating increases during the exhibition period. Most wildlife are accustomed to boating use. Negligible to minor short-term effects are anticipated as a result of modified boat rations

Overall, impacts on wildlife would be the same as described for Alternative 1a.

4.1.3.3 Demobilization

Impacts on wildlife would be the same as described for Alternative 1a.

4.1.4 Alternative 1d

4.1.4.1 Installation

Impacts on wildlife would be the same as described for Alternative 1a.

4.1.4.2 Exhibition

Unless otherwise noted, impacts on wildlife would be the same as described for Alternative 1a.

Closing the AHRA sites would limit foot traffic along the riverbanks during the exhibition. However, by closing these sites, some visitors may be displaced to alternate, potentially undeveloped places to park, recreate, or view panels. Increased human activity in areas removed from the main highway-river corridor may result in short-term minor disturbances to wildlife.

4.1.4.3 Demobilization

Impacts on wildlife would be the same as described for Alternative 1a.

4.1.5 Alternative 2

4.1.5.1 Installation

The area of disturbance associated with installation activities would be reduced by this alternative, resulting in approximately 4.0 acres of direct disturbance and 2,618 acres of indirect disturbance, compared to the 6.0 acres and 3,516 acres, respectively, for Alternative 1a. Disturbance at staging and visitor sites would remain the same as described for Alternative 1a.

The elimination of panels and construction activities west of Texas Creek would reduce impacts to the Brown's Canyon herd of bighorn sheep. In particular, this alternative would lessen impacts at the County Line panel site, which is a high use site for bighorn sheep. The overall level of impact on bighorn sheep, however, would remain moderate-significant due to the extensive amount of construction activity that would occur lower in the canyon between Texas Creek and Parkdale. In this portion of the Project Area, impacts would be similar to those described for Alternative 1a.

The elimination of construction activities above Texas Creek would reduce disturbance to other species and their habitat within this area, including severe winter habitat for elk located MM 224.5 and 228.5, the mule deer crossing area between MM 234 and 235, the black bear conflict areas near County Line and MM 235, and other wildlife on the western portion of the Analysis Area.

4.1.5.2 Exhibition

With approximately 1.1 miles less panels compared to Alternative 1a, this alternative would have a somewhat lower level of impact on wildlife. The total area of panels would be approximately 38.0 acres, compared to the 50.0 acres associated with Alternative 1a.

The elimination of panels above Texas Creek would reduce the obstacles for bighorn sheep and other species to utilize water and riparian areas in the upper portions of the river corridor.

Impacts to wildlife in all areas below Texas Creek would be the same as described for Alternative 1a.

A June/July viewing period is closer to the bighorn lambing season and the installation period would likely have greater impacts to lambs and lambing. Lambs still dependent on ewes would experience increased stress during a particularly sensitive time period. A June/July viewing period would also have greater impact on all terrestrial wildlife species' reproductive seasons. An earlier exhibition period would be a significant but localized impact on many species that breed within or adjacent to the Analysis Area. These effects would consist of both short- and long-term consequences. Increased stress during lambing or other species' breeding seasons may result in increased mortality in the short-term; ultimately, offspring mortality could affect population dynamics and survivorship in the long-term.

4.1.5.3 Demobilization

Below Texas Creek, impacts on wildlife would be the same as described for Alternative 1a. No demobilization activities would occur above Texas Creek, reducing the obstacles for bighorn sheep and other species to utilize water and riparian areas in the upper portion of the river corridor.

4.1.6 Alternative 3

Alternative 3 was developed by analyzing bighorn sheep data, interviewing bighorn sheep specialists onsite at each panel location, and creating a panel placement scenario that would work toward lowering adverse effects on bighorn sheep and other species. The primary data used in this process was the bighorn sheep observations (recorded in GIS by the CDOW and BLM) as well as the on-site interviews with CDOW personnel to identify where sheep come down to the river and how to best avoid major displacement of sheep movement patterns.

4.1.6.1 Installation

This alternative would have approximately 1.8 miles less panel than Alternative 1a, and would provide a greater amount of separation between remaining panel sections. The total area of direct disturbance would be reduced from the 6.0 acres associated with Alternative 1a to 4.2 acres. Indirect disturbance would occur on approximately 3,162 acres, compared to the 3,516 acres associated with Alternative 1a. Disturbance at staging areas and visitor sites would remain at 84.3 acres, the same as Alternative 1a.

More specifically, this alternative would have 1.6 miles of panel through the Parkdale segment over approximately 3.0 miles, compared to 2.5 miles over the same river segment for Alternative 1a. Eliminating construction activities at key locations, such as frequent watering areas or other concentration areas, may allow bighorn sheep and other wildlife to access the river with lower levels of stress, thus reducing long-term impacts.

The nearly continuous extent of panel segments associated with Alternative 1a through the Parkdale section would be interrupted by two larger breaks, each with a length of 0.4 to 0.5 mile. In effect, these breaks would create a refuge in an area of concentrated bighorn sheep winter use where noise and other construction activities would be less apparent, thus allowing bighorns to remain within their accustomed range and minimize the risk of temporary displacement during a sensitive time of the year. However, even

with these larger breaks in the panels, sheep may still be deterred from the river due to the overall increase in human activities, noise, and new above-ground structures nearby.

Similarly, a larger break would be provided within the Spike Buck and Texas Creek panel segments, each approximately 0.25 mile in length. The total length of panel segments at Three Rocks and Maytag would also be reduced.

At other locations where panels would be installed, Alternative 3 would impact wildlife in the same way as described for Alternative 1a. See Alternative 1a installation for a discussion of impacts from construction activities and added human presence.

The overall effect on bighorn sheep would be reduced to a moderate level of impact.

4.1.6.2 Exhibition

This alternative would have a reduced area of panels compared to Alternative 1a, a total of 35.0 acres compared to the approximately 50.0 acres associated with Alternative 1a. The breaks in panels proposed under this alternative have been designed to provide bighorn sheep improved access to water resources and would have a reduced level of impact compared to Alternative 1a (see Appendix B, Attachment 1). As a result, this phase of Alternative 3 would result in a moderate level of impact on bighorn sheep compared to the moderate-significant level of impact associated with Alternative 1a. The types of impacts on bighorn sheep would be the same as described for Alternative 1a.

- Parkdale panel site. A 0.5-mile gap would be provided at Tallahassee Draw, an area of critical importance for bighorn sheep. Bootlegger Draw is also highly utilized by sheep, and the sheep that come down out of Bootlegger would be provided a 0.4-mile break at this location to enable them to get to the river.
- Spike Buck panel site. The east end of the Spike Buck section gets a high amount of sheep use. A 0.25-mile break for wildlife at MM 262.5 to 262.25 would be provided.
- Three Rocks panel site. The length of the panels in this area would be reduced by approximately 0.25 mile. This would provide a 0.3-mile section of panels while lessening the disturbance to bighorn sheep.
- Texas Creek panel site. A break between MM 253.9 and 253.7 would allow the sheep in this area to come down to the river. It would provide a 0.3-mile section of panels followed by a 0.2-mile break, and then another 0.2-mile section of panels.
- County Line panel site. The area across from MM 225.7 is the most critical sheep utilization area along the river between Texas Creek and Salida. This panel location has very high bighorn use and would be removed in this alternative in order to reduce disturbance and stressors to bighorn sheep.

A reduction in the length of panels at strategic sites would lower the risk of bat collisions and reduce the probability that mule deer and other species would avoid preferred habitat and access to water because of fabric flapping or large numbers of spectators. Only minor impacts would result to other wildlife species.

4.1.6.3 Demobilization

Reduced demobilization activity in key locations may allow bighorn sheep and other wildlife to access the river with lower levels of stress, thus reducing impacts. At other locations where panels would not be removed, Alternative 3 would impact wildlife in the same way as described for Alternative 1a.

4.1.7 Alternative 4

4.1.7.1 Installation

Alternative 4 would result in a reduction of 4.5 miles of panels and a reduction in the total area directly disturbed. The total area disturbed at panel sites would be approximately 1.6 acres compared to the 6.0 acres associated with Alternative 1a. Indirect disturbance would occur on approximately 1,145 acres, compared to the 3,516 acres associated with Alternative 1a. The removal of all panels within the ACEC and elimination of any construction activities within that area would substantially reduce impacts to wildlife in the lower canyon, including bighorn sheep and a variety of other species.

Where panels occur under Alternative 4, installation activities would impact wildlife in the same way as described for Alternative 1a installation. The installation duration and subsequently, the period of installation disturbance, would also be substantially reduced under this alternative. The overall degree of impact would be reduced to a minor level for all species as a result of a greatly reduced panel configuration and greatly shortened installation period.

4.1.7.2 Exhibition

The total area occupied by panels would be reduced to 5.4 acres compared to the 50.0 acres associated with Alternative 1a, resulting in less habitat displacement. The majority of the panels would be located in a section of the corridor that is largely surrounded by private lands. Access to off-highway viewing and vantage points would be constrained by a patchwork of private and public land ownership. Therefore, it is anticipated that fewer visitors would leave the immediate viewing areas for alternative vantage points. The potential for disturbances to wildlife on slopes or cliffs in areas removed from the corridor would be greatly reduced under this alternative.

4.1.7.3 Demobilization

Demobilization activities would impact wildlife in the same way as described for Alternative 1a at those locations where removal activities would occur. However, the extent of disturbance would be greatly reduced and impacts would be reduced to minor. No demobilization activities or effects would occur within the ACEC.

4.2 AVIAN WILDLIFE AND HABITAT

Environmental impacts to avian wildlife within the Analysis Area would result primarily from construction activities, the presence of cable wires and fabric panels spanning the river, an expected increase in visitation, and the removal process. The Analysis Area contains a wide variety of songbirds, raptors, and waterfowl, some of which habituate to human activities (e.g., corvids) and other species that are sensitive to or deterred by human activity (e.g., golden eagle). Impacts would vary depending on species and location. It is likely, however, that with the exception of the No Action Alternative, all alternatives would

result in temporary displacement of avian species from riparian habitat and increased mortality from strikes with cables or other project elements.

In considering the impacts of this unique project, there are some unknowns. There are no wildlife studies that address or document the impacts from a temporary art installation, such as the OTR project. Therefore, drawing conclusions on the expected impacts must be based on research of projects with similar impact mechanisms. For example, comparisons between this art installation and other activities, such as active construction sites or powerlines, can be made. There are both similarities and differences between these project types. It is unprecedented to have over one-thousand cable lengths strung across a river for nearly 6.0 miles; therefore this chapter will discuss the probability of impact in a relative sense. In general, avian collisions with cables should be expected. (As mammals, bats are covered in the terrestrial wildlife section but will have many of the same life history strategies and issues as the avian species discussed here.)

4.2.1 No Action Alternative

Under the No Action Alternative, the OTR project would not be constructed or displayed. As a result, OTR actions would not occur and there would be no effects on avian wildlife species or their habitat from the project. Habitat conditions in the Analysis Area would continue on current trends, assuming the same level of existing activities and management direction as described in Chapter 3.0.

4.2.2 Alternative 1a

4.2.2.1 Installation

The installation of the Artists' proposal would effectively create major construction sites at various locations in the Analysis Area, complete with rail traffic, heavy equipment, and large rock drills to establish a network of cables spanning the river approximately every 24 feet for 5.9 miles of river. The timing of installation is intended to avoid the bighorn lambing season and thereby also partially avoids the breeding bird season, but would occur during other sensitive periods for avian species, including the early and late breeding season and the winter roosting period for eagles.

The most serious concern for avian species is the density of the proposed cable network over the river. Cable installation would begin approximately 2 months before installation of fabric panels. Bare cables would be spanning the river for up to 4 months, generally June through October. Records of bird collisions with wires in Colorado date back to the first telegraph wires installed between Denver and Cheyenne (Coues 1876). Since then, many studies and reports have been completed to research and track the impacts of wires and wire collisions on avian species (Dailey and Avery 1978, Lewis 1997, Hufford 2001, APLIC 2006).

The panel cables can be compared to powerlines, guy wires on communication towers, and other wire span applications. The Avian Power Line Interaction Committee (APLIC) has developed accepted best practices for wire spans to minimize the risk of avian collision. In general, species with high flight speeds, those that fly in flocks, those with large wing spans, and those with a lack of agility are at most risk (APLIC 2006). Marking wires is the most effective way to reduce the chance of avian wire strike mortality (Beaulaurier 1981). However, the chance of bird strike still exists even with marking. During low light periods, high speed maneuvers, or flock migrations, avian species would not see or have time to avoid the extensive network of obstacles presented by the OTR project.

During the majority of the installation period, the cable would be bare and would therefore pose a higher risk of avian collisions. The resulting impacts are difficult to determine because there are no studies that have assessed the effects of a cable network of this density spanning a riparian zone.

It is reasonable to assume that avian wildlife foraging and drinking within the Analysis Area at speeds up to 200 mph (e.g., peregrine falcon), with complex flight behaviors (e.g., white-throated swift), a lack of agility (e.g., great blue heron), or migrating in flocks (e.g., Canada goose) would be impacted and that some level of mortality or injury would occur. A discussion of potential effects on key avian groups follows.

a. Raptors

Raptor species with potential to be impacted within the Analysis Area, either along the corridor or in the vicinity of the river, include the golden eagle, prairie falcon, American kestrel, great-horned owl, and red-tailed hawk. These raptor species generally nest between March and July. CDOW has developed recommendations and guidelines for buffering nests to limit disturbance (CDOW 2008b).

Anchor survey crews, which are scheduled to begin work in May 2011, would have the potential to impact nesting raptors by encroaching on territories for periods long enough to disrupt nesting behavior.

Anchor drilling, beginning in June, would also have the potential to disrupt raptors at nesting locations if the anchor sites are located within an inappropriate proximity to nest sites (CDOW 2008b).

Cable installation, beginning in June and lasting to the exhibition start, would have the potential to impact raptors directly by disturbing nests in proximity to installation sites and by increasing the potential for raptor collisions with the cables (Harness et al. 2003). The possibility of cable collisions would also increase for fledgling raptors learning how to fly in June and July.

As stated in APLIC (2006), birds with a lack of agility and large wing spans are susceptible to increased risk of collision. ATF installation spanning the winters of 2011/2012 and 2012/2013 would have the potential to impact raptor species that overwinter in the canyon, particularly the bald eagle (see also Section 4.8, Threatened, Endangered, and Sensitive Species).

Golden Eagle. There are four documented golden eagle nests within the Analysis Area. One is located within 200 feet of the proposed Vallie Bridge panel site (J.F. Sato 2007). The recommended guideline for buffering golden eagle nests is 0.25 miles, and the seasonal restriction to human encroachment within 0.5-mile radius of active nests is from December 15 through July 15 (CDOW 2008b). The Vallie Bridge golden eagle nest occurs on the cliffs just south of the highway and is located in proximity to traffic and other activities along the highway. However, the disturbance related to project installation would be different from the current disturbance mechanisms, primarily traffic, and would present new noises, increased human presence, and new human activities to which the eagles are not adapted.

Also, the potential for fledging collisions in June and July would increase. As stated in APLIC (2006), birds with a lack of agility and large wing spans are at increased risk of collision. The potential for take, as described under the Bald and Golden Eagle Protection Act and the MBTA, is a real possibility.
Taken together, these project activities can be expected to result in a moderate to significant impact, depending on how project activities influence nesting success at Vallie Bridge.

Other Raptor Species. Other raptor species with the potential to be impacted in the Analysis Area include American kestrel, red-tailed hawk, sharp-shinned hawk, and turkey vulture. The great-horned owl, western screech owl, northern saw-whet owl, and flammulated owl are also likely to occur in the overall Project Area (Kingery 1998). These species generally nest between March and July. Installation activity during the nesting season would have the potential to disrupt nesting birds. The potential for direct mortality or nest destruction is also a possibility during the installation phase and would be considered a "taking" under the MBTA. An increased potential for mortality through direct strike with the cables would also be associated with this phase of the project.

These increased risk factors and potential for disturbance would be a moderate to significant short-term impact, depending on how raptors in the project vicinity respond to installation activities.

b. Passerines

Many different passerine species nest and feed along the river in the Analysis Area. A list of these species is presented in Chapter 3.0 (Table 3-3). Many of these species capitalize on the rich protein diet of the insect hatches that occur along the river. Feeding often occurs above the water at heights comparable to where the cables would be positioned. Disruption of avian feeding on aquatic insect hatches is very likely. This would result in birds abandoning the area for less stressful or more successful feeding sites.

Species feeding on hatches during low light, at high speeds, or juveniles with poor agility are at risk of collision with bare cables. Realistically, any individual foraging in the area would have a relatively high probability of colliding with cables. Species that use the ground, shrubs, small branches, and trees (<8-inch diameter) to build nests could be impacted by removal if nest sites are within the area of disturbance.

Heavy human traffic and noise have been found to modify the composition and abundance of avian species, including increasing the numbers of corvids (Ballenger and Ortego 2001). Corvids can often outcompete other species for resources and harass other species. Corvids can also cause conflict with visitors by stealing food and disturbing trash containers.

Overall, this phase of the project would result in a moderate short-term impact on passerines.

c. Waterfowl/Shorebirds/Wading Birds/Gulls/Pelicaniformes

A variety of species within this avian group nest and feed along the river. A list of these species is presented in Chapter 3.0 (Table 3-3). Many of these species capitalize on the rich diet of the small fish, macro-invertebrates, and riparian plants found on the river's bottom and edge. Feeding often occurs at the riparian edge just downslope of the anchor installation sites. Disruption of avian feeding habitats is likely. This would result in some birds abandoning the area for a less stressful site. If disturbances cause birds within this group to abandon active nest sites, the impacts would be moderate and potentially long-term.

These species often fly in flocks, have large wing spans, are less agile in flight, and/or access the area during low light periods. Species in this group migrate up and down the river in groups. These species are particularly susceptible to cable collisions during routine flights or migrations up and down the river corridor.

Overall, this phase of the project would result in moderate short-term impacts on waterfowl species.

4.2.2.2 Exhibition

The wide variety of avian species that inhabit the Arkansas River corridor would likely be influenced differently by the presence of the proposed panels, as their access to the river and adjacent ground cover and vegetation may be interrupted. Depending upon their ability to adapt to the panels, meaning whether or not they would be able to continue regular activities by traveling underneath the panels or be able to seek out gaps in the panels along the river, is difficult to ascertain.

Of the 42.0 miles of riparian habitat between Parkdale and County Line, 5.9 miles would ultimately be covered by the proposed panels. The panel area totals approximately 50.0 acres, which includes the river itself and its banks. Therefore, approximately 13.4% of river area and riparian habitat between Parkdale and the upper panels at County Line would be covered during the viewing period and the several weeks when the fabric is in place.

During the exhibition period, the issues of exposed cables and increased human presence would have impacts similar to those described above under installation. Additional impacts would also include:

- The movement and sound of the fabric panels (i.e., from wind) would potentially deter all avian species from using preferred riparian habitat during the exhibition period. For species or individuals that are not deterred by the presence of panels or fabric noise, the bare cable ends leading to ATF connection points would still present collision risk to these species.
- Visitors walking on the riverbanks or climbing to high vantage points to view panels have the potential to impact nesting and perching birds. Nest destruction would be a moderate but localized short-term direct impact and could be considered a “taking” under the MBTA.
- The amount of river essentially “blocked” to feeding by the panels could limit feeding or result in dispersal.
- Increased human activity and the potential for uncontained trash or discarded food items may result in short-term increases in corvid populations, as described above.

Without empirical knowledge of the density of the specific resident and migratory avian populations that inhabit the Arkansas River riparian zone during the summer exhibition period, it is difficult to predict how many birds would be displaced during this time period. However, some context can be derived from research at other riparian locations in Colorado.

Three common avian species that are known to inhabit the Arkansas River corridor are: American robin, yellow-rumped warbler, and black-billed magpie. Bidar (1993) found that the densities of these species within riparian habitat are 6.4, 2.3, and 2.6 birds/ha, respectively. Less abundant species that are known to inhabit the Arkansas River corridor and were included in the same study are house wren, the song sparrow, and the yellow warbler, with respective densities of 1.4, 0.6, and 0.3 birds/ha.

Given those densities, the following estimates can be made of the number of individuals that would be displaced during the viewing period, based on the 50.0 acres of panels associated with Alternative 1a.

Table 4-3. Estimated Number of Individual Birds Displaced by Alternative 1a Panel Placement*

Species	Bidar 1993 Density (birds/ha)**	Density per Acre (birds/acre)	Approx. Number of Birds Displaced by Panel Placement
American Robin	6.352	15.689	784
Yellow-rumped Warbler	2.273	5.614	281
Black-billed Magpie	2.559	6.321	316
House Wren	1.422	3.512	176
Song Sparrow	0.569	1.405	51
Yellow Warbler	0.284	0.701	35

Source: Bidar 1993

*Species shown presents a representative cross-section of birds known to occur in the Analysis Area.

**Study density results were calculated using the following equation: total number of birds in the plots/(14 days)(6 plots)

The overall level of impact associated with this phase of the project would be moderate to significant and short-term, depending on the rate of mortality resulting from bird strike/entanglement, habitat modification, and displacement.

4.2.2.3 Demobilization

Demobilization activities would impact birds in the same way as the installation phase. All cables would be removed within 4 to 5 weeks of the exhibition period. Cable collision impacts would be the same as described for the installation period.

Although restoration activities would occur over a 3-month period, an additional 3 to 5 years could be necessary to reestablish or restore the habitat to its existing condition. During that time frame, there would be additional impacts to wildlife from restoration or monitoring teams, soil stabilization or revegetation efforts, and from lower quality habitat conditions that may exist while native forage species are being reestablished.

4.2.3 Alternative 1c

4.2.3.1 Installation

Installation impacts would be the same as described for Alternative 1a.

4.2.3.2 Exhibition

Extending the exhibition period by one week would increase the probability of avian wildlife collisions and entanglement compared with Alternative 1a. The primary impacts to avian species would occur as a function of the number of visitors, presence of cables and panels, and increased activity in suitable habitat areas. The incremental addition of one week to the viewing period is impossible to quantify, but could result in a measurable increase in avian strikes.

New, temporary rations would allow for limited boating increases during the exhibition period. Most avian wildlife are accustomed to boating use in the corridor. Therefore, negligible to minor short-term effects are anticipated as a result of modified boat rations.

With the exception of impacts resulting from an extended exhibition period, impacts on avian species would be the same as described for Alternative 1a.

4.2.3.3 Demobilization

Demobilization impacts would be the same as described for Alternative 1a.

4.2.4 Alternative 1d

4.2.4.1 Installation

Installation impacts would be the same as described for Alternative 1a.

4.2.4.2 Exhibition

Unless otherwise noted, impacts on wildlife would be the same as described for Alternative 1a.

Closing the AHRA sites would limit foot traffic along the riverbanks during the exhibition. However, by closing these sites, some visitors may be displaced to alternate, possibly undeveloped places to park, recreate, or view panels. Increased human activity in areas removed from the main highway-river corridor may result in short-term minor disturbances to avian wildlife, such as disturbance of ground nests or flushing of individuals.

4.2.4.3 Demobilization

Demobilization impacts would be the same as described for Alternative 1a.

4.2.5 Alternative 2

4.2.5.1 Installation

The elimination of installation activities west of Texas Creek would eliminate impacts to the Vallie Bridge golden eagle nest site and other birds in the western portion of the Analysis Area. The length of panel area would be reduced to 4.8 miles at 5 sites, and the area of disturbance at panel sites would be reduced to 4.1 acres. Activities downstream of Texas Creek would impact avian wildlife in the same way as described for Alternative 1a.

4.2.5.2 Exhibition

An earlier exhibition period would result in an increased level of impact on many species that breed within the Analysis Area, including young that have not yet fledged. These impacts would be partially offset by the fact that Alternative 2 has approximately 1.1 fewer miles of panel compared to Alternative 1a, and the total area of panels is approximately 38.0 acres compared to the 50.0 acres associated with Alternative 1a.

The exhibition phase of the project would result in moderate short-term impacts to all species.

4.2.5.3 Demobilization

Below Texas Creek, impacts on avian wildlife would be the same as described for Alternative 1a. No demobilization activities would occur above Texas Creek.

4.2.6 Alternative 3

Alternative 3 would reduce habitat disturbance and the risk of direct mortality to migratory birds from cable strikes.

4.2.6.1 Installation

A reduced panel configuration would allow improved access to the river for avian foragers to feed and drink. Ultimately, this would reduce stress levels on individuals and groups. The total length of panel would be reduced to 4.1 miles and the area of disturbance at panel sites reduced to 4.2 acres, compared to the 5.9 miles of panel and 5.5 acres of disturbance associated with Alternative 1a.

Other installation impacts would be the same as described for Alternative 1a.

4.2.6.2 Exhibition

This alternative would have a reduced area of panels compared to Alternative 1a, a total of 35.0 acres compared to the approximately 50.0 acres associated with Alternative 1a. This would result in a reduction in the amount of habitat disturbances and displacement during the viewing period, and an overall level of impact in the minor to moderate range.

Except as noted otherwise, the impacts of the exhibition period would be the same as for Alternative 1a. However, a reduction in the amount of panel would lower the risk of avian collisions and reduce the barriers to on-water feeding.

4.2.6.3 Demobilization

The demobilization period impacts would be similar to those as described for Alternative 1a.

4.2.7 Alternative 4

4.2.7.1 Installation

Alternative 4 would result in a reduction of 4.5 miles of panel and the removal of all panels within the ACEC. The elimination of all installation activities in the ACEC would significantly reduce impacts to avian wildlife in the lower canyon.

4.2.7.2 Exhibition

The total area occupied by panels would be reduced to 5.4 acres compared to the 50.0 acres associated with Alternative 1a, resulting in less habitat displacement. The impacts of the exhibition period would be similar to those described for Alternative 1a exhibition. Exhibition period visitation is anticipated to be greatly reduced under this alternative. Additionally, the majority of panels would be located in a section of the corridor that is largely surrounded by private lands. Access to off-highway viewing and vantage points is constrained by a patchwork of private and public land ownership. Therefore, it is anticipated that fewer visitors would leave the immediate viewing areas for alternative vantage points. The potential for disturbances to avian wildlife on slopes, cliffs, or in suitable ground-nesting habitat areas removed from the corridor is therefore reduced under this alternative. The overall level of impact would be reduced to the minor level.

4.2.7.3 Demobilization

Demobilization activities would impact wildlife in the same way as described for Alternative 1a at those locations where removal activities would occur. However, the extent of disturbance would be greatly reduced and impacts would be reduced to minor and short-term. No demobilization activities or effects would occur within the ACEC.

4.3 AQUATIC WILDLIFE AND HABITAT

The following aquatic biology issues are discussed as part of the impact analysis for the phases of the proposed OTR project:

Construction/Demobilization

- Effects of surface disturbance activities on water quality (sedimentation), aquatic habitat, and aquatic species.
- Effects of potential reduction in riparian vegetation within construction areas near the river.
- Effects of potential contaminants entering the river from construction equipment or materials.
- Effects of noise and vibration on aquatic species.

Exhibition

- Effects of shading from the fabric on water temperature and ecological processes, such as photosynthesis, invertebrate emergence or hatching, decomposition, and food web dynamics.
- Potential effects of the fabric on aquatic habitat and species if it should break from the structures and cover the river surface.
- Potential effects of panel vibrations on aquatic habitat and fish.
- Potential effects of water or hail runoff from the fabric on aquatic habitat.
- Effects of human presence and noise on fish species during the exhibition phase.

Impacts on aquatic biology resources were evaluated by relating project activities to habitat and ecological functions of aquatic species within the 42.0-mile stretch of the Arkansas River between Salida and Cañon City. The analysis focused on impact issues listed above for the three phases of the proposed project. Available literature was used as a basis for determining the effects of the activities (e.g., shading effects on photosynthesis, invertebrate hatching, food web dynamics, and water temperature; sedimentation; and other water quality effects on species and habitat). After considering applicant-committed protection measures and BLM BMP or management guidance in the Royal Gorge Resource Area RMP (BLM 1996), impacts were described in terms of duration and magnitude or intensity. If impacts of moderate or high level remained after applying these measures, mitigation was proposed (Chapter 5.0) to further reduce impacts.

4.3.1 No Action Alternative

Under the No Action Alternative, the OTR project would not be constructed or displayed. As a result, OTR actions would not occur and there would be no effects on aquatic species and their habitat from the project. Habitat conditions in the Arkansas River would continue with current trends, assuming the same level of existing activities and management direction. The primary activities within the river corridor involve fishing and rafting. Flows in the Arkansas River would be expected to follow recent operation regimes, which would be the primary factor in determining the quantity of aquatic habitat.

4.3.2 Alternative 1a

4.3.2.1 Installation

Construction activities for panel installation would occur along 5.9 miles of the river in eight areas. The 8 panel sites would extend between the Parkdale and County Line areas along the Arkansas River. The Parkdale area would have the highest construction level (2.5 miles, or approximately 42% of the total panel length). Lengths of panel construction for the other seven areas would range from 0.3 to 0.9 mile per area (5% to 15% of the total panel length). Construction would occur during a 28-month period. In total, 9,100 anchor holes at 2,275 sites would be required for the panels, which represent approximately 1,542 points per mile. An estimated 1.9 acres would be disturbed for the anchor points and 3.7 acres for the equipment and footpaths. Soils removed from the anchor holes would be bagged and removed from the construction areas. However, construction equipment and human activity would result in surface disturbance that could contribute to localized erosion in areas adjacent to the river. Surface disturbance would also occur in the Texas Creek construction staging area (CSA), which would encompass approximately 56.0 acres. The area is located within the Texas Creek drainage in close proximity to the Arkansas River. Further discussion of potential sedimentation effects are provided in Water Resources, Section 4.10. When considering construction activities within the entire project study area, surface disturbance activities could result in moderate level sediment impacts during the 28-month construction period. Project design features involving sediment fences, rubber mats, and treads on equipment disturbance areas; covering soil piles; limiting public access to work areas; and restoring disturbed areas to preconstruction conditions would be implemented to reduce sediment input to the river. These project design features, or BMPs, are listed in the Water Resource Section (4.10) as part of the impact discussion for Alternative 1a. As a result of these design features, sediment input to the river would be considered a minor level impact on aquatic species and their habitat.

Construction activities could also disturb or remove riparian vegetation along the river. Based on a habitat characterization study conducted at the proposed panel areas, riparian vegetation generally is limited, except for the Parkdale, Three Rocks, and County Line areas. Disturbance to the limited riparian vegetation could further reduce overhanging cover, bank stability, and food and nutrient input provided by streamside shrubs or small trees. Construction activities would result in a moderate impact level, if riparian vegetation is removed by surface disturbance activities. Loss of riparian vegetation would be a long-term impact, since it would take more than 5 years for regrowth of woody vegetation. Implementation of the mitigation measures presented in Chapter 5.0 by restricting removal of riparian vegetation could be expected to reduce the level of impact from a moderate to a negligible level.

Vehicle and equipment use within the construction areas would pose a risk to aquatic species from potential fuel or lubricant spills. If fuel or lubricant reaches the river, aquatic species could be exposed to toxic conditions depending on the volume spilled and river discharge. Impacts from fuel spills could include

direct mortalities or reduced health of organisms. Design features involving proper handling and storage of hazardous materials would be used to minimize accidental spills. In addition, each work crew would be trained to recognize and contain a spill. After implementing the design features, potential hazardous material spills are still considered a minor and short-term impact due to the negligible risk associated with potential contamination from spills.

The construction phase of the project also would result in increased human presence along the river and noise from equipment. Noise measurements indicated that drilling produced levels of 10 to 20dBA above background conditions at a distance of 300 feet from the drill sites. However, the magnitude of noise levels that would be produced in the riverine environment is unknown. When considering that surface disturbance activities would occur near the river, noise levels would likely be produced above background conditions. If noise levels are within the range of sensitivity for fish (50-2,000 Hz), effects typically involve avoidance movements (U.S. Department of Transportation 2010). Noise also can cause physiological responses in fish, such as reduced feeding, depending on the noise level and duration (Hastings and Popper 2005). Design measures consisting of mufflers and spark arresters would reduce noise levels from engine-powered equipment. However, drilling noise would persist periodically during the period of anchor construction. As a result, construction could result in moderate noise levels in the river environment and cause avoidance responses or physiological effects on fish populations. Some minor avoidance of shoreline areas by fish could occur if human activity is immediately adjacent to the water's edge.

4.3.2.2 Exhibition

The exhibition phase of the OTR project would involve 5.9 miles of polypropylene fabric panels being suspended over the river for a 2-week period in early August. The impact evaluation for this activity focused on whether shading from the fabric would affect water temperature and ecological processes, such as photosynthesis, invertebrate hatching or emergence, organic material input, and food web dynamics. Separate discussions are provided below for these impact topics.

a. Photosynthesis

Primary production in the Arkansas River is dominated by attached benthic algae, particularly in the shallow areas along both sides of the river. Typically, photosynthetic rates increase linearly with increasing sunlight and then plateau and even decline at the highest light levels (Hill 1996). Photoinhibition is common in algal cells exposed to high light levels. The saturation rate for benthic algae has been estimated to be approximately 10% to 30% of full sunlight or irradiance (Hill 1996; Wellnitz and Rader 2003). Studies conducted under 30% of full sunlight conditions showed no effects on algal biovolume and only a minor reduction in the number of taxa (Wellnitz and Rader 2003). Based on tests conducted by the panel fabric manufacturer, approximately 40% to 50% of full sunlight (average of 47%) would pass through the fabric (OTR 2009). Considering the estimate of at least 40% of light passing through the fabric, sufficient light would be present to maintain photosynthetic rates at current levels. As a result, the effect of the panel system on photosynthesis is considered to be minor.

b. Invertebrate Emergence

Most of the aquatic insect species develop as immature stages in aquatic environments and then emerge as adults at the water surface (Merritt and Cummins 1988). Emergence or hatching is related to life history characteristics and ecological factors such as temperature. After emerging, insects fly to adjacent terrestrial vegetation located near the waterbody. When considering the vertical distance between the panels and the river (8 to 25 feet), it is assumed that most insects would be able to move diagonally from

the water surface without obstruction by the fabric. It is possible that some insects could collide with the fabric at the lower end of the suspension distance. However, they are expected to eventually move away from the fabric to areas adjacent to the river. Therefore, the effect of the panel system on invertebrate emergence is considered to be minor and short-term in duration.

c. Organic Material Input and Food Web Dynamics

Placement of the panel over the river could result in a reduction in litter input during the 2-week exhibition period. Litter input from terrestrial vegetation is an important part of the food web dynamics. Studies involving plastic or net materials suspended over streams for approximately 30 days showed that litter and organic matter flow were reduced in the streams (Nakano et al. 1999; Hall et al. 2000). Other changes noted in these studies included a reduction in terrestrial insect input, alterations in macroinvertebrate composition, and a shift in fish feeding from terrestrial to aquatic invertebrates in the covered streams. Although litter and terrestrial insect input to the Arkansas River could be reduced in the covered areas during the exhibition period, the magnitude of change would likely be low for the following reasons: (1) the fabric would not restrict litter input from the banks of the river; (2) there is a limited amount of riparian vegetation along the river; and (3) the short duration of the 2-week exhibition period. As a result, the effect of the panel system on organic input and food web dynamics is considered to be minor.

d. Water Temperature

As discussed in Water Resources (Section 4.10), panel placement above the river could result in a minor and short-term reduction in water temperatures. The qualitative analysis indicated that a slight reduction in temperature (several degrees F) could occur during the period when the panels are positioned above the river (August 2-week viewing and estimated 2-week timeframe to remove the panels). The continual movement of water from upstream areas would maintain river temperatures within average ranges for August and September. This potential slight cooling of water temperatures would not be expected to affect aquatic species or ecological processes, such as photosynthesis, decomposition, fish feeding, or invertebrate development. Water temperatures during panel placement would be within the range considered to provide optimum growth and survival for adult and juvenile trout (53° to 66°F) (Ruckerman et al 1986; Raleigh et al. 1984). Water temperatures also would be within the tolerance range for trout (32° to 80°F). Therefore, the effect of panel placement on water temperature is considered to be negligible and short-term in duration.

e. Effects of a Potential Panel Release

If the panels should break from the cable system, aquatic habitat could be disturbed as the fabric hits the river surface. The disturbance could extend into the water column if the panel totally loosened from the cables. Portions of the water surface and substrate could be covered depending on the size of the panel. The presence of the panels in the river could affect fish movements and ecological functions, such as feeding. In addition, if panels move to the river bottom, periphyton and macroinvertebrate communities could be covered. In relative terms, the area of the river potentially affected by a panel release would be considered small in comparison to the overall study area. The duration of this impact would be short-term because there would be continual monitoring of the panel system. If panels were to break from the cables, there would be immediate response to remove the panels from the river. As a result, the effect of a potential panel release is considered to be a potential minor and short-term impact on aquatic species and their habitat.

f. Effects of Fabric Structure Vibrations

The cable structure system was designed to hold the fabric panels in place without extensive movements. Wind could result in slight vibrations of the fabric material; however, the resulting noise level is expected to be at a relatively low level. Any noise produced by the fabric vibrations would not be expected to disturb fish in the river. This impact level is considered to be minor.

g. Effects of Runoff from the Panel

As discussed in Water Resources (Section 4.10), if a hail or severe rain event occurred during the exhibition period in August, concentrated runoff from the panels could occur and affect aquatic habitat. Depending on the volume of hail or rain flowing into an area, substrate or habitat could be altered. Natural runoff from this type of storm event could combine with effects in an area that may receive concentrated flow off the panels. The impact concern involves alteration of habitat features such as substrate and channel configuration. If a large storm event occurred during the exhibition period, it could result in a moderate and short-term localized impact on aquatic habitat. Implementation of the mitigation measures presented in Chapter 5.0 to restore the affected area could be expected to reduce the level of impact to short-term, but the impact would still be moderate.

h. Effects on Fish from Noise and Human Presence

The exhibition phase of the project also would result in increased human presence along the river, as well as increased rafting. The increased activity could result in noise disturbance to fish. The typical reaction of fish to noise and surface disturbance to the water is to move away from the area. Fish also could be stressed by increased level of rafting and human presence along the river, which could affect feeding and growth for several weeks during the exhibition period. Fish are expected to resume normal feeding patterns and other behavioral activities after the exhibition period is completed. Noise and human presence during August would not affect spawning or migration periods for adult and juvenile trout. Brown trout, which is the only naturally reproducing trout species in the river at this time, is a fall spawner. The effect of human activity and noise during the exhibition period is considered a moderate level impact. The duration of impacts could range from several weeks to over several months, depending on whether physiological effects persist beyond the exhibition period.

4.3.2.3 Demobilization

The effects of demobilization on aquatic species and their habitat would be similar to effects discussed for the construction phase. Activity would occur in a 3-month period and would involve surface disturbance activities at the anchor points and cable structures. The same project design features would be used to minimize soil disturbance and potential sedimentation effects. As a result of these design features, sediment input to the river would be considered a minor effect on aquatic species and their habitat.

4.3.3 Alternative 1c

4.3.3.1 Installation

Project construction activities for Alternative 1c would be the same as Alternative 1a. The same types of impacts discussed in Alternative 1a involving surface disturbance/sedimentation, alteration or loss of riparian vegetation, and potential fuel spills would result from installation activities. Human activity and noise would be reduced to a one-year period under Alternative 1c, although impacts would be considered minor, as discussed for Alternative 1a. The same project design features discussed for Alternative 1a

related to sediment control, fuel handling, spill containment, and noise reduction also would be applied to Alternative 1c.

4.3.3.2 Exhibition

The exhibition phase of Alternative 1c would consist of a 21 to 28-day viewing period in August. Shading from the panels would continue over a longer period of time, which could result in a larger quantity of terrestrial insects and litter being partially obstructed from entering the river. As previously discussed under Alternative 1a, material could still enter the river from the sides of the channel. However, the potential reduction of terrestrial insects may result in trout feeding on aquatic invertebrates during a longer period of panel coverage. This impact could increase to a moderate level, although it cannot be quantified. The longer period of shading would not be expected to affect photosynthesis, since benthic algae typically cease this process during sunlight levels above approximately 30%.

The extension of the viewing period and removal of boat rationing would result in increased human activity and rafting activity on the river for a 3-week period in August. In total, approximately 455,000 visitors, or a 29% increase in visitors, would occur under Alternative 1c in comparison to Alternative 1a. This increased activity could result in stress on trout in terms of avoidance reactions, reduced feeding and growth, and adverse effects on fish health. The August timeframe represents an important period for fish to grow and maintain healthy conditions. This feeding and development period is particularly critical for brown trout, which must improve fitness conditions prior to spawning in the fall. Adverse effects on feeding could have a carryover impact on brown trout spawning and subsequent recruitment to the population in the year after the exhibition period for Alternative 1c. As a result of the potential long-term effect on brown trout population, the impact level is considered to be moderate to significant for this alternative.

4.3.3.3 Demobilization

Impacts from the demobilization phase of Alternative 1c on aquatic species and their habitat would be the same as discussed for Alternative 1a.

4.3.4 Alternative 1d

4.3.4.1 Installation

Project construction activities for Alternative 1d would be the same as Alternative 1a, except that installation would be compressed into 14 months instead of 28 months. The same types of impacts discussed in Alternative 1a involving surface disturbance/sedimentation, alteration or loss of riparian vegetation, and potential fuel spills would result from installation activities. Human activity and noise would be reduced to a one-year period under Alternative 1d, although impacts would be considered a low level, as discussed for Alternative 1a. The same project design features discussed for Alternative 1a related to sediment control, fuel handling, spill containment, and noise reduction also would be applied to Alternative 1d. As a result of the shorter construction period for Alternative 1d, sediment effects on aquatic habitat are considered to be a low impact level. Noise and human activities during construction would occur over a 12-month timeframe, which would reduce impacts on fish to a low level. Impacts from other installation activities for Alternative 1d would be the same as described for Alternative 1a.

4.3.4.2 Exhibition

The exhibition phase of Alternative 1d would consist of a 2-week viewing period in early to mid-September, with the ending date no later than September 21. The effects of the panels on photosynthesis, water temperature, insect emergence, and organic material input would be the same as discussed for Alternative 1a. The shift of the exhibition period to September is expected to result in an overall net decrease in visitors. The estimated number of visitors is 245,000, which is approximately 29% lower than Alternative 1a. However, this alternative would result in increased rafting visitors. The increased rafting activity would not affect brown trout spawning movements, which typically occur in mid-October through mid-November. The increased rafting activity could result in additional noise and human presence along the river, which could result in fish avoidance responses, especially in shallower areas. The increased rafting could result in avoidance responses and adverse effects on trout feeding during the 2-week exhibition period. Impacts on brown trout feeding could adversely affect health and conditions of fish prior to spawning in October. The 2-week period would lessen the impact level compared to Alternative 1c. The overall effects of the exhibition period on trout are considered a moderate level impact.

4.3.4.3 Demobilization

Impacts from the demobilization phase of Alternative 1d on aquatic species and their habitat would be the same as discussed for Alternative 1a.

4.3.5 Alternative 2

4.3.5.1 Installation

Construction activities associated with panel installation for Alternative 2 would involve 4.8 miles of the river in five areas. The 5 panel sites would extend between Parkdale and Texas Creek on the Arkansas River. The Parkdale area would have the highest construction level (2.5 miles or approximately 52% of the total panel length). Lengths of panel construction for the other four areas would range from 0.3 to 0.9 mile per area (6% to 19% of the total panel length). Construction activities would occur over a 28-month period at 1,850 anchor sites (7,400 holes) within the total 4.8-mile panel lengths. Surface disturbance and potential sediment input to the river would be lower compared to Alternatives 1a through 1d due to the decrease in anchor sites and river miles for the panels. Surface disturbance associated with the CSAs would be the same as Alternative 1a. As discussed for Alternative 1a, project design features and BLM BMPs would be implemented to reduce potential sediment input to the Arkansas River. As a result of these design features, sediment input to the river would be considered a minor level impact on aquatic species and their habitat.

Construction activities near the river edge also could damage or remove riparian vegetation within the 4.8 miles of panels. The potential risk for effects on riparian vegetation would be reduced as a result of the lower panel length under Alternative 2. Construction activities could result in a moderate impact level, if woody vegetation immediately adjacent to the river is removed by surface disturbance activities. Loss of riparian vegetation would be considered a long-term impact as a result of the time required for growth of woody vegetation.

The effects of a potential fuel or lubricant spills on aquatic species would be a potential minor and short-term impact for Alternative 2, if a spill reached the river. As discussed for Alternative 1a, project design features would minimize the potential occurrence of accidental spills or contaminants from entering the river. Since the work area along the river would be reduced slightly under this alternative, construction

activities would pose a reduced spill risk for this alternative. The spill risk would be considered negligible as discussed for Alternative 1a.

The effects of noise and human presence from the construction on fish would be reduced to a smaller section of the Arkansas River. However, the same types of effects involving fish movements to avoid work areas near the river edge could occur under Alternative 2. This impact is considered a moderate impact level.

4.3.5.2 Exhibition

The exhibition for Alternative 2 would occur during 2 weeks in late June or early July. This shift to an earlier period would result in the same types of impacts to aquatic species and their habitat as discussed for Alternative 1a. Potential impacts to photosynthesis, insect emergence, organic material input, or water temperature are considered to be minor. As discussed for Alternative 1a, potential panel runoff of precipitation from a major storm event could alter aquatic habitat, which could be a moderate and short-term localized impact if aquatic habitat is altered. The effects of noise and human presence on trout populations are considered the same as Alternative 1a (moderate impact level with duration ranging from several weeks to over several months).

4.3.5.3 Demobilization

Impacts from the demobilization phase of Alternative 2 on aquatic species and their habitat would be the same as discussed for Alternative 1a.

4.3.6 Alternative 3

4.3.6.1 Installation

The installation activities for Alternative 3 would involve the same overall section of the Arkansas River as discussed for Alternatives 1a through 1d (Parkdale to County Line). However, the total panel length (4.1 miles at 8 sites) would require considerably fewer anchor sites (1,600) and anchor holes (6,400). As discussed for the other alternatives, the majority of the anchor installation would occur in the Parkdale site (39% of the total panel length). The potential sediment input to the Arkansas River would be reduced under this alternative (compared to Alternative 1a) as a result of less surface disturbance. The same design features would be applied to Alternative 3, with the impact level considered to be minor.

Impacts for other installation activities would be the same as discussed for Alternative 1a: moderate level for noise and human presence effects, moderate level for effects on riparian vegetation, and minor level for potential fuel spills.

4.3.6.2 Exhibition

Impacts from the exhibition phase of Alternative 3 on aquatic species and their habitat would be the same as discussed for Alternative 1a.

4.3.6.3 Demobilization

Impacts from the demobilization phase of Alternative 3 on aquatic species and their habitat would be the same as discussed for Alternative 1a.

4.3.7 Alternative 4

4.3.7.1 Installation

Panel installation for Alternative 4 would include a total of 1.4 miles at 4 sites during a 14-month period. Panel lengths at the 4 sites would be similar, 0.3 mile for Parkdale, Vallie Bridge, and County Line. The Tunnel area would involve a panel length of 0.5 mile. The number of anchor sites would be reduced to 550 with 2,200 anchor holes. Surface disturbance would be greatly reduced under this alternative compared to Alternative 1a. Installation impacts would be considered low impact level after implementation of project design features and BLM BMPs for erosion control.

Impacts for other installation activities would be the same as discussed for Alternative 1a: moderate level and short-term for noise and human presence effects, moderate level and long-term for effects on riparian vegetation, and minor level and short-term for potential fuel spills.

4.3.7.2 Exhibition

Impacts from the exhibition phase of Alternative 4 on aquatic species and their habitat would be the same as discussed for Alternative 1a.

4.3.7.3 Demobilization

Impacts from the demobilization phase of Alternative 4 on aquatic species and their habitat would be the same as discussed for Alternative 1a. Demobilization would require less time and ground disturbance to complete this phase of the project compared to Alternative 1a.

4.4 WETLANDS, FLOODPLAINS, AND RIPARIAN HABITAT

4.4.1 No Action Alternative

Under the No Action Alternative, wetland, floodplain, and riparian habitat conditions would remain unchanged and would continue along existing trends, as described in Section 3. 4.

4.4.2 Alternative 1a

4.4.2.1 Installation

Due to project design requirements (i.e., drilling into stable surfaces), direct impacts to wetlands and riparian habitat would be generally avoided; however, some wetland and riparian habitat would be trampled as part of the installation phase, including anchor survey and vegetation clearing. No impacts to wetland or riparian vegetation are expected associated with the installation of cables or fabric panels. Cutting or trimming wetland and riparian vegetation may be required to set up survey equipment or to provide clear lines of sight. Control points and bench marks would not likely occur in the riparian zone. The drill operations would directly impact some riparian vegetation at some of the anchor locations.

No filling of waters of the U.S. is expected to occur as part of this project; however, riparian vegetation communities impacted would include approximately 50 square feet (sq ft) of boxelder, less than 0.1 acre of coyote willow, 100 sq ft of coyote willow/clematis, 350 sq ft of coyote willow/rock, 650 sq ft of narrow

leaf cottonwood, and less than 0.1 acre of river birch. Some rocks and soil may become loosened as part of the installation and may travel downslope into wetland and riparian habitat.

The hardware being installed has a relatively small profile and would have minimal impact on the floodplain capacity. The floodplain has already been altered by the addition of the highway and railroad fill or ballast, and the anchors and ATFs would not result in any appreciable effects.

Installation period visitors would likely hike along the river to watch the installation process and participate in recreation activities associated with the river, such as boating, fishing, camping, and hiking along the riverbank. These recreation activities may cause trampling of the wetland and riparian habitat. Impacts to wetland and riparian habitat are difficult to quantify since human behavior is difficult to predict. However, the levels of impact associated with installation viewing activities are anticipated to be similar to current peak recreational use periods. No wetlands or riparian habitat would be impacted as part of the installation of the Texas Creek Staging Area.

4.4.2.2 Exhibition

Incidental impacts to wetland, floodplain, and riparian habitat associated with high recreational use, such as dispersed camping and cross-country hiking, would affect the existing wetland, floodplain, and riparian habitat, mostly through incremental trampling and related off-shoulder parking. Trampling impacts to wetland, floodplain, and riparian habitat could range from short-term minor impacts to long-term significant impacts, depending upon the behavior of the visitors.

Increased boating would result in additional on-shore or riverbank wetland and riparian habitat trampling. Increased trampling would result from beaching or anchoring boats, hiking, picnicking, or other on-shore activities that may trample wetland, floodplain, and riparian habitat or compact soil. Patrols and monitors would limit most of this activity in the panel areas.

The closures of informal pullouts near panel areas, combined with the presence of event staff and monitors, would help to eliminate or reduce most trampling of wetland and riparian habitat near panel displays during the exhibition period.

Impacts to wetlands or riparian habitat are not anticipated as a result of exhibition period activities at Texas Creek, Fremont Road Information Center, Parkdale, Vallie Bridge, or Salida Information Center. The Vallie Bridge Limited Rest Stop is an existing AHRA recreation site and no further modifications would be created for the purposes of visitor amenities.

4.4.2.3 Demobilization

No wetland and riparian habitat would be trampled or crushed from removing fabric and cables. Some of the wetland and riparian species would likely have regrown between the time the anchors were installed and demobilization occurs. Some of this riparian vegetation regrowth would be impacted again during the anchor removal. The anchor assemblies' removal would have a smaller footprint since they would be removed by crane. All impacts to wetland, floodplain, and riparian habitat associated with demobilization are likely to be short-term direct impacts associated with incremental trampling or direct removal associated with anchor installation and removal. Most of the impacts to wetland, floodplain, and riparian habitat would have occurred during the installation and exhibition phase of the project, and activities during the demobilization phase would likely occur in previously impacted areas. However, some visitors may be inclined to visit those areas that were prohibited during the exhibition period. Wetland and

riparian habitat are resilient to disturbance and barring extremely destructive events or activities, most wetlands and riparian habitat would recover within the short-term.

4.4.3 Alternative 1c

4.4.3.1 Installation

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.4.3.2 Exhibition

The effects of Alternative 1c would be similar to those described for Alternative 1a. However, the increased number of visitors and extended exhibition duration would likely increase the amount and intensity of the wetland, floodplain, and riparian habitat trampled outside of the monitored and patrolled area, compared to Alternative 1a. Trampling of wetland and riparian habitat by boating is also expected to increase slightly relative to Alternative 1a.

4.4.3.3 Demobilization

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.4.4 Alternative 1d

4.4.4.1 Installation

The effects of Alternative 1d would be similar to those described for Alternative 1a.

4.4.4.2 Exhibition

The effects of Alternative 1d would be similar to those described for Alternative 1a. Although the September viewing period would likely decrease the number of visitors overall, the potential impacts to native wetland, floodplain, and riparian habitat would remain relatively unchanged from Alternative 1a. Monitor and patrol staff would, as described for Alternative 1a, prohibit pedestrian or vehicle access in the immediate panel areas, thereby limiting impact to wetland, floodplain, and riparian habitat by trampling.

4.4.4.3 Demobilization

The effects of Alternative 1d would be similar to those described for Alternative 1a.

4.4.5 Alternative 2

4.4.5.1 Installation

The type and nature of disturbance impacts would be the same as described for Alternative 1a. However, the Alternative 2 footprint is reduced from 5.5 to 4.1 acres. Dominant riparian communities impacted include 0.04 acres of coyote willow, 348 sq ft of coyote willow/rock, 348 sq ft of hop tree, 0.01 acres of narrow-leaf cottonwood, and 0.04 acres of river birch. The impacts to riparian communities are provided in Table 4-4. Impacts to wetland, floodplain, and riparian habitat by trampling would be less for the installation activities, but the impacts of installation period visitors are likely to remain the same as described for Alternative 1a.

4.4.5.2 Exhibition

The effects to wetland and riparian habitat associated with Alternative 2 within the exhibition area are likely to be similar to that of Alternative 1a. However, effects to wetland and riparian habitat outside of the active exhibit area (e.g., Texas Creek) are likely to increase due to less restricted access to lands along the river.

The June/July viewing period is not likely to have an appreciable effect on wetland, floodplain, and riparian habitat resources.

4.4.5.3 Demobilization

The effects of Alternative 2 would be similar to those described for Alternative 1a, but with a smaller footprint, as described in the Installation effects discussion.

Table 4-4. Wetland, Floodplain, and Riparian Habitat Impacts Associated with Staging Areas by Alternatives

Disturbed Wetland, Floodplain, and Riparian Habitat Type	Alternatives 1A-1D, 2, and 3 Staging Areas	Alternative 4 Staging Areas	Location
	Acres	Acres	
Rock	0.490		Texas Creek
Mixed Herbaceous	0.073		Texas Creek
Ballast Fill	0.388	0.388	Parkdale
Cattail	0.005	0.005	Parkdale
Cholla/Rock	0.253	0.253	Parkdale
Coyote Willow	0.296	0.296	Parkdale
Disturbed	0.055	0.055	Parkdale
Highway Fill	0.006	0.006	Parkdale
Juniper	0.264	0.264	Parkdale
Mixed Herbaceous	0.427	0.427	Parkdale
Mixed Herbaceous/Cholla	11.200	11.200	Parkdale
Open Juniper	0.111	0.111	Parkdale
Open Juniper/Cholla/Rock	0.455	0.455	Parkdale
Open Piñon-juniper/Rock/Cholla	0.680	0.680	Parkdale
Ponderosa Pine	0.097	0.097	Parkdale
Reed Canary Grass	0.070	0.070	Parkdale
Rock	0.226	0.226	Parkdale
Rock/Rubber Rabbitbrush	0.043	0.043	Parkdale
Rubber Rabbitbrush	0.148	0.148	Parkdale
Scrub Oak	0.052	0.052	Parkdale
Sedge	0.017	0.017	Parkdale
Sparsely Vegetated/Rock	0.752	0.752	Parkdale
Sparsely Vegetated/Rubber Rabbitbrush	0.076	0.076	Parkdale
Total	16.185	15.622	

4.4.6 Alternative 3

4.4.6.1 Installation

The disturbance mechanisms and nature of impacts would be the same as described for Alternative 1a. However, the Alternative 3 footprint is reduced from 5.5 to 3.9 acres. Impacts to riparian vegetation include 0.02 acres of coyote willow, 87 sq ft of coyote willow/clematis, 348 sq ft of hop tree, 392 sq ft of narrow-leaf cottonwood, and 0.24 acres of river birch. Table 4-4 provides a summary of disturbance areas by cover type for Alternative 3. Trampling effects by the installation would be less, but trampling effects by visitors would likely be similar to Alternative 1a.

4.4.6.2 Exhibition

The effects of Alternative 3 would be similar to those described for Alternative 1a.

4.4.6.3 Demobilization

The effects of Alternative 3 would be similar to those described for Alternative 1a, but with a smaller footprint, as described in the Installation effects discussion.

4.4.7 Alternative 4

4.4.7.1 Installation

The disturbance mechanisms and nature of impacts would be the same as described for Alternative 1a. However, the Alternative 4 footprint is reduced from 5.5 to 1.6 acres. Dominant riparian habitat impacted includes 43 sq ft of boxelder, 0.01 acres of coyote willow, 87 sq ft coyote willow/ clematis, 348 sq ft of hop tree, and 130 sq ft of narrow-leaf cottonwood. Table 4-4 provides a summary of disturbance areas by cover type for Alternative 4. Unlike Alternative 1a, Alternative 4 installation activities would have no effect on native wetland, floodplain, and riparian habitat within the Arkansas Canyonlands ACEC.

4.4.7.2 Exhibition

The effects of Alternative 4 would be similar to those described for Alternative 1a. Under Alternative 4, no viewing activities would occur within the ACEC. Therefore, the incidental trampling of wetland, floodplain, and riparian habitat by visitors wanting to view panels and hardware would likely be altogether eliminated in the ACEC. Parking impacts and viewing area impacts would be less with Alternative 4, reducing wetland, floodplain, and riparian habitat impact from 16.1 to 15.6 acres.

4.4.7.3 Demobilization

The effects of the Alternative 4 would be similar to those described for Alternative 1a, but with a smaller footprint as described in the Installation effects discussion. No demobilization activities would occur within the ACEC.

4.5 VEGETATION AND PLANT COMMUNITIES

4.5.1 No Action Alternative

Under the No Action Alternative, vegetation conditions would remain unchanged and would continue along existing trends, as described in Section 3.5.

4.5.2 Alternative 1a

4.5.2.1 Installation

At each panel location, some vegetation would be disturbed by survey crew trampling during the anchor surveying process. In addition, soil and loose rocks may become dislodged and travel downhill, resulting in minor impacts to individual plants downslope. Cutting or trimming vegetation may be required to set up survey equipment or to provide clear lines of sight. All impacts to vegetation as a result of anchor surveying would be minor and would likely recover in the short-term (Cole 1995).

Drilling and anchor or ATF installation operations would directly impact vegetation at each of the anchor sites. Vegetation clearing for installation could range from 5 sq ft (for small footpaths) to 0.4 acres (for a track drill path), and from a 3-foot radius oval to a 37-foot radius oval for the drill pad and installation disturbance, depending on the anchor site.

Although the creation of roads or benches for equipment would not be required as part of the anchor installation, some minor soil disturbance is expected to occur from skidding associated with the starting and stopping on slopes with both track and tire mounted equipment. Soils disturbance would prolong the amount of time required to restore native vegetative cover. If soil compaction occurs, vegetation would have a more difficult time reestablishing due to limited water holding capacity and impeded root growth (Allmaras 1988).

A total of 5.5 acres would be disturbed by the drilling activities, of which 4.6 acres falls within vegetative communities and 0.8 acres is dominated by vegetated rock, and 1.3 acres is sparsely vegetated. Impacts to sparsely vegetated rock is the most prevalent cover type impacted with 1.1 acres, and grass and rubber rabbitbrush being the second and third most prevalent cover types impacted at 0.6 acres and 0.5 acres, respectively. Drilling into the soil would impact plant roots (if encountered) causing plants to become stressed or die, depending upon the severity of the impact.

In areas with steep and rocky terrain, the drilling and anchor installation activities have the potential to dislodge larger rocks that could tumble downhill and crush vegetation, or damage trees downslope and disturb soil.

Alternative 1a would include the area north of Texas Creek for installation staging. The 55.8-acre staging area is dominated by 13.0 acres of piñon-juniper, 11.8 acres of grass/forb mix, and 10.1 acres of sparse piñon-juniper/shrub/rock mix. A complete summary of vegetation types impacted by the Texas Creek Staging Area is provided in Table 4-5. Impacts are associated with minor grading and the placement of a gravel base. Activity at the Texas Creek Staging Area is likely to create dust from parking and use of heavy equipment is likely to generate dust. McCrea (1984) notes that roadside dust causes reduced photosynthesis leading to the loss of plant yield, and dust hinders the pollination of small seeded fruit by insects, thus reducing effective fertility.

Table 4-5. Texas Creek Staging Area Vegetation Impacts (CDOW/BLM 2004)

Alternatives 1A-1D, 2, and 3 Staging Areas	
Disturbed Vegetation Classes	Acres
Irrigated Ag	6.28
Grass Dominated	2.52
Grass/Forb Mix	11.78
Shrub/Grass/Forb Mix	5.86
Rabbitbrush/Grass Mix	4.14
Piñon-Juniper	12.99
Gambel Oak	0.46
Piñon-Juniper/Oak Mix	1.26
Sparse Piñon-Juniper/Shrub/Rock Mix	10.13
Herbaceous Riparian	0.31
	55.73

During cable installation activities, some riverbank vegetation would be disturbed by pedestrian trampling, the use of rafts to pull cables and/or leader lines across the river (specifically, the beaching and tethering of rafts to the shore), and the dragging of leader lines over riverbank vegetation to anchor sites. Upland vegetation on slopes is generally sparsely vegetated and impacts to plants can be mostly avoided. However, riparian and wetland vegetation is generally a dense narrow band along the riverbank that may be disturbed (see also Section 3.4 Wetlands, Floodplains and Riparian Habitat). Soil and rocks may become loosened as a result of pedestrian travel along the steep slopes. Overall, the impacts of cable installation on native vegetation are anticipated to be short-term and minor.

Although the panel installation crews would be able to access the anchor locations from previously disturbed drilling access paths, the panel would need to be spread between adjacent cables. This would result in additional pedestrian trampling of vegetation by workers carrying the panel fabric. In addition to vegetation, rocks and soil would likely be loosened as part of this activity. Although the impacts are difficult to quantify due to the limited intensity and repetition of pedestrian trampling of vegetation associated with the anchor, cable, and fabric installation, the effects are expected to be short-term and minor.

Monitoring and patrol operations by OTR Corp's private security team would have negligible short-term effects on vegetation in the corridor. Although most monitoring and patrol operations would occur from the road or railroad ROW, periodic visits to particular activity or installation sites may be necessary and would require walking in vegetated areas.

No trees are expected to be removed as part of this project. However, trees that obstruct anchor or cable installation activities would be trimmed. Specific tree conflicts are difficult to identify at this stage since many cables can be adjusted both horizontally and vertically at the time of installation to avoid conflicts with trees. There are 11 ponderosa pines and one cottonwood tree within 15 feet of the anchors, cables, or fabric panels located at the Tunnel, Vallie Bridge, Spikebuck and Parkdale panel sites (Table 4-7). Anchors in proximity to trees could damage roots and stress trees, making them more susceptible to drought and disease. Cables could abrade and damage tree bark as the cables flex in the wind. In

addition, branches could conflict with fabric panels in proximity by becoming entangled as branches and panels sway in the wind.

Table 4-6. List of Trees in Proximity to the Panel Sites (BLM 2006)

Trees	Species	Location	DBH (in)	Height (ft)	Note	Proximity to Anchor (ft)	Proximity to Cable (ft)	Proximity to Fabric Panel (ft)
1	Ponderosa Pine	Tunnel	18	60	Dead snag		15	
2	Cottonwood	Vallie Bridge	20	40	Close to the road		15	
3	Ponderosa Pine	Spikebuck	20	45	North side of river		15	
4	Ponderosa Pine	Spikebuck	16	45	North side of river		2	
5	Ponderosa Pine	Spikebuck	20	50	North side of river		15	
6	Ponderosa Pine	Spikebuck	10	40	North side of river		1	
7	Ponderosa Pine	Spikebuck	14	30	North side of river	15	15	
8	Ponderosa Pine	Spikebuck	10	20	Dead snag		5	6
9	Ponderosa Pine	Spikebuck	10	40	Near road		6	
10	Ponderosa Pine	Spikebuck	8	25	Dead top		4	7
11	Ponderosa Pine	Spikebuck	10	40			10	
12	Ponderosa Pine	Parkdale	16	40	Close to river		8	8

The installation period is expected to attract increased visitation for the duration of installation activities. It is anticipated that visitors to the installation may visit or use vegetated and unvegetated pullouts in the canyon, as well as vegetated and unvegetated shoulders along US 50 and county roads to view the installation activities. This increased use could expand existing pullouts by trampling native and nonnative vegetation and compacting soil and root zones. Additionally, visitors may hike to various anchor sites or key vantage points (e.g., tops of hills) to view the installation activities. Hiking to the hardware would include the trampling of existing native and nonnative vegetation and compacting soil. Infrequent pedestrian traffic through the vegetation to visit the anchor locations or to key vantage points would have only a short-term minor effect on the vegetation from trampling and soil compaction. However, frequent pedestrian visitation by an estimated 344,000 visitors could establish social trails that have longer-term effects on the surrounding vegetation and may result in soil compaction, increased erosion, or dislodging of rocks. Impacts to vegetation caused by trampling of visitors are difficult to quantify because of the uncertainty of human behavior. The impacts to vegetation resulting from visitors during the installation period could range from short-term minor impacts to significant long-term effects.

4.5.2.2 Exhibition

The closures of informal pullouts near panel areas combined with the presence of event staff and monitors would help to eliminate or reduce most trampling of vegetation near panel displays during the exhibition period. The four parking/aid stations include Parkdale Viewing Center, Vallie Bridge Limited Rest Stop (existing), Fremont Road Information Center, and Salida Information Center. Excluding the Salida Information Center, impacts total 28.49 acres and would likely consist of minor grading and the placement of a temporary gravel base. A summary of the impacts, by location, is provided in Table 4-7, excluding the Salida Information Center. It is not anticipated that natural vegetation would be disturbed at the Salida site. Primary cover types being impacted include 10.9 acres of piñon-juniper and 7.9 acres of grass/forb mixed.

Table 4-7. Summary of Parking/Aid Station Impacts to Vegetation (CDOW/BLM 2004)

Alternatives 1A-1D, 2, and 3 Staging/Aid Areas		
Disturbed Vegetation Classes	Acres	Location
Irrigated Ag	1.70	Parkdale
Shrub/Grass/Forb Mix	1.38	Parkdale
Piñon-Juniper	10.61	Parkdale
Gambel Oak	0.07	Parkdale
Piñon-Juniper/Oak Mix	0.85	Parkdale
Sparse Piñon-Juniper/Shrub/Rock Mix	2.21	Parkdale
Water	1.29	Parkdale
Grass/Forb Mix	0.01	Vallie Bridge
Piñon-Juniper	0.09	Vallie Bridge
Sub-Alpine Shrub Community	0.19	Vallie Bridge
Water	0.29	Vallie Bridge
Grass Dominated	0.31	Fremont Road
Grass/Forb Mix	7.92	Fremont Road
Shrub/Grass/Forb Mix	1.02	Fremont Road
Piñon-Juniper	0.19	Fremont Road
Piñon-Juniper/Oak Mix	0.01	Fremont Road
Sparse Piñon-Juniper/Shrub/Rock Mix	0.35	Fremont Road
Total	28.49	

Incidental impacts to vegetation associated with high recreational use, such as dispersed camping and cross-country hiking, would affect the existing native vegetation, most likely through incremental trampling and related off-shoulder parking. Trampling impacts to vegetation could range from short-term minor impacts to long-term significant impacts, depending upon the behavior of visitors. The trampling impacts are difficult to quantify prior to the event.

Increased boating would result in additional on-shore or riverbank vegetation trampling. Increased trampling would result from beaching or anchoring boats, hiking, picnicking, or other on-shore activities that may trample vegetation or compact soil. Patrols and monitors would limit most of this activity in the panel areas, but in addition, some private boaters who could be less experienced may portage their boat to avoid more difficult sections of the river.

4.5.2.3 Demobilization

Vegetation would be trampled or crushed during fabric and anchor removal activities. All impacts to vegetation associated with demobilization are likely to be short-term direct impacts associated with incremental trampling or direct removal associated with anchor installation and removal. Most of the impacts to vegetation would have occurred during the installation and exhibition phase of the project, and activities during the demobilization phase would likely occur in previously impacted areas. However, some visitors may be inclined to visit those areas that were prohibited during the exhibition period. The replacement of topsoil and restoration of the disturbed and trampled areas would off-set impacts and make impacts minor and short-term.

4.5.3 Alternative 1c

4.5.3.1 Installation

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.5.3.2 Exhibition

The effects of Alternative 1c would be similar to those described for Alternative 1a. However, the increased number of visitors and extended exhibition duration would likely increase the amount and intensity of the vegetation trampled outside of the monitored and patrolled area, compared to Alternative 1a. Trampling of vegetation by boating is also expected to increase compared to Alternative 1a.

4.5.3.3 Demobilization

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.5.4 Alternative 1d

4.5.4.1 Installation

The effects of Alternative 1d would be similar to those described for Alternative 1a.

4.5.4.2 Exhibition

The effects of Alternative 1d would be similar to those described for Alternative 1a. Although the September viewing period would likely decrease the number of visitors overall, the potential impacts to native vegetation would remain relatively unchanged from Alternative 1a. Monitor and patrol staff would, as described for Alternative 1a, prohibit pedestrian or vehicle access in the immediate panel areas, thereby limiting impact to vegetation by trampling.

4.5.4.3 Demobilization

The effects of Alternative 1d would be similar to those described for Alternative 1a.

4.5.5 Alternative 2

4.5.5.1 Installation

The disturbance mechanisms and nature of impacts would be the same as described for Alternative 1a. However, the Alternative 2 footprint is reduced from 5.5 to 4.1 acres and impacts to vegetation

communities are reduced from 4.6 to 3.3 acres. Table 4-7 provides a summary of disturbance areas by cover type for Alternative 2. The direct impacts associated with the installation of Alternative 2 would be 4.1 acres, including 3.3 acres of vegetation, 0.7 acres of rock, and 0.5 acres of disturbed covers of vegetation communities east of Texas Creek. The impacts to vegetation communities are provided in Table 4-8. The dominant vegetation communities impacted include 0.9 acres of sparsely vegetated rock, 0.6 acres of grass, and 0.4 acres of rabbitbrush.

Impacts to vegetation by trampling would be less for the installation activities, but for visitors, it is likely to remain the same.

4.5.5.2 Exhibition

The reduced panel display may increase visitor use in nonexhibit areas (west of Texas Creek), since monitor staff and event patrol staff would be concentrated to the active exhibition area. The effects to vegetation associated with Alternative 2 within the exhibition area are likely to be similar to that of Alternative 1a. However, effects to vegetation outside of the active exhibit area (e.g., Texas Creek) are likely to increase due to less restricted access to lands along the river.

The June/July viewing period is not likely to have an appreciable effect on vegetation resources.

4.5.5.3 Demobilization

The effects of Alternative 2 would be similar to those described for Alternative 1a but with a smaller footprint, as described in the installation effects discussion.

4.5.6 Alternative 3

4.5.6.1 Installation

The disturbance mechanisms and nature of impacts would be the same as described for Alternative 1a. However, the Alternative 3 footprint is reduced from 5.5 to 3.9 acres and vegetation impacts reduced from 4.6 to 3.3 acres. Table 4-7 provides a summary of disturbance areas by cover type for Alternative 3. The dominant vegetation communities impacted by Alternative 3 would be 0.5 acres of sparsely vegetated/rock, 0.5 acres of grape, 0.4 acres of mixed herbaceous, and 0.4 acres of rubber rabbitbrush. Impacts associated with the staging area are the same as Alternative 1a. Trampling effects by the installation would be less, but trampling effects by visitors would likely be similar to Alternative 1a.

4.5.6.2 Exhibition

The effects of Alternative 3 would be similar to those described for Alternative 1a.

4.5.6.3 Demobilization

The effects of Alternative 3 would be similar to those described for Alternative 1a but with a smaller footprint, as described in the installation effects discussion.

4.5.7 Alternative 4

4.5.7.1 Installation

The disturbance mechanisms and nature of impacts would be the same as described for Alternative 1a. However, the Alternative 4 footprint is reduced from 5.5 to 1.6 acres, including a reduction in vegetation impacts from 4.6 to 1.5 acres.

Unlike Alternative 1a, Alternative 4 installation activities would have no effect on native vegetation within the Arkansas Canyonlands ACEC. The dominant vegetation types impacted include 0.3 acres of open piñon-juniper, 0.3 acres of sparsely vegetated/rock, and 0.2 acres of mixed herbaceous.

4.5.7.2 Exhibition

The effects of Alternative 4 would be similar to those described for Alternative 1a. Under Alternative 4, no viewing activities would occur within the ACEC. Therefore, the incidental trampling of vegetation by visitors wanting to view panels and hardware would likely be altogether eliminated in the ACEC. Parking impacts and viewing area impacts would be less with Alternative 4, reducing vegetation impacts from 28.5 to 18.7 acres and would not include the Fremont Road Information Center. Table 4-8 provides a summary of the impacts to cover type by location.

Table 4-8. Summary of Impacts to Cover Type by Location

Alternative 4 Staging/Aid Areas		
Disturbed Vegetation Classes	Acres	Location
Irrigated Ag	1.70	Parkdale
Shrub/Grass/Forb Mix	1.38	Parkdale
Piñon-Juniper	10.61	Parkdale
Gambel Oak	0.07	Parkdale
Piñon-Juniper/Oak Mix	0.85	Parkdale
Sparse Piñon-Juniper/Shrub/Rock Mix	2.21	Parkdale
Water	1.29	Parkdale
Grass/Forb Mix	0.01	Vallie Bridge
Piñon-Juniper	0.09	Vallie Bridge
Sub-Alpine Shrub Community	0.19	Vallie Bridge
Water	0.29	Vallie Bridge
	18.69	

4.5.7.3 Demobilization

The effects of Alternative 4 would be similar to those described for Alternative 1a but with a smaller footprint, as described in the installation effects discussion. No demobilization activities would occur within the ACEC.

4.6 NOXIOUS WEEDS AND INVASIVE SPECIES

4.6.1 No Action Alternative

Under the No Action Alternative, invasive and noxious weeds conditions would remain unchanged and would continue along existing trends, as described in Section 3.6.

4.6.2 Alternative 1a

4.6.2.1 Installation

Species such as common mullein, cheatgrass, and kochia are ubiquitous throughout the Analysis Area and would likely expand into disturbed areas. At each panel location, disturbance by the installation activities, including the removal of native vegetation and disturbance of soil, could provide opportunities for invasive and noxious weeds to become established. Invasive and noxious weed seed could be transported by wind, water, soil, or animals. Although installation equipment would be washed prior to mobilizing on the project, vehicles can spread weed seed within the greater Project Area. Pedestrian workers can also spread weed seed via footwear and clothing.

In addition to invasive and noxious weeds, other nonnative species may readily expand into the newly disturbed areas. Installation activities that would result in the clearing of native vegetation and soil disturbances include anchor surveys, drilling operations, anchor and ATF installation, and cable and panel installation. Trampling of vegetation could also provide opportunities for invasive and noxious weeds to become established. A total of 5.5 acres of vegetation would be disturbed by the drilling and anchor installation activities and become more susceptible to weed invasion.

Reopening of the railroad ROW for rail-mounted trucks would introduce a new transport mechanism into the local ecosystem. Work along existing roads and the railroad ROW would further disperse weed seed.

The soil disturbance at the 55.7-acre Texas Creek Staging Area would also be susceptible to invasion by weeds. The parking of vehicles and continuous activities would create suitable disturbed conditions for weeds to become established. Installation activities along the river could spread reed canary grass to other areas.

In addition, the turnouts and pullouts along the roads and highway also contain nonnative and weed species. Overall, with proper and complete implementation of an integrated weed management plan as described in Chapter 2.0, potential weed spread and associated impacts would be minor and short-term.

4.6.2.2 Exhibition

Vehicles from outside the Project Area can import weed seed from other areas, including weed species uncommon to the Project Area. The closures of informal pullouts near panel areas, combined with the presence of event staff and monitors, would help to minimize the importation and spread of weeds seed into the disturbance areas during the exhibition period. Increased soil disturbance and loss of vegetation due to trampling resulting from beaching or anchoring boats, hiking, picnicking, or other on-shore activities would provide opportunities for weeds to become established on the riverbanks. Weed seed deposition along the riverbanks, particularly below the high water line, can be problematic if spring high flows flush weed seeds downstream. Implementation of an integrated weed management plan would help to minimize any potential long-term effect.

4.6.2.3 Demobilization

Invasive and noxious weeds would have an opportunity to be imported or spread to areas disturbed by trampling of vegetation and disturbance of soil. Implementation of an integrated weed management plan would help to minimize any potential long-term effect.

4.6.3 Alternative 1c

4.6.3.1 Installation

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.6.3.2 Exhibition

The effects of Alternative 1c would be similar to those described for Alternative 1a. However, the increased number of visitors and extended exhibition duration would likely increase the amount and intensity of the invasive and noxious weeds trampled outside of the monitored and patrolled area, compared to Alternative 1a. Trampling of vegetation by boating is also expected to increase the opportunity for the establishment of weeds compared to Alternative 1a. These impacts would be relatively short-term and minor.

4.6.3.3 Demobilization

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.6.4 Alternative 1d

4.6.4.1 Installation

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.6.4.2 Exhibition

The effects of Alternative 1d would be similar to those described for Alternative 1a. These impacts would be short-term and minor.

4.6.4.3 Demobilization

The effects of Alternative 1d would be similar to those described for Alternative 1a.

4.6.5 Alternative 2

4.6.5.1 Installation

The disturbance mechanisms and nature of impacts would be the same as described for Alternative 1a. However, the Alternative 2 footprint is reduced from 5.5 to 4.1 acres and therefore creates a smaller opportunity for the establishment of weeds.

All other incremental trampling of vegetation would create opportunities for invasive and noxious weeds to become established but would be less than Alternative 1a. The impacts to vegetation associated with trampling is difficult to quantify, but are likely to contribute to the establishment and transport of weeds. Impacts to the staging area would be the same as Alternative 1a.

4.6.5.2 Exhibition

The reduced panel display may increase visitor use in nonexhibit areas, areas west of Texas Creek, since monitor staff and event patrol staff would be concentrated to the active exhibition area. The effects of invasive and noxious weeds associated with Alternative 2 within the exhibition area are likely to be similar to that of Alternative 1a. However, effects to invasive and noxious weeds outside of the active exhibit area are likely to increase due to less restricted access to lands along the river.

The June/July viewing period is not likely to have an appreciable effect on invasive and noxious weeds resources.

4.6.5.3 Demobilization

The effects of Alternative 2 would be similar to those described for Alternative 1a but with a smaller footprint, as described in the installation effects discussion.

4.6.6 Alternative 3

4.6.6.1 Installation

The disturbance mechanisms and nature of impacts would be the same as described for Alternative 1a. However, the Alternative 3 footprint is approximately 1.6 acres smaller that Alternative 1a and therefore the opportunities for invasive and noxious weeds to establish would be less.

4.6.6.2 Exhibition

The effects of Alternative 3 would be similar to those described for Alternative 1a.

4.6.6.3 Demobilization

The effects of Alternative 3 would be similar to those described for Alternative 1a but with a smaller footprint, as described in the installation effects discussion.

4.6.7 Alternative 4

4.6.7.1 Installation

The disturbance mechanisms and nature of impacts would be the same as described for Alternative 1a. However, the Alternative 4 footprint would be reduced from 5.5 to 1.6 acres, and therefore the opportunity for weed establishment would be less.

Alternative 4 installation activities would not increase the expansion of weeds within the Arkansas Canyonlands ACEC.

4.6.7.2 Exhibition

The effects of Alternative 4 would be similar to those described for Alternative 1a. Under Alternative 4, no viewing activities would occur within the ACEC. Therefore, expansion of weeds within the ACEC would not occur.

4.6.7.3 Demobilization

The effects of Alternative 4 would be similar to those described for Alternative 1a but with a smaller footprint, as described in the installation effects discussion. No demobilization activities would occur within the ACEC.

4.7 RANGE RESOURCES

4.7.1 No Action Alternative

Under the No Action Alternative, range resources would remain unchanged and would continue along existing trends, as described in Section 3.7.

4.7.2 Alternative 1a

4.7.2.1 Installation

Range resources would be impacted by the loss of forage at specific installation sites, such as anchor locations and staging areas. Additionally, livestock grazing on active allotments at the time of installation may be disturbed by increased human activity and noise. However, these impacts are expected to be minor and short-term.

Installation activities, such as survey, drilling, anchor and ATF installation, would remove a total of 4.6 acres of vegetation. Activities at the Texas Creek Staging Area would render approximately 56.0 acres of vegetation in the Table Mountain allotment unusable for the duration of the project in a loss of 55.7 acres of vegetation. In addition, trampling of vegetation associated with the survey, installation of cables and fabric panels would also result in a loss of forage. Impacts associate with vegetation loss are minor and short-term. Grasses and forbs would likely recover the following year. Seven allotments totaling 87,367 acres would be affected by a minor temporary loss (0.07%) of forage. In addition, there may be a minor disruption to ranching activities associated with the added traffic and parking of work crews and associated equipment. Dust associated with parking and work activities may reduce photosynthesis and pollination. Impacts to range resources are expected to be relatively temporary and minor in nature. Grazing activities can continue during the installation and minimal disruption would be created.

4.7.2.2 Exhibition

Traffic disruption and trampling of vegetation would temporarily affect ranching operations in the area. The development of the Fremont, Vallie Bridge, and Parkdale aid stations would result in the temporary seasonal loss of 26.91 acres of range forage. The Vallie Bridge Limited Rest Stop is an existing AHRA recreation site and no further modifications would be created for the purposes of visitor amenities. Increased traffic in the project vicinity would likely affect ranching operations during the 2-week period of exhibition. Trampling of range forage would cause the temporary loss of forage and provide opportunities for weeds to become established. Seasonal grazing at the Parkdale allotment occurs between July 16 and August 31. Some accommodations by the ranch operator would be required to avoid visitor conflict during the exhibition period.

4.7.2.3 Demobilization

Traffic delays and trampling of vegetation would continue to occur during demobilization, mostly during the weeks following the exhibition period. Effects to ranching operations during the demobilization period would consist of short-term disruptions.

4.7.3 Alternative 1c

For all stages, the effects of Alternative 1c would be similar to those described for Alternative 1a.

4.7.4 Alternative 1d

For all stages, the effects of Alternative 1d would be similar to those described for Alternative 1a.

4.7.5 Alternative 2

4.7.5.1 Installation

The effects to range resources would be similar to those described for Alternative 1a, but slightly reduced. The impacts to vegetation would be reduced from 4.6 to 3.3 acres, compared to Alternative 1a. Traffic and trampling impacts would be similar to Alternative 1a, but slightly reduced.

4.7.5.2 Exhibition

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to range resources would likely be less due to the smaller footprint.

The June/July viewing period may disrupt some of the grazing operations that occur on the Parkdale Allotment between June 15 and July 15. Some accommodations by the ranch operator would be required to avoid visitor-livestock conflicts during the exhibition period.

4.7.5.3 Demobilization

The effects of Alternative 2 would be similar to those described for Alternative 1a but with a smaller footprint, as described in the installation effects discussion.

4.7.6 Alternative 3

4.7.6.1 Installation

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to range resources would likely be less due to the smaller footprint. Loss of range forage associated with drilling operations and anchor installation would be reduced from 4.6 to 3.3 acres, compared to Alternative 1a. Traffic and trampling impacts would be similar to Alternative 1a, but slightly reduced.

4.7.6.2 Exhibition

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to range resources would likely be less due to the smaller footprint.

4.7.6.3 Demobilization

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to range resources would likely be less due to the smaller footprint.

4.7.7 Alternative 4

4.7.7.1 Installation

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to range resources would likely be less due to the smaller footprint. Loss of range forage associated with drilling operations and anchor installation would be reduced from 4.6 to 1.5 acres, compared to Alternative 1a. Forage loss associated with the development of the Texas Creek Staging Area would be reduced from 55.7 to 44.2 acres. Traffic and trampling impacts would be similar to Alternative 1a, but slightly reduced. No installation work would occur within the ACEC, therefore there would be no impacts to range resources within the ACEC.

4.7.7.2 Exhibition

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to range resources would likely be less due to the smaller footprint. Forage loss from the temporary development of the aid stations would be reduced since the Fremont Road Information Center is dropped from this alternative reducing the loss of forage from 26.9 to 18.7 acres. No exhibition would occur in the ACEC, therefore there would be no impacts to range resources within the ACEC.

4.7.7.3 Demobilization

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to range resources would likely be less due to the smaller footprint. No demobilization activities would occur within the ACEC, therefore there would be no impacts to range resources within the ACEC.

4.8 THREATENED, ENDANGERED, AND SENSITIVE SPECIES

A summary of impacts on threatened, endangered, and sensitive species is provided in Table 4-9, and each species is discussed separately in the remainder of this section.

Table 4-9. Summary of Threatened, Endangered, and Sensitive Species Impacts by Alternative

Species	No Action	Alternative 1 *1a*	*1c*	*1d*	Alt. 2	Alt. 3	Alt. 4
Big free-tailed bat	No effect	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate
Botta's pocket gopher	No effect	Moderate	Moderate	Moderate	Minor	Moderate	Moderate
Fringed myotis	No effect	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate
Gunnison's prairie dog	No effect	Minor	Minor	Minor	Minor	Minor	Minor
Northern river otter	No effect	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate
Townsend's big-eared bat	No effect	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate
Yuma myotis	No effect	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate
Bald eagle	No effect	Moderate	Moderate	Moderate	Minor	Moderate	Moderate
Barrow's goldeneye	No effect	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Lewis' woodpecker	No effect	Moderate	Moderate	Moderate	Minor to moderate	Moderate	Moderate
Mexican spotted owl	No effect	Minor	Minor	Minor	Minor	Minor	Minor
Northern Goshawk	No effect	Minor to Moderate	Minor to Moderate	Minor to Moderate	Minor to Moderate	Minor to Moderate	Minor to Moderate
Peregrine falcon	No effect	Minor to Moderate	Minor to Moderate	Minor to Moderate	Minor to Moderate	Minor to Moderate	Minor to Moderate
Flathead chub	No effect	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor
Greenback cutthroat trout	No effect	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor
Southern redbelly dace	No effect	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor	Negligible to minor
Northern leopard frog	No effect	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate
Colorado checkered whiptail	No effect	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Fendler's false cloak fern	No effect	Negligible to moderate	Negligible to moderate	Negligible to moderate	Negligible to moderate	Negligible to moderate	Negligible to moderate
Arkansas Canyon stickleaf	No effect	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate	Minor to moderate

4.8.1 Terrestrial Wildlife

4.8.1.1 No Action Alternative

Under the No Action Alternative, the OTR project would not be constructed or displayed. As a result, OTR actions would not occur and there would be no effects on threatened, endangered, or sensitive terrestrial wildlife or their habitat. Habitat and population conditions in the Analysis Area would continue along current trends assuming the same level of existing activities and management direction as described in Section 3.1.

4.8.1.2 Alternative 1a

a. Installation

Mammals

Big free-tailed bat *(Nyctinomops macrotis)* (BLM Sensitive Species). All bat species would be affected to some level and would need to change behaviors to adapt to the cables over the riparian habitat they use to forage on insect hatches and drink from the river (especially at flat water areas with few ripples). Construction activity around roost locations has a potential to disturb bat feeding, drinking, or mating behavior.

While specific information on the big free-tailed bat is not available, direct mortality of bats in general, due to collisions with the proposed project, is expected to occur. Bat collisions with communication towers, powerlines, and wind turbines are well documented (Dedon et al., 1989). The largest body of research available for bat collisions with man-made objects pertains to wind power projects. In the Rocky Mountain Region, research indicates a collision mortality rate of approximately 1.2 bats/turbine/year at wind power facilities (Johnson 2005). Research also indicates higher rates of bat activity and mortality at wind turbines to occur during migration season, from approximately mid-July through August (Johnson et al. 2004).

Bats have an advantage over avian species in conducting regular daily activities such as feeding, as they are equipped with highly refined wings that allow for intricate flight maneuvers and slower speeds (Hedenström et al. 2007), as well as echolocation capabilities that allow them to detect and avoid objects. However, research indicates that bats rely less on echolocation and more on visibility for navigation when traveling long distances, such as during migration (Crawford and Baker 1981), therefore leading to more collisions (Johnson et al. 2004). Increased collisions have also been associated with inclement weather (Van Gelder 1956), and bats' inability to detect finer-grain objects such as mist nets (Horn et al. 2008).

While the proposed project would be installed at lower heights than communication towers, powerlines, or wind turbines, installation, viewing, and demobilization activities would overlap with a period of bat migration. Not enough is known at this time to understand if the lower height would reduce the number of collisions. However, it is reasonable to conclude that the presence of the panels, cables, and other associated equipment would lead to some degree of bat mortality. If bats cannot detect and avoid the cables during project installation and a high rate of collisions occurs, there would be minor to moderate short-term impacts.

Botta's pocket gopher *(Thomomys bottae)* (State Species of Concern). Fossorial mammals use vibration for communication (Narins and Lewis 2000, Mason and Narins 2001). Heavy construction and drilling has the potential to limit this species' ability to communicate and utilize resources. This would be a minor

short-term impact, disorienting fossorial mammals during drilling or moving heavy equipment leading to a potential increase in mortality rates for fossorial mammals.

Trampling and compaction from heavy equipment has the potential to cause direct mortality to this species as well as habitat destruction (e.g., tunnel compaction). This would be a moderate short-term impact to populations if this species occurs at proposed construction locations.

Fringed myotis *(Myotis thysanodes)* (BLM Sensitive Species). The effects to fringed myotis would be the same as described for the big free-tailed bat.

Gunnison's prairie dog *(Cynomys gunnisoni)* (Federal Candidate Species). The Gunnison's prairie dog may inhabit areas of Chaffee and Fremont counties; however, there are no data available that indicate specific occurrences within the Analysis Area or along the Arkansas River corridor. Because this species' diet consists mostly of grasses and sedges and they do not require open water sources, their use of the riparian corridor should be limited, as it does not serve any particular habitat requirements. Furthermore, because of their small size and burrowing behavior, they can be expected to easily navigate around the installed anchor and cables and underneath the panels. Only minor short-term impacts to the Gunnison's prairie dog would occur, should they be present within the Analysis Area, which would be due to increased human activity during the installation phase.

Northern river otter *(Lutra canadensis)* (State Threatened Species). River otter use riverbanks for nearly all components of life history, including feeding, drinking, breeding, and denning. It is unknown whether river otters use this section of the Arkansas River. If present, installation activities on the riverbanks would result in minor to moderate short-term impacts to this species as a result of habitat displacement. Direct mortality is unlikely.

Townsend's big-eared bat *(Corynorhinus townsendii)* (State Species of Concern, BLM Sensitive Species). Typically, Townsend's big-eared bat does not tolerate human presence. Increased human activity near maternity roosts could result in increased disturbance to Townsend's big-eared bat. Of the 15 known maternity roosts in the state, one is located just west of Wellsville (within the Project Area) and one is located in proximity to Cleora. The Wellsville site is well removed from the closest panel site at County Line (1-2 miles), while the roost site near Cleora is more proximate, lying as close as 0.5 mile within the County Line panel site.

In addition, a fall/winter hibernaculum is located in the Parkdale panel area in the vicinity of Tallahassee Creek north of the river, and a fall/winter roost site is located just east of Cleora (in close proximity to the maternity roost). There is also a summer roost in the Royal Gorge area (Navo 1999 as cited in J.F. Sato 2007).

None of the roost sites would be directly disturbed by project activities. However, higher levels of feeding and other activity occur within proximity of roost sites, and the potential for collisions with cables or other structures would be higher at panels sites located in proximity to a roost. Any mortalities to this species, which has limited numbers in the state, would be considered a moderate to significant impact.
Other effects would be similar to those described for the big free-tailed bat.

Yuma myotis *(Myotis yumaensis)* (BLM Sensitive Species). The effects to Yuma myotis would be identical to those described for the big free-tailed bat.

Birds

Bald eagle *(Haliaeetus leucocephalus)* (State Threatened Species, State Species of Concern). During the installation period, the river canyon would experience an increase in human activity and installation equipment. Installation activities, including anchor surveys, anchor drilling, and ATF installation, would occur throughout the winter months leading up the exhibition period.

Bald eagles are regular winter residents within the Analysis Area and have been confirmed to perch in 39 dead trees (snags) within the Analysis Area. Another 106 snags have been identified as suitable eagle perch trees.

Fifty of the 145 suitable perch trees identified by the BLM are located within 1,640 feet of panel sites, 36 are within 656 feet, and 26 are within 164 feet. One of the trees confirmed as an eagle perch is within 1,640 meters of a proposed panel location. This tree is an old ponderosa pine on the south side of the river, 0.25 river miles west of the Tunnel panel section.

DeLap and Knight (2003) observed that bald eagles tend to use sites that are farther away and hidden from construction activity. The 2008 CDOW raptor recommendations include:

- No human encroachment from November 15 through March 15 within 0.25-mile radius of an active winter night roost if there is no direct line of sight between the roost and the encroachment activities.
- No human encroachment from November 15 through March 15 within 0.5-mile radius of an active winter night roost if there is a direct line of sight between the roost and the encroachment activities.

Other literature consistently recommends buffer distances of 656 feet to 1,640 feet as appropriate to avoid disturbance of bald eagles (McGarigal et al. 1991, Grubb and King 1991, Stalmaster and Kaiser 1998). However, in areas where disturbance happens regularly, bald eagles can habituate and buffers may not need to be as large in these circumstances (Becker 2002).

In the Analysis Area, bald eagles are known to co-exist with auto traffic. However, foot traffic in the winter along this section of the canyon is not common. The presence of survey crews, construction personnel, and interested viewers would result in increased and uncommon disturbances.

Foot traffic has been shown to be far more likely to disturb bald eagles than autos or boats (Knight and Knight 1984, Stalmaster and Kaiser 1998). It is likely that bald eagles in the Analysis Area are adapted to auto traffic, but would be adversely impacted by an increase in foot traffic and installation activities.

Feeding eagles are more likely to be disturbed than those perching, and additive disturbances can cause eagles to take a longer time to resume feeding (Stalmaster and Kaiser 1998). Over time, the added energetic cost to the eagles may cause them to abandon the area or be more vulnerable to harsh winter conditions because of greater energy expenditures during routine activities.

During the installation period, bald eagle strikes on bare wire would be unlikely if cable installation begins in June and cables are removed before the eagles return in November. Collisions could be considered a "taking" under the MBTA. Under the amendment to the Act (Federal Register 74:46835-46879; 11

September 2009), individual permits can authorize limited instances of disturbance, and in certain situations other take, but individual permits do not authorize landscape-scale mortalities and injuries. Any mortality to this species from collision would be considered a significant impact. Displacement from preferred habitat due to construction activities would be a moderate, short-term impact.

Barrow's goldeneye *(Bucephala islandica)* (BLM Sensitive). This species has a relative lack of agility, may use this corridor for migration, and is at risk of collision with exposed cables during the installation period. Collisions could be considered a "taking" under the MBTA. Any mortality to this species from collision would be a moderate impact to a species that has limited numbers in the state.

Lewis' woodpecker *(Melanerpes lewis)* (BLM Sensitive). Impacts would be similar to those described for the Barrow's goldeneye. Additionally, this species is known to nest in the Analysis Area. Installation activities during the breeding season would have the potential to result in moderate short-term impacts to nesting activities if one of the few known breeding locations in the area is abandoned.

Mexican spotted owl *(Strix occidentalis)* (Federally Threatened, State Threatened Species). The potential for collision impacts would be similar to those described for the bald eagle and passerine species. Additionally, other impacts would include disturbance from increased noise, human presence, and installation activities. Delaney and Grubb (1999) found that stimuli located more than 344 feet away did not flush Mexican spotted owls, and owls that were flushed returned to pre-disturbance behavior within 10 to 15 minutes after a stimulus event. The installation activities would have no direct effects on this species. Potential indirect effects would be short-term, localized, and minor.

Northern Goshawk *(Accipiter gentilis)* (BLM Sensitive). The potential for collision impacts would be similar to those described for the bald eagle and passerine species. However, data suggest that nesting northern goshawks are not disturbed by noise from logging trucks passing >1,312 feet away from nesting sites (Grubb et al. 1998). Therefore, disturbances from increased noise, human presence, and associated installation activities are anticipated to be minor, localized, and short-term impact.

Peregrine falcon *(Falco peregrinus anatum)* (State Species of Concern). The potential for collision impacts would be similar to those described for the bald eagle and passerine species.

During 2009 summer field surveys, a peregrine falcon was observed perched on the cliffs opposite the Parkdale panel area and later soaring over the water just upstream of this location. It is known that this species uses the river corridor for hunting, and that many of its prey species are also dependent on the river for hunting and foraging.

Impacts to this species would be similar to those described for the bald eagle and passerine species. Cable collisions or panel entanglement could be considered a "taking" under the MBTA. Any mortality to this species from collision would be a moderate to significant impact to the species, which has limited numbers in the state. Displacement from preferred habitat would be a moderate short-term impact.

Fish

Flathead chub *(Hybopsis gracilis)* (State Species of Concern, BLM Sensitive). It is unlikely that flathead chub occupy this section of river. No effects to this species or its habitat are anticipated as a result of installation activities.

Greenback cutthroat trout *(Oncorhynchus clarki stomias)* (Federally threatened, State threatened, BLM sensitive). It is unlikely that greenback cutthroat trout occupy this section of river. The nearest known occurrence of greenback cutthroat trout is in Hayden Creek (CDOW, personal communication 2010). No direct or indirect effects to this species or its habitat are anticipated as a result of installation activities.

Southern redbelly dace *(Phoxinus erythrogaster)* (State endangered). It is unlikely that southern redbelly dace occupy this section of river. No effects to this species or its habitat are anticipated as a result of installation activities.

Amphibians

Northern leopard frog *(Rana pipiens)* (State species of concern, BLM Sensitive). It is unknown if northern leopard frogs occupy the Analysis Area. This species utilizes riparian habitats for all components of its life history, including feeding, drinking, breeding, and hibernating. The potential risks to this species include trampling or destruction of suitable habitat, and the further introduction of exotic pathogens harmful to amphibians as a result of installation activities. The overall risk to this species is considered low and impacts, if any, would be minor.

Reptiles

Colorado checkered whiptail *(Cnemidophorus neotesselatus)* (State species of concern). It is documented that Colorado checkered whiptail occupy the Analysis Area in the area where Tallahassee Draw enters the Arkansas River. This species utilizes upland habitats such as dry arroyos. The potential risks to this species include trampling or habitat disturbance as a result of installation activities. Trampling and habitat disturbance would likely be the result of increased machine and foot traffic in upland areas adjacent to the active installation sites. Impacts associated with these activities would be moderate and short-term.

b. Exhibition

Mammals

Big free-tailed bat. The primary potential impacts to this species during the exhibition period are the risk of being entangled in the fabric panels and colliding with the cables. Although bats have difficulty detecting fine-grain objects, such as a mist net, the fabric used on the project would have a more solid quality that is more likely to be detected by bats. Still, the risk of entanglement cannot be fully determined at this time. If entangled occurs at an incidental to low rate, this would be a minor to moderate effect. The risk is largely limited to the 2-week exhibition period. If entanglement results in a high rate of mortality, the impacts would be significant and long-term. Impacts due to collisions would be identical as those described for the installation phase. In addition, the presence of large fabric panels may inhibit feeding during the exhibition period.

Botta's pocket gopher. If this species is present at the Vallie Bridge campsite, it may be affected by additional trampling during the exhibition period activities. The overall risk to this species is considered low and impacts, if any, would be minor.

Fringed myotis. Impacts to this species would be similar to those described for the big free-tailed bat.

Gunnison's prairie dog. Only minor short-term impacts to the Gunnison's prairie dog, should they be present within the Analysis Area, would result from increased human activity during the exhibition phase.

Impacts to this species may consist of temporary displacement and habitat disturbance. Direct mortality to this species is not anticipated.

Northern river otter. Given the dependency of this species on the river and riverbanks for nearly all life stages, this species is likely to be affected by exhibition period activities, including the presence of fabric panels and increased visitation and/or recreational use in the river corridor. Impacts to this species may consist of displacement from or avoidance of suitable habitat areas.

Panel hardware, such as anchors and ATFs, may affect this species' willingness to access shoreline habitat in panel areas. In the lower portion of the canyon where panel continuity is greater, these impacts would be moderate and short-term. Above Texas Creek, impacts to this species are anticipated to be minor and short-term.

Increased human presence and activities both on-river and on the riverbanks may affect this species' feeding and foraging routines.

Townsend's big-eared bat. The potential for collision with fabric, cables, and ATFs would be the same as described for the big free-tailed bat. Additionally, the presence of large fabric panels may inhibit feeding during the exhibition period. This species forages over water and in riparian vegetation. Impacts in the Parkdale panel area would be moderate but short-term due to the continuity of the panels. In all other panel locations, the impacts to feeding maneuvers would be minor and short-term.

Winter hibernacula sites are unlikely to be disturbed by the August exhibition period. However, maternity roosts on the west end of the Project Area may be affected by increased human presence, activities, traffic, and noise at the Fremont Road Information Center and Parkdale Viewing Center during the exhibition period. These effects are anticipated to be moderate and short-term. Indirect impacts from increases in hiking on the adjacent canyon walls related to the visitation estimates is a potential moderate but short-term impact (see recreation section). Any mortality to this species from collision or entanglement would be a moderate impact to a species with limited numbers in the state.

Yuma myotis. This species would experience impacts similar to those described for the Townsend's big-eared bat.

Birds

Bald eagle. Bald eagles have typically migrated from the Analysis Area by the proposed exhibition period window (August). As such, no effects are anticipated to this species as a result of exhibition period activities and visitation.

Barrow's goldeneye. This species is typically not present, except as an occasional migrant, during the exhibition period. Indirect impacts from increases in camping and hiking related to increased visitation near breeding ponds is a potential minor but short-term impact.

Lewis' woodpecker. The primary impact to this species as a result of the exhibition period would be the potential for increased human activity in the corridor or suitable habitat areas adjacent to the river to disturb second nesting attempts. If second attempts are impeded by human disturbances, the effects would be moderate and long-term. Indirect impacts from increases in camping and hiking in the adjacent forest related to the visitation estimate is a potential minor but short-term impact. Any mortality to this

species from collision or entanglement would be a moderate impact to this species, which has limited numbers in the state.

Mexican spotted owl. No direct effects to this species are anticipated as a result of exhibition period activities or visitation; however, this species may be disturbed by off-river recreational activities and increased visitation to suitable habitat areas adjacent to the river. As described for the installation period, Delaney and Grubb (1999) found that stimuli located more than 344 feet away did not flush Mexican spotted owls, and owls that were flushed returned to pre-disturbance behavior within 10 to 15 minutes after a stimulus event. Indirect impacts from increases in camping and hiking in the nearby side canyons related to the visitation estimate is a potential moderate but short-term impact. Any mortality to this species from collision or entanglement would be a significant impact.

Northern goshawk. The effects on the northern goshawk would be similar to those described for the Mexican spotted owl. No direct effects to this species are anticipated as a result of exhibition period activities or visitation; however, this species may be disturbed by off-river recreational activities and increased visitation to suitable habitat areas adjacent to the river. Indirect impacts from increases in camping and hiking in the adjacent forest related to the visitation estimate is a potential moderate but short-term impact. Any mortality to this species from collision or entanglement would be a moderate to significant impact.

Collisions could be considered a "taking" under the MBTA. Any mortality to this species from collision would be considered a significant impact. Displacement from preferred habitat due to construction activities would be a moderate, short-term impact.

Peregrine falcon. The potential effects to this species would be similar to those described for the Mexican spotted owl and northern goshawk. Increased human activity or disturbance during the exhibition period would result in minor short-term effects to this species, including temporary displacement from hunting or perching areas. Indirect impacts from increases in camping and hiking on the adjacent cliff areas is a potential moderate but short-term impact. Any mortality to this species from collision would be a moderate to significant impact.

Fish

For all T&E and sensitive fish species, the primary disturbance mechanism during this stage of the project is increased human presence and activity in the river corridor. River recreation increases are not anticipated to have measurable effects on fish species or habitat quality.

The presence of panels over the river has the potential to affect invertebrate emergence, food web dynamics, and photosynthesis of benthic algae. Overall, these effects are anticipated to be negligible to minor and short-term, limited to the exhibition period. Given that the flathead chub, greenback cutthroat trout, and southern redbelly dace are not likely to occur in the Analysis Area and the short-term and localized nature of potential effects, there would be no effect to these species. Indirect impacts from increases in camping, fishing, and hiking in tributary drainages that support greenback cutthroat trout populations related to the visitation estimates is a potential.

Amphibians

Northern leopard frog. It is unknown if northern leopard frogs occupy the Analysis Area. The potential risks to this species during the exhibition period include trampling or destruction of suitable habitat as a

result of visitor pedestrian traffic in suitable habitat areas. If the species is present, these impacts would be moderate and short-term.

Reptiles

Colorado Checkered Whiptail. It is documented that Colorado checkered whiptail occupy the Analysis Area in the area where Tallahassee Draw enters the Arkansas River. The potential risks to this species during the exhibition period include trampling or habitat disturbance as a result of increased recreation or off-river visitor traffic, for example, visitor camping or hiking in suitable habitat areas located off-river or visitors hiking to off-river vantage points. Because the majority of exhibition period visitation activities would occur in areas outside of this species' preferred habitat, the potential for impact is limited. Impacts would be moderate and short-term.

c. Demobilization

For all T&E and sensitive species, demobilization activities would have similar effects to those described for the installation period.

Beyond the official removal activities, restoration activities could require an additional 3-5 years to restore habitat to its existing condition and treat any exotic species resulting from the soil disturbance. During that time frame there would be additional impacts to wildlife from restoration crews working in the corridor. These effects would be minor and limited to localized restoration sites. Although these effects would continue beyond the official project timeline, the presence of restoration crews would not be considered a long-term impact.

d. Determinations of Effect for Federally Listed Species

Mexican spotted owl. For the purposes of ESA consultation, the analysis of Alternative 1a results in a determination of "**may affect, not likely to adversely affect**" the Mexican spotted owl and its habitat if the owl is found to exist within the Analysis Area at the time of the management decision.

Greenback cutthroat trout. For the purposes of ESA consultation, the analysis of Alternative 1a results in a determination of "**may affect, not likely to adversely affect**" on the greenback cutthroat trout or its habitat.

4.8.1.3 Alternative 1c

a. Installation

All species impacts would be the same as described for Alternative 1a.

b. Exhibition

Extending the exhibition period by one week would have the potential to increase the probability of collision or entanglement by avian and mammal species. The primary impacts to wildlife occur as a function of the numbers of visitors, presence of cables and panels, and increased activity in suitable habitat areas. The addition of one week to the viewing period could add a significant impact from collision related mortality to increased timing of stress to T&E wildlife.

New, temporary rations would allow for limited boating increases during the exhibition period. Most wildlife are accustomed to boating use. Negligible to minor short-term effects are anticipated as a result of modified boat rations.

All species impacts would be the same as described for Alternative 1a.

c. Demobilization

All species impacts would be the same as described for Alternative 1a.

d. Determinations of Effect for Federally Listed Species

Mexican spotted owl. For the purposes of ESA consultation, the analysis of Alternative 1c results in a determination of "**may affect, not likely to adversely affect**" the Mexican spotted owl and its habitat if the owl is found to exist within the Analysis Area at the time of the management decision.

Greenback cutthroat trout. For the purposes of ESA consultation, the analysis of Alternative 1a results in a determination of "**may affect, not likely to adversely affect**" on the greenback cutthroat trout or its habitat.

4.8.1.4 Alternative 1d

a. Installation

All species impacts would be the same as described for Alternative 1a.

b. Exhibition

New, temporary rations and subsequent increases in boating activity would have the same effect as described for Alternative 1c.

Closing the AHRA sites would reduce foot traffic along the riverbanks during the exhibition. However, by closing these sites, some visitors may be displaced to alternative places to park, recreate, or view panels. Increased human activity in areas removed from the main highway-river corridor may result in short-term minor disturbances to wildlife.

Overall, all species impacts would be the same as described for Alternative 1a.

c. Demobilization

All species impacts would be the same as described for Alternative 1a.

d. Determinations of Effect for Federally Listed Species

Mexican spotted owl. For the purposes of ESA consultation, the analysis of Alternative 1d results in a determination of "**may affect, not likely to adversely affect**" the Mexican spotted owl and its habitat if the owl is found to exist within the Analysis Area at the time of the management decision.

Greenback cutthroat trout. For the purposes of ESA consultation, the analysis of Alternative 1a results in a determination of "**may affect, not likely to adversely affect**" on the greenback cutthroat trout or its habitat.

4.8.1.5 Alternative 2

a. Installation

Unless otherwise noted below, all installation period impacts to T&E and sensitive species would be the same as described for Alternative 1a.

Botta's pocket gopher. By removing all panels and installation activities west of Texas Creek, the potential for impacts to this species' habitat is nearly eliminated with this alternative.

Bald eagle. By removing all panels and installation activities west of Texas Creek, the potential for impacts to known winter roost sites is nearly eliminated with this alternative.

Lewis's woodpecker. By removing all panels and installation activities west of Texas Creek, the potential for impacts to known nest sites is nearly eliminated with this alternative. Nest sites below Texas Creek would be affected as described for Alternative 1a.

All bat species. By removing all panels and installation activities west of Texas Creek, the potential for impacts to known maternity roost sites and fall/winter roost sites is nearly eliminated west of Texas Creek with this alternative. Impacts to bat species or habitat east of Texas Creek would be the same as described for Alternative 1a.

b. Exhibition

Unless otherwise noted below, all exhibition period impacts to T&E and sensitive species would be the same as described for Alternative 1a. The potential for exhibition period disturbances to Botta's pocket gopher and Lewis's woodpecker would be greatly reduced due to the removal of panels west of Texas Creek. It is still anticipated, however, that there would be increased human activity west of Texas Creek even without panel viewing areas.

The June/July viewing would impact breeding T&E species and juvenile T&E species that have not yet reached adult stage by the exhibition period. For breeding pairs and juveniles, an earlier exhibition period would result in localized, short-term, direct impact on many species in the Analysis Area. These effects would consist of higher stress levels, dispersal, or modified behaviors that may be moderate to significant in the short-term and potentially minor to moderate in the long-term.

c. Demobilization

All species impacts would be the same as described for Alternative 1a. No demobilization activities would occur west of Texas Creek.

d. Determinations of Effect for Federally Listed Species

Mexican spotted owl. For the purposes of ESA consultation, the analysis of Alternative 2 results in a determination of "**may affect, not likely to adversely affect**" the Mexican spotted owl and its habitat if the owl is found to exist within the Analysis Area at the time of the management decision.

Greenback cutthroat trout. For the purposes of ESA consultation, the analysis of Alternative 1a results in a determination of "**may affect, not likely to adversely affect**" on the greenback cutthroat trout or its habitat.

4.8.1.6 Alternative 3

a. Installation

For all T&E and sensitive species, the intentional breaks in panel continuity would not result in any measurable differences from Alternative 1a. Although the panel breaks represent slightly less impact on avian hunters, the overall impact is still adverse.

b. Exhibition

All species impacts would be similar to those described for Alternative 1a.

c. Demobilization

All species impacts would be similar to those described for Alternative 1a.

d. Determinations of Effect for Federally Listed Species

Mexican spotted owl. For the purposes of ESA consultation, the analysis of Alternative 3 results in a determination of "**may affect, not likely to adversely affect**" the Mexican spotted owl and its habitat if the owl is found to exist within the Analysis Area at the time of the management decision.

Greenback cutthroat trout. For the purposes of ESA consultation, the analysis of Alternative 1a results in a determination of "**may affect, not likely to adversely affect**" on the greenback cutthroat trout or its habitat.

4.8.1.7 Alternative 4

a. Installation

The removal of all panels in the ACEC would represent a substantial reduction in impacts for T&E and sensitive species, particularly avian hunters and migratory birds, from Alternative 1a. Alternative 4 would remove all impediments to avian hunting and bat echolocation in the ACEC. It is assumed that all impacts would be the same as described for Alternative 1a, with the exception of panel sites in the ACEC. No direct impacts to habitat would occur within the ACEC under this alternative.

b. Exhibition

The impacts of the exhibition period would be the same as in Alternative 1a, except for exhibition period activities in the ACEC. Although visitors would still pass through the ACEC, human disturbances would be extremely limited under this alternative as most visitors would bypass the lower canyon altogether since relatively few panels are visible below Texas Creek.

c. Demobilization

The impacts of the exhibition period would be the same as in Alternative 1a; however, no demobilization activities would occur within the ACEC.

d. Determinations of Effect for Federally Listed Species

Mexican spotted owl. For the purposes of ESA consultation, the analysis of Alternative 4 results in a determination of "**may affect, not likely to adversely affect**" the Mexican spotted owl and its habitat if the owl is found to exist within the Analysis Area at the time of the management decision.

Greenback cutthroat trout. For the purposes of ESA consultation, the analysis of Alternative 4 results in a determination of "**no effect**" on the greenback cutthroat trout or its habitat.

4.8.2 Threatened, Endangered, and Sensitive Plant Species

4.8.2.1 No Action Alternative

Under the No Action Alternative, T&E and sensitive plants would remain unchanged and would continue along existing trends, as described in Section 3.8.

4.8.2.2 Alternative 1a

a. Installation

No T&E species occur within the Project Area; however, two special status plant species occur in the vicinity of the panel areas, including Fendler's false cloak fern and Arkansas Canyon stickleaf. The panel areas fall within PCAs that have been created to help conserve these two species as well as other biological resources. The installation associated with Alternative 1a would have a footprint of 5.5 acres, with 4.6 acres being vegetated, and are included in the four PCAs (County Line, Badger Creek Tunnel, Vallie, and McIntyre Hills).

Fendler's false cloak fern. No Fendler's false cloak fern fall within the anchor drilling and installation footprint. However, at the County Line panel area a record of Fendler's false cloak fern was found within 35 feet of the anchor disturbance zone. This record indicates a total of 26 plants in proximity to the anchor installation disturbance. The anchor drilling and installation footprint would impact 0.01 acre of CNHP element occurrence record for Fendler's false cloak fern. There were several age classes present (determined by size) with evidence of disease, predation or injury (Neid 2007). Some of the plant mortality may be due to drought. Fendler's false cloak fern is found in crevices in granite cliffs which may help provide some structural protection from disturbance. Ferns grow from rhizomes and adventitious roots. During the installation, above ground stems and leaves may be disturbed, but the rhizomes and adventitious roots may be protected in the granite crevices. Therefore, installation activities are not anticipated to affect population viability in the long-term.

Arkansas Canyon stickleaf. The Arkansas Canyon stickleaf has been found within proximity of each of the panel areas, with the closest being within one foot at Parkdale and Three Rocks. Installation at County Line, Tunnel, Texas Creek, Maytag, Three Rocks, Spikebuck, and Parkdale would likely impact a number of Arkansas Canyon stickleaf. The mapping of Arkansas Canyon provided is limited to single points, even though many individuals are represented at each point. Table 3-23 (in Chapter 3.0) provides an inventory of the number of stickleaf within the vicinity of each panel area. In addition, Arkansas Canyon stickleaf is an annual species, and the number and extent of the population may fluctuate from year to year.

One of the habitat requirements of the Arkansas Canyon stickleaf is that it thrives in disturbed native habitats. There are 16 locations of Arkansas Canyon stickleaf that are within approximately 50 feet of the anchor disturbance zones, of which 10 are within 10 feet of a disturbance zone. In 2006, there were between 85 and 115 individual stickleaf plants that were documented within 50 feet of the anchor disturbance area; however, these numbers likely fluctuate from year to year depending upon rainfall and competition from perennial species.

In addition, the anchor drilling and installation footprint would impact an area of 0.93 acre within the CNHP mapped element occurrence records for Arkansas Canyon stickleaf. The drilling and anchor installation would likely directly impact some Arkansas Canyon stickleaf; however, it is not clear if the surrounding disturbance and vegetation clearing would have a negative or positive effect on these annual plants. If disturbance is limited to some vegetation clearing, which would expose more bare soil, the Arkansas Canyon stickleaf may thrive with less competition. However, if the disturbance results in a loss of soil and seed bank, the disturbance would have a negative effect on this species. Disturbance of these annuals during their blooming period would prevent plants from producing seed in the year of disturbance. Disturbance-oriented annuals are typically adapted to these types of situations and rely on seed banked in the soil for successive generations. However, with repeat disturbances in successive years, such as the 2-year succession of anchor and cable installation activities followed by a season of restoration activities, seed banks could become partially or wholly depleted, which may diminish this species chance of survival at this specific location. Overall, impacts to this species are anticipated to be minor to moderate in both the short- and long-term.

The installation phase also includes trampling of sensitive plant resources associated with installation crews and visitors. If plants are trampled, especially during the flowering and/or sporing phase, subsequent generations would be adversely effected.

b. Exhibition

Fendler's false cloak fern. The rhizomes of most Fendler's false cloak fern would be protected in granite crevices. If trampling of the above-ground vegetation occurs, the rhizome would likely be protected. Trampling prior to dispersing reproductive spores would disrupt its reproductive cycle, but this impact would be relative short lived since the perennial plant would resprout the following year if the rhizomes remain intact.

Arkansas Canyon stickleaf. Trampling would likely have a minor effect on the Arkansas stickleaf and could provide a short-term beneficial opportunity for this species to thrive with reduced perennial competition. However, this benefit assumes that no additional competitive annuals are introduced and that individuals and population viability are not severely jeopardized by installation activities.

c. Demobilization

No further impacts to sensitive plant populations are anticipated beyond the installation phase.

4.8.2.3 Alternative 1c

a. Installation

The effects of Alternative 1c would be similar to those described for Alternative 1a.

b. Exhibition

The effects of Alternative 1c would be similar to those described for Alternative 1a.

c. Demobilization

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.8.2.4 Alternative 1d

a. Installation

The effects of Alternative 1c would be similar to those described for Alternative 1a.

b. Exhibition

The effects of Alternative 1c would be similar to those described for Alternative 1a.

c. Demobilization

The effects of Alternative 1c would be similar to those described for Alternative 1a.

4.8.2.5 Alternative 2

a. Installation

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to sensitive plant species would be slightly less due to the reduced panel footprint. Under Alternative 2, there would be no direct effects to sensitive plant populations located west of Texas Creek.

b. Exhibition

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to sensitive plant species would likely be less due to the smaller footprint. Trampling impacts to sensitive populations west of Texas Creek would be greatly reduced, if not altogether eliminated.

The June/July viewing period is not likely to have an appreciable effect on T&E and sensitive plants resources.

c. Demobilization

The effects of Alternative 2 would be similar to those described for Alternative 1a but with a smaller footprint, as described in the installation effects discussion.

4.8.2.6 Alternative 3

a. Installation

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to sensitive plant species would likely be less due to the smaller footprint.

b. Exhibition

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to sensitive plant species would likely be less due to the smaller footprint.

c. Demobilization

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to sensitive plant species would likely be less due to the smaller footprint.

4.8.2.7 Alternative 4

a. Installation

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to sensitive plant species would likely be less due to the smaller footprint. No installation work would occur within the ACEC, therefore there would be no impacts to sensitive plant populations within the ACEC.

b. Exhibition

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to sensitive plant species would likely be less due to the smaller footprint. No exhibition would occur in the ACEC, therefore there would be no impacts to sensitive plant populations within the ACEC.

c. Demobilization

The disturbance mechanisms and nature of impacts would be similar to Alternative 1a, but the impacts to sensitive plant species would likely be less due to the smaller footprint. No demobilization activities would occur within the ACEC, therefore there would be no impacts to sensitive plant populations within the ACEC.

PHYSICAL RESOURCES

4.9 ATMOSPHERE, AIR RESOURCES, AND AIR QUALITY

Regulatory Framework and Associated Impacts

Ambient air quality and the emission of air pollutants are regulated under both federal and State of Colorado laws and regulations.

Federal Clean Air Act

The federal CAA, and the subsequent federal Clean Air Act Amendments of 1990 (CAAA), require the EPA to identify NAAQS to protect public health and welfare. The CAA and the CAAA established NAAQS for seven pollutants, known as “criteria” pollutants. The ambient standards set for these pollutants satisfy “criteria” specified in the CAA.

The EPA has developed classifications for distinct geographic regions. An area is classified as in “attainment” if the area has “attained” compliance with the NAAQS for that pollutant. It is classified as “nonattainment” if the levels of ambient air pollution exceed the NAAQS for that pollutant. If the monitored pollutants have fallen from nonattainment levels to attainment levels, it is classified as “maintenance.”

Conformity for Federal Actions

According to Section 176I of the CAA (40 CFR 51.853), a federal agency must make a conformity determination in the approval of a project having air emissions that exceed specified thresholds in nonattainment and/or maintenance areas. The proposed project is not in a nonattainment or maintenance area; therefore, a general conformity analysis is not required for the proposed project.

EPA and Colorado Air Quality Programs

The CAA directs the EPA to delegate primary responsibility for air pollution control to qualified state governments that comply with certain minimum requirements. The CDPHE is the agency in the State of Colorado that has been delegated the responsibility for maintaining air quality and attaining the NAAQS. The proposed project must conform to the NAAQS and to other restrictions, such as a dust control plan, as dictated by CDPHE.

In addition to the designations relative to attainment of conformance with the NAAQS, the CAA requires the USEPA to place selected areas within the U.S. into one of three classes, which are designed to limit the deterioration of air quality when it is "better than" the NAAQS. Class I is the most restrictive air quality category. It was created by Congress to prevent further deterioration of air quality in National Parks and Wilderness of a given size, which were in existence prior to 1977, or those additional areas that have since been designated Class I under federal regulations (40 CFR 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II areas, which allow a relatively greater deterioration of air quality, although still below NAAQS. No Class III areas have been designated. The proposed project is in a Class II area. The nearest Class I area is Great Sand dunes National Park located about 35.0 miles south of the proposed project.

Federal PSD regulations limit the maximum allowable increase in ambient particulate matter in a Class I area resulting from a major or minor stationary source to 5 $\mu g/m^3$ (annual geometric mean) and 10 $\mu g/m^3$ (24-hour average). Increases in other criteria pollutants are similarly limited. Specific types of facilities (listed facilities) that emit, or have the potential to emit, 100 tons per year (tpy) or more of PM_{10}, $PM_{2.5}$ or other criteria air pollutants, or any facility that emits, or has the potential to emit, 250 tpy or more of PM_{10}, $PM_{2.5}$, or other criteria air pollutants, are considered major stationary sources. Major stationary sources are required to notify federal land managers of Class I areas within 100 km (62.0 miles) of the major stationary source. The proposed project would not result in air emissions above these major source thresholds; therefore, the proposed project is not subject to PSD rules. No individual Hazardous Air Pollutant (HAP) would be emitted in a quantity greater than the major source limit of 10 tpy, and the combined HAP emissions would be less than the major source limit of 25 tpy; therefore, the proposed project would not constitute a major HAP source.

Energy Requirements and Greenhouse Gases (GHG)

Recent scientific evidence suggests there is a direct correlation between global warming and emissions of GHG. The USEPA has identified CO_2, CH_4, N_2O, and fluorinated gases (HCFCs, CFCs, and halons) as the principal GHGs that enter the atmosphere due to human activities (USEPA 2008). Although many of these gases occur naturally in the atmosphere, man-made sources have substantially increased the emissions of GHGs over the past several decades. Of the human caused GHGs, the greatest contribution currently comes from CO_2 emissions.

GHG emissions associated with the construction of the proposed project primarily would be associated with the consumption of energy for construction equipment over the 2-year (or 1-year) construction schedule and from vehicle traffic during the viewing period and for three months afterward for removal of the project. Heavy equipment, including flatbed trucks, flatbed rail cars, and support vehicles, would be used during installation of the anchors and panels. Cables would be hauled on-site using flatbed trucks, a rail vehicle, winches, line guns, and rafts or boats. Drilling would be required to install the anchors that would be transported to the locations using two flatbed trucks and flatbed rail cars.

There would also be increased GHG emissions during the 2-week viewing period when as many as 190,000 vehicles are expected to travel through the viewing area. The current national annual emission of GHGs is approximately 8 billion tons (USEPA 2008). A rough but conservative estimate of GHGs resulting during the viewing period can be given by the following calculation:

- 380,000 visitors would arrive in 131,035 vehicles (2.9 persons per vehicle).
- Visitors would drive 50.0 miles through the viewing corridor resulting in 6,552,000 vehicle miles traveled (VMT).
- Assuming each vehicle gets about 20 mpg, the cars would consume 348,000 gallons of fuel.
- Each gallon of fuel burned generates 19.4 pounds CO_2 or 3,178 tons CO_2.

This rough calculation indicates that the Artists' Proposed Action would emit less than 4,000tpy of GHGs, or less than 0.00006% of the national annual emissions.

While global and national inventories of GHGs are established, regional and state-specific inventories are in varying levels of development. Quantification techniques are also in development. For example, there is a good understanding of climate change emissions related to fuel usage; however, measuring and understanding the effects of albedo is less comprehensive. Analytical tools necessary to quantify climatic impacts are presently unavailable. As a consequence, impact assessment of specific effects of anthropogenic GHG releases cannot be determined.

Criteria Pollutant Emissions

The three phases of each Action Alternative would have localized and temporary impacts on air quality due to emissions of gaseous pollutants and particulates in the Project Area: installation, viewing, and removal.

4.9.1 No Action Alternative

Under the No Action Alternative, no temporary work of art for public viewing would be installed, and there would be no exhibition or demobilization impacts. If the No Action Alternative is selected, the area may experience some limited increase in traffic, based on general trends of increasing traffic on US 50 over the years. The No Action Alternative is not expected to adversely affect air quality or cause an exceedance of air quality standards.

4.9.2 Action Alternatives

4.9.2.1 Installation

Construction activities associated with installation would cause an increase in fugitive and gaseous emissions in the local area. Dust generated from these open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream (e.g., stack, chimney, or vent). Increases in local fugitive dust levels would result in minor temporary localized air quality impacts. Heavy equipment, including flatbed trucks, flatbed rail cars, drill rigs, and a crane, would be used to install anchors. Five flatbed trucks, two coordination vans, one rail vehicle, line guns, and rafts or boats would be used to install cables and fabric panels. In general, all surface-disturbing activities in the proposed Project Area would be conducted using best practical methods to prevent particulate matter from becoming airborne. Best practical methods include, but are not limited to, gravel parking lots, chemical stabilization, and watering.

Equipment used for installing OTR (and for removing it) would add fugitive dust emissions to the air. Some of the proposed activities would be similar to emissions from equipment that is routinely used for maintenance on the highway. In addition to emissions from construction equipment and vehicles, windblown dust is also a factor due to the generally dry conditions. Dust can be generated from installation activities involving disturbance to vegetation (exposure of soil) by construction vehicles accessing areas and during installation of anchors.

The impact of a fugitive dust source on air pollution depends on the quantity and drift potential of the dust particles injected into the atmosphere. In addition to large dust particles that settle out near the source (often creating a local nuisance problem), considerable amounts of fine particles are also emitted and dispersed over much greater distances from the source. PM_{10} represents a relatively fine particle size range and, as such, is not overly susceptible to gravitational settling (USEPA 1995).

The potential drift distance of particles is governed by the initial injection height of the particle, the terminal settling velocity of the particle, and the degree of atmospheric turbulence. Theoretical drift distance, as a function of particle diameter and mean wind speed, has been computed for fugitive dust emissions. Results indicate that for a typical mean wind speed of 16 km/hr (10 mph), particles larger than about 100 µm are likely to settle out within 6 to 9 meters (20 to 30 feet) from the point of emission. Particles that are 30-100 µm in diameter are likely to settle within a few hundred feet of the source. Smaller particles, particularly PM_{10}, and $PM_{2.5}$, have much slower gravitational settling velocities and are much more likely to have their settling rate retarded by atmospheric turbulence. (AP-42, Section 13.2)

Control techniques for fugitive dust sources generally involve watering, chemical stabilization, or reduction of surface wind speed with windbreaks or source enclosures. Watering, the most common and generally least expensive method, provides temporary dust control. The use of chemicals to treat exposed surfaces provides longer dust suppression, but may be costly, have adverse effects on plant and animal life, or contaminate the treated material. Windbreaks and source enclosures are often impractical because of the size of fugitive dust sources. (AP-42, Section 13.2)

The reduction of source extent and the incorporation of process modifications or adjusted work practices, both of which reduce the amount of dust generation, are preventive techniques for the control of fugitive dust emissions. These techniques could include, for example, the elimination of mud/dirt carryout on paved roads at construction sites. On the other hand, mitigative measures entail the periodic removal of dust-producing material. (AP-42, Section 13.2)

Because of the proximity of the Parkdale Area to Parkdale Siding, this small community would be most affected by the limited air quality effects from project installation activities. The Texas Creek restaurant and store could also be impacted by proposed OTR activities at the Texas Creek Recreation Site. The other Project Areas are significantly outside community areas. Roadside parks would be temporarily affected by the limited air quality impacts from project installation activities associated with the Texas Creek and Maytag areas.

4.9.2.2 Exhibition

Visitation estimates (Appendix C) and a Traffic Operations Analysis (Appendix D) were completed for the Project Area. The analysis included data for existing traffic conditions as well as predictions for traffic conditions during the OTR viewing period. According to the study, several thousands of additional vehicles are expected to visit the temporary work of art. Because OTR viewing would require natural lighting,

sightseeing traffic would be limited to daylight hours (although additional viewers may use their vehicles to attempt to view the work of art at night, especially if a full moon is present). In addition, private buses may be used to decrease congestion and offer a better viewing experience, buses may be used for transportation of project monitors, and vans may be required to transport project coordinators.

The increase in traffic may temporarily decrease air quality during the proposed period of OTR viewing. This decrease would result from increased vehicular emissions in stop-and-go traffic and from vehicle sources of particulate emissions, including tailpipe exhaust and brake and tire wear. NOx and CO emissions are influenced by speed and traffic congestion and are highest at both high, free-flow speeds (60-70 mph) and low, congested speeds (15-20 mph). It is expected that traffic volumes would peak during weekends and decreases in air quality would be most pronounced during these periods.

According to the Traffic Operations Analysis, there is potential for traffic congestion to occur during peak viewing periods, especially on weekends.

The viewing period would temporarily cause increased direct vehicle emissions, including NOx, CO, and particulates along segments and intersections of US 50. Roadway and parking lot sources of particulate emissions and windblown dust are also expected to increase. Windblown dust is a factor due to the area's dry conditions and could result from increased road pulloffs and increased pedestrian/hiking activities during OTR viewing. River valley wind conditions are expected to disperse air pollutants, and project design features are expected to minimize traffic flow problems. Any effects on air quality would be temporary because the viewing period is only 2 weeks. The Artists' Proposed Action would not seriously impact area air quality as it would not result in an exceedance of air quality standards.

In summary, minor emission increases, which include CO, NOx, $PM_{2.5}$, and $PM_{10,}$ are expected to be minor and short-term (limited to the viewing period) and would be dispersed by up-valley and down-valley winds that occur in the project corridor during the summer, thereby reducing the potential for buildup of levels greater than the NAAQS.

4.9.2.3 Demobilization

Heavy equipment, including flatbed trucks, flatbed rail cars, and support vehicles, would be used to remove the panels. Cables would be removed using flatbed trucks, a rail vehicle, winches, line guns, and rafts or boats. The anchors would be removed using two flatbed trucks, a flatbed rail car, and drill rigs. Equipment used for removal would add emissions to the air similar to those during installation, but over a shorter time frame, resulting in minor temporary impacts to air quality.

4.9.3 Impacts of Alternatives Compared

Air quality impacts from the various alternatives are compared in Table 4-10. Impacts can be broadly classified into six categories:

1. Anchor Drilling
2. Disturbed Ground
3. Paved Roads
4. Unpaved Roads
5. Tailpipe Emissions
6. Greenhouse Gas Emissions

4.9.3.1 Construction

Compressing the construction schedule to one year instead of two years would effectively double the annual installation and construction related emissions from the project for that year. Equipment used for installation would add emissions to the air similar to those during Alternative 1a, but over a shorter time frame.

4.9.3.2 Exhibition

Impacts to air quality during shorter viewing periods would be somewhat less than Alternative 1a. No alternatives would result in exceedances of air quality standards.

4.9.3.3 Demobilization

Impacts to air quality from demobilization under each alternative would be about the same as Alternative 1a.

This page intentionally blank

Table 4-10. Air Quality Impacts

Disturbance Mech. / Impact	No Action	Alt 1a (Artists' Proposed Action)	Alternative 1c	Alternative 1d	Alternative 2	Alternative 3	Alternative 4
INSTALLATION PERIOD							
Impact 1 Anchor drilling	None	Fugitive dust – direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	No change from Alt 1a.
Impact 2 Disturbed ground	None	Fugitive dust – direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	No change from Alt 1a.
Impact 3 Paved road emissions	None	Fugitive dust – direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	No change from Alt 1a.
Impact 4 Unpaved road emissions	None	Fugitive dust – direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	No change from Alt 1a.
Impact 5 Increased vehicle congestion at roads and Intersections	None	Fugitive dust and tailpipe emissions– direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	No change from Alt 1a.
Impact 6 Increased green house gas (GHG) emissions	None	Green house gas (GHG) emissions- direct, short-term, regional, no effect	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.
EXHIBITION PERIOD							
Impact 1 Anchor drilling	None	None	None	None	None	None	None
Impact 2 Disturbed ground	None	Fugitive dust – direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.
Impact 3 Paved road emissions	None	Fugitive dust and tailpipe emissions– direct, short-term, localized, minor	Less than Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	Less than Alt 1a.
Impact 4 Unpaved road emissions	None	Fugitive dust emissions– direct, short-term, localized, negligible	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a..	No change from Alt 1a.	No change from Alt 1a.

Disturbance Mech. / Impact	No Action	Alt 1a (Artists' Proposed Action)	Alternative 1c	Alternative 1d	Alternative 2	Alternative 3	Alternative 4
Impact 5 Increased vehicle congestion at roads and intersections	None	Tailpipe emissions– direct, short-term, localized, minor	Less than Alt 1a	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	Less than Alt 1a.
Impact 6 Increased green house gas (GHG) emissions	None	Green house gas (GHG) emissions- direct, short-term, regional, no effect	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.
DEMOBILIZATION / RESTORATION PERIOD							
Impact 1 Anchor drilling	None	None	None	None	None	None	None
Impact 2 Disturbed ground	None	Fugitive dust emissions– direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	Less than Alt 1a.
Impact 3 Paved road emissions	None	Fugitive dust and tailpipe emissions– direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	Less than Alt 1a.
Impact 4 Unpaved road emissions	None	Fugitive dust and tailpipe emissions– direct, short-term, localized, minor	No change from Alt 1a.	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	Less than Alt 1a.
Impact 5 Increased vehicle congestion at roads and intersections	None	Tailpipe emissions– direct, short-term, localized, minor	Less than Alt 1a	No change from Alt 1a.	Less than Alt 1a.	Less than Alt 1a.	Less than Alt 1a.
Impact 6 Increased green house gas (GHG) emissions	None	Green house gas (GHG) emissions- direct, short-term, regional, no effect	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.	No change from Alt 1a.

4.10 WATER RESOURCES

Due to the locations of the proposed project and its associated activities, the focus of this impact assessment is on the Arkansas River and associated water resources from approximately one-half mile upstream of the Chaffee/Fremont County line, downstream to the US 50 bridge (Harvey Bridge) at Parkdale, Colorado. For most purposes of this assessment, USGS gages 07093700 (Arkansas River near Wellsville) and 07094500 (Arkansas River at Parkdale) form the upstream and downstream points on this portion of the river. Potential impacts to water resources from the project would involve changes to the existing quantities of surface water or ground water, and changes to the existing qualities of these resources. An example might include water quality degradation from river channel or bank disturbance during project installation. On the other hand, impacts could also result from the effects of water resources on the project features. For example, an unusual flood event may reduce access along the river, or threaten cable footings by eroding a streambank. Both of these different impact viewpoints are considered in this assessment.

The potential for impacts to water resources also depends on compliance with federal, state, and local regulations that govern waters of the state as a public property and resource. Compliance with regulatory permitting programs, successful implementation of precautionary control measures and BMPs, and coordination with other agency programs would reduce the potential for water resources impacts from, and to, the project.

Regulatory requirements and other agency programs that directly apply to water resource in the Project Area include:

- The Clean Water Act (including Section 404), the Safe Drinking Water Act; and designated beneficial uses and water quality standards administered by CDPHE;
- Stormwater permit requirements for construction activities from the CDPHE Water Quality Control Division;
- Executive Order 11988 (Floodplains) and related state and county floodplain management programs;
- Water rights as administered by CDWR; and
- BLM and interagency recreation and fisheries programs for the Arkansas River, notably pertaining to the AHRA.

Additional regulatory programs that pertain to the project and may influence impacts to water resources include state and county solid and hazardous waste rules, public sanitation requirements, and transportation requirements. These programs and requirements are considered in this section and addressed in greater detail in other sections of this EIS.

4.10.1 No Action Alternative

Under the No Action Alternative, impacts to water resources from the project would not occur. Surface water and groundwater conditions in the study area would exist in their present state as described in Chapter 3.0, and continue along existing trends.

4.10.2 Alternative 1a

4.10.2.1 Installation

Assessments of the potential intensity, extent, and duration of impacts from project installation are discussed in more detail below. In summary, however, potential installation impacts include incidental river channel disturbance; additional sediment yield, transport, and turbidity in the Arkansas River from construction disturbance and access bridge improvements; and water quality degradation from spills or other uncontrolled discharges. Flood conveyance impacts may also occur due to access bridge improvements or restricted clearance between the river water surface and the bottom of the panel cables. The latter consideration is not specifically a water resource issue, but may create associated impacts to recreational activities. Impacts of water resources on the proposed project may result from the effect of flows on cable footings or bridges, or from runoff and inundation at the proposed Texas Creek CSA. Additional impacts to water resources may result from increased water supply and sanitation demands.

It is assumed for purposes of this assessment that water quality impacts would be reduced by implementing a stormwater management plan (SWMP) approved by CDPHE in compliance with the Colorado Water Quality Control Act and the Federal Water Pollution Control Act. Such a permit is required for construction disturbance totaling 1.0 acre or more in size (Jessup 2010, CDPHE 2007). Total soil disturbance along the river corridor for the Artists' Proposed Action is anticipated to be about 5.5 acres, and an additional 10.4 acres would be disturbed for staging and training areas in uplands (J. F. Sato 2007, Section 5.3.2.2). Under the CDPS General Permit COR-030000, an SWMP would be prepared as part of a permit required for stormwater discharges associated with construction activities. The permit documentation would describe all potential pollution sources that may reasonably be expected to impact the quality of stormwater runoff associated with project construction activities. Further documentation and controls may be necessary if CDPHE determined that an individual permit would be required. According to CDPS General Permit COR-030000, at a minimum, each of the following sources and activities would be evaluated for their potential to contribute pollutants to stormwater discharges, and would be addressed in the SWMP if they have such potential (CDPHE 2007):

- All disturbed and stored soils;
- Vehicle tracking of sediments;
- Management of contaminated soils;
- Loading and unloading operations;
- Outdoor storage activities (building materials, fertilizers, chemicals, etc.);
- Vehicle and equipment maintenance and fueling;
- Significant dust or particulate generating processes;
- Routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents, oils, etc.;
- On-site waste management practices (waste piles, liquid wastes, dumpsters, etc.);
- Concrete truck/equipment washing, including the concrete truck chute and associated fixtures and equipment;
- Dedicated asphalt and concrete batch plants;

- Nonindustrial waste sources such as worker trash and portable toilets; and
- Other areas or procedures where potential spills can occur.

In addition, the Record of Decision (ROD) and approved management plan for the BLM RGFO (BLM 1996) indicates that in perennial riparian areas within the Arkansas River subregion, all OHV use would be limited to designated roads and trails. Seasonal limits also may be placed on OHV traffic areas in order to protect perennial riparian areas and fishery habitat (BLM 1996).

To comply with CDPHE, BLM, and other agency requirements, BMPs would be defined, implemented, and maintained to reduce the potential for pollutant sources to reduce water quality. Among others, such practices would include both structural and nonstructural methods for erosion and sediment control, practices for materials handling and spill prevention, solid and liquid waste management and disposal practices, and practices to dispose of groundwater or stormwater dewatered from excavations (CDPHE 2007). Examples of BMPs listed by CDPHE include (CDPHE 2007):

- Structural practices, such as placing silt fences, filter fabric, rock or gravel drains, stabilized berms or ditches to control runoff, staked straw bales or coir logs, and catchment basins or sumps;
- Nonstructural practices, such as preserving natural vegetation, scheduling activities (such as during dry periods), preventive maintenance and spill response procedures, managing off-road travel, proper storage and disposal of fluids, trash or other materials, and controls on vehicle washing or re-fueling.

A substantial number of BMPs are detailed as part of the project proposal. In Chapter 5.0 of the project design and planning report, some of the BMPs that would mitigate potential impacts to water resources would include (J.F. Sato 2007):

- Riverbank disturbance would be minimized during all phases of the project;
- Sediment fences would be installed below each anchor location (if warranted by site conditions);
- Newly exposed soil and rock would be covered with erosion control fabric as needed to control erosion;
- Working on slopes during high intensity rain storms would be prohibited;
- Grout used to place some of the anchors would be nontoxic. Any spills of grout would be immediately cleaned up and removed from the site for proper disposal;
- Sites where vegetation damage occurs would be revegetated following removal of all facilities;
- Erosion control measures, such as erosion control fabric, would be installed where needed, such as steep slopes and erosive soils;
- Spills of fuel or other liquids during construction would be cleaned up and removed from the site;
- Foot traffic would be controlled during the viewing period, to the extent possible, especially in areas with erosive soils or steep slopes;

- Silt fencing and other erosion control materials would be erected to protect wetlands and stream systems from erosion run-in;
- Equipment servicing and staging areas would be located at least 100 feet from wetland and drainage systems to protect these areas from contaminants;
- Absorbent materials (pillows and barriers) would be on hand for emergency spill control;
- Construction areas would be revegetated as soon as possible to curtail erosion and rapid runoff that may affect wetlands and aquatic habitats;
- Construction activities would be prohibited during high intensity rainstorms;
- No work would be conducted on steep slopes during high intensity rainstorms;
- Existing vegetated buffers would be maintained or new buffers established to protect wetlands and streams;
- Grout that is used to place some anchors would be nontoxic and contained at the site of application;
- Any spills generated during project installation and removal would be cleaned up and immediately removed from the site for proper disposal;
- A contingency plan would be developed that would include procedures for evacuation and measures for minimizing potential damage from project structural components during a large flood;
- Mats would be used to protect vegetation and surface soils from equipment tracks and tires when moving from the highway or railroad to access drill points;
- Special treads or tires would be used for drill rigs and associated equipment;
- Equipment would be service on the railroad or highway ROW. Any spills of fuel, lubricants, hydraulic fluids, or solvents would be cleaned up with absorbent materials and properly disposed;
- Spoil from drilling operations would be contained, and erosion control measures would be used to curtail overland flow from drill sites;
- Water and drilling fluids used during drilling would be collected for proper disposal;
- An incident response plan would be developed during the preconstruction stage that would identify all appropriate responders for hazardous and contaminated spills, as well as specify procedures that would be followed by the contractor for such incidents;
- All petroleum products and other hazardous materials (for example, fuel, solvents) used for construction purposes would be handled and stored to prevent accidental spillage or other harm to the project area;
- Stockpile management measures, including perimeter barriers, covers, and location considerations, would be used to minimize effects on local waterways from possible spills. The handling of materials would involve implementation of appropriate training of personnel, specific storage techniques for different materials, proper labeling, containment techniques, cleanup specifications/equipment, and regular maintenance and inspection protocols;

- Dewatering operations (if required) would be performed as consistent with applicable state and local permits. These practices would remove and discharge excess water generated by storms or groundwater dewatering; and
- Should dewatering be required, permit acquisition (from CDPHE) may require additional water analyses and/or procedures to remove specific contaminants and lower total suspended solids to acceptable levels.

Additional BMPs are described in the proponent's project documentation and elsewhere in this EIS. With implementation of BMPs and the proposed controlled excavation and drilling practices (see Chapter 2.0), the potential for sediment or spills to affect surface water quality would be reduced. However, with the duration and extent of proposed construction activities, the steep slopes involved, and the proximity to the Arkansas River, incidents and water quality impacts would still be likely to occur.

Under Alternative 1a, approximately 9,000 anchor locations would be drilled. Off-road rubber-tracked and rubber-tired drills, with support vehicles, would be employed at approximately 45% of the anchor locations upstream of Vallie Bridge display Section 3. Off-road drilling would also occur at part of the Maytag display segment, and off-road access trails would be employed at portions of the proposed Three Rocks, Spike Buck, and Parkdale displays (J.F. Sato 2007). This off-road traffic would increase the potential for erosion and sedimentation during installation and removal. Impacts would be especially likely during the "mud season" of February through May, when precipitation and wet soil conditions are more common.

If sediments escape the control practices at 1% of the proposed anchor locations, then 90 incidents would occur during project installation. If releases occurred at 5% of the proposed anchor locations, then 450 incidents would take place during project installation. Soils in the Project Area consist primarily of gravelly to cobbly sandy loams and loamy sands (see Chapter 3.0). These relatively coarse-textured soils carry small portions of silts and clays. When excavated soils or drill cuttings are released into the river, the coarse sediment fractions would likely settle out of the flow within several tens of yards downstream. The actual settlement distance would vary with streamflow turbulence, velocity, and depth at the incident time and location, as well as with the particle-size distribution of the escaped material. At lower flows, settlement would occur over shorter distances in thicker deposits. At higher flows, settlement would be dispersed over larger areas of streambed. The finer silt and clay particles would be suspended downstream for longer distances, creating a turbidity plume that may be noticeable through one or two riffle-pool sequences. Again, the intensity and extent of these impacts would depend on flow conditions and the volume and size-distribution of the escaped sediment. Sediment distribution and settling would probably take place before a spill response could be conducted.

Since it is estimated that about 1.8 cubic feet of soil would be excavated at each anchor site (see Chapter 2.0), this gives a general magnitude of the potential volume that could be released in any particular incident. Additional site disturbance and drilling for anchors may increase that volume somewhat, but in general the amount of sediment that may enter the river in a single incident would be likely to be small relative to the river; e.g., probably less than a cubic yard. Further consideration of this impact is discussed for soil resources in Section 4.11. These incidents would form direct, localized, short-term impacts to surface water quality. They could occur with negligible to moderate intensity at any of the proposed panel locales during the installation period. Because of the potential for erosion and sedimentation impacts during the project, additional mitigation is recommended (Measures WATER-1, WATER-2 in Chapter 5.0).

Implementation of the additional mitigation measures recommended here and for soils in Section 4.11 would reduce the potential sedimentation impacts to low intensity.

More intensive monitoring of the river (greater than the recommended measure) is not warranted. Baseline sediment transport data are limited for the Arkansas River at or between Parkdale and the gage near Wellsville. In addition, the timing and yield from sediment sources vary widely along the river and its tributaries. Because of these factors, a river monitoring program would not be likely to produce useful results related to project activities. Frequent inspection of project disturbance, along with implementation and maintenance of BMPs, would be the most effective approach for minimizing erosion and sedimentation impacts from the project.

Slurry grout pumping would be conducted during anchor installation. Blowouts or tank spills are unlikely; but if they did occur, then grouting materials could enter the river. Similar to sediments, these materials would migrate downstream various distances in relation to the volume released and their settling characteristics in the flow field. Depending on the release volume, flocculation, and flow turbulence, a noticeable turbidity plume could migrate a mile or more downstream before being dispersed to negligible concentrations. Spill response procedures and equipment would be available, and their timely application would reduce the extent of impacts. As with the potential effects from sediment releases, any releases of grout materials would form direct, localized, short-term impacts to surface water quality. If they occurred, these impacts would have minor to moderate intensity depending on the volume of material released and the effectiveness of response activities.

Degradation of surface water and groundwater quality could occur at the proposed CSA at Texas Creek if spills or leaks occurred there. Fuels, solvents and lubricants, grouting materials, wastewater, and sediments are likely to be stored on-site. It is assumed for this assessment that adequate management practices for storage, containment, and removal of these substances would be applied in compliance with regulatory programs, permit approvals, and a plan that is implemented to prevent and respond to spills. Further discussion of these permits and practices is presented for Hazardous Materials (Section 4.17). In addition, the proposed location of the concrete wash out pit at the Texas Creek CSA would need to be approved by State Parks. According to that agency, the construction details of the pit must specify that it be lined sufficiently to prevent any type of seepage of liquids/materials (White 2010).

Moderate to significant short-term adverse impacts to water quality would occur if spills or leaks of fuel, solvents, or lubricants occurred along the river corridor during parking or refueling of project vehicles or equipment. The severity and extent of impacts would depend on the nature and location of the spill or leak, the river flow at the time, and the proximity to ongoing beneficial uses (e.g., rafting, fishery habitat). Parking of vehicles and equipment would take place at or near the work sites. Proposed refueling practices have been further detailed by OTR, and would take place at the work locations from mobile fueling trucks (OTR 2010b). After refueling the respective equipment, the refueling trucks would be returned to the proposed Texas Creek Staging Area. Large quantities of fuels would only be stored there. This approach would reduce the potential for large spills to affect the river or wetlands.

Refueling procedures would be developed and training would be provided to further limit the potential for leaks or spills (OTR 2010b). These would include moving equipment being fueled further than 100 feet from the river or wetland as much as possible and practical, unless the equipment is located on a paved surface. Spill kits would be present to enable immediate spill responses. Crews would be trained to respond to fuel leaks or spills. Equipment servicing would be done within the Texas Creek Staging Area, except in emergency situations such as when a drill might be immovable. For equipment and work on the

railroad side of the project, fuel would be stored on railroad cars. The same refueling procedures would be used on the railroad side to reduce the potential for spills. Equipment would be stored overnight at the work areas but would be moved 100 feet or more away from any water or wetlands if at all possible (OTR 2010b).

Severe water quality impacts would result if a large volume of diesel fuel, gasoline, or oil were released into the Arkansas River, a flowing tributary, or an adjacent wetland. Spills could be caused from a lack of automatic shut-off equipment, momentary inattention to refueling on the part of the crew, lack of BMPs for containment, mechanical failure (such as a break in a fuel line), vandalism, or a major flood (or rockslide) causing equipment to be swept into the river. Obviously, some causes of spills would be more or less likely than others. The potential for an extreme flood is discussed in this section, and locations that are more generally prone to rockslides or debris flows are identified in Section 4.12, Tables 4-12 (Rockfall Hazard Areas) and 4-13 (Potential Debris Flow Areas at Tributary/Ephemeral Streams), respectively. The likelihood, severity, and extent of impacts from spills or leaks of fuel or lubricants would vary widely. However, because of the potential for severe, widespread impacts to water quality, additional mitigation (WATER-3 in Chapter 5.0) is recommended. Implementation of recommended measure WATER-3 would reduce the potential for water quality impacts from spills or leaks to a negligible or minor intensity.

Sediments, drill cuttings, waste grout, and washwater would be stored in pits excavated at the proposed Texas Creek CSA (see Chapter 2.0). It is assumed that stormwater would be routed around the pits in accordance with site drainage provisions implemented from an approved stormwater management plan, which was discussed previously. However, groundwater contamination could result from seepage out of the pits through relatively coarse soil materials (see Chapter 3.0) if the pits were unlined. If degradation of groundwater quality occurred, it would create a direct, long-term impact of moderate intensity. The impact would be generally localized in water-bearing zones along Texas Creek Gulch. However, due to the proximity of the river, sufficient off-site migration could occur over time to a wider, but still localized area along the river corridor. Because of the potential for such impacts, additional mitigation is recommended (WATER-4 in Chapter 5.0).The proposed CSA location is located in a FEMA-designated 100-year floodplain (Flood Hazard Zone A) along Texas Creek Gulch (FEMA 2007). During a brief site visit in July 2009, the location was observed to consist of alluvial washes and transported sediments up to cobble and boulder sizes. These features make it likely that runoff and sediment are transported through the area at recurrence intervals less than 100 years. Higher-level terrace deposits border the active alluvial surface on both sides. Based on inspection of aerial photos, it appears that a drainage control berm has been built down the center of the location, and active fan and channel deposits are located on either side of this feature. Locating the CSA in this geomorphic position would greatly increase the risk of flood damages at the facility, and encourage uncontrolled discharges of fluids and materials from the site. Since the location is near the Arkansas River, there would also be greater likelihood of discharges and debris entering the river. If that occurred, moderate to significant direct impacts to water quality, flow conveyance, and other resources could result in the locale.

Prior to constructing the CSA facilities at this location, compliance with the Fremont County Floodplain Resolution and other applicable regulations would require the proponent to obtain an approved flood damage prevention permit from Fremont County. It is possible that engineered measures, if required by agencies, could direct runoff and sediment away from project structures and storage areas. Additional mitigation is recommended (WATER-5 in Chapter 5.0) since the actual outcome of the permit application and approval process, in terms of protective measures, is not known at this time. If the CSA site were to be moved outside of a delineated floodplain area, then floodplain management considerations would be

reduced or eliminated. However, stormwater controls, considerations for vehicle washing and maintenance, and spill controls and countermeasures would still pertain to CSA activities.

It is currently not known if parking lots would be paved at the visitation sites (see Chapter 2.0). If asphalt or other paving materials were used on these sites, the potential exists for water quality degradation during construction from spills into the river during transport, and from site runoff. It is assumed that site drainage and runoff water quality would be adequately managed through BMPs implemented in compliance with an approved stormwater management plan and CDPHE permit, and with other agency provisions or stipulations. Although driver training and spill prevention and response measures are typically provided for paving activities, material spills into rivers do occur during transport (USEPA 2009d, Columbia Broadcasting System 2009, American Broadcasting Company 2009). If a loaded transport truck spilled into the Arkansas River or a tributary, the asphalt would coagulate and settle onto the streambed within distances likely to be on the order of a few hundred yards (USEPA 2009d). Any released fuel would also migrate downstream. Spill control and countermeasures, including cleanup, would further disturb the channel bed and banks and locally entrain sediment. A spill event of this nature would create a minor, short-term, local impact on water quality. Based on historical incidents, no long-term widespread impact to water quality would be anticipated (USEPA 2009d). It is assumed that if asphalt or other paving materials are transported to the parking lot sites, the potential for impacts from spills would be reduced by safety and spill response programs.

Under Alternative 1a, installation activities would take place over approximately 28 months (see Chapter 2.0). If water surface elevations rise several feet above the values used for project construction, then clearance for recreation would be reduced during the latter part of installation or the display period. Average monthly flows for the spring through early fall months are identified in Chapter 3.0 for USGS stream gages at Wellsville and Parkdale. Assuming that the elevation datum at each gage location is near the bottom of the river cross-section, the approximate water surface elevations for average monthly flows are indicated below, based on recorded field measurements (USGS 2009f).

Table 4-11. Approximate Average Water Surface Elevations at USGS Stream gages on the Arkansas River

Gage Location	Elevation Datum, ft	May: Average Elevation, ft.	June: Average Elevation, ft.	July: Average Elevation, ft.	August: Average Elevation, ft.	September: Average Elevation, ft.
Wellsville	6,883.4	6,888.0	6,889.1	6,888.5	6,887.7	6,887.0
Parkdale	5,720.0	5,724.0	5,725.1	5,724.4	5,723.7	5,723.0

Source: USGS 2009f

Although this information depicts average conditions and depths of less than 6 feet, it should be noted that both higher and lower flows commonly occur in all months. Because of the nature of the river channel geometry and flow hydraulics, fairly substantial changes in discharge create less dramatic changes in water surface elevations at low to moderate flows. However, large flow events, such as flood runoff or annual peak flows, result in higher flow stages. At Parkdale, annual peak flows in 1985 and 1995 resulted in stages of 9.13 feet and 8.82 feet, respectively. Both events occurred in June (USGS 2009f). At Wellsville in the same years, June stages reached 8.12 and 8.40 feet, respectively. In addition, convective storms may raise river stages quickly and significantly. Instantaneous peak flows and river stages, with durations of minutes to hours, could be much greater (J.F. Sato 2007, Chapter 5, Section 5.4.3.). The more intense events are most frequent from mid-July through October, whereas sustained storms are more likely between May and August. These large storms are most common along the eastern base of the Rocky Mountain foothills (Downton et al. 2003).

Under dead load, the proposed cables would have a maximum sag of approximately 2.5 feet for a 175-foot cable span (Golder 2000). It is likely that slight additional fabric sag over the panel distance of 35 to 40 feet between cables would occur during exhibition. In combination, these factors could reduce the project clearance if unusually high flows occurred during the project, or during normal flows, if the cables and panels were placed at insufficient elevations. While restricted clearance does not generate an impact to water resources *per se*, there may be secondary effects on installation efforts or on recreational uses of the river. The latter are designated beneficial uses under Colorado regulations and inter-agency programs.

Anchor Transition Frames (ATFs; see Chapter 2.0) would provide support and elevation to the proposed cross-channel cables and fabric panels. Preliminary designs indicate typical ATF heights of 3 to 4 feet (J.F. Sato 2007, Appendix J). It is anticipated that during final design and construction, the specifics of ATF heights and other site design factors would consider a range of seasonal flow elevations. This is recommended as part of further project studies by the proponent's consulting staff (J.F. Sato 2007, Chapter 5, Section 5.4.4.3). As a result, impacts resulting from clearance considerations would probably be avoided. If such impacts to designated water uses did occur, they would most likely be minor, local, and short-term limitations on recreation.

To improve access for parking and visitation, upgrades are proposed to the existing river bridge about 1.5 miles west of Parkdale (Harvey Bridge). It is assumed for this assessment that bridge design and construction would meet Fremont County guidelines to address hydrology, hydraulics, and scour considerations, as well as any applicable standards from the state (CDOT 2004, 2009a). Work on the bridge would involve localized channel and bank disturbance and related sedimentation impacts. Sediment transport and turbidity would be most noticeable generally in a one- or two--mile reach of the river, above the more turbulent flows in the Royal Gorge. These would be short-term, minor effects.

Construction water use and additional sanitation requirements would increase the demands on water supplies during and after the installation period. It is anticipated that the project would use existing supplies from currently permitted water rights holders and suppliers. As described in Chapter 2.0, construction labor would be hired from local sources to the extent possible, and existing local accommodations would likely be used by out-of-area contractors. On that basis, impacts to existing water supply and sanitation facilities are not anticipated. Temporary use approvals or substitute water supply plans would be required if temporary water diversions for construction are needed. If so, permit applications would be submitted to the Colorado State Engineer, and would undergo reviews before any approvals may be issued (CDWR 2009). Based on water rights considerations and supply conditions that would be evaluated by the CDWR during such a review process, no impacts to existing water rights or availability are anticipated.

There is potential for the proposed project to be adversely affected by streambank erosion, particularly on the outside portion of bends where flow depths and velocities are greater. In most locations along the river, existing streambanks have been reinforced with riprap to stabilize the highway or railroad embankments. If it occurs, however, the proposed anchor points where bank erosion could most likely affect the project include:

- The north bank at the downstream end (Section 08) of the Texas Creek panel array, with anchor points in sediments opposite a point-bar deposit;
- The north bank near the upstream part (Section 02) of the Three Rocks panel array, with anchor points in alluvial fan sediments where the channel narrows;

- The northeast bank at the downstream end (Section 06) of the Three Rocks panel array, with anchor points in alluvial fan or terrace sediments; and
- The northeast bank at the downstream end (head of Section 04) of the Tunnel panel array.

Based on examination of project aerial photography, the bank at the Texas Creek location above has already been reinforced with riprap by the railroad. A wider, shallower riffle occurs upstream where the bend begins. These existing features would minimize the potential for streambank erosion at the proposed anchor points at the Texas Creek display segment. At the Three Rocks locations, the alluvium may be coarse enough, and the proposed anchor sites may be set back on the bank far enough to minimize bank erosion effects on the project. Additional anchoring practices may be needed at those locations. At the Tunnel location, resistant bedrock may be close to the surface along part of the bend (Golder 2000). This would reduce or eliminate streambank instabilities. If loose colluvium or alluvium forms the bank along the Tunnel site, however, then additional anchoring techniques or stabilization may be needed to protect the project there. Because of the potential for site conditions to affect the proposed project and result in flow, erosion, or sedimentation impacts, additional mitigation is recommended (WATER-6 in Chapter 5.0).

If practices were implemented to protect the banks, no impacts to flow or water quality would be anticipated. However, placing bank stabilization would create disturbance impacts and permanent channel modifications. Recommended additional mitigation reflects this consideration in light of the temporary nature of the project.

4.10.2.2 Exhibition

During the exhibition phase of the proposed project, ongoing implementation of an approved stormwater management plan is assumed. This would reduce the potential for water quality impacts. Occasional localized, minor, short-term impacts may occur from runoff leaving parking areas containing sediments, litter, or oil and grease.

Water quality, notably temperature and dissolved oxygen concentrations, could also be affected by shading from the fabric panels. As described in Chapter 2.0, the panels would be translucent, allowing approximately 47% of natural sunlight to pass through the fabric (OTR 2009). In total, there would be approximately 925 fabric panel sections. Each section would vary from about 50 to 120 feet wide, and from 35 to 40 feet long, depending on location. From the water's edge, the distance between the fabric and bank slopes would remain open. This open space between the panels and slopes would range from about 8 to 25 feet. The openings are intended to allow the public and wildlife to access the river, and allow to sunlight to illuminate the river on both sides.

Water temperature data are available for instantaneous sampling conducted by USGS at both the river gage near Wellsville and the Parkdale gage (USGS 2010). A review of data available since 1989 (when the voluntary flow management program was initiated) indicates that near Wellsville, the data generally reflect an instantaneous grab sample taken on a monthly basis. Data are missing for a number of months, but the available data are generally similar to contemporaneous values at Parkdale. At Parkdale, an extensive series of daily maximum and minimum water temperatures were recorded through 2007. For available August data between 1989 and 2007, maximum daily water temperatures at Parkdale ranged from about 14° to 25°C (a 9° range). Minimum daily temperatures ranged from about 11° to 20°C (USGS

2010). More typically, water temperatures in August at Parkdale varied approximately three degrees, from about 17° to 20°C, over the course of a day.

In a relatively cool August, as in 1990, maximum daily water temperatures at Parkdale ranged from 17.1° to 22.2°C. Minimum daily water temperatures that month ranged from 14.1° to 17.3°C, and the change during the course of a day was up to 4.9°. In a relatively warm August, as in 2007, maximum daily water temperatures at Parkdale ranged from 18.9° to 22.8°C. Minimum daily water temperatures that month ranged from 16.6° to 19.7°C, and the change during the course of a day was up to 5.9°. Overall, the USGS data indicate that water temperatures vary naturally in the river, and sometimes range widely from one day to the next. Under the circumstances, project effects on water temperature are likely to be indistinguishable from natural conditions.

The relatively short travel time for a given volume of water to pass under a display segment would also limit the potential for distinguishing water temperature changes from the project. For example, at a mean flow velocity of 3 feet per second, a parcel of water would travel under a 1.0-mile length of display in about half an hour. At a mean velocity of 5 feet per second, a parcel of water would travel under a 1.0-mile-long display segment in about 18 minutes. Eddy separation and turbulent mixing would both occur during that time, and also when the water is outside the display reach. Even at a slow velocity of one foot per second, river water would be in partial shade less than 20% of the daylight hours needed to travel the length of displays in this alternative (J.F. Sato 2007, Section 5.3.2.2).

Under these circumstances, discernible changes in water temperatures from shading are not expected. Project effects, if they occur, would most likely be slight reductions of water temperatures, and small, related improvements in dissolved oxygen availability. Numerous research investigations have indicated that shading along riparian corridors is likely to have these effects. Several studies indicate that solar radiation, ambient reflected radiation, and stream surface area are the dominant factors that affect water temperatures during a given runoff condition (Cross 2001, Teti 2000, Beschta 1997, Larson and Larson 1996, Amaranthus et. al. 1989, Brown 1969). The translucent fabric would block some of the direct solar radiation. Ambient reflected radiation may be somewhat reduced by the fabric, but remaining open areas would allow some of this energy to be transmitted to water surfaces. Flow depths, turbulent mixing, and the distances between display locations would also reduce the potential for discernible water temperature changes. Widespread, noticeable water quality impacts from shading are not anticipated during the proposed exhibition season. The potential exists for small effects, such as minor reductions in summer water temperatures, to occur locally. These may be beneficial or adverse, depending on water uses (such as species habitat requirements).

River stages and clearance under the fabric panels are less likely to vary substantially during a short exhibition period in early August. A severe thunderstorm could still raise water levels substantially. Project information indicates that extreme instantaneous peak flows have a 3.4% to 15.5% chance of occurrence during the proposed August viewing period (J.F. Sato 2007, Chapter 5, Section 5.4.3). These data reflect short-term (minutes to hours) information. The potential impacts from high flood stages are further discussed previously for Alternative 1a under “Installation”. Because of the potential for impacts from high flood stages during the exhibition phase, additional mitigation is recommended (WATER-7 in Chapter 5.0).

Based on average data, water imports to the river from the West Slope would be declining in August, and average flows early in the month would be about 1,000 cfs at Wellsville (Smith and Hill 2000). Interagency augmentation agreements, which began in 1989, would typically attempt to maintain a minimum flow of

700 cfs at the Wellsville gage if sufficient water is available (Smith and Hill 2000). Agencies may or may not maintain flows at 700 cfs, depending on conditions and the timing of water uses in any given year. Generally, the average depth at Parkdale would be on the order of 4 feet under normal circumstances. Under these conditions, clearance under the panels is not likely to be an issue during the exhibition period. Greater examination of this consideration, as recommended by the proponent's staff for final design and installation (J.F. Sato 2007, Chapter 5, Section 5.4.4.3) would further reduce the potential for impacts.

Effects on other resources and project viewing conditions would occur if river flows were lower than about 700 cfs. Such conditions are common in the flow records since 1989 near Wellsville and at Parkdale after about mid-August (USGS 2010). Before mid-August or so, flows above 700 cfs are much more common.

One agency concern during the exhibition phase is the potential for water or hail from a severe storm to collect in the fabric panels and then create a sudden outpour onto the river or its banks (Gilbert 2009). If this occurred, localized impacts on water temperature or from erosion and sedimentation could result. The potential for intense rainfall to cause structural failure was tested by the proponent's staff in 1998 (J.F. Sato 2007, Chapter 5, Section 5.7.6). Fabric porosity allowed water to immediately pass through, with no ponding. Subsequent calculations indicated that the fabric can readily allow water to pass through during a 9-inch per hour storm event (a 100-year storm for the study area).

In addition, once the fabric panels are installed, an accumulation of hail on the fabric panels could cause them to sag extensively or fail. A number of recent hailstorm events in the general project locale are reported in Chapter 5, Table 5.7-16, of the project plan (J.F. Sato 2007), and in recent proponent submittals (Parsons 2010). Hail does occur in the study area, mostly from June through August. Recorded diameters have ranged up to about 2 inches (J.F. Sato 2007, Chapter 5, Section 5.7.6), but recent data indicate diameters more commonly of 3/8-inch or less (Parsons 2010). Impacts on hailstorm tests conducted in Fremont County indicate stresses typically on the order of 1 pound per square foot from reasonably heavy events (Parsons 2010). Hail would likely collect at the low point of a fabric panel, and may be removed from there by wind action. Tension placed on the fabric panels from hail would be minor in comparison to wind forces already considered in design (Parsons 2010).

If a substantial hail accumulation occurred on the display panels and caused extensive sagging or failure, it could block flows, re-direct flow onto a streambank, or create a sudden outpour into the river. Negative impacts could result from erosion and sedimentation, water temperature changes, or recreation restrictions. According to project engineers, hail would most likely be accompanied by high-enough winds to cause billowing of the fabric panels (Golder 2000, Parsons 2010). While the billowing effect should reduce any collection of hail, this condition would be considered in final design for completeness (Golder 2000). Normally, sag from hail accumulation would be much less than the maximum sag dimension associated with a 175-foot span. The average fabric panel would be 65 to 75 feet long, and the worst-case sag estimate would only apply to about 3% of the proposed display (Parsons 2010). Hail impact or accumulation is unlikely to cause a fabric panel or its cable connections to fail. If such a failure were to occur, effects from one panel would not be transmitted to other panels. As a result of these tests and considerations, negligible or minor water resources impacts are anticipated from stormwater or hail accumulation on the fabric panels.

Greater visitation of the study area would occur during the exhibition period. As a result, demands on drinking water and sanitation uses would increase. This may create minor, localized, short-term effects on domestic water supplies and wastewater treatment in nearby municipalities or at accommodations near the canyon. Impacts could include greater drawdown and longer recovery times in groundwater wells,

temporary water shortages for some municipal or domestic uses, and increased loading to septic tank fields and wastewater treatment plants. Although there is potential for these impacts to occur, the likelihood is unknown. No water supply shortfalls or wastewater treatment bypasses are known to have occurred in the region due to previous summer tourist demands. The capacities of water supply and wastewater treatment facilities at Salida and Cañon City are described in Section 4.15. Based on the assessments in that section, the existing regional water supply and sanitation infrastructure would be adequate to meet large seasonal visitation demands.

4.10.2.3 Demobilization

Potential impacts to water resources during the demolition phase of the proposed project would generally be similar to those described for the installation phase. These include incidental river channel and bank disturbance; additional sediment yield, transport, and turbidity in the Arkansas River; and water quality degradation from spills or other uncontrolled discharges. Flood conveyance impacts may also occur due to restricted clearance between the river water surface and the bottom of the panel cables until their removal. The likely intensity, extent, and duration of these potential impacts would be similar to those described for the installation phase. Removal efforts would be concentrated during low-flow months after the display period in early August. After mid-August, river flows and water levels generally decrease until the spring runoff.

During removal, display panels would be pulled back across the cabling system and then the cables themselves would be pulled back across the river under tension. A pulling rope would maintain tension during cable removal (OTR 2010 - revised MEC OTR Plan 03-23-10 Rev2), and it is likely that an approach similar to installing the cables would be used to remove them. By employing such an approach, cable contact with the river flow would be avoided. Negligible flow or water quality impacts would generally result from cable removal. If tension connections failed, or if cables, ropes or cords became tangled in the river, impacts to channel bottom structure, sedimentation, and recreation uses would result. Sediment transport or channel changes from any retrieval efforts would be local, minor, and short-term. Minor, short-term limitations on recreational uses would occur locally during cable or rope retrievals during the low flow months. If a section of cable or tensioning rope were left in the river, however, significant impacts to recreational uses would result. Although this would be an unlikely event, an additional mitigation measure (WATER-9 in Chapter 5.0) is recommended because of impacts that would result if materials were left in the river or on the bank.

4.10.3 Alternative 1c

4.10.3.1 Installation

Potential impacts would be the same as described for Alternative 1a.

4.10.3.2 Exhibition

Potential impacts would be the same as described for Alternative 1a, but have somewhat longer duration. Visitation would slightly increase the potential for parking lot runoff within the canyon to contain trash and oil and grease. There would be somewhat greater demand on water supplies and sanitation facilities within the canyon due to the longer viewing period.

4.10.3.3 Demobilization

Potential impacts would be the same as described for Alternative 1a.

4.10.4 Alternative 1d

4.10.4.1 Installation

Potential impacts would be essentially the same as described for Alternative 1a. The potential for some impacts may be reduced if the shorter duration of construction encountered favorable weather and flow conditions. However, if weather and flows were unfavorable, greater impacts may occur since installation efforts would be concentrated in a shorter time frame. Assessing differences in installation impacts between this alternative and others under such circumstances is infeasible.

4.10.4.2 Exhibition

Potential impacts would be the same as described for Alternative 1a. The September viewing period would likely have lower river flows, reducing the potential for restricted clearance from that of alternatives with earlier viewing periods. The average flow at Parkdale in September for the period 1989 (when the cooperative agency flow program began) through 2007 was about 430 cfs (USGS 2010). Mean daily flows in September during that period were rarely over 700 cfs. Low flows would limit the potential for viewing the displays from river rafting. If visitors attempting to raft encountered difficulties on the river or switched to other means of viewing the displays, it may increase the potential for impacts related to other resources (such as traffic safety). If the viewing period under Alternative 1d were to include the Labor Day weekend, then somewhat greater demand on water supplies and sanitation facilities would be expected during those days due to a pulse of visitation. If the viewing period was later than the Labor Day weekend, less demand on those resources would be likely than for other alternatives, since much of the summer tourist season would be over.

Daily water temperatures in September at Parkdale ranged between 80° and 23.4° C. Minimum daily water temperatures varied between 8° to about 19°, and maximum daily water temperatures varied from about 11° to 23.4°C (USGS 2010). More typically, daily water temperatures varied from about 14° to 17.5°C (a range of 3.5°). Potential effects on water temperatures from the display segments under this alternative would be essentially the same as for Alternative 1a. There may be slightly more cooling effect on water temperatures from shading, due to lower flow conditions during the September display period in comparison to the early-August period of Alternative 1a.

4.10.4.3 Demobilization

Potential impacts would be the same as described for Alternative 1a.

4.10.5 Alternative 2

4.10.5.1 Installation

Potential impacts would be similar in nature to those described for Alternatives 1a through 1d. However, the linear extent of installation would be reduced under this alternative, reducing the potential for those impacts to occur. No displays west of Texas Creek would reduce or eliminate the potential for installation activities to occur upstream.

4.10.5.2 Exhibition

Potential impacts would be similar in nature to those described for Alternative 1a through 1d, but would occur over a shorter linear extent. No displays west of Texas Creek would reduce or eliminate the potential for exhibition impacts upstream. The June or July viewing period would encounter higher flow

stages, increasing the potential for restricted clearance between the display and the river water surface. The average daily flow in June for the period 1989 (when the cooperative agency flow management program began) to 2007 was about 1,960 cfs. The maximum recorded mean daily flow in June for that period was 4, 830 cfs. The average and maximum daily flows for July were less.

Daily water temperatures in June at Parkdale ranged between about 8° and 23.4°C for the period 1989 through 2007. Minimum daily water temperatures varied between about 8° to about 19°, and maximum daily water temperatures varied from about 12° to 23.4°C (USGS 2010). More typically, daily water temperatures varied from about 14° to 17°C, a range of about 3°. Potential effects on water temperatures from the display segments under this alternative would be essentially the same as for Alternative 1a, but may be somewhat less due to the higher flows and more turbulent mixing. There may be slightly less cooling effect on water temperatures from shading, due to higher flow conditions in comparison to the early-August period of Alternative 1a.

4.10.5.3 Demobilization

Potential impacts would be similar in nature to those described for Alternative 1a. No displays west of Texas Creek would reduce or eliminate the potential for demobilization impacts upstream. However, the earlier viewing period would offset the demobilization period into earlier summer months. Where the displays are installed, higher flows may increase the potential for demobilization impacts above that of other alternatives.

4.10.6 Alternative 3

4.10.6.1 Installation

Potential impacts would be similar in nature to those described for Alternative 1a and other alternatives. However, the linear extent of installation would be reduced under this alternative, reducing the potential for those impacts to occur.

4.10.6.2 Exhibition

Potential impacts would be similar in nature to those described for other alternatives.

4.10.6.3 Demobilization

Potential impacts would be similar in nature to those described for Alternative 1a, but would be reduced due to the shorter length of the project.

4.10.7 Alternative 4

4.10.7.1 Installation

Potential impacts would be similar in nature to those described for other alternatives. However, the linear extent of installation would be greatly reduced under Alternative 4, and would substantially reduce the potential for those impacts to occur. It is assumed that the shorter extent of installation would enable even more attention to safety and environmental controls. In addition, eliminating the Parkdale visitation facility would remove the need to upgrade the bridge there, and would remove the potential for construction runoff to degrade water quality in the adjacent river at that location.

4.10.7.2 Exhibition

Potential impacts would be similar in nature to those described for other alternatives. If restricted clearance occurs from high river stages, the much shorter linear extent of the display would reduce the extent of impacts in comparison to other alternatives. Potential impacts to water quality from parking lot runoff at Parkdale would not occur.

4.10.7.3 Demobilization

Potential impacts would be similar in nature to those described for other alternatives, but the potential for them to occur would be reduced by the shorter length of the project.

4.11 SOIL RESOURCES

The following impact analysis focuses on soil resources that may be affected by installation, exhibition, and demobilization of the proposed project. This section includes an overview of scoping issues identified for soil resources and a discussion of impact assessment methodologies. Additional mitigation measures are presented in Chapter 5.0.

Impact assessments were based on a range of soil characteristics such as soil texture, soil cover, slope, and existing soil quality parameters. This information was based on SSURGO database reviews and analyses (NRCS 2009) and field observations in October of 2009.

Assumptions

- Impact analysis is based on the assumption that the following design criteria proposed for soil resources would be adopted and implemented successfully.
- All excavated materials and drill cuttings would be containerized and stored for future use in restoration.
- A concrete washout area would be needed at the Texas Creek CSA.

Soil Resource Design Criteria

- Disturbed soils and work areas would be covered during off-work periods.
- The following BMPs would be utilized at all staging, information, and parking areas to control stormwater runoff, provide sediment control, and aid in soil stabilization. This list is not all inclusive; additional BMPs would be applied as necessary.
    - Harden soil surfaces at high use areas
    - Install sediment fence downgradient from loose or exposed soils
    - Install temporary drainage diversion features
    - Install flow dissipation devices on lead out ditches (riprap/vegetative)
    - Cover exposed piles of soil or construction materials with plastic sheeting to prevent contact with rainwater

- Where the soil surface would be hardened, the use of road fabric is recommended. Road fabric is a permeable woven geotextile that allows water on the surface to flow through the gravel to the soil beneath, but is strong enough to reduce rutting and restrict subgrade soil particles from working up into the gravel surface. This dramatically reduces the amount of gravel necessary to keep the trafficked area in service.
- The following criteria would apply for restoration of all heavily impacted areas such as parking and CSAs, unless otherwise agreed to by the land management agency or landowner:
    - Remove gravel and geotextile fabric from soil surface (if applied) and dispose of properly
    - Decompact compacted areas by cross ripping large areas or subsoiling to the depth of compaction
    - Recontour to the original land contours
    - Seed with native seed mix
    - Mulch with certified weed free straw
    - Install sufficient traffic barriers to prevent trespass and allow for recovery
- Equipment would only be operated when soils are dry (below the plastic limit to a depth of 6 to 8 inches or more) or frozen. If rutting over 2 inches in depth occurs, soil is too wet to operate and detrimental soil mixing, compaction, and a reduction in soil productivity may occur.

Scoping Issues

Issues related to soil resources, as identified during the scoping process, include the following:

- Soil compaction associated with pedestrian and vehicle traffic
- Erosion and sedimentation into the Arkansas River associated with construction, exhibition, and restoration
- Ineffective restoration of impacted sites

4.11.1 No Action Alternative

Under the No Action Alternative, the proposed project would not be installed or displayed on federal lands. As stated in Chapter 2.0, it is assumed that without the use of BLM lands in the corridor, OTR would not proceed on other nonfederal lands. Therefore, no project-related disturbance would occur to soils. Impacts would continue at present levels as a result of natural conditions and existing recreation and development in the Project Area. Natural and anthropogenic actions, such as erosion, agriculture, fire, and urbanization, would continue to impact soil resources.

4.11.2 Alternative 1a

4.11.2.1 Installation

Under the Artists' Proposed Action, approximately 85.0 acres of soils would be impacted to varying degrees as a result of installation of the proposed project. Panels would be installed over 5.9 miles of the Arkansas River. Under Alternative 1a, approximately 9,000 anchor locations would be drilled. Installation

of anchors would require travel across the ground surface by foot and/or rubber tired or tracked mechanical equipment and support vehicles at approximately 45% of the anchor locations upstream of Vallie Bridge display Section 3. Off-road drilling would also occur at part of the Maytag display segment, and off-road access trails would be employed at portions of the proposed Three Rocks, Spike Buck, and Parkdale displays (J.F. Sato 2007). Impacts such as soil compaction from equipment and foot traffic, soil mixing from excavation and handling, and spills of fuels and lubricants may alter the capability of these soils temporarily following construction. In addition, the surface disturbance caused by off-road traffic would increase the potential for erosion and sedimentation during installation and removal. Impacts would be especially likely during the wetter periods of February through May, when precipitation and saturated soil conditions are more common. Implementation of the recommended mitigation measures (Chapter 5.0) would reduce the potential erosion and sedimentation impacts to low intensity.

Drilling, for each anchor site, would require excavation of approximately 1.77 cubic feet of soil. Drilling would occur on fill materials described in Section 3.11, as well as native soils, rock fill, and rock outcrop. The mixing of topsoil and subsoil would alter the soil productivity, except in areas with deep topsoil or on fill materials that have been previously altered. There is also potential for contaminated soils along the UPRR corridor to be unearthed or disturbed. The unearthed, loose soils would then be subject to wind and water erosive forces, potentially making them airborne or leading to erosion and sedimentation into the Arkansas River. Implementation of mitigation measure SOIL-2 (Chapter 5.0) would help to minimize erosion and sedimentation to the Arkansas River.

The most notable impacts to soils during installation would occur in association with the construction of the CSA and information areas. Each CSA and information area would be constructed on native soil materials, with the exception of the Vallie Bridge Limited Rest Stop. The Vallie Bridge Limited Rest Stop is located on a graveled site where the existing use is a parking/day use area. No additional modifications would be required at this site. However, grading, leveling, and graveling would be required to construct the remaining facilities. During construction, the soil profiles would be mixed with a corresponding loss of soil structure. Soils would be compacted as a result of the construction of CSA/information areas with compaction maintained, at least in part, by continued vehicle and foot traffic. The potential for erosion would increase through the loss of vegetation cover and soil structure as compared to an undisturbed state. Soil productivity would decrease, in like manner, primarily as a result of profile mixing and compaction along with the loss in vegetative cover. A decrease in soil productivity would also occur in association with soil salvage and stockpiling activities as microbial action is curtailed, at least to some degree, in the constructed long-term stockpiles (approximately 2 years for construction). These impacts would begin immediately as the soils are subjected to grading and construction activities, and continue until the site is successfully reclaimed. Any spills of fuels, lubricants, solvents, grout, and wastewater stored on site could lead to soil contamination and a long-term decrease in soil productivity.

A portion of the proposed Texas Creek CSA is currently located on an alluvial fan at the mouth of drainage. This site is occasionally flooded. Impacts may include accelerated erosion and sedimentation to Texas Creek Gulch and the Arkansas River due to flooding or precipitation. Other impacts anticipated to occur at these sites include soil rutting and mixing, compaction, and a short-term loss of soil productivity.

A concrete washout pit would be constructed at the Texas Creek CSA. The effects would be similar to what is described above for the CSA/information areas. Soil contamination could result at this site unless the pit is lined. Implementation of mitigation measure SOIL-1 (Chapter 5.0) would help to minimize soil contamination at this location.

Approximately 90,000 visitors are estimated to visit the site during the installation period. The highest numbers are anticipated during the last stage of installation. Traffic management during the installation phase would consist of normal construction activity traffic management techniques and equipment. Vehicle pullouts would likely see large volumes of visitor use. River access would mostly occur on existing foot trails; however, new foot trails may be created due to the volume of visitors. This would result in decreased soil cover, short-term increases in compaction, erosion, and sedimentation to the Arkansas River, as well as increase the potential for trash and soil contamination due to vehicle related pollutants along the river corridor.

4.11.2.2 Exhibition

It is anticipated that visitors would view the art by automobile from the highway or by watercraft from the river. Direct pedestrian access to the exhibit would be limited to the Parkdale Visitor Center; however, pedestrians would not be prohibited from walking to panel locations elsewhere. All pullouts along the US 50 corridor within 0.5 mile of any panel would be closed. The closures would be enforced by project personnel and law enforcement. Bicyclists would only be permitted in the corridor Monday through Thursday. It is anticipated that although some pullout closures would occur, those that remain open would be utilized by visitors. Impacts similar to those described above for vehicle pullouts are anticipated.

Impacts associated with exhibition would primarily be related to increased visitor traffic along the Arkansas River and associated visitor facilities and information centers. The Fremont, Parkdale, and Texas Creek visitor facilities would be constructed on native soil materials. Impacts would be similar to those described for the Texas Creek CSA during construction. In general, impacts anticipated to occur at these sites include soil rutting and mixing, compaction, accelerated erosion, and a short-term loss of soil productivity due to vehicle traffic.

The Vallie Bridge Limited Rest Stop is located on a site where the existing use is a parking/day use area. The site is currently compacted, graveled, and not vegetated. Impacts at this site are not anticipated to change drastically from the current use of the site.

Soil disturbance could result in the event that a failure occurs with the art. Impacts such as soil erosion or mass movement of the soils would occur if an anchor failed or a cable broke loose. These types of impacts would be localized, and impacts would be minor to moderate depending on the severity of the failure.

4.11.2.3 Demobilization

Demobilization would occur immediately after the 2-week viewing period. Restoration of disturbed soils would include removing anchors 12 inches below the soil surface and completely removing anchors from bedrock. The materials that were excavated and stored during installation would be returned to the corresponding surface anchor site. After the surface anchor is removed, the soil would be used to restore the ground surface to original contours and tamped to stabilize the site. The mixing of subsoil and topsoil would temporarily reduce soil productivity at discrete localized locations. In locations with fill materials, soils have been previously mixed and effects to soil productivity due to soil mixing are anticipated to be minor or negligible.

The warehouse/office building at Texas Creek would be a temporary structure and result in the removal of soil resources at the structure location.

Soil design criteria would minimize soil resources impacts when implemented. At the visitor information sites and information centers, soil would be decompacted by cross ripping or subsoiling to the depth of compaction, and the area would be re-contoured to the original contours. The site would be seeded and mulched to restore the site back to the original use, unless otherwise agreed to by the landowner or land management agency.

4.11.3 Alternative 1c

4.11.3.1 Installation

Although Alternative 1c would use an accelerated construction schedule of 1 year instead of 2 years, impacts are anticipated to be similar to Alternative 1a.

Alternative 1c may use a CSA and visitor information area site east of Cañon City off of US 50 or the Fremont Road Information Center. Impacts at either facility would be similar to those described in Alternative 1a for Texas Creek.

4.11.3.2 Exhibition

Alternative 1c would offer a transit system to relieve some of the traffic congestion. Impacts to soil resources would be similar to Alternative 1a. Alternative 1c may use a CSA and visitor information area site east of Cañon City off of US 50 or the Fremont Road Information Center. Impacts at either facility would be similar to those described above for other CSA and information areas in Alternative 1a. The transit system may lead to reduced use of highway pullouts and visitor foot traffic along the river.

4.11.3.3 Demobilization

Impacts would be the similar to Alternative 1a. Alternative 1c may use a CSA and visitor information area site east of Cañon City off of US 50 or the Fremont Road Information Center. Impacts at either facility would be similar to those described above for other CSA and information areas in Alternative 1a.

4.11.4 Alternative 1d

4.11.4.1 Installation

Impacts would be the same as Alternative 1a.

4.11.4.2 Exhibition

Impacts would be similar to Alternative 1a, except the viewing season would be in September. The AHRA sites would also be closed during the exhibition period. Although pullouts would be closed within 0.5 mile from panel sites, the number of visitors that would use the other pullouts along the highway would potentially increase. Impacts would include additional visitor foot traffic along the river, which would denude vegetative soil cover and lead to an increase in compaction, runoff, and erosion.

4.11.4.3 Demobilization

Impacts would be the same as Alternative 1a.

4.11.5 Alternative 2

4.11.5.1 Installation

Alternative 2 would include only the Artists' proposed panels located east of Texas Creek, a total of approximately 4.8 miles of panels at 5 sites in the project corridor. Impacts would be similar to Alternative 1a, except spatially the magnitude of impacts would be less.

4.11.5.2 Exhibition

Impacts would be similar to Alternative 1a, except spatially the magnitude of impacts would be less.

4.11.5.3 Demobilization

Impacts would be similar to Alternative 1a, except spatially the magnitude of impacts would be less.

4.11.6 Alternative 3

4.11.6.1 Installation

Alternative 3 would include a total of 4.1 miles of panels, which differ from the Artists' proposed locations, at 8 sites in the project corridor. Impacts would be similar to Alternative 1a, except spatially the magnitude of impacts would be less.

4.11.6.2 Exhibition

Visitation may be slightly less than Alternative 1a. Impacts would be similar to Alternative 1a, except spatially the magnitude of impacts would be less.

4.11.6.3 Demobilization

Impacts would be similar to Alternative 1a, except spatially the magnitude of impacts would be less.

4.11.7 Alternative 4

4.11.7.1 Installation

The Alternative 4 panel configuration varies substantially from the Alternative 1a. Alternative 4 would include a total of 1.4 miles of panels at 4 sites in the project corridor. The Parkdale Viewing Center would not be constructed, which would result in less surface disturbance to soils. In general, impacts would be similar to Alternative 1a, except the duration and magnitude of impacts would be less.

4.11.7.2 Exhibition

Visitation is anticipated to be slightly less than Alternative 1a. Impacts would be similar to Alternative 1a, except spatially the magnitude of impacts would be less.

4.11.7.3 Demobilization

Impacts would be similar to Alternative 1a, except the duration and magnitude of impacts would be less.

4.12 GEOLOGIC SUBSTRATE AND TERRAIN

Geologic Substrate and Terrain

The geologic substrate is defined for purposes of these evaluations as bedrock and overlying unconsolidated (loose) surficial geologic units (including alluvium, colluvium, talus, etc.), including any mineral resources that may be present (sand and gravel for aggregate, industrial and gem minerals, oil and gas, etc.). Terrain is defined as the landforms developed on the geologic substrate, ranging from essentially flat valley bottoms to sloping hillsides and riverbanks to nearly vertical cliffs. Evaluation of environmental consequences related to soils developed on the geologic substrate and thus mantling the terrain is presented in this section.

4.12.1 No Action Alternative

The absence of installation and removal of OTR project components would have no impact on the geologic substrate (including mineral resources) or terrain of the Project Area. Natural geologic processes, including rockfalls and debris flows, would occur in response to the existing geologic and ongoing biologic conditions (root growth), weather events, and climatic changes. CDOT and/or the UPRR may or may not implement future remedial or mitigation measures related to rockfalls and/or debris flows in the Project Area.

4.12.2 Alternative 1a

4.12.2.1 Installation

The evaluation of environmental consequences related to the geologic substrate and terrain assumes that the site access, anchor drilling and grouting, and near-surface anchor removal would be as described in Chapter 2.0. In particular, no grading (excavation or filling) of the existing terrain would occur during installation with the exception of very minor shaping and surfacing of staging and parking areas.

a. Access to and Work at ATF Sites

Access to and installation work at the proposed ATF sites, and more specifically the individual anchor locations at each ATF site, would be accomplished by means and methods that would not result in short- or long-term significant impacts to the existing natural or already modified (e.g., railroad fill) terrain or geologic structures (e.g., rock outcrops or riverbanks).

Minor grading and surfacing with gravel/aggregate (aggregate is sand and gravel soil) at staging, parking and viewing areas and at the Fremont Road Information Center and Salida Information Center are regarded as not significant impacts to the geologic substrate due to the very shallow excavations and fills necessary (less than a few feet) given the nearly flat terrain at these sites.

b. Anchor Hole Drilling and Grouting

Drilling anchor holes in overburden or rock would result in vibration of the ground immediately around the hole. However, the level of vibration or ground shaking would be very minor and would not be felt at the surface within even a few feet to at most a few tens of feet away from the hole, if at all. The vibrations would also dissipate very rapidly in the ground beneath the bottom of the hole. Given the small diameter (on the order of 1.75 to 4.0 inches nominal) and shallow depth (a few tens of feet) of the proposed anchor

holes, the anticipated level of vibration or ground shaking would not be nearly strong enough to fracture the surrounding rock, trigger earthquakes, or to cause changes in the properties of water-bearing geologic units (i.e., aquifers) that would impact the yield of water from existing even nearby wells. Impacts such as these can be associated with much larger scale drilling involving major extraction of water or oil and gas, and/or injection of fluids for enhanced oil and gas production (e.g., water-flooding). However, these types of drilling are very different and of much larger scale than the shallow anchor drilling proposed for this project. Blasting is not proposed for anchor installation so that no associated impacts would occur.

Pressure grouting of anchor holes drilled in overburden or highly fractured rock would result in some grout penetrating the ground around the hole. However, given the nature of the overburden materials and fractured rock anticipated at the anchor hole sites and the relatively low grouting pressures proposed (a maximum of 300 psi, but typically much lower pressures), the grout penetration would be in the order of inches to at most a few feet or locally possibly a few tens of feet. Thus, no impacts to alluvial or bedrock aquifers or even nearby water wells would be expected from pressure grouting.

Drilling and/or grouting of anchor holes on steep slopes in highly fractured rock or coarse (boulder) overburden that are already unstable (active) or barely stable (i.e., imminently unstable or metastable), especially using the percussion (hammering) method of drilling, could conceivably result in triggering a local rockfall. However, the potential for such a condition should be recognized as part of the geotechnical assessment to be made during the detailed site inventory that would be conducted at every drilling location at each ATF site prior to any work at the site.

c. Rockfall/Debris Flow Hazard

Potential Impacts to Workers. Workers travelling to and from work sites and installing the anchors at the ATF sites and the cables and panels would be subject to some level of hazard from rockfall or debris flow activity at some of the locations of the work.

Rockfalls can occur at any location where the bedrock on a slope or cliff is broken by fractures, joints, faults, or bedding planes (referred to generally as discontinuities) that are oriented such that a piece or pieces of the rock can be dislodged from the slope/cliff by one or more means, including but not limited to:

- Root growth or prying (when wind bends the tree or shrub above ground);
- Vibration (naturally occurring such as during an earthquake, or man-induced such as by running heavy construction equipment or blasting); and
- Water or ice pressure (when water or ice accumulates in a discontinuity and the water's weight or the expansive pressure of ice forming pushes on the surface of the discontinuity).

The potential hazards posed by rockfalls include direct impact of a worker or vehicle by a moving (falling, bouncing, or rolling) rock and driving into or losing control by trying to avoid a moving or stationary rock when travelling in a vehicle.

Areas that have been identified by CDOT as known and potential rockfall sites/reaches along US 50 that are adjacent to panel reaches and information centers, staging areas, and viewing/parking areas are summarized on Table 4-12. The risk (probability) of a rockfall occurring at the sites/reaches shown on Table 4-13 and causing injury to or the death of a worker would be difficult if not impractical to calculate, but would likely be low in comparison to common voluntary risks accepted in society such as routine travel

by car or air, and of similar order of magnitude as other involuntary risks such as fire, drowning, and lightning strike (Bunce 1994). Although determined to be low overall, the risk of a rockfall/worker interaction would be greater at these sites/reaches than at other locations along US 50, based on the studies performed by CDOT where the work sites are on the same side of the river and adjacent to the highway (Ortiz 2009, FHWA 1993). Where the highway (and guardrail if present) is located between the slope presenting the rockfall hazard and the site of the work, the highway (and guardrail) may tend to reduce the potential for some rockfalls to reach the site of the work by acting as a catchment (or barricade). The relative degree of hazard from rockfall on the opposite side of the river at these and other locations in the Project Area has not been studied but would be expected to be similar to the CDOT-identified sites/reaches if relevant conditions were otherwise similar (e.g., slope inclination, rock type).

Table 4-12. Rockfall Hazard Areas

Beginning Mile Marker	Ending Mile Marker	Adjacent OTR Project Component	CDOT Rockfall Hazard Score[1]	CDOT Rockfall Hazard Rank[2]
225.35	225.47	County Line - westernmost panel array	234	520
229.99	230.04	Tunnel – westernmost panel array	231	531
230.14	230.22	Tunnel – central panel array	294	382
230.23	230.30	Tunnel – central panel array	294	382
237.62	237.74	Vallie Bridge – two western panel arrays	516	27
237.82	237.92	Vallie Bridge – two eastern panel arrays	318	316
237.93	238.00	Vallie Bridge – easternmost panel array	243	494
253.34	253.40	Texas Creek – westernmost panel array	252	471
253.74	253.78	Texas Creek – central panel arrays	297	375
253.80	253.90	Texas Creek – central panel arrays	228	534
253.90	254.04	Texas Creek – central panel arrays	240	504
253.90	253.92	Texas Creek – central panel arrays	147	672
253.92	253.90	Texas Creek – central panel arrays	335	284
254.08	254.12	Texas Creek – easternmost panel array	156	654
259.10	259.15	Three Rocks – easternmost panel array	510	34
263.60	264.00	Parkdale West – easternmost panel array; Parkdale Central – western two arrays	408	136
264.27	264.35	Parkdale Central – west-central panel arrays	222	549
264.35	264.44	Parkdale Central – west-central panel arrays	435	99
265.68	265.84	Parkdale East – east-central panel arrays and west end of Viewing Center	213	574

[1] A higher score indicates a higher hazard rockfall as compared to other rockfalls in the inventory.

[2] A lower ranking indicates a higher hazard rockfall as compared to the total of 756 chronic rockfall sites in the statewide inventory.

Debris flows can occur where surficial material (e.g., soil, alluvium, colluvium, talus) becomes saturated typically by rainfall or snowmelt (and sometimes by discharging groundwater seepage) and moves downslope, usually in a channel or swale in the terrain. Debris flows can move slowly or rapidly and can be composed of a wide range of material sizes from silt and clay to large boulders. It is not uncommon for trees and brush to be incorporated and transported in the flow. The hazards posed by debris flows include direct impact or burial of a worker or vehicle by a moving debris flow and driving into or losing control by trying to avoid a moving or stationary debris flow, when travelling in a vehicle.

Specific locations of previous debris flows have not been systematically studied in the Project Area and no hazard rating system has been developed as for rockfalls. As previously reported in Chapter 3.0, Rogers

(2005) noted that *"U.S. Hwy 50, CO Hwy 69 and county roads of this corridor have been flooded periodically with rock, mud, woody debris and floodwater from tributary streams, requiring frequent cleanup and roadway repairs after the larger events."* The location of tributary and ephemeral streams identified in the project GIS by approximate US 50 mile marker that may be potential locations for future debris flows crossing panel work sites, information centers, staging areas, and viewing/parking areas are listed on Table 4-15. It is important to understand that site-specific studies of these locations have not been made to assess the risk of future debris flows in these locations, and that other locations may be susceptible to this hazard.

Table 4-13. Potential Debris Flow Areas at Tributary/Ephemeral Streams

Approximate US 50 Mile Marker	OTR Project Component Traversed
237.8	Vallie Bridge – east-central panel array
237.9	Vallie Bridge – east-central panel array
237.9	Vallie Bridge – easternmost panel array
252.5	Texas Creek –west staging area
253.3	Texas Creek – east end of east viewing/staging area
258.7	Three Rocks – west-central panel array
258.8	Three Rocks – west panel arrays
260.8	Spike Buck West – easternmost panel array
262.3	Spike Buck East – west-central panel array
262.4	Spike Buck East – east-central panel array
263.2	Parkdale West – western panel array
263.7	Parkdale West – eastern panel array
264.0	Parkdale Central – western panel array
264.2	Parkdale Central – western panel array
264.3	Parkdale Central – west-central panel array

The overall level of risk to workers from rockfalls and debris flows would be generally lower than that experienced by CDOT and railroad maintenance crews working along the reach of US 50 and the UPRR track within the project boundaries. This is due to the shorter overall exposure period for the OTR workers and the location of the OTR work being further from the slopes from which rockfalls and debris flows are generated. Although the risk of being injured or killed by rockfall or debris flow would be very small overall, this risk would be further minimized by strict adherence to proper safety procedures including: pre-work site stability assessment; avoidance of areas of significant imminent or active instability; selective scaling of especially loose or precarious rock s or debris in otherwise stable work areas; heightened vigilance during and following precipitation events (moderate to heavy rainfall or rapid snowmelt); among others.

Potential Impacts to the Project Components. The risk (probability) of rockfalls and debris flows to strike or inundate project components including anchors, ATFs, cables and panels would be low, generally similar to that described above for workers during the installation period. As for workers, the risk (while low) would be higher in areas of previously identified rockfall hazard and at tributary and ephemeral stream crossings. However, even in the unlikely event of a direct rock impact or debris flow inundation of a project feature, significant damage or failure may not occur. Should a large enough rock strike or debris flow pressure occur to break an ATF, cable or panel, the impacts would be minor.

d. Mineral Resources Impacts

Direct and indirect impacts to active placer[1] (and possibly lode[2]) mining operations may occur at some or all of the panel sections during the installation period. Direct impacts would involve disturbance (including dispersal or covering in the immediate area of the work) and possibly removal of mineral-bearing overburden from placer deposits or ore from a lode deposit on a claim. Indirect impacts could include interference with access to actively mined claims and/or the mining operations themselves, and noise from drilling operations within hearing distance of claimants working their placer deposits. The direct disturbance/removal impacts would be significant if mineral-bearing (most likely gold in this instance) overburden or rock were encountered at the specific location of an anchor hole or grading for a parking or staging area. The overall scale of the impact may be small in terms of volume but would be significant to the claimant if high-value placer or lode gold (or other associated minerals of value) happened to be encountered. Although not quantifiable, the probability of any individual anchor hole or local area of grading encountering high-value ore in significant quantity is judged as low. However, the impact to the claimant in the event that even a small volume of gold (or other high value mineral) is lost would be significant given the value of these minerals both in economic and less tangible terms (e.g., the satisfaction of finding a precious and rare material like gold). Interference with access to a claim or to active mining operations is possible depending on the specific conditions (site terrain, existing access width, availability of alternate access routes, etc.), but would be of short duration given the nature of the work at any given anchor location or parking/staging area. Overall, impacts to access on mining claims are judged minor if proper coordination with affected claimants takes place prior to access as required per the mitigation measures in Chapter 5.0. Noise impacts could be significant if the location of the drilling or grading operations is very close to active mining activity, but would be of short duration and are judged minor overall again with proper coordination with affected claimants.

Impacts to other mineral resources are not anticipated due to the absence of existing hard rock or fluid minerals extraction operations at the work sites, the short duration of installation activities, and the small ground disturbance planned.

4.12.2.2 Exhibition

No direct or indirect impacts to the geologic substrate (except possibly mineral resources) or terrain would occur during the exhibition period. Proper coordination with mining claimants and mineral materials contract holders, as defined in the mitigation measures in Chapter 5.0, would avoid potential significant impacts to access and haulage to and from these properties that might result associated with traffic and access controls during the exhibition period.

The potential impacts to visitors and exhibition staff from rockfalls or debris flows during the exhibition period would be similar in nature to the potential impacts to workers described above during the installation period. No actions associated with the installation of the OTR project components or exhibition during the OTR event would cause a higher incidence of rockfalls or debris flows. However, the potential for such a natural event impacting the public or event staff would be somewhat greater because there would be more people passing through and possibly stopping at locations of existing rockfall and/or

[1] Placer mining is defined herein as extraction of typically heavy minerals (including but not limited to gold) that have concentrated in overburden (e.g., alluvium or colluvium) by natural mechanical means including deposition in flowing water.

[2] Lode mining is defined herein as extraction of minerals from intact rock (i.e., bedrock) including from veins filling fissures in the rock or from mineralized rock formed by replacement or alternation of host rock by geochemical processes.

debris flow risk. Although greater due solely to the temporarily higher volume of traffic and stops, the probability of a visitor or staff person being injured or killed by a rockfall or debris flow would still be very small.

4.12.2.3 Demobilization

a. Access to and Work at ATF Sites

Access to and removal work at the proposed ATF and associated cable, anchor locations, and panel sites would be accomplished by methods that would not result in short- or long-term impacts to the existing natural or already modified (e.g., railroad fill) terrain or geologic structures (e.g., rock outcrops or riverbanks).

b. Anchor Removal and Anchor Hole Restoration

Properly implemented patching of rock from which the anchor would be completely removed (or patching the upper 12 inches of rock where the anchor was collared in a block of rock or boulder) using a nonshrink mortar including rock cuttings saved from each individual anchor location would only be noticeable by careful observation from very near the anchor location. Over time natural weathering processes would further blend the patched area into the surrounding rock color and texture. If proper patching procedures were not followed, there would be a potential for seasonal freeze-thaw activity during which snowmelt water seeps into the contact area between the grout and the in-place rock or boulder (the thaw part of the cycle), followed by freezing of the intruded water during a subsequent cold spell (the freeze part of the cycle). Repeated episodes of freeze-thaw over time (likely in the long-term) could eventually result in "jacking" the grout plug out of the ground. If this occurred, the grout plug and open top of the anchor hole would be visible from nearby (up to a few tens of feet if sight line is unobstructed). Proper patching should include thoroughly preparing the rock pocket to be grouted including removal of loose rock fragments or other debris to result in a clean, intact rock surface to promote proper, long-term bonding of the grout to the natural rock.

In the event that an anchor hole requiring patching during the restoration period is located on a mining claim, there is a possibility of an impact of direct loss to the claimant if the cuttings removed from the anchor hole contain minerals of value (especially gold) that would be bound with grout and thus prevented from recovery. This potential impact would be avoided by proper coordination with the claimant prior to and during the anchor installation period as defined in the mitigation measures in Chapter 5.0.

Removal of the upper 12 inches of anchor rod in anchor holes in overburden materials and filling the resulting hole as proposed by the Applicant would not cause any major short-term impact for anchor holes that are not located in pre-existing unstable or metastable ground (e.g., imminent or active rockfall or debris flow areas). As discussed above under Installation, anchors should not be sited in areas of imminent or active rockfall or debris flow. The portions of anchors to remain below 12 inches in currently stable overburden areas (i.e., areas outside of imminent or active rockfall, debris flow or other slope instability, and above the 100-year floodplain and thus not subject to significant potential riverbank erosion) would be subject to the possibility of being exposed over the very long-term (up to hundreds to thousands of years) by natural slope processes of erosion. However, this possibility would not be considered a major impact given the uncertainty that such erosion would occur at the anchor site and the very long time that would likely pass before such erosion would advance sufficiently to expose the remaining portion of an anchor.

c. Rockfall/Debris Flow Hazard

Potential Impacts to Workers. Workers travelling to and from work sites and removing the anchors at the ATF sites and the cables and panels would be subject to some level of hazard from rockfall or debris flow activity at some of the locations of the work. The potential hazards and risks during removal would be similar but somewhat less than those described previously during installation due to a shorter exposure period.

Potential Impacts to the Project Components. The risk (probability) of rockfalls and debris flows to strike or inundate project components including anchors, ATFs, cables and panels during the demobilization period would be generally similar to that described above during the installation period but would diminish to zero upon completion of removal of the project components.

d. Mineral Resources Impacts

Impacts to mineral resources during the demobilization period would be generally similar to those described for the installation period, except that removal or covering of mineral-bearing soil or rock would not be anticipated.

4.12.3 Alternative 1c

4.12.3.1 Installation

The environmental consequences related to the geologic substrate and terrain, during the installation period for Alternative 1c, would be the same as for Alternative 1a, except that the period of exposure of workers and project components to rockfall and debris flow hazards would be only half as long (work occurring over a one year rather than 2-year period) so that the resulting cumulative risk of impacts would be on the order of half as much all other factors being equal.

4.12.3.2 Exhibition

The environmental consequences related to the geologic substrate and terrain, during the exhibition period for Alternative 1c, would be the same as for Alternative 1a except that the cumulative risk of rockfall/debris flow impacts to the public would be marginally higher due to the extended viewing window (3 to 4 weeks versus 2 weeks).

4.12.3.3 Demobilization

The environmental consequences related to the geologic substrate and terrain, during the demobilization period for Alternative 1c, would be the same as for Alternative 1a.

4.12.4 Alternative 1d

4.12.4.1 Installation

The environmental consequences related to the geologic substrate and terrain during the installation period for Alternative 1d would be the same as for Alternative 1a.

4.12.4.2 Exhibition

The environmental consequences related to the geologic substrate and terrain, during the exhibition period for Alternative 1d would be the same as for Alternative 1a.

4.12.4.3 Demobilization

The environmental consequences related to the geologic substrate and terrain during the demobilization period for Alternative 1d would be the same as for Alternative 1a.

4.12.5 Alternative 2

4.12.5.1 Installation

The environmental consequences related to the geologic substrate and terrain during the installation period for Alternative 2 would be the same as for Alternative 1a, except that the cumulative risk of rockfall/debris flow hazard would be likely somewhat lower due to the shorter cumulative reach of the work and the fewer work sites.

4.12.5.2 Exhibition

The environmental consequences related to the geologic substrate and terrain during the exhibition period for Alternative 2 would be the same as for Alternative 1a, except that rockfall/debris flow hazard could be marginally greater during the earlier viewing window (especially during June when late snowmelt and higher runoff flows may still be occurring).

4.12.5.3 Demobilization

The environmental consequences related to the geologic substrate and terrain during the demobilization period for Alternative 2 would be the same as for Alternative 1a, except that the cumulative risk of rockfall/debris flow hazard would be likely somewhat lower due to the shorter cumulative reach of the work and the fewer work sites.

4.12.6 Alternative 3

4.12.6.1 Installation

The environmental consequences related to the geologic substrate and terrain during the installation period for Alternative 3 would be the same as for Alternative 1a, except that the cumulative risk of rockfall/debris flow hazard would be likely somewhat lower due to the shorter cumulative reach of the work.

4.12.6.2 Exhibition

The environmental consequences related to the geologic substrate and terrain during the exhibition period for Alternative 3 would be the same as for Alternative 1a.

4.12.6.3 Demobilization

The environmental consequences related to the geologic substrate and terrain during the demobilization period for Alternative 3 would be the same as for Alternative 1a, except that the cumulative risk of rockfall/debris flow hazard would be likely somewhat lower due to the shorter cumulative reach of the work and the fewer work sites.

4.12.7 Alternative 4

4.12.7.1 Installation

The environmental consequences related to the geologic substrate and terrain during the installation period for Alternative 4 would be the same as for Alternative 1a, except that the cumulative risk of rockfall/debris flow hazard would be very likely lower due to the shorter cumulative reach of the work and the fewer work sites, and because the period of exposure of workers and project components to rockfall and debris flow hazards would be only half as long (work occurring over a one year rather than two year period).

4.12.7.2 Exhibition

The environmental consequences related to the geologic substrate and terrain, during the exhibition period for Alternative 4, would be the same as for Alternative 1a.

4.12.7.3 Demobilization

The environmental consequences related to the geologic substrate and terrain during, the demobilization period for Alternative 4, would be the same as for Alternative 1a, except that the cumulative risk of rockfall/debris flow hazard would be very likely lower due to the shorter cumulative reach of the work and the fewer work sites.

4.13 ENVIRONMENTAL JUSTICE / PROTECTION OF CHILDREN

Environmental Justice and Protection of Children

Identification of Issues

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, states that "To the greatest extent practicable and permitted by law… each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of it programs, policies, and activities on minority populations and low-income populations…".[3]

The environmental justice impact analysis addresses the potential effects to these populations within the PAA and SAA, respectively, as a result of OTR activities.[4] To determine if these potential effects are likely to occur, the project team considered the following OTR activities: specific locations of construction activity; locations of lane closures or detours; and specific hiring practices for recruiting construction or exhibition period workers.

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, states that "to the extent permitted by law and appropriate, and consistent with the agency's mission, each Federal Agency: (a) shall make it a high priority to identify and assess environmental health risks and safety

[3] President William Clinton, February 11, 1994.

[4] The primary and secondary socioeconomic Analysis Areas (PAA and SAA) are defined in Chapter 3.0. The PAA encompasses Chaffee and Fremont counties, including Salida and Cañon City. The SAA encompasses El Paso and Pueblo counties, including Colorado Springs and Pueblo.

risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."[5]

The Protection of Children impact analysis addresses the potential impacts to children within the PAA and SAA as a result of OTR activities. To determine if these potential effects are likely to occur, the project team considered the following OTR activities: changes in air quality, water quality, noise levels, increased traffic or accessibility to hazardous materials or other waste products.

Data Sources and Methodology

Data utilized for the environmental justice impact analysis includes Census information on minority and low-income populations within the PAA and SAA, as described in Chapter 3.0; information on construction activities from OTR engineers and project managers; and results from transportation and traffic analyses. The locations and timing of construction activities and traffic management activities were studied to determine disproportionate impacts to any specific population. The hiring protocols for construction workers and exhibition period staff were also considered in determining environmental justice impacts.

Data utilized to assess the environmental health or safety risks to children includes Census information on the percent of the population under 18 years of age and number of children less than 18 years of age within the PAA and SAA, as described in Chapter 3.0; and other resource impact analyses, including air quality, water resources, hazardous materials, sound resources and noise, nonhazardous waste and transportation.

Impacts during the installation and demobilization periods were grouped together due to the similarities of types of activities and visitation levels during these periods.

4.13.1 No Action Alternative

No new work of art would be constructed along US 50 under the No Action Alternative. Visitation to the PAA and SAA would be unchanged under the No Action Alternative.

a. Environmental Justice

The existence and conditions of minority and low-income populations within the PAA and SAA would be the same as described in Chapter 3.0. There would be no effect to these populations as a result of the No Action Alternative.

b. Protection of Children

The existence and conditions of children under the age of 18 within the PAA and SAA would be the same as described in Chapter 3.0. There would be no effect to this population as a result of the No Action Alternative.

[5] President William Clinton, April 21, 1997.

4.13.2 Alternative 1a

4.13.2.1 Installation and Demobilization

a. Environmental Justice

Various construction activities, including surveying, anchor and ATF installation, cable installation, and fabric panel installation would occur in the vicinity of all panel locations between Parkdale and Salida over a period of about 2 years (a total of 28 months), as described in Chapter 2.0. Some areas along the Arkansas River include more panels than other areas; however, construction activities would generally follow the same pattern at each location in terms of type of work and timing. The Parkdale area includes the most panels, and therefore construction would occur over the longest period of time at that site. Construction effects, including noise, increased traffic, and occasional lane closures would affect all residents living in the vicinity of construction sites, as well as all drivers using US 50, and would not disproportionately impact one specific group or another.

Census Tract 9790 in Fremont County covers a large area west of Cañon City to the Chaffee County line on the north and south sides of the Arkansas River and US 50. About 7% of the total Fremont County population and about 9% of total Fremont County households were located in Census Tract 9790 in 2000.[6] There is insufficient data to determine the number of minority or low-income residents or the specific location of minority or low-income households within the Census Tract; however, it is likely that these residents are dispersed over a large area and do not reside together in one location. Therefore, no adverse human health, environmental or social impacts would be disproportionately experienced by minority or low-income groups in the PAA as a result of OTR construction activities. These groups would be expected to experience impacts on the same pattern of impacts as nonminority or higher income residents. Minority or low-income residents of the SAA would not be disproportionately affected by construction activities during installation or demobilization.

It is assumed that all OTR construction contractors and subcontractors would adhere to applicable federal and state level equal opportunity laws and regulations regarding the hiring of workers. Therefore, qualified minority and low-income residents of the PAA and SAA would have the same hiring opportunity during installation or demobilization as any other qualified worker in the area.

b. Protection of Children

Environmental health or safety risks to children generally result from changes in air quality, water quality, noise levels, increased traffic or accessibility to hazardous materials or other waste products. Impacts to these resources as a result of installation and demobilization activities would be as follows:

- **Air Quality**: As described in Section 4.9 Atmosphere, Air Resources and Air Quality, localized increases in fugitive dust and gaseous emissions would result from construction activities, equipment operation and vehicle traffic. However, control techniques to minimize dust from becoming airborne would be implemented at construction sites.
- **Water Resources**: As described in Section 4.10 Water Resources, water quality could be decreased as a result of construction activities; however, a stormwater management plan would reduce the impacts of potential soil erosion or other effects of construction activity. All drinking

[6] US Census Bureau, 2000 Decennial Census, Census 2000 Summary File 4. (Census Bureau 200a)

water accessible to children would be treated at local water treatment plants to meet federal and state drinking water standards for quality and would not be affected by any temporary reduction in water quality due to construction activity.

- **Noise**: As described in Section 4.24 Sound Resources and Noise, noise resulting from the operation of construction equipment would be limited to areas near the fabric panels. Noise at the Texas Creek Staging Area would result from additional traffic, people and equipment operation.
- **Hazardous Materials**: According to Section 4.17 Hazardous Materials, a number of hazardous materials would be required for construction activities. Transportation of hazardous materials would occur within the project corridor (US 50) during installation and demobilization periods; USDOT regulations for the transportation of these materials are designed and enforced to reasonably minimize the risk of release. Hazardous materials would be securely stored at the Texas Creek Staging Area according to federal and state regulations. Equipment fueling operations would also occur at the Texas Creek Staging Area during installation and demobilization; the hydraulic oil used for this purpose has a lower toxicity than other petroleum products. Emergency planning and release response plans are designed to minimize the impacts of any release; any contaminated soil or water resulting from the release of hazardous materials during transportation, fueling or heavy equipment operation would be managed as a solid waste product under applicable CDPHE requirements. Therefore, although there is some potential for the release of hazardous materials during installation and demobilization, the federal and state safety measures in place suggest that impacts to children from hazardous materials would likely be negligible.
- **Nonhazardous Waste**: During the installation and demobilization periods, nonhazardous waste would be generated by construction activities and by visitors. According to Section 4.18 Nonhazardous Waste, this waste would be gathered from staging areas, visitors centers, parking areas and from along the corridor and would be properly disposed of in landfills, brought to salvage yards or recycled. Impacts from nonhazardous waste would likely be negligible.
- **Traffic Volume**: Traffic related safety risks to children might result from higher than normal levels of traffic and the driver distractions during installation and demobilization (Section 4.16 Transportation and Traffic). It is presumed that proper warnings about increased traffic would be publicly disseminated during installation and demobilization. Traffic would also slow down somewhat for viewing during these periods, reducing accident risks. Children would generally be accompanied by adults, either within vehicles or as pedestrians. A number of measures are proposed to mitigate traffic risks. On balance, traffic related risks would not be disproportionate to any populations, including children.

Overall, given the results described above, potential impacts to children's health and safety would not be disproportionate and would be short-term, localized and negligible.

4.13.2.2 Exhibition

a. Environmental Justice

Various traffic management activities would be put in place during the exhibition period to limit delays on US 50 and at intersections of roads adjoining US 50. Congestion and delays on US 50 and at adjoining intersections would affect all drivers on these roads and would not disproportionately impact minority or

low-income populations. Discussed as part of installation and demobilization impacts, only a small number of people reside in the areas adjacent to US 50, west of Cañon City. Minority or low-income residents in this area would likely be spread out over a large geographic area and would not reside in one general location. Traffic delays and congestion would also generally be spread over the entire Project Area.[7] Therefore, disproportionate impacts to minority or low-income populations would not be expected as a result of visitor traffic or traffic management activities during the exhibition period.

The specific hiring protocol for OTR monitors and supervisors during the exhibition period is unknown at this point; however, it is assumed that equal opportunity practices would be followed and that qualified members of minority and low-income populations would have the same opportunity of employment as other people.

b. Protection of Children

During the exhibition period, children in the PAA could be affected by changes in air quality, water quality, noise levels, hazardous materials, nonhazardous waste or traffic. Effects to these resources during the exhibition period activities are as follows:

- **Air Quality**: As described in Section 4.9 Atmosphere, Air Resources and Air Quality, increases in visitor traffic would result in increased vehicle emissions (gaseous and particulate matter) and decreased air quality during the exhibition period. However, no federal or state air quality standards would be exceeded.
- **Water Resources**: As described in Section 4.10 Water Resources, water quality could be affected by runoff leaving parking areas or by shading from fabric panels. All drinking water accessible to children would be treated at local water treatment plants to meet federal and state drinking water standards for quality and would not be affected by any temporary reduction in water quality due to construction activity.
- **Noise**: As described in Section 4.24 Sound Resources and Noise, highway noise would generally be lower than normal along US 50 during the exhibition period due to decreased vehicle speed. Any diversion of through traffic to alternate routes would also reduce vehicle noise. During peak period hours, noise would increase to levels that would be detectable, but not readily noticeable by the average person.[8]
- **Hazardous Materials**: According to Section 4.17 Hazardous Materials, hazardous materials would be stored at the Texas Creek Staging Area during the exhibition period. These materials would be securely stored according to federal and state regulations and potential impacts would be negligible.
- **Nonhazardous Waste**: Waste material created by visitors during the exhibition period would be gathered from staging areas, visitors centers, parking areas and from along the corridor and would be recycled or properly disposed of in landfills. Impacts from nonhazardous waste would be negligible.

[7] Traffic delays and congestion may be greater in the vicinity of the staging areas and visitors centers and at certain intersections, but the majority of visitors to OTR would travel the entire length of the exhibit, creating additional traffic all along US 50.

[8] Refer to Section 4.24 for technical descriptions of noise levels.

- **Traffic Volume**: Higher than normal levels of traffic and the presence of driver distractions could increase safety risks to children, as vehicle passengers and as on the ground viewers of OTR at staging areas and other viewing locations (Section 4.16 Transportation and Traffic). Traffic related risks would be reduced by vehicles travelling at slower speeds along US 50 during the exhibition period because of heavier traffic and in order to view the panels. Traffic control officers would help manage visitor traffic and avoid potential safety risks. Law enforcement officials would also be monitoring the area to enforce temporary traffic regulations and medical personnel would be readily available in the case of any type of accident. Children would be presumably accompanied by adults, either in vehicles or as pedestrians. On balance, traffic risks to children would be disproportionate to a minor extent.

Overall, given the results described above, potential impacts to children's health and safety would not be disproportionate, except for traffic risks which would be disproportionate to a minor extent.

4.13.3 Alternative 1c

4.13.3.1 Installation and Demobilization

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate, the same as described for Alternative 1a.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate, the same as described for Alternative 1a.

4.13.3.2 Exhibition

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the exhibition period would occur over a period of 3 weeks, extending the duration of increased traffic volume, congestion, delays, and potential detours.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate, similar to those described for Alternative 1a, except that the exhibition period would occur over a period of 3 weeks, extending the duration of increased traffic volume, noise, and reduced air quality.

4.13.4 Alternative 1d

4.13.4.1 Installation and Demobilization

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate, the same as described for Alternative 1a.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate, the same as described for Alternative 1a.

4.13.4.2 Exhibition

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate, the same as described for Alternative 1a.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate, the same as described for Alternative 1a.

4.13.5 Alternative 2

4.13.5.1 Installation and Demobilization

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced construction activity, visitor traffic, and related impacts (congestion and delays) to PAA residents.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced construction activity, visitor traffic, and related impacts (vehicle emissions and potential for accidents) to children.

4.13.5.2 Exhibition

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced visitor traffic and traffic related impacts (congestion and delays) to PAA residents.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced visitor traffic and related impacts (vehicle emissions and potential for accidents) to children.

4.13.6 Alternative 3

4.13.6.1 Installation and Demobilization

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced construction activity, visitor traffic and related impacts (congestion and delays) to PAA residents.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced construction activity, visitor traffic and related impacts (vehicle emissions and potential for accidents) to children.

4.13.6.2 Exhibition

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced visitor traffic and traffic related impacts (congestion and delays) to PAA residents.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced visitor traffic and related impacts (vehicle emissions and potential for accidents) to children.

4.13.7 Alternative 4

4.13.7.1 Installation and Demobilization

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced construction activity, visitor traffic, and related impacts (congestion and delays) to PAA residents. However, the compressed 1-year installation schedule would result in increased annual construction traffic and vehicle activity, potentially counteracting the effects of a smaller art work.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced construction activity, visitor traffic, and related impacts (vehicle emissions and potential for accidents) to children. However, the compressed 1-year installation schedule would result in increased annual construction traffic and vehicle activity, potentially counteracting the effects of a smaller art work.

The compressed installation schedule would have little or no effect on most of the resources that would impact children. Annual emissions from construction activities and vehicle traffic would be doubled, but the reduced size of the artwork and reduced visitation might counteract the emissions effects of a compressed schedule.

4.13.7.2 Exhibition

a. Environmental Justice

Impacts to minority and low-income populations within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced visitor traffic and traffic related impacts (congestion and delays) to PAA residents.

b. Protection of Children

Impacts to the health and safety of children within the PAA and SAA would not be disproportionate. Effects would be similar to those described for Alternative 1a, except that the smaller art installation would result in reduced visitor traffic and related impacts (vehicle emissions and potential for accidents) to children.

4.14 SOCIOECONOMICS, SOCIAL IMPACTS

Identification of Socioeconomic Issues

The socioeconomic impact analysis addresses effects of OTR to residents, businesses, and public jurisdictions within the primary and secondary socioeconomic Analysis Areas (PAA and SAA, respectively).[9] Socioeconomic effects include:

- General economic impacts;
- Specific visitation related impacts;
- Traffic and congestion related impacts to local residents, businesses and public services; and
- Fiscal impacts to local governments.

Visitation Estimates

Estimates of visitation to OTR during the installation, exhibition, and demobilization were developed and presented in the draft technical paper Visitation Projections for Over the River.[10] Visitation estimates for OTR were based on visitation to specific past Christo and Jeanne-Claude art installations; visitation to comparable national and international events; and a market penetration analysis that estimated the percentage of the population assumed to visit OTR from various areas within and outside of Colorado. These visitation numbers drive to some extent the analysis of impacts for socioeconomics and are important inputs into the analysis of several other resources, such as transportation.

[9] The primary and secondary socioeconomic Analysis Areas (PAA and SAA) are defined in Chapter 3. The PAA encompasses Chaffee and Fremont counties, including Salida and Cañon City. The SAA encompasses El Paso and Pueblo counties, including Colorado Springs and Pueblo.

[10] Harvey Economics, *Visitation Projections for Over the River*, December 2009, Draft. (Harvey Economics 2009)

Table 4-14 provides a summary of the visitation to OTR during the installation, exhibition, and demobilization periods by alternative. The total visitation estimates reflect visitors that would come to the area in a normal year, who would become OTR viewers, as well as new visitors who would be enticed to visit the area solely to view OTR. The net new visitation estimates reflect total visitation less those who would normally come to the area for other recreational activities, which provides a basis for determining the incremental effects of OTR. Exhibition period visitation under the No Action Alternative is the estimated visitation that would occur in the Project Area during the first two weeks of August in a normal year.

Table 4-14. Summary of Projected Total and Net Visitation to OTR, by Alternative

Alternative	Installation Period Visitation		Exhibition Period Visitation		Demobilization Period Visitation	
	Total	**Net**	**Total**	**Net**	**Total**	**Net**
No Action	NA	NA	100,000	NA	NA	NA
1a	36,000	20,000	344,000	244,000	36,000	20,000
1c	46,000	26,000	439,000	314,000	46,000	26,000
1d	23,000	13,000	224,000	149,000	23,000	13,000
2	38,000	21,000	361,000	261,000	38,000	21,000
3	33,000	18,000	320,000	220,000	33,000	18,000
4	15,000	8,000	145,000	45,000	15,000	8,000

Notes: (1) Visitation numbers in this table reflect the number of visits to OTR. Visitation numbers include multiple visits per person, for certain types of visitors, during the exhibition period.

(2) The No Action exhibition period visitation numbers are an estimate of visitation to the Project Area during the first two weeks of August.

Source: Harvey Economics 2009, Harvey Economics 2010.

Data Sources

Data for the socioeconomic impact analysis includes inputs from a variety of sources, including OTR engineers (total project costs, total spending on materials and supplies, number and type of workers hired and the wages paid to employees); other resource analysts (transportation and traffic, recreation, and public safety); local interviews (county planners, visitors bureaus and recreational guides and outfitters); and local and regional economic and tourism data.

Methodology and Assumptions

Installation and demobilization period impacts are combined for the socioeconomic analysis for two main reasons: (1) the estimated visitation during each of these periods is the same, resulting in the same spending, employment, and fiscal impacts; and (2) the available cost estimates do not break down

equipment rental and other costs by installation and demobilization activity. Socioeconomic impacts that do differ for the installation and demobilization periods are noted and explained.

Economic Output, Employment, and Income Effects. OTR Corp provided expenditure, employment, and wage data for OTR installation, exhibition, and demobilization activities for Alternative 1a.[11] These data were scaled to estimate the same data for other alternatives based on the number of panels for each alternative.[12] Chapter 2.0 of this EIS identifies the number of panels by alternative. Economic multipliers for the construction industry were applied to the OTR data to estimate total economic output, employment, and income as a result of installation and demobilization activities.[13]

Economic multipliers for the performing arts industries were applied to visitor spending projections to estimate total economic output, employment, and income as a result of visitation to OTR.[14] Industry and location-specific economic multipliers allow for the estimation of indirect and induced employment opportunities and wages resulting from OTR expenditures; from installation, exhibition, and demobilization worker spending; and from visitor spending.[15] Any additional employment would be temporary and would occur within both the PAA and SAA. It is assumed that existing workers would work overtime to meet the needs of visitors and OTR contractors; the creation of new positions would be minimal and temporary. All cost, income, and economic output data is reported in constant 2009 dollars.

Local businesses that rely on transportation of goods and services, including the agricultural industry, have the potential to suffer revenue losses as a result of increased travel time. Data on traffic delays, reduced speeds, and lane closures on various roadways were utilized to assess impacts to these types of businesses.

Employment and income effects to the rafting industry as a result of OTR were specifically addressed. Daily rafting levels during the exhibition periods were assumed to increase toward peak period (July) levels. It is assumed that for the August exhibition periods, water levels would be maintained at a high enough level to support rafting activity, but that water levels would fall to normal levels in September.[16] For blossoming that would occur in July, no additional rafters were assumed since rafting is already at its peak in July. For blossoming that would occur in August, water levels are assumed to be adequate and it is assumed that additional rafting would occur at that time. During the demobilization periods, which would occur in late August or in September, water levels may be inadequate to support additional rafting. The spending of additional rafters on trips would increase revenue to rafting companies and would support additional or extended guide employment and associated wages.

---

[11] Jonita Davenport, OTR Project Director, HarveyEconomicsquestions12-03-09JD, December 16, 2009.

[12] Vince Davenport, OTR Project Engineer, Personal Communication, December 11, 2009.

[13] Colorado Department of Local Affairs, RIMS Multipliers, 2005; construction industry multipliers for the Colorado Springs MSA Region and the Scenic and Resort Region, which includes Chaffee County.

[14] Colorado Department of Local Affairs, RIMS Multipliers, 2005; Museums, historical sites, zoos and parks industry multipliers for the Colorado Springs MSA Region and the Scenic and Resort Region, which includes Chaffee County.

[15] Employment is reported in full-time equivalents (FTEs) for the installation and demobilization, due to the extended time-frame of these periods. An FTE is defined as one person working full-time for a period of one year. For the exhibition period, employment is reported in person-hours due to the short time-frame of the viewing window.

[16] In 2006, the Southeastern Colorado Water Conservancy District, the Colorado Department of Natural Resources, Colorado Division of Wildlife, Colorado Division of Parks and Outdoor Recreation, Chaffee County, Arkansas River Outfitters Association and Trout Unlimited entered into a Voluntary Flow Management Program (VFMP) that addresses recreational flow rates in the Arkansas River between July 1st and August 15th.

Impacts to fishing outfitters and guide services were based on the number of anglers lost to the area during the two months of steel cable and fabric panel installation, the week of the blossoming, the exhibition period, and the first month of demobilization. Displacement of anglers would occur as a result of the existence of the steel cables and fabric panels; increased traffic volume and number of people visiting the area; and the closure of certain pulloffs during the exhibition period. It was assumed that 50% of anglers along the Arkansas River between Salida and Parkdale would be displaced during the later installation and earlier demobilization periods, and all anglers would be displaced during the exhibition period. It was also assumed that 25% of displaced anglers would visit the area at a different time of year. The number of anglers displaced was based on data from CDOW Fisheries Inventories, which estimated the number of anglers at various locations by month. Lost revenue would be incurred by the existing outfitter and guide services in the area. No anglers are assumed to be displaced during earlier periods of the installation or during later periods of the demobilization.

Impacts to hunting outfitters and guide services were based on the number of hunters lost to the area during the installation, exhibition, and demobilization periods. It was assumed that 10% of hunters would be lost during the installation period due to potential impacts to wildlife from construction activity noise; increased traffic volume from construction workers and visitors; and the potential for reduced access to preferred hunting locations and staging areas. It was also assumed that 10% of hunters would be lost during demobilization. Although demobilization would occur throughout the hunting seasons for several species, construction related noise during this period would be considerably less than during the installation period. During the exhibition period, all hunting in the area would be lost due to the substantially increased traffic volume; associated noise; and potentially blocked or reduced access to staging areas and parking facilities. Hunting data was obtained from several sources, including the CDOW and USFWS surveys of hunting activity in Colorado.

Visitor Spending. Visitors were assumed to be either overnight or day visitors, depending on the distance traveled to get to OTR. The numbers of net overnight and day visitors to OTR, by alternative, are shown in Table 4-15.

Table 4-15. Summary of Net Overnight and Day OTR Visitation, by Alternative

Alternative	Net Installation/ Demobilization Period Visitation			Net Exhibition Period Visitation		
	Overnight	Day	Total	Overnight	Day	Total
No Action	0	0	0	0	0	0
1a	4,000	16,000	20,000	72,000	172,000	244,000
1c	5,000	21,000	26,000	103,000	211,000	314,000
1d	2,500	10,500	13,000	33,000	116,000	149,000
2	4,000	17,000	21,000	78,000	183,000	261,000
3	3,000	15,000	18,000	65,000	155,000	220,000
4	1,500	6,500	8,000	16,000	29,000	45,000

Notes: (1) Visitation numbers in this table reflect the number of visits to OTR. Visitation numbers account for multiple visits per person, for certain types of visitors, during the exhibition period.

(2) Installation and demobilization data show estimated visitation during each of those periods.

Source: Harvey Economics 2010.

The market penetration analysis included in *Visitation Projections for Over the River* described visitor origin and the drive time to the area.[17] During the exhibition period, overnight visitors would fill hotels and other accommodations in the PAA to capacity; the remaining overnight visitors would find accommodation in the SAA or elsewhere in Colorado. Overnight visitors to the PAA were assumed to make the majority of their trip purchases within the PAA and a small portion of purchases in the SAA; for overnight visitors to the SAA, the reverse was assumed. The average overnight visitor to the PAA or SAA area would spend an estimated $114 per night, while the average day visitor would spend an estimated $56 per day.[18] Visitor spending estimates are based on the number of net new visitors during each period, which accounts for existing visitors to the PAA, including those who would likely be displaced. Displaced visitors are people who would normally visit the PAA or SAA during the time of year OTR is occurring, but would not come because of the traffic and crowds. Of the nonangler visitors that would rather avoid crowds, 50% would be assumed to visit at a different time of year and 50% would not visit the PAA that year.

Visitor spending estimates are reported in constant 2009 dollars, as are all income and economic output data based on visitor spending numbers.

[17] Harvey Economics, *Visitation Projections for Over the River*, December 2009, Draft.

[18] Colorado State University, Department of Agricultural and Resource Economics, Economic Development Report 08-05, *Valuing Chaffee County's Working Landscapes and Water Quality: An Analysis of Summer Tourists*, 2008; and Longwoods International, *Colorado Travel Year 2008, Final Report, August 2009*; data were adjusted to 2009 dollars by Harvey Economics, 2009.

Demographic Impacts. The impact to local residents during the installation, exhibition, and demobilization periods was largely based on the outputs of the transportation analysis. Factors considered include the location and duration of delays, levels of congestion, location of detours, road closings, or other factors that would cause inconveniences to local commuters.

Housing Impacts. Capacity data for accommodations within the PAA and SAA were provided in Chapter 3.0. Hotels and other accommodations in the PAA and SAA are normally (without OTR) at 75% capacity during the July and August tourist season. These data were used for determining the number of visitors that could be accommodated within the PAA during the blossoming, exhibition period, and the first week of demobilization. Accommodations in the PAA were assumed to reach 100% capacity during these times. Other visitors would stay in the SAA, which has enough overnight capacity to easily accommodate the remaining overnight OTR visitors. It is possible that people who own second homes in the PAA would rent these out to OTR visitors. However, for the purposes of this analysis, only existing hotel, motel, and other accommodations were considered since the availability of rental homes at that time is unknown.

Public Facilities and Services. Impacts to law enforcement, fire protection, emergency medical services, and other health services are assessed as part of Public Health and Safety. Potential impacts to public transportation to local schools are based on current school schedules, which indicate when local schools would be in session throughout the year. If a school would be in session during any part of the installation, exhibition, or demobilization periods, the transportation analysis was consulted to determine the extent of potential delays. The socioeconomics analysis also addresses water and wastewater services in Salida and Cañon City.

Fiscal Impacts. The materials and supplies that would be purchased for OTR within the PAA and SAA would be subject to local, county, and state level sales taxes. Additionally, about 80% of overnight and day visitors' purchases would be subject to sales or occupancy taxes.[19] State, county, and local sales tax rates as of October 2009 were applied to these purchases. Sales tax revenues typically go to the county and to cities for distribution among various departments. All sales tax revenue estimates are reported in constant 2009 dollars.

Federal, state, and county agencies that provide emergency services (law enforcement, medical and fire) or other public services within the PAA have cost recovery agreements in place with OTR Corp that ensure the reimbursement of any costs resulting from increased demands due to OTR construction activities or visitation. Therefore, local governments within the PAA and SAA would not be liable for any costs resulting from OTR activities.

4.14.1 No Action Alternative

Under the No Action Alternative, no temporary work of art would be installed over the Arkansas River along US 50. No new construction activities would occur and no additional visitation to the PAA or SAA would occur as a result of any art installation, viewing, or removal activities under this alternative. Demographic, economic, and social conditions in the PAA and SAA would remain unchanged from those described in Chapter 3.0, with the exception of normal population growth. Visitation to the PAA and SAA and visitor spending patterns would also remain as described in Chapter 3.0.

[19] Transportation related expenditures are assumed to be not sales taxable.

4.14.2 Alternative 1a

Complete details describing Alternative 1a are included in Chapter 2.0. The following assumptions provide the basis of the socioeconomic impact analysis for Alternative 1a:

- **Installation and demobilization periods**: a total of 289 temporary employees contracted by OTR; total costs of $31.0 million, including $6.3 million for wages and $8.3 million for materials and supplies; the spending patterns and demands for services of 36,000 visitors, including 21,000 new visitors, during the installation period and during the demobilization period; and potential for traffic delays on US 50.
- **Exhibition period:** 350 OTR contracted, temporary employees; $312,000 in wages for temporary employees; the spending patterns and demand for services of net new visitors to the PAA and SAA; and increased traffic volume and congestion, including a maximum of 7.5-10.5 minutes of increased travel time on US 50, depending on direction of travel.

4.14.2.1 Installation and Demobilization

a. Economic Output, Employment and Income

Installation and Demobilization Activities. Of the $31.0 million OTR installation costs for Alternative 1a, about $6.3 million would be for wages, $8.3 million would be for materials and supplies purchased during installation, and $16.5 million would be for other costs.[20] Materials required for OTR include steel cables, aluminum, and fabric for the panels. Approximately 75% of total spending on materials and supplies would occur within Colorado, including about $1.5 million of materials that would be purchased within Chaffee and Fremont counties (PAA) and another $1.6 million of materials that would be purchased within El Paso and Pueblo counties (SAA).[21] Of the other expenses related to installation and demobilization, about 20% is assumed to be spent within the PAA ($2.7 million), 20% within the SAA ($2.7 million), and the remainder in Colorado or elsewhere.

The installation of fabric panels under Alternative 1a would take place over a period of 28 months and the demobilization would occur over about a 3-month period. Approximately 289 workers would be hired, including survey crews; anchor and ATF installation crews; steel cable installation crews; and fabric panel installation and unfurling crews.[22] To the extent possible, these workers would be hired from local communities, Cañon City or Salida. An estimated 30% of installation and demobilization workers would be hired from the PAA, 50% from the SAA, and the remaining 20% would come from other areas of Colorado or elsewhere.[23] Each phase of the installation would occur over a specific period of time, ranging from about 7 days up to 15 months, as described in Chapter 2.0. Each employee would work for about 220 hours per month, with total hours for each type of worker depending on the activity. Wages for more specialized workers range from $20 to $30 per hour and fabric panel unfurling crews could expect to earn about $15 per hour. Table 4-16 provides a summary of total hours and hourly wages for each type of worker employed under Alternative 1a.

[20] Other costs likely include equipment rental. No additional materials would be needed during the demobilization period.

[21] The fabric panels would be manufactured in Germany.

[22] Data on the number and types of employees, hours of work and wages was obtained from OTR Corp: Jonita Davenport, OTR Project Director, *HarveyEconomicsquestions12-03-09JD, December 16, 2009.*

[23] The actual number of workers hired from the PAA and SAA would depend on the availability and qualifications of the existing workforce at the time of installation and demobilization. It is assumed that the majority of qualified workers SAA required for these activities would come from the SAA.

Table 4-16. OTR Installation and Demobilization Employment Summary, Alternative 1a

Type of Worker	Number of Workers	Months of Work	Total Number of Hours	Hourly Wage	Total Wages
Surveyors	3	15	9,900	$25	$285,000
Anchor and ATF Installation					
Anchor drilling	15	14	46,200	$20	$1,100,000
ATF installation	15	8	26,400	$20	$629,000
Steel Cable Installation	20	2	8,800	$30	$298,000
Fabric Installation					
Fabric panel installation	25	2	11,000	$30	$414,000
Fabric panel unfurling	25	7 days	1,300	$15	$24,000
Demobilization	186	3	122,807	$25	$3,500,000
TOTAL	**289**		**226,407**		**$6,250,000**

Note: Total wages include $28 per diem.

Sources: OTR Corp, Harvey Economics 2009.

The local purchase of materials and supplies and spending on wages would stimulate additional economic activity as businesses purchase additional supplies or hire additional workers. In addition, installation and demobilization worker spending would create additional jobs and income. The total economic output resulting from installation and demobilization activities would amount to about $25.8 million within the PAA and SAA, including about $8.9 million in personal income. An additional $38.7 million of economic output, including $2.7 million of personal income, would be created in other areas of the state. Table 4-17 shows the economic output, employment, and personal income created by OTR installation and demobilization activities.

Table 4-17. Economic Output, Employment and Income Generated by OTR Installation and Demobilization Activities, Alternative 1a

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$6,117,000	$4,477,000	$10,594,000
SAA	$7,423,000	$7,764,000	$15,187,000
Rest of Colorado	$15,385,000	$23,278,000	$38,663,000
Total	$28,925,000	$35,519,000	$64,444,000
Employment (FTEs)			
PAA	34	29	62
SAA	57	63	120
Rest of Colorado	23	33	56
Total	113	125	238
Personal Income			
PAA	$1,875,000	$1,172,000	$3,047,000
SAA	$3,125,000	$2,691,000	$5,816,000
Rest of Colorado	$1,250,000	$1,474,000	$2,724,000
Total	$6,250,000	$5,337,000	$11,587,000

Notes: (1) Employment has been converted to the number of full-time equivalents (FTEs). Actual OTR employees would work varying numbers of hours depending on the type of work.

(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.

Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Compared to the existing characteristics of the PAA, SAA, and the state (as described in Chapter 3.0), impacts to employment and personal income levels as a result of OTR installation and demobilization activities would be minor, beneficial, and temporary. The increase in employment and personal income levels would be realized on a regional level since employees would be hired from the PAA, SAA and other areas of the state. Total economic output created by OTR installation and demobilization activities would also have a beneficial, short-term and minor impact at the regional level.

Local Business Activity. Local businesses in the PAA that rely on transportation of goods, such as agricultural and mining operations, could be affected by delays on US 50 and other local roadways during the installation and demobilization phases. Slow moving vehicles and occasional temporary lane closures on US 50 would create minor, short-duration, and temporary delays as a result of construction activities.[24] However, construction traffic would be especially light during the months of July, August, and September, when work would occur on the north side of the Arkansas River and the railroad would be used for access to those areas.[25] Visitor traffic would add some travel time delays and congestion to roadways; however,

[24] Any closures required on US 50 for construction purposes would be limited to one lane up to 400 feet per location, with locations not closer than 10 miles apart. No existing public or private roads would be blocked during installation or demobilization.

[25] No work requiring lane closures on US 50 would be performed in July, August or September.

visitation would be spread out over a period of 28 months during installation and over a period of 3 months during demobilization, which would lessen the impacts of visitor traffic.

The transportation needs of the agricultural industry in the PAA, focusing on cattle ranching, are briefly discussed in Chapter 3.0. Many cattlemen own or lease hay fields that are not adjacent to their cattle and therefore must transport hay on roads within the PAA, mainly on US 50. Additionally, ranchers frequently move their cattle from upper elevation grazing lands closer to home in the late summer, when higher elevation grazing lands dry out. Long delays could cause a reduction in the weight of cattle, and therefore the price per animal obtained at market.[26] The temporary delays anticipated during the installation and demobilization periods may be an inconvenience to ranching operations, but would not be expected to have any measurable impact on rancher revenues. Overall, impacts to ranchers during the installation and demobilization periods would be negligible and short-term due to the limited time frame of construction activities and the implemented traffic management measures. Ranching operations in the SAA would experience no impacts, since roads in those areas are not expected to experience delays or closures due to installation or demobilization activities or visitation.

Other than cattle ranching operations, produce growers on the East Slope transport fruits, vegetables, and other goods to the West Slope on US 50, and mining operations in the PAA also use US 50 to transport goods. These businesses are expected to experience temporary delays from construction and visitor traffic, but overall impacts would be negligible and short-term.

The Arkansas River experiences relatively low activity from anglers during the month of July. The fishing industry within the PAA (outfitters, guides, hotels, restaurants, and other local service providers) would lose about $61,000 of revenue as a result of anglers displaced during the installation period. The demobilization period would begin in mid-August. Impacts to anglers would likely occur during the first month of demobilization when the fabric panels and steel cables would be removed. Losses to the fishing industry during demobilization would be about $49,000. The amount of lost revenue would be spread among the various fishing related businesses in the PAA. Hours of employment for a small number of fishing guides might be reduced. Industry-wide losses would be minor and short-term, but moderate impacts to income are likely to be experienced by outfitters and guides located in the PAA.

Rafting interest on the Arkansas River would likely increase during the blossoming period in July under Alternative 1a. Historically, July is the most popular month for rafting on the Arkansas and maximum levels of activity likely occur in a normal year. Therefore, no additional revenue would accrue to the rafting industry under Alternative 1a. The demobilization period under this alternative would begin in mid-August, and this activity might also add to rafting interest. It is assumed this activity would increase rafting levels over the normally low August levels. Additional revenue to rafting companies would be about $118,000. Additional earnings to employees would be about $30,000. There would be no new employees hired under this alternative, as some of the seasonal workers would simply stay on longer and would increase their earnings from the extended rafting season. Impacts to rafting companies and employees within the PAA would be short-term, minor, and beneficial.

The 28-month installation period would reduce interest in hunting in the PAA during two hunting seasons. Construction noise, increased traffic volume, and potentially reduced access to hunter staging areas would result in slightly reduced hunting activity during installation. Reduced hunting activity in the area over

[26] Richard Green, President of the Fremont County Cattleman's Association, September 2009.

these two seasons would result in a loss of about $131,000 to local outfitters, guides, and other businesses that provide services to hunters. Revenue losses during the demobilization period would amount to about $61,000. Demobilization would include some noise, increased traffic, and potentially reduce access to hunting areas. Revenue loss estimates are based on average per day spending by big game hunters, adjusted for the portion spent in the PAA, and the average number of hunting days per big game hunter. Impacts to the hunting industry in the PAA as a result of installation and demobilization activities would be short-term and minor.

Service industry businesses in the PAA and SAA that rely on spending by local residents and visitors, such as retail establishments, hotels and restaurants, would benefit from the spending activity of construction workers and visitors. Visitor spending is described in detail as part of the following section.

Visitor Activity. An estimated 36,000 people would visit OTR during the installation phase and the same number during the demobilization phase, including 20,000 net visitors to the area during each phase. A small number of visitors who have an interest in the technical aspects of the project may be interested in visiting the area during the early stages of the installation; however, it is expected that installation period visitation would increase in the days leading up to the exhibition period as the cabling begins, and that half the installation visitation would occur in the days immediately before the exhibition period when the fabric panels are put into place and the artwork blossoms.[27] During the demobilization period, it is expected that 40% of visitation would occur within the week immediately following the exhibition period, when the fabric is removed.

Total net spending by visitors during the installation and demobilization periods, accounting for the displacement of some visitors and the existing visitation to the area, would amount to $2.7 million of direct spending in the PAA and about $912,000 of direct spending in the SAA. Direct expenditures would include purchases of retail goods and services; money spent in restaurants and on accommodations; spending for recreational activities; and transportation related expenditures. Spending by visitors would also generate additional, indirect or induced, economic activity as service and retail sector businesses purchase additional supplies or hire additional employees. Total economic output due to visitor spending is estimated to be $5.2 million in the PAA and about $2.0 million in the SAA, for a total of $7.2 million.

Visitor spending during the installation and demobilization periods would stimulate a number of short-term, temporary employment opportunities. An estimated 75 total jobs and $2.1 million of total income would be created within the PAA and SAA as a result of net visitor spending. Table 4-20 provides the net economic output, employment, and income generated by OTR visitor spending during the installation and demobilization periods.

Total net spending by visitors during the installation and demobilization periods, accounting for the displacement of some visitors and the existing visitation to the area, would amount to $2.7 million of direct spending in the PAA and about $912,000 of direct spending in the SAA. Direct expenditures would include purchases of retail goods and services; money spent in restaurants and on accommodations; spending for recreational activities; and transportation related expenditures. Spending by visitors would also generate additional, indirect or induced, economic activity as service and retail sector businesses purchase additional supplies or hire additional employees. Total economic output due to visitor spending is estimated to be $5.2 million in the PAA and about $2.0 million in the SAA, for a total of $7.2 million.

[27] Harvey Economics, *Visitation Projections for Over the River*, December 2009, Draft.

Visitor spending during the installation and demobilization periods would stimulate a number of short-term, temporary employment opportunities. An estimated 75 total jobs and $2.1 million of total income would be created within the PAA and SAA as a result of net visitor spending. Table 4-18 provides the net economic output, employment, and income generated by OTR visitor spending during the installation and demobilization periods.

Table 4-18. Net Economic Output, Employment and Income Generated by OTR Visitor Spending during Installation and Demobilization, Alternative 1a

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$2,736,000	$2,416,000	$5,152,000
SAA	$912,000	$1,136,000	$2,048,000
Total	$3,648,000	$3,552,000	$7,200,000
Employment (FTEs)			
PAA	30	23	53
SAA	11	11	22
Total	41	34	75
Income			
PAA	$914,000	$561,000	$1,475,000
SAA	$323,000	$321,000	$644,000
Total	$1,237,000	$882,000	$2,119,000

Notes: (1) Employment is defined as full time equivalents (FTEs).
(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Compared to the effects of current visitor spending in the PAA and SAA, as described in Chapter 3.0, net visitor spending due to OTR installation and demobilization activities would have a minor, short-term, beneficial impact on employment and personal income in the region.

b. Demographic Effects

There would be a minor, temporary influx of construction workers to the PAA and SAA during the installation and demobilization periods; no long-term demographic effects would occur as a result of worker relocation during installation or demobilization.

Slow moving construction vehicles, temporary lane closures and additional traffic volume from construction workers and visitors would result in minor occasional, temporary delays to PAA residents commuting to work on US 50 or driving that road for other purposes. Construction traffic would be light during the months of July, August, and September, when work would occur only on the north side of the Arkansas River and no work requiring lane closures on US 50 would be performed. Therefore, delays during peak summer months would be negligible as a result of construction activities. Visitor traffic would

add some travel time delays and congestion to roadways; however, visitation would be spread out over a period of 28 months during installation and over a period of 3 months during demobilization, which would lessen the impacts of visitor traffic. Overall, impacts to residents within the PAA would be negligible and short-term due to the limited time frame of construction activities and the implemented traffic management measures.

c. Housing Effects

Transient housing includes hotels, motels, B&Bs, and other facilities that are developed for shorter stays; these accommodations are geared towards tourists and others that require accommodation for a short period of time. Temporary housing is generally considered longer term and can include rental apartments or homes; these are facilities with kitchens and other amenities that can accommodate longer-term stays. Construction workers who are hired from local communities within the PAA and those hired from within the SAA would reside in their current homes and would not require special housing accommodations. Nonlocal, contractor staff would be housed in temporary housing units within local communities. About 10% of total workers would need local housing during the installation and demobilization periods. These workers would be housed in motels, apartments or rental homes. The PAA has adequate short-term housing available to meet the needs of these workers.[28]

Overnight visitors would be accommodated in the available housing units in the PAA and SAA. About 4,000 net visitors would stay in the area overnight during the installation period and during the demobilization period. About 2,000 of the installation visitors would come during the blossoming period and about 1,600 visitors would visit during the first week of mobilization. The PAA and SAA have adequate accommodations to meet the demands of net overnight visitors during these periods. Impacts to housing facilities in the PAA would be negligible during the early part of installation and the later part of demobilization and would be minor during the blossoming period and the first week of demobilization due to the numbers of visitors anticipated during those times. Besides being temporary, impacts to housing facilities in the SAA would be negligible at all times of installation and demobilization; it is assumed that the majority of overnight installation and demobilization visitors would stay in the PAA.

d. Public Facilities and Services

Water and Wastewater. Potable water would be available at each of the three visitor centers, the Texas Creek Staging Area, and the Vallie Bridge Limited Rest Stop. These water supplies would be trucked in by tanker truck on a daily or as needed basis. Water and wastewater providers and facilities in the PAA and SAA have the resources and capacity to meet any increased demands from construction workers and visitors, which would be spread out over a number of months. These providers would experience negligible, short-term effects during OTR installation and demobilization.

Schools. Under Alternative 1a, the blossoming would occur during July. In the current 2009-2010 school year, Fremont County and Salida schools began on August 20, and it is assumed that area schools would open around the 20th during the year of the OTR exhibition. Therefore, during blossoming, there would be no impact to school services. Prior to blossoming, during the portion of the 2-year installation period when school is in session, school busses could experience negligible to minor, short-term delays as a result of slow moving construction vehicles and occasional temporary lane closures. However, no bus stops would be closed and no bus stop access points would be blocked. Demobilization would take place at a time that

[28] It would be the responsibility of each contractor to provide housing for nonlocal employees.

would overlap with the school year. As for the installation period, school busses could experience negligible minor, short-term delays during demobilization as a result of slow moving construction vehicles and occasional temporary lane closures. Overall, impacts to school transportation services would be negligible to minor and short-term during the installation and demobilization periods.

Other Services. Law enforcement, fire protection, and emergency medical services during the installation and demobilization periods are discussed in detail as part of the Public Health and Safety section. In summary, emergency services would be available to visitors and residents throughout the installation and demobilization periods. The majority of on-site services would occur only during the exhibition period; however, ambulances and paramedics would be staged at Parkdale and Texas Creek during the blossoming week of installation and, in addition, a medical helicopter would be located at the Texas Creek Staging Area during the week prior to exhibition. Overall, impacts to emergency services would be negligible to minor given the level of expected visitation and the distribution of those visitors over the 28-month installation and 3-month demobilization periods.

e. Fiscal Impacts

All OTR expenditures on materials and supplies in the PAA and SAA would be subject to applicable city, county, and state sales tax. Sales tax rates for specific cities and counties within the PAA and SAA are discussed in Chapter 3.0; the state sales tax rate is 2.9%. OTR expenditures on materials and supplies during the installation period would result in a total of $126,000 of local (city and county) tax revenue within the PAA and SAA and about $14,000 of state sales tax revenue.[29]

About 80% of visitor spending would also be subject to applicable sales or occupancy taxes.[30] Net visitor spending during the installation and demobilization periods would result in $134,000 of local sales and occupancy tax revenue and $35,000 of state sales tax revenue. Sales tax and occupancy tax revenue collected within the PAA includes $38,000 to Salida, $26,000 to Chaffee County, $21,000 to Cañon City, $14,000 to Fremont County and $7,000 to Buena Vista. Table 4-19 provides a breakdown of local sales and occupancy tax revenue collected within the PAA and SAA as well as information on state sales tax revenue.

Table 4-19. Local and State Sales and Occupancy Tax Revenue Collected during the OTR Installation and Demobilization Periods, by Source, Alternative 1a

Source of Tax Revenue	PAA	SAA	State
OTR Purchases	$64,000	$62,000	$181,000
Visitor Spending	$106,000	$28,000	$35,000
Total	**$170,000**	**$90,000**	**$216,000**

Notes: (1) Local sales taxes include applicable county and city level taxes.
(2) Revenue is based on sales tax rates as of October 2009.
Sources: OTR Corp, Colorado Department of Revenue, Harvey Economics 2009.

[29] No materials would be purchased for the demobilization period.
[30] Transportation related expenditures are assumed not to be taxable.

Tax revenue collected on OTR purchases and visitor purchases would be negligible and short-term for the PAA, SAA, and the state.

Federal, state, and county agencies, or other entities that provide emergency services (law enforcement, medical and fire) or other public services within the PAA, have cost recovery agreements in place with OTR Corp that ensure the reimbursement of any costs resulting from increased demands due to OTR construction activities or visitation. These entities include the BLM, CSP, CDOT, State Parks, Fremont County, and Chaffee County. Therefore, local governments within the PAA would not be liable for any costs resulting from OTR activities and would not experience any fiscal impacts as a result of installation or demobilization activities.

f. Social Setting - Quality of Life

The residents of Fremont and Chaffee counties value the scenic and rural nature of the areas they live in and view these features as part of the quality of life in the area. Although increased construction and visitor traffic during installation and demobilization may be noticeable to these residents, this traffic would be temporary and limited to a 28-month period for installation and a 3-month period for demobilization. Traffic related impacts would be negligible during these periods. The influx of additional visitor spending and temporary increase in the incomes of local residents would be a benefit to the area. No permanent changes to scenic features of the landscape, the attractiveness of the area or to the quality of life of residents are expected to occur as a result of OTR installation and demobilization activities.

4.14.2.2 Exhibition

a. Economic Output, Employment and Income

OTR Activity. OTR expenditures during the exhibition period would consist solely of wages for monitors, supervisors, and other staff. No materials or other supplies would be purchased during the exhibition period. A total of 350 OTR contracted personnel, referred to as monitors, would be stationed at visitor centers, a rest area along US 50, and throughout the corridor at the panel sites. About 70% of OTR contracted exhibition employees would be hired from within Chaffee and Fremont counties (PAA) and another 15% would likely come from El Paso and Pueblo counties (SAA).[31]

OTR staff would work for 8 hours each day for the duration of the 14-day exhibition period. Wages would range from just over minimum wage for monitors, up to about $18 per hour for supervisors. Total wages for OTR staff would amount to about $312,000. This equates to about $890 per worker over the entire exhibition period. The relatively small amount of direct wages generated over a short period of time would not stimulate any measureable indirect or induced employment or earnings. Employment and income impacts to the region as a result of OTR activity during the exhibition period would be beneficial, but negligible and short-term.

Local Business Activity. Businesses that rely on transportation of goods and services would experience travel time delays and congestion during the exhibition period, especially during peak periods. Westbound traffic on US 50 would experience a maximum drive time increase of 10.5 minutes (less than a 20% increase) between Fremont Road Information Center and the Fremont/ Chaffee County line. Eastbound traffic would experience a maximum drive time increase of 7.5 minutes (about a 14% increase) between the county line and Fremont Road Information Center. These delays generally reflect lower overall average

[31] Jonita Davenport, OTR Project Director, HarveyEconomicsquestions12-03-09JD, December 16, 2009.

speeds through the corridor, especially near intersection locations and panel sites. Drivers making left-hand turns onto US 50 from adjacent roads or driveways would also experience delays. Traffic control officers would control major roadway intersections to minimize these delays; however, the delays could be as much as several minutes. Additionally, heavy traffic volume in Cañon City and moderate traffic volume in Salida during peak periods would result in delays at a number of city intersections. The maximum delay time and congestion at intersections would generally occur during peak periods, including weekends. Ranching operations would be inconvenienced by delays and congestion on US 50 and at local road intersections.

Long delays in the transportation of cattle to market result in reduced cattle weight and lower prices. For example, a 2-hour delay could result in about a 3% to 5% weight loss for cattle.[32] However, the short delays expected during the exhibition period would have a negligible effect on cattle weight and on rancher revenues. Ranchers may reduce delays by avoiding peak period traffic and weekends during the exhibition period. Overall impacts to ranchers would be negligible and short-term. Other transportation based operations would also be inconvenienced by delays and congestion, but impacts are expected to be negligible and short-term due to the timing and extent of delays.

Angler expenditures include payments made to guides and outfitters, and also expenditures for food, lodging, and other local purchases. The total number of anglers on the Arkansas River during August is relatively low, compared to the peak months of April and September. Losses to the industry in the PAA during the exhibition period are expected to be about $34,000. These losses would be experienced by a number of proprietors over a 2-week period and are not expected to cause any change in employment. Outfitters and guides would likely experience minor income losses.

The OTR exhibition would likely generate considerable rafting interest. Under Alternative 1a, rafting would likely be equivalent to typical July levels during the first two weeks of August. July is the busiest month for rafting on the Arkansas River. Typically, approximately half the number of rafting trips that occur in July, occur in August. This increase in rafting would generate additional revenue to rafting companies of about $1.5 million. Rafting employees receive payment on a per trip basis, so the increase in trips would result in increased earnings of about $380,000. No new employment would occur due to the brief exhibition period; rather existing seasonal employees would see increased earnings. Overall, impacts to the rafting industry would be beneficial, moderate, and short-term.

The exhibition period would occur during part of the hunting season for bighorn sheep, which begins on August 1 and runs through the beginning of October. It is unknown how many bighorn sheep hunters would be active during the first two weeks of August, but as a worst case scenario it was assumed that all bighorn sheep hunters would be lost to the area as a result of the OTR exhibition. This would result in a loss of revenue of about $1,500 to local outfitters, guides, and other businesses that provide services to hunters. The hunting seasons for other game species begin after the exhibition period ends, and therefore no loss of hunters or related revenue would be expected from these hunters. Impacts to the hunting industry in the PAA during the exhibition period would be short-term and negligible.

Tourism based business activity in the PAA would increase to a large extent, albeit temporarily, during the exhibition period under Alternative 1a; however, other businesses would also benefit from increased

[32] Richard Green, President of the Fremont County Cattleman's Association, September 2009.

revenues due to the spending of additional visitors.[33] The SAA would also experience higher temporary business activity, but the relative effects would be less, owing to larger, more diverse economies.

Visitor Activity. An estimated 344,000 visits to OTR would occur throughout the exhibition period, including a net of 244,000 new visits to the area. Net overnight and day visitor spending during the exhibition period would amount to $11.8 million of direct expenditure in the PAA and about $12.4 million of direct expenditure in the SAA. Direct expenditures would include purchases of retail goods and services; money spent in restaurants and on accommodations; spending for recreational activities; and transportation related expenditures.[34] The demands of visitors and the direct expenditures by visitors would support additional employment in the PAA and SAA. Spending by visitors would also generate additional, indirect or induced, economic activity as service and retail sector businesses purchase additional supplies or hire additional employees. Total economic output due to visitor spending is estimated to be about $50.0 million, including $22.2 million in the PAA and $27.8 million in the SAA. Visitor spending would stimulate a number of short-term, temporary employment opportunities. An estimated 1.1 million hours of work and $15.1 million of total income would be created within the PAA and SAA as a result of net visitor spending during the exhibition.[35] The majority of these additional hours would be filled by existing employees that accept overtime work and take on additional shifts; this would result in a temporary increase in wages for most existing employees. It is assumed that a relatively small number of new, temporary employees would be hired during the exhibition period. As described in Section 3.14, Socioeconomics, the existing workforce in the PAA includes over 28,000 people and about 376,000 people in the SAA. Over 25% of these workers are employed in industries that cater to visitors.[36] The 1.1 million hours of additional employment created under Alternative 1a would translate into additional full-time workloads (over a 2-week period) for about 13,400 workers or a lesser amount of additional hours for an even greater number of workers. Given the size of the available workforce in the PAA and SAA, it is reasonable that the existing workforce would absorb the bulk of these additional work hours. Table 4-20 provides the net economic output, employment and income generated by OTR visitor spending during the exhibition period.

[33] The following Visitor Spending section of the Socioeconomic impact analysis provides information about the total level of visitor spending by geographic area and the total economic impacts of that spending.

[34] Direct visitor expenditures include spending on recreational activities within the PAA, including rafting trips.

[35] Employment is described in terms of person-hours for the exhibition period due to the short time-frame of this period. A calculation of full-time equivalents (FTEs) is not appropriate since additional employment would only occur over a two week period. An FTE is one person working full-time for a period of one year.

[36] These include retail trade; arts, entertainment and recreation; accommodations and food services; other services; and real estate, rentals and leasing.

Table 4-20. Net Economic Output, Employment and Income Created by OTR Visitor Spending during Exhibition, Alternative 1a

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$11,810,000	$10,428,000	$22,238,000
SAA	$12,383,000	$15,429,000	$27,812,000
Total	$24,193,000	$25,857,000	$50,050,000
Employment (Person Hours)			
PAA	266,105	201,175	467,280
SAA	295,989	310,969	606,958
Total	562,094	512,144	1,074,238
Personal Income			
PAA	$3,945,000	$2,421,000	$6,366,000
SAA	$4,384,000	$4,359,000	$8,743,000
Total	$8,329,000	$6,780,000	$15,109,000

Note: Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Effects on economic output, employment, and personal income due to visitor spending during the exhibition period would be beneficial, moderate, and short-term.

b. Demographic Effects

Few OTR contracted employees would need to migrate to work at the exhibition. About 70% of OTR employees (monitors, supervisors, and other staff) would be hired from within Chaffee and Fremont counties (PAA). Another 15% would likely come from El Paso and Pueblo counties (SAA).[37] These employees would commute each day between their homes and various locations throughout the corridor that would require monitors; therefore, these employees would not cause any demographic changes. The remaining 15% of OTR employees would come from other areas of Colorado, other states, or other countries.

Visitation to OTR would create traffic delays and congestion for local PAA residents during the exhibition period, especially during peak periods. Westbound traffic on US 50 would experience a maximum drive time increase of 10.5 minutes between Fremont Road Information Center and the Fremont/ Chaffee County line (about a 19% increase). Eastbound traffic would experience a maximum drive time increase of 7.5 minutes between the county line and Fremont Road Information Center (about a 14% increase). These delays generally reflect lower overall average speeds through the corridor, especially near intersection locations and panel sites. Additional delays would be experienced by drivers making left-hand turns onto

[37] Jonita Davenport, OTR Project Director, HarveyEconomicsquestions12-03-09JD, December 16, 2009.

US 50 from adjacent roads or driveways. Major roadway intersections would be controlled by traffic control officers to minimize these delays; however, the delays could be as long as several minutes. Heavy traffic volume in Cañon City and moderate traffic volume in Salida during peak periods would result in delays at a number of city intersections.

In terms of commuting, peak OTR visitor traffic would occur between about 9:00 am and 5:00 pm on weekends (Saturdays and Sundays); these are days and times that would not affect most commuters, who would generally drive to and from work on weekdays earlier than 9:00 am and later than 5:00 pm. Weekday traffic would be lighter than weekend traffic, limiting the delays and congestion on US 50. Additionally, the majority of OTR visitors are expected to drive westbound from Cañon City to Salida to view the panels; therefore, eastbound traffic is expected to be lighter than westbound traffic on US 50 throughout the day and commuters may experience delays in only one direction. For example, commuters driving east to Cañon City or other areas for work may not experience noticeable delays going to work in the morning, but may see short delays when returning home. Commuters driving west from communities such as Cotopaxi or Howard to Salida should also experience negligible delays in the mornings, since they would likely be on the road to Salida before westbound OTR visitor traffic reached those areas. Overall, impacts to local PAA residents during the 2-week exhibition period would be short-term and minor to moderate, due to the timing and extent of delays.

c. Housing Effects

Only about 50 employees would require temporary housing within the PAA or SAA; housing would not be provided by OTR. OTR employees emigrating from outside the PAA or SAA would likely rent homes or apartments or stay in hotels for the 2-week period.

Overnight visitors would be accommodated in the available transient housing units in the PAA and SAA, including hotels, motels, B&Bs, campgrounds, and other similar facilities. About 75,000 net visitors would stay in the area overnight throughout the exhibition period. Accommodations within the PAA would be filled to maximum capacity during the entire exhibition period and remaining overflow visitors would stay in SAA accommodations. The SAA has adequate facilities to meet the demands of these overnight visitors.

Overall, impacts to housing facilities in the PAA would be moderate to significant and short-term, as hotels and other accommodations would be filled to capacity during the exhibition period. Housing facilities in the SAA would experience minor impacts, given the number of overnight visitors expected to stay in the SAA and the capacity of those facilities, described in Chapter 3.0.

d. Public Facilities and Services

Water and Wastewater

Cañon City Water System*:* The 2009 peak day water demand for Cañon City was approximately 10.2 MGD. In previous years, the peak day demand has been as high as 11 MGD. However, the Cañon City Water Treatment Plant has a capacity of 22 MGD. Therefore, it is expected that Cañon City would be able to meet maximum water demands attributable to OTR staff and visitors that stay overnight in hotels or other accommodations or stop in the City for lunch, to visit other attractions or for other reasons.[38]

[38] Interview with Bob Hartzman, Cañon City Water Treatment Plant Supervisor, December, 22, 2009.

Cañon City Wastewater System: Wastewater services for Cañon City are provided by the Fremont Sanitation District. In 2009, the peak day wastewater demand for Cañon City was approximately 7.5 MGD, while the average day demand was 6 MGD. The wastewater treatment plant has a peak capacity of 10.2 MGD, with average (normal conditions) capacity of 8.5 MGD. Cañon City is expected to be able to meet maximum wastewater demand attributable to OTR visitation during the exhibition period.[39]

Salida Water System: In 2007, the City of Salida water treatment plant treated 1,640 AF of water to meet customer demands. By 2013, the City's annual demand is projected to reach 1,914 AF. During the summer of 2009, the peak demand was slightly less than 4 MGD.[40] To meet this demand, the City of Salida has three raw water sources, totaling 3.7 MGD, plus a treated water storage tank capacity of 3.25 million gallons. Using stored water, the water treatment plant can maintain a rate of 4 MGD. With the City at full capacity, Salida's water system is capable of meeting the demands of residents and visitors.[41]

Salida Wastewater System: The Salida Waste Water Treatment Facility (SWWTF) has a permitted capacity of 2.1 MGD, but operates with a total capacity of 1.3 MGD due to ammonia treatment limitations. The 2009 maximum daily wastewater flow was 1.2 MGD; therefore, the SWWTF is close to reaching its treatment capacity. Plans are in place to upgrade the current facility to a capacity of 2.7 MGD. Although construction has been delayed, sufficient treatment capacity should be available to meet the needs of OTR staff and visitors that stop in Salida, as long as construction has started by the spring of 2012.[42] In 2013, the maximum daily wastewater flow is projected to be 1.63 MGD.[43]

Schools. In the 2009-2010 school year, Fremont County and Salida schools began on August 20. It is assumed that schools would also begin around this date during the year of the OTR exhibition. Therefore, under Alternative 1a, it is likely that local schools would begin after the exhibition period ends. As a result, there would be no impacts to area schools during the exhibition period.

Other Services. Law enforcement, fire protection, and emergency medical services during the exhibition period are discussed in detail as part of the Public Health and Safety section. In summary, law enforcement personnel would be staged in pullouts near each panel locations and at several other locations throughout the corridor; ambulances and paramedics would be staged at Texas Creek and Parkdale, along with a medical helicopter at the Texas Creek Staging Area; first aid stations would be located at all information centers; firefighting equipment would be located at Texas Creek, Parkdale and the Vallie Bridge Limited Rest Stop; and hazardous spill containment equipment would also be located at staging areas. Due to increased traffic volume and anticipated congestion and delays, an increase in response times of emergency vehicles and emergency responders would be expected. Overall, impacts to emergency services and the ability of service providers to meet the demands of visitors and residents would likely be minor and short-term during the exhibition period.

---

[39] Interview with Jim Pearson, Fremont Sanitation District, January 12, 2010.

[40] Over the last eight years (2000-2007), peak water demands occurred in June in five years and in July in three years.

[41] Interview with acting manager of the Salida Water Treatment Plant, December 22, 2009.

[42] Schmueser Gordon Meyer, INC. Preliminary Engineering Report for the Salida Wastewater Treatment Facility, January 2009.

[43] Interview with Randy Sack, Salida Waste Water Treatment Facility Plant Manager, December 22, 2009.

e. Fiscal Impacts

Public sector revenues during the OTR exhibition period would come primarily from sales and occupancy taxes on visitor expenditures. OTR spending during the exhibition period would consist solely of wages to employees. No materials or other supplies subject to sales taxes would be purchased during the exhibition period. Visitor spending would generate about $1.4 million of sales and occupancy tax revenues, including the following:

- $413,000 of local (city and county) taxes in the PAA, including $147,000 in tax revenues to Salida, $98,000 to Chaffee County, $91,000 to Cañon City, $65,000 to Fremont County and $12,000 to Buena Vista;
- $475,000 of local (city and county) taxes in the SAA; and
- $503,000 of state level sales tax revenue.

Fiscal impacts to local jurisdictions and to the state as a result of visitor spending would be negligible to minor, beneficial, and short-term.

Federal, state, and county agencies or other entities that provide emergency services (law enforcement, medical and fire) or other public services within the PAA have cost recovery agreements in place with OTR Corp that ensure the reimbursement of any costs resulting from increased demands due to OTR construction activities or visitation. These entities include the BLM, CSP, CDOT, State Parks, Fremont County, and Chaffee County. Therefore, local governments within the PAA would not be liable for any costs resulting from OTR activities, and these entities would not experience any increases in expenditures as a result of OTR activities.

f. Social Setting

Colorado Arts Climate. As discussed in Sections 3.20, Recreation and 3.14, Socioeconomics, a number of annual arts festivals take place in the PAA and SAA. Outside the PAA and SAA, Denver is home to the well renowned Denver Art Museum as well as many local art galleries. Various groups in the Denver metropolitan area host well attended art festivals and events that support the arts throughout the year. The Scientific and Cultural Facilities District; Denver Office of Cultural Affairs; Colorado Council on the Arts; and the Colorado Business Committee for the Arts are examples of the many entities that promote and support art and culture awareness, education, and events in the State of Colorado. Additionally, many other cities throughout the state also host one-time or annual events that are focused on various types of artwork. There is an awareness on the part of residents and visitors that art and cultural events are available and accessible and many people view them as an important part of their quality of life. Denver area arts groups as well as other entities throughout the state are excited about and supportive of the opportunities that OTR would bring to Colorado residents. The publicity surrounding OTR would bring additional awareness to the arts community and to other artistic endeavors in Colorado and may result in increase interest and participation in the arts from a larger base of people in the future.

g. Quality of Life - PAA

Quality of life is important to PAA residents and a valuable feature of living in the area. As described previously, increased traffic from OTR visitors would cause some delays and congestion on US 50 and adjacent roads; however, these impacts would be temporary, occurring only during a 2-week period. Additional visitor spending during the exhibition period would temporarily add to residents' personal

income, providing a short-term economic benefit. No permanent changes to the quality of life of Fremont or Chaffee county residents would occur as a result of the OTR exhibition.

4.14.2.3 Alternative 1a Summary

During the installation, exhibition, and demobilization periods, OTR construction activities, OTR expenditures, and net visitor spending would generally result in minor to moderate short-term increases in employment, personal income, local business activity, and sales tax revenues. The fishing industry in the PAA is likely the only sector of the local economy that would experience a loss of business and a loss of revenue because of OTR activities. Traffic delays and congestion during the exhibition period have the potential for negligible impacts to commercial business activity and minor to moderate impacts to PAA residents. Local service providers, including emergency services, would be able to meet the demands of both visitors and residents from the beginning of the installation period through the end of the demobilization period. There would be some potential for delays to school transportation services during the installation and demobilization periods, but these would be negligible to minor. Table 4-21 provides a summary of socioeconomic impacts resulting from OTR installation, exhibition, and demobilization under Alternative 1a.

This page intentionally blank

Table 4-21. Summary of Socioeconomic Impacts during the Installation/ Demobilization and Exhibition Periods, Alternative 1a

	Installation/ Demobilization	Exhibition	Total
OTR Expenditures	$31,000,000	$312,000	$31,312,000
Materials and Supplies	$8,300,000	$0	$8,300,000
Wages	$6,250,000	$312,000	$6,562,000
Other	$16,450,000	$0	$16,450,000
Total Visitation	72,000	344,000	$416,000
Net Visitation	40,000	244,000	$284,000
Net Visitor Spending (Direct)	$3,648,000	$24,193,000	$27,841,000
Sales Tax Revenue			
Local Sales Tax Revenue	$260,000	$887,000	$1,147,000
State Sales Tax Revenue	$216,000	$503,000	$719,000
Local Business Impacts			
Fishing Industry	($110,000)	($34,000)	($144,000)
Rafting Industry Revenue	$118,000	$1,502,000	$1,620,000
Rafting Employee Wages	$30,000	$378,000	$408,000
Ag/ Mining/ Other	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays
Hunting Industry	($192,000)	($1,500)	($193,500)
Touristic and Other Local Businesses	Included in economic output	Included in economic output	Included in economic output
Economic Output (includes above impacts)	$71,342,000	$50,015,500	$121,357,500
Employment (FTEs)	313	NA	NA
Employment (Person Hours)	NA	1,074,238	NA
Personal Income	$13,705,000	$15,108,000	$28,813,000
Resident Impacts	Potential for increased travel time	Maximum of 7.5 to 10.5 minute travel time delays on U.S 50	Increased travel times
Public Facilities and Services			
Water/ Sewage	Can meet demands	Can meet demands	Can meet demands
Schools	Potential for delays	No impact	Potential for delays
Protection and Emergency Medical Services	Can meet demands	Can meet demands	Can meet demands

Notes: (1) All dollars are expressed in constant 2009 terms.

(2) Local sales tax revenue indicates tax dollars collected by jurisdictions within the PAA and SAA only.

Source: Harvey Economics 2009.

This page intentionally blank

4.14.3 Alternative 1c

Complete details describing Alternative 1c are included in Chapter 2.0. The following assumptions provide the basis of the socioeconomic impact analysis for Alternative 1c:

- **Installation and demobilization periods**: A total of 289 OTR employees; total costs of $31.0 million, including $6.3 million for wages and $8.3 million for materials and supplies; the spending patterns and demands for services of 46,000 visitors, including 26,000 new visitors, during the installation period and during the demobilization period; and potential for traffic delays on US 50.
- **Exhibition period**: 350 OTR employees; $468,000 for wages; the spending patterns and demands for services of net new visitors to the PAA and SAA; and increased traffic volume and congestion, including a maximum of 8.5 to 10.5 minutes of increased travel time on US 50, depending on direction of travel.

4.14.3.1 Installation and Demobilization

a. Economic Output, Employment and Income

Installation and Demobilization Activities. OTR costs, construction activities, employment, and wages would be the same as described for Alternative 1a. Total economic output, employment, and wages resulting from OTR installation and demobilization activities would also be the same as for Alternative 1a.

Local Business Activity. Agricultural operations, mining operations, and other businesses that rely on US 50 for transportation of goods and services would experience the same types of impacts as described for Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts to anglers and the fishing industry during the installation period would be the same as described in Alternative 1a. Impacts to anglers and the fishing industry during the demobilization period would be slightly more than those described for Alternative 1a due to the later start of demobilization activities coupled with seasonal fishing activity. A total of $118,000 of revenue would be lost under Alternative 1c. Industry-wide losses would be minor and short-term, but moderate impacts to income are likely to be experienced by outfitters and guides located in the PAA.

Impacts to the rafting industry during the installation period would be the same as described in Alternative 1a. Benefits during demobilization would be slightly greater than for Alternative 1a due to the larger number of visitors during this period under Alternative 1c. Total additional industry earnings would be about $149,000 and additional employee earnings would be about $37,000. Impacts to rafting companies and to employees would be minor and short-term.

Impacts to the hunting industry would be the same as described in Alternative 1a.

Impacts on touristic and other local businesses would be greater than under Alternative 1a, due to a larger number of expected visitors.

Visitor Spending. The number of visitors during the installation and demobilization periods would be somewhat higher than Alternative 1a. A total of 46,000 visitors, including 26,000 net visitors would visit

during each period under Alternative 1c. Table 4-22 illustrates the economic, employment and income effects of visitor spending under Alternative 1c, by geographic location.

Table 4-22. Net Economic Output, Employment and Income Created by OTR Visitor Spending during Installation and Demobilization, Alternative 1c

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$3,496,000	$3,087,000	$6,583,000
SAA	$1,165,000	$1,452,000	$2,617,000
Total	$4,661,000	$4,539,000	$9,200,000
Employment (FTEs)			
PAA	39	29	68
SAA	14	14	28
Total	52	44	96
Personal Income			
PAA	$1,168,000	$717,000	$1,885,000
SAA	$412,000	$410,000	$822,000
Total	$1,580,000	$1,127,000	$2,707,000

Notes: (1) Employment is defined as full time equivalents (FTEs).
(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2010.

Net visitor spending due to OTR installation and demobilization activities under Alternative 1c would have a minor, short-term beneficial impact on employment and personal income in the region.

b. Demographic Effects

Demographic impacts, including impacts to local residents from traffic delays, would be the similar to those described for Alternative 1a, except that the duration of impacts would occur over a period of one year. Construction traffic during installation would be heavier due to the compressed time frame; construction traffic during demobilization traffic would be the same as under Alternative 1a. Visitor traffic during installation would be only slightly more concentrated since most of that visitation would occur during the blossoming period, similar to under Alternative 1a. Overall, traffic impacts to residents would be negligible to minor and short-term.

c. Housing Effects

Housing impacts during installation and demobilization would be similar to those of Alternative 1a, with the exception that about 5,000 additional net overnight visitors would be housed within the PAA and SAA. About 2,500 visitors would visit during the blossoming period and 2,000 would visit in the first week of demobilization. The PAA and SAA have adequate accommodations to meet the needs of these visitors.

d. Public Facilities and Services

Impacts upon water and wastewater providers and facilities during the installation and demobilization periods would be the same as described under Alternative 1a.

Impacts to schools during the installation and demobilization periods would be the same as described under Alternative 1a, except that the demobilization period would begin and end one week later due to the extended exhibition period.

Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety section.

e. Fiscal Impacts

Sales tax revenue generated by OTR expenditures would be the same as for Alternative 1a. Sales and occupancy tax revenue generated by visitor spending would be higher than that of Alternative 1a due to the larger number of visitors. About $171,000 of net local taxes would be collected under Alternative 1c, within the PAA and SAA as a result of visitor spending. Sales and occupancy tax revenue generated by visitor spending and collected within the PAA includes $49,000 to Salida, $33,000 to Chaffee County, $27,000 to Cañon City, $18,000 to Fremont County and $9,000 to Buena Vista. Table 4-23 provides the sales and occupancy tax revenue generated during installation and demobilization under Alternative 1c.

Table 4-23. Local and State Sales and Occupancy Tax Revenue Collected during the OTR Installation and Demobilization Periods, by Source, Alternative 1c

Source of Tax Revenue	PAA	SAA	State
OTR Purchases	$64,000	$62,000	$181,000
Visitor Spending	$135,000	$36,000	$45,000
Total	**$199,000**	**$98,000**	**$226,000**

Notes: (1) Local sales taxes include applicable county and city level taxes.
(2) Revenue is based on sales tax rates as of October 2009.
Sources: OTR Corp; Colorado Department of Revenue, Harvey Economics 2010.

Tax revenue collected on OTR purchases and visitor purchases would be negligible and short-term for the PAA, SAA, and the state.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting- Quality of Life

Impacts to the quality of life of residents of the PAA would be the same as those described for Alternative 1a. No permanent change to the quality of life in Fremont or Chaffee counties would occur as a result of installation or demobilization activities under Alternative 1c.

4.14.3.2 Exhibition

a. Economic Output, Employment and Income

OTR Activities. The employment, wages and total earnings of OTR personnel under Alternative 1c would be similar to that described for Alternative 1a, except that the 350 monitors and supervisors would work for the entire 3-week exhibition period, earning a total of about $468,000. These impacts to employment and personal income would be negligible and short-term.

Local Business Activity. Impacts to agricultural operations, mining operations and other businesses that rely on transportation of goods and services would be the similar to those described for Alternative 1a, except that the maximum delay time for eastbound traffic would be 8.5 minutes during peak periods, 1 minute longer than under Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts to anglers and the fishing industry during the exhibition period would be similar to those described for Alternative 1a, except that lost revenue to the industry would be higher, about $51,000, as a result of the longer exhibition period. Impacts to outfitters and guides would be minor and short-term.

Benefits to the rafting industry during the exhibition period would be similar to Alternative 1a, except that additional revenues would increase to $1.9 million and additional employee earnings would be about $470,000. These increases are due to the longer exhibition period and based on the assumption that there would be adequate flow in the Arkansas River during the last week of the exhibition period. Impacts to rafting companies and employees would be minor to moderate and short-term.

Impacts to the hunting industry during the exhibition period would be the same as for Alternative 1a.

Benefits to touristic and other local businesses would be greater than under Alternative 1a due to the extended exhibition period; additional visitors would visit OTR and spend money in the PAA and SAA during the third week of the exhibition. Net visitor spending would be about $9.0 million higher than for Alternative 1a.

Visitor Spending. The number of visitors during the exhibition period would differ from Alternative 1a. Total visitation for Alternative 1c is about 95,000 visits higher than for Alternative 1a due to the extended exhibition period. Net visitor spending in the PAA and SAA would amount to $33.2 million over the exhibition period, with total economic output of $69.1 million. Table 4-24 illustrates the economic, employment and income effects of visitor spending under Alternative 1c, by geographic location.

Table 4-24. Net Economic Output, Employment and Income Created by OTR Visitor Spending during Exhibition, Alternative 1c

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$15,100,000	$13,334,000	$28,434,000
SAA	$18,086,000	$22,535,000	$40,621,000
Total	$33,186,000	$35,869,000	$69,055,000
Employment (Person Hours)			
PAA	340,241	257,221	597,462
SAA	432,301	454,179	886,480
Total	772,542	711,401	1,483,943
Personal Income			
PAA	$5,044,000	$3,096,000	$8,140,000
SAA	$6,402,000	$6,366,000	$12,768,000
Total	$11,446,000	$9,462,000	$20,908,000

Note: Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp; DOLA 2009, Harvey Economics 2010.

Effects on employment and personal income due to visitor spending during the exhibition period would be beneficial, minor and short-term.

b. Demographic Effects

Demographic effects would be similar to Alternative 1a, except that the maximum delay time for eastbound traffic would be 8.5 minutes during peak periods, 1 minute longer than under Alternative 1a. Impacts to residents of the PAA as a result of traffic delays would be minor to moderate and short-term.

c. Housing Effects

Housing impacts would be similar to those described for Alternative 1a, except that a higher number of visitors would stay overnight in the PAA or SAA. There would be adequate accommodations in the PAA and SAA to meet the needs of these visitors. Impacts to housing facilities in the PAA would be moderate to significant and short-term as hotels and other accommodations would be filled to capacity during the exhibition period. Housing facilities in the SAA would experience minor impacts, given the number of overnight visitors expected to stay in the SAA and the capacity of those facilities.

d. Public Facilities and Services

Local water and wastewater system impacts would be similar to those described for Alternative 1a, except that higher demands would be experienced over a longer period of time (3 weeks). Service providers would be able to meet the additional demands of visitors over the 3-week period. The 3-week exhibition period under Alternative 1c suggests that school would begin towards the end of the exhibition period.

Delays of up to 10.5 minutes could occur for school busses driving on US 50; however, peak period visitation to OTR would likely occur on Saturdays and Sundays, when school would not be in session. Impacts to school transportation services would be negligible to minor during the exhibition period.

Emergency services would be provided as described for Alternative 1a, except that on-site services would be available for 3 weeks of exhibition, and as described in the Public Health and Safety section.

e. Fiscal Impacts

OTR spending patterns during the exhibition period would be the same as described for Alternative 1a; no sales tax revenues would be generated by any OTR activities.

Visitor spending would generate about $1.9 million of sales and occupancy tax revenues for Alternative 1c, including the following:

- $519,000 of local (city and county) taxes in the PAA, including $185,000 in tax revenue to Salida, $123,000 to Chaffee County, $116,000 to Cañon City, $84,000 to Fremont County and $12,000 to Buena Vista;
- $701,000 of local (city and county) taxes in the SAA; and
- $698,000 of state level sales tax revenue.

Net tax revenue generated under Alternative 1c would be about 38% more than for Alternative 1a. These tax revenues would be beneficial, negligible to minor and short-term.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting

Colorado Arts Climate. The impact of OTR on Colorado's arts community and participation in art events by residents and visitors would be the same as described for Alternative 1a.

g. Quality of Life- PAA

Impacts to the quality of life in Fremont and Chaffee counties as a result of the OTR exhibition would be the same as described for Alternative 1a, except that traffic related impacts would occur over a 3-week period.

4.14.3.3 Alternative 1c Summary

During the installation, exhibition, and demobilization periods, OTR construction activities, OTR expenditures, and net visitor spending would generally result in minor to moderate short-term increases in employment, personal income, local business activity and sales tax revenues. The fishing industry in the PAA is likely the only sector of the local economy that would experience a loss of business and a loss of revenue because of OTR activities. Traffic delays and congestion during the exhibition period have the potential for negligible impacts to commercial business activity and minor to moderate impacts to PAA residents. Local service providers, including emergency services, would be able to meet the demands of both visitors and residents from the beginning of the installation period through the end of the

demobilization period. There would be some potential for delays to school transportation services during the installation and demobilization periods, but these would be negligible to minor. Table 4-25 provides a summary of socioeconomic impacts resulting from OTR installation, exhibition, and demobilization under Alternative 1c.

This page intentionally blank

Table 4-25. Summary of Socioeconomic Impacts during the Installation/ Demobilization and Exhibition Periods, Alternative 1c

	Installation/ Demobilization	Exhibition	Total
OTR Expenditures	$31,000,000	$468,000	$31,468,000
Materials and Supplies	$8,300,000	$0	$8,300,000
Wages	$6,250,000	$468,000	$6,718,000
Other	$16,450,000	$0	$16,450,000
Total Visitation	92,000	439,000	$531,000
Net Visitation	52,000	314,000	$366,000
Net Visitor Spending	$4,661,000	$33,186,000	$37,847,000
Sales Tax Revenue			
Local Sales Tax Revenue	$297,000	$1,220,000	$1,517,000
State Sales Tax Revenue	$225,000	$698,000	$923,000
Local Business Impacts			
Fishing Industry	($118,000)	($51,000)	($169,000)
Rafting Industry Revenue	$148,000	$1,877,000	$2,025,000
Rafting Employee Wages	$37,000	$472,000	$509,000
Ag/ Mining/ Other	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays
Hunting Industry	($192,000)	($1,500)	($193,500)
Touristic and Other Local Businesses	Included in economic output	Included in economic output	Included in economic output
Economic Output (including above impacts)	$73,333,000	$69,002,500	$142,335,500
Employment (FTEs)	334	NA	NA
Employment (Person Hours)	NA	1,483,943	NA
Personal Income	$14,294,000	$20,908,000	$35,202,000
Resident Impacts	Potential for increased travel time	Maximum of 8.5 to 10.5 minute travel time delays on U.S 50	Increased travel times
Public Facilities and Services			
Water/ Sewage	Can meet demands	Can meet demands	Can meet demands
Schools	Potential for delays	Potential for delays	Potential for delays
Protection and Emergency Medical Services	Can meet demands	Can meet demands	Can meet demands

Note: (1) Dollars expressed in 2009 constant terms.

(2) Local sales tax revenue indicates tax dollars collected by jurisdictions within the PAA and SAA only.

Source: Harvey Economics 2010.

This page intentionally blank

4.14.4 Alternative 1d

Complete details describing Alternative 1d are included in Chapter 2.0. The following assumptions provide the basis of the socioeconomic impact analysis for Alternative 1d:

- **Installation and demobilization periods**: A total of 367 OTR employees; total costs of $31.0 million, including $6.3 million for wages and $8.3 million for materials and supplies; the spending patterns and demands for services of 23,000 visitors, including 13,000 new visitors, during the installation period and during the demobilization period; and potential for traffic delays on US 50.
- **Exhibition period**: 350 OTR employees; $312,000 for wages; the spending patterns and demands for services of net OTR visitors to the PAA and SAA; and increased traffic volume and congestion, including a maximum of 6.5 to 9.5 minutes of increased travel time on US 50, depending on direction of travel.

4.14.4.1 Installation and Demobilization

a. Economic Output, Employment and Income

Installation and Demobilization Activities. The installation period for Alternative 1d would be compressed into 14 months, half the installation time under Alternative 1a.[44] However, the total number of panels under Alternative 1d and the amount of work required to install the panels would be the same as for Alternative 1a; therefore, the number of workers required under Alternative 1d would generally be double that of Alternative 1a during the shorter installation period.[45] Table 4-26 illustrates the hours of work and the wages for each type of worker employed under Alternative 1d.

[44] The demobilization period would remain the same as under Alternative 1a at 3 months.

[45] The blossoming of the fabric panels would occur over a period of 7 days, as under Alternative 1a, and would therefore not require a doubling of fabric panel unfurling personnel.

Table 4-26. OTR Installation and Demobilization Employment Summary, Alternative 1d

Type of Worker	Number of Workers	Months of Work	Total Number of Hours	Hourly Wage	Total Wages
Surveyors	6	7.5	9,900	$25	$285,000
Anchor and ATF Installation					
Anchor drilling	30	7	46,200	$20	$1,100,000
ATF installation	30	4	26,400	$20	$629,000
Steel Cable Installation	40	1	8,800	$30	$298,000
Fabric Installation					
Fabric panel installation	50	1	11,000	$30	$414,000
Fabric panel unfurling	25	7 days	1,300	$15	$24,000
Demobilization	186	3	122,807	$25	$3,500,000
TOTAL	**367**		**226,407**		**$6,250,000**

Notes: (1) Alternative 1d includes a 14 month installation period.
(2) Total wages include $28 per diem per worker.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2010.

OTR spending on materials, wages and other purchases would be the same as under Alternative 1a. The total number of hours required for installation and demobilization would also be the same as under Alternative 1a. Therefore, total economic output, employment and personal income created by installation and demobilization under Alternative 1d would be the same as under Alternative 1a.

Local Business Activity. Agricultural operations, mining operations and other businesses that rely on US 50 for transportation of goods and services would experience the same types of impacts as described for Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts from a reduction in angler activities during the installation period would be less than those described in Alternative 1a due to the compressed installation schedule; revenue losses would be about $41,000. Under this alternative, demobilization would begin the third week of September. Impacts to the fishing industry would be slightly less than those under Alternative 1a due to the late September start of the demobilization period and the minimal fishing activity that occurs between October and December. Revenue losses due to reduced fishing activity during this period would be about $32,000. Industry-wide revenue losses would be minor and short-term. Impacts to outfitters and guides from reduced fishing activity during the installation and demobilization periods would be moderate and short-term.

Blossoming would occur in late August under Alternative 1d. More rafting would occur during this period as compared to normal late August levels; however the typically low water levels in the Arkansas River at this time of year would dampen that increase somewhat. As a result, additional income to the rafting industry would be about $59,000 and additional employee earnings would be about $15,000. No new employment is projected. Demobilization would begin in late September; low water levels at this time of year would not allow for any additional rafting activity due to OTR demobilization visitors. Therefore, no

additional industry or employee earnings would be expected. Overall impacts to rafting companies and employees would be minor and short-term.

Revenue losses to the hunting industry in the PAA would be less than for Alternative 1a due to the shorter installation period. The 14-month installation period under Alternative 1d would affect one hunting season and revenue losses to outfitters, guides and other businesses would amount to about $65,000.

Demobilization period impacts would be the same as described for Alternative 1a. Overall impacts to the hunting industry would be short-term and minor.

Impacts on touristic and other local businesses would be smaller than for Alternative 1a, due to a lower number of expected visitors.

Visitor Spending. The number of visitors during the installation and demobilization periods would be less than Alternative 1a. A total of 23,000 visitors, including 13,000 net visitors would visit during each period under Alternative 1d. Table 4-27 illustrates the economic, employment and income effects of visitor spending under Alternative 1d, by geographic location.

Table 4-27. Net Economic Output, Employment and Income Created by OTR Visitor Spending during Installation and Demobilization, Alternative 1d

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$1,748,000	$1,543,000	$3,291,000
SAA	$583,000	$726,000	$1,309,000
Total	$2,331,000	$2,269,000	$4,600,000
Employment (FTEs)			
PAA	19	15	34
SAA	7	7	14
Total	26	22	48
Personal Income			
PAA	$584,000	$358,000	$942,000
SAA	$206,000	$205,000	$411,000
Total	$790,000	$563,000	$1,353,000

Notes: (1) Employment is defined as full time equivalents (FTEs).
(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2010.

Net visitor spending due to OTR installation and demobilization activities under Alternative 1d would have a minor, short-term beneficial impact on employment and personal income in the region.

b. Demographic Effects

Demographic impacts, including impacts to local residents from traffic delays, would be the same as described for Alternative 1a, except that the duration of impacts would occur over a period of one year. Construction traffic during installation would be heavier due to the compressed time frame; construction traffic during demobilization traffic would be the same as under Alternative 1a. Visitor traffic during installation would be only slightly more concentrated since most of that visitation would occur during the blossoming period, similar to under Alternative 1a. Overall, traffic impacts to residents would be negligible to minor and short-term.

c. Housing Effects

Housing impacts during installation and demobilization would be similar to those of Alternative 1a, with the exception that more net overnight visitors would be housed within the PAA and SAA. About 1,300 visitors would visit during the blossoming period and 1,000 would visit in the first week of demobilization. The PAA and SAA would have adequate accommodations to meet the needs of these visitors.

d. Public Facilities and Services

Impacts upon water and wastewater providers and facilities during the installation and demobilization periods would be the same as described under Alternative 1a.

Impacts to schools during the installation and demobilization periods would be the same as described under Alternative 1a, except that the demobilization period would begin in mid to late September.

Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety section.

e. Fiscal Impacts

Sales tax revenue generated by OTR expenditures would the same as for Alternative 1a. Sales and occupancy tax revenue generated by visitor spending would be lower than that of Alternative 1a due to the smaller number of visitors. About $86,000 of net local taxes would be collected under Alternative 1d within the PAA and SAA as a result of visitor spending. Sales and occupancy tax revenue generated by visitor spending and collected within the PAA includes $24,000 to Salida, $16,000 to Chaffee County, $13,000 to Cañon City, $9,000 to Fremont County and $5,000 to Buena Vista. Table 4-28 provides the tax revenue generated during installation and demobilization under Alternative 1d.

Table 4-28. Local and State Sales and Occupancy Tax Revenue Collected during the OTR Installation and Demobilization Periods, by Source, Alternative 1d

Source of Tax Revenue	PAA	SAA	State
OTR Purchases	$64,000	$62,000	$181,000
Visitor Spending	$68,000	$18,000	$22,000
Total	**$132,000**	**$80,000**	**$203,000**

Notes: (1) Local sales taxes include applicable county and city level taxes.
(2) Revenue is based on sales tax rates as of October 2009.
Sources: OTR Corp, Colorado Department of Revenue, Harvey Economics 2010.

Tax revenue collected on OTR purchases and visitor purchases would be negligible and short-term for the PAA, SAA and the state.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting- Quality of Life

Impacts to the quality of life of residents of the PAA would be the same as those described for Alternative 1a, except that construction and visitor traffic would be limited to a 14-month period during installation. No permanent change to the quality of life in Fremont or Chaffee counties would occur as a result of installation or demobilization activities under Alternative 1d.

4.14.4.2 Exhibition

a. Economic Output, Employment and Income

OTR Activities. The employment, wages and total earnings of OTR personnel under Alternative 1d would be the same as that described for Alternative 1a.

Local Business Activity. Impacts to agricultural operations, mining operations and other businesses that rely on transportation of goods and services would be similar to those described for Alternative 1a, except that the maximum delay time for eastbound traffic would be 6.5 minutes during peak periods, one minute less than under Alternative 1a, and the maximum delay time for westbound traffic would be 9.5 minutes, also one minute less than under Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts from a reduction in angler activities during the exhibition period would be much higher than those described in Alternative 1a; revenue losses would be about $64,000. This 88% increase in lost revenues is due to a much higher level of angler activity on the Arkansas River in September as compared to August, under normal conditions. Outfitters and guides would experience minor to moderate, short-term impacts as a result of these revenue losses.

Under Alternative 1d, low water levels in the Arkansas River during the September exhibition period would not be adequate to accommodate any additional rafting activity. The rafting industry would not experience any increase in income and employees would not earn any additional wages as a result of OTR exhibition period visitation under Alternative 1d. Therefore, there would be no impact to rafting companies or employees during this period.

Impacts to the hunting industry during the exhibition period would be the same as described for Alternative 1a.

Benefits to touristic and other local businesses would be considerably less than under Alternative 1a due to the lower number of people expected to visit during the September exhibition period. Net visitor spending would be about $12 million lower than for Alternative 1a.

Visitor Spending. The number of visitors during the exhibition period would differ from Alternative 1a. The total number of visits under Alternative 1d is about 120,000 less than for Alternative 1a, mainly due to the effects of a September exhibition period. Net visitor spending in the PAA and SAA would amount to $12.5 million over the exhibition period, with total economic output of $25.3 million. Table 4-29 illustrates the economic, employment and income effects of visitor spending under Alternative 1d, by geographic location.

Table 4-29. Net Economic Output, Employment and Income Created by OTR Visitor Spending during Exhibition, Alternative 1d

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$7,377,000	$6,514,000	$13,891,000
SAA	$5,087,000	$6,339,000	$11,426,000
Total	$12,464,000	$12,853,000	$25,317,000
Employment (Person Hours)			
PAA	166,224	125,665	291,890
SAA	121,601	127,755	249,357
Total	287,826	253,421	541,247
Personal Income			
PAA	$2,464,000	$1,512,000	$3,976,000
SAA	$1,801,000	$1,791,000	$3,592,000
Total	$4,265,000	$3,303,000	$7,568,000

Note: Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2010.

Effects on employment and personal income due to visitor spending during the exhibition period would be beneficial, minor and short-term.

b. Demographic Effects

Demographic impacts would be similar to those of Alternative 1a, except that the maximum delay time for eastbound traffic would be 6.5 minutes during peak periods, 1 minute less than under Alternative 1a, and the maximum delay time for westbound traffic would be 9.5 minutes, also 1 minute less than under Alternative 1a. Impacts to residents of the PAA as a result of traffic delays would be minor to moderate and short-term.

c. Housing Effects

Housing impacts would be the same as described for Alternative 1a, except that a larger number of visitors would stay overnight in the PAA or SAA. There would be adequate accommodations in the PAA and SAA to meet the needs of these visitors. Impacts to housing facilities in the PAA would be moderate to significant and short-term as hotels and other accommodations would be filled to capacity during the exhibition period. Housing facilities in the SAA would experience minor impacts, given the number of overnight visitors expected to stay in the SAA and the capacity of those facilities.

d. Public Facilities and Services

Local water and wastewater system impacts would be similar to those described for Alternative 1a. Under Alternative 1d, school would be session throughout the entire September exhibition period. As a result, delays of up to 9.5 minutes could be experienced by school busses traveling on US 50; however, it is likely that peak period visitation, and maximum delay times, would occur on weekends, when school would not be in session. Impacts to school transportation services would be negligible to minor during the exhibition period.

Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety section.

e. Fiscal Impacts

OTR spending patterns during the exhibition period would be the same as described for Alternative 1a; no sales tax revenues would be generated by any OTR activities.

Visitor spending would generate about $705,000 of sales and occupancy tax revenues for Alternative 1d, including the following:

- $268,000 of local (city and county) taxes in the PAA, including $96,000 in tax revenues to Salida, $64,000 to Chaffee County, $57,000 to Cañon City, $39,000 to Fremont County and $12,000 to Buena Vista;
- $186,000 of local (city and county) taxes in the SAA; and
- $250,000 of state level sales tax revenue.

Net tax revenue generated under Alternative 1d would be about 49% less than for Alternative 1a. These sales and occupancy tax revenues would be beneficial, negligible to minor and short-term.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting

Colorado Arts Climate. The impact of OTR on Colorado's arts community and participation in art events by residents and visitors would be the same as described for Alternative 1a.

g. Quality of Life- PAA

Impacts to the quality of life in Fremont and Chaffee counties as a result of the OTR exhibition would be the same as described for Alternative 1a.

4.14.4.3 Alternative 1d Summary

During the installation, exhibition and demobilization periods, OTR construction activities, OTR expenditures and net visitor spending would generally result in minor to moderate short-term increases in employment, personal income, local business activity and sales tax revenues. The fishing industry in the PAA is likely the only sector of the local economy that would experience a loss of business and a loss of revenue because of OTR activities. Traffic delays and congestion during the exhibition period have the potential for negligible impacts to commercial business activity and minor to moderate impacts to PAA residents. Local service providers, including emergency services, would be able to meet the demands of both visitors and residents from the beginning of the installation period through the end of the demobilization period. There would be some potential for delays to school transportation services during the installation, exhibition and demobilization periods, but these would be negligible to minor. Table 4-30 provides a summary of socioeconomic impacts resulting from OTR installation, exhibition and demobilization under Alternative 1d.

Table 4-30. Summary of Socioeconomic Impacts during the Installation/ Demobilization and Exhibition Periods, Alternative 1d

	Installation/ Demobilization	Exhibition	Total
OTR Expenditures	$31,000,000	$312,000	$31,312,000
Materials and Supplies	$8,300,000	$0	$8,300,000
Wages	$6,250,000	$312,000	$6,562,000
Other	$16,450,000	$0	$16,450,000
Total Visitation	46,000	224,000	$270,000
Net Visitation	26,000	149,000	$175,000
Net Visitor Spending	$2,330,000	$12,465,000	$14,795,000
Sales Tax Revenue			
Local Sales Tax Revenue	$212,000	$454,000	$666,000
State Sales Tax Revenue	$203,000	$250,000	$453,000
Local Business Impacts			
Fishing Industry	($73,000)	($64,000)	($137,000)
Rafting Industry Revenue	$59,000	$0	$59,000
Rafting Employee Wages	$15,000	$0	$15,000
Ag/ Mining/ Other	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays
Hunting Industry	($127,000)	($1,500)	($128,500)
Touristic and Other Local Businesses	Included in economic output	Included in economic output	Included in economic output
Economic Output (including above impacts)	$68,844,000	$25,252,500	$94,096,500
Employment (FTEs)	286	NA	NA
Employment (Person Hours)	NA	541,247	NA
Personal Income	$12,940,000	$7,568,000	$20,508,000
Resident Impacts	Potential for increased travel time	Maximum of 6.5 to 9.5 minute travel time delays on U.S 50	Increased travel times
Public Facilities and Services			
Water/ Sewage	Can meet demands	Can meet demands	Can meet demands
Schools	Potential for delays	Potential for delays	Potential for delays
Protection and Emergency Medical Services	Can meet demands	Can meet demands	Can meet demands

Notes: (1) Dollars expressed in 2009 constant terms.

(2) Local sales tax revenue indicates tax dollars collected by jurisdictions within the PAA and SAA only.

Source: Harvey Economics 2010

This page intentionally blank.

4.14.5 Alternative 2

Complete details describing Alternative 2 are included in Chapter 2.0. The following assumptions provide the basis of the socioeconomic impact analysis for Alternative 2:

- **Installation and demobilization periods**: A total of 235 OTR employees; total costs of $25.1 million, including $5.1 million for wages and $6.7 million for materials and supplies; the spending patterns and demands for services of 38,000 visitors, including 23,000 new visitors, during the installation period and during the demobilization period; and potential for traffic delays on US 50.
- **Exhibition period**: 284 OTR employees; $253,000 for wages; the spending patterns and demands for services of net new visitors to the PAA and SAA; and increased traffic volume and congestion, including a maximum of 7.5-9.5 minutes of increased travel time on US 50, depending on direction of travel.

4.14.5.1 Installation and Demobilization

a. Economic Output, Employment and Income

Installation and Demobilization Activities. Construction activities would occur as described for Alternative 1a. OTR costs, employment and wage data for Alternative 1a were scaled to portray those of Alternative 2 based on the number of panels under each alternative. Employment and wage data for Alternative 2 is provided in Table 4-31.

Table 4-31. OTR Installation and Demobilization Employment Summary, Alternative 2

Type of Worker	Number of Workers	Months of Work	Total Number of Hours	Hourly Wage	Total Wages
Surveyors	3	15	8,000	$25	$231,000
Anchor and ATF Installation					
Anchor drilling	12	14	37,500	$20	$892,000
ATF installation	12	8	21,400	$20	$510,000
Steel Cable Installation	16	2	7,100	$30	$241,000
Fabric Installation					
Fabric panel installation	20	2	8,900	$30	$336,000
Fabric panel unfurling	20	7 days	1,000	$15	$19,000
Demobilization	151	3	99,600	$25	$2,838,000
TOTAL	**235**		**183,500**		**$5,067,000**

Note: Total wages include $28 per diem per worker.

Sources: OTR Corp; Harvey Economics 2009.

Total economic output, employment and wages resulting from OTR installation and demobilization activities under Alternative 2 is shown in Table 4-32.

Table 4-32. Net Economic Output, Employment and Income Created by OTR Installation and Demobilization Activities, Alternative 2

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$4,959,000	$3,630,000	$8,589,000
SAA	$6,019,000	$6,295,000	$12,314,000
Rest of Colorado	$12,475,000	$18,874,000	$31,349,000
Total	$23,453,000	$28,799,000	$52,252,000
Employment (FTEs)			
PAA	28	23	51
SAA	46	51	97
Rest of Colorado	18	27	45
Total	92	101	193
Personal Income			
PAA	$1,520,000	$950,000	$2,470,000
SAA	$2,534,000	$2,182,000	$4,716,000
Rest of Colorado	$1,014,000	$1,195,000	$2,209,000
Total	$5,068,000	$4,327,000	$9,395,000

Notes: (1) Employment has been converted to the number of full-time equivalents (FTEs). Actual OTR employees would work varying numbers of hours depending on the type of work.

(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.

Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Spending on OTR installation and demobilization activities under Alternative 2 would have a minor, short-term beneficial impact on employment and personal income in the region.

Local Business Activity. Agricultural operations, mining operations and other businesses that rely on US 50 for transportation of goods and services would experience the same types of impacts as described for Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts to anglers and the fishing industry during the installation and demobilization periods would be similar to those described for Alternative 1a, except that revenue losses during installation would be about $68,000 and losses during demobilization would be about $34,000. Overall, losses to the industry would be minor, but local outfitters and guides would likely experience moderate losses of income.

Impacts to the rafting industry during the installation and demobilization periods would be the same as described under Alternative 1a.

Impacts to the hunting industry during the installation and demobilization periods would be the same as described under Alternative 1a.

Impacts on tourist and other local businesses would be similar to those of Alternative 1a, due to a similar number of expected visitors during the installation and demobilization periods.

Visitor Spending. The number of visitors during the installation and demobilization periods would differ from Alternative 1a. A total of 38,000 visitors, including 23,000 net visitors would visit during each period under Alternative 2. Table 4-33 illustrates the economic, employment and income effects of visitor spending under Alternative 2, by geographic location.

Table 4-33. Net Economic Output, Employment and Income Created by OTR Visitor Spending during Installation and Demobilization, Alternative 2

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$2,888,000	$2,550,000	$5,438,000
SAA	$963,000	$1,199,000	$2,162,000
Total	$3,851,000	$3,749,000	$7,600,000
Employment (FTEs)			
PAA	32	24	56
SAA	11	12	23
Total	43	36	79
Personal Income			
PAA	$965,000	$592,000	$1,557,000
SAA	$341,000	$339,000	$680,000
Total	$1,306,000	$931,000	$2,237,000

Notes: (1) Employment is defined as full time equivalents (FTEs).
(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Net visitor spending due to OTR installation and demobilization activities under Alternative 2 would have a minor, short-term beneficial impact on employment and personal income in the region.

b. Demographic Effects

Demographic impacts, including impacts to local residents from traffic delays, would be the same as described for Alternative 1a.

c. Housing Effects

Housing impacts during installation and demobilization would be the same as under Alternative 1a.

d. Public Facilities and Services

Impacts upon water and wastewater providers and facilities during the installation and demobilization periods would be the same as described under Alternative 1a.

Impacts to schools during the installation and demobilization periods would be similar to those described under Alternative 1a, except that the demobilization period would begin in late July or early August. A major portion of the demobilization work would occur before the school year begins and overall impacts from potential delays would likely be negligible. Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety section.

e. Fiscal Impacts

Sales tax revenue generated by OTR expenditures would be less than Alternative 1a because fewer materials would be needed to install the smaller number of panels. However, sales and occupancy tax revenue generated by visitor spending would be higher than that of Alternative 1a due to the larger number of visitors. About $141,000 of net local taxes would be collected under Alternative 2 within the PAA and SAA as a result of visitor spending. Tax revenue generated by visitor spending and collected within the PAA includes $40,000 to Salida, $27,000 to Chaffee County, $22,000 to Cañon City, $15,000 to Fremont County and $8,000 to Buena Vista. Table 4-34 provides the sales and occupancy tax revenue generated during installation and demobilization under Alternative 2.

Table 4-34. Local and State Sales and Occupancy Tax Revenue Collected during the OTR Installation and Demobilization Periods, by Source, Alternative 2

Source of Tax Revenue	PAA	SAA	State
OTR Purchases	$52,000	$50,000	$146,000
Visitor Spending	$112,000	$29,000	$37,000
Total	**$164,000**	**$79,000**	**$183,000**

Notes: (1) Local sales taxes include applicable county and city level taxes.
(2) Revenue is based on sales tax rates as of October 2009.

Sources: OTR Corp, Colorado Department of Revenue, Harvey Economics 2009.

Tax revenue collected on OTR purchases and visitor purchases would be negligible and short-term for the PAA, SAA and the state.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting- Quality of Life

Impacts to the quality of life of residents of the PAA would be the same as those described for Alternative 1a. No permanent change to the quality of life in Fremont or Chaffee counties would occur as a result of installation or demobilization activities under Alternative 2.

4.14.5.2 Exhibition

a. Economic Output, Employment and Income

OTR Activities. The employment, wages and total earnings of OTR personnel under Alternative 2 would be lower than that described for Alternative 1a. Approximately 284 monitors and supervisors (instead of 350) would be hired, earning a total of about $253,000 over the 2-week period. Impacts to employment and income from OTR activity during the exhibition period would be negligible and short-term.

Local Business Activity. Impacts to agricultural operations, mining operations and other businesses that rely on transportation of goods and services would be the similar to those described for Alternative 1a, except that the maximum delay time for westbound traffic would be 9.5 minutes during peak periods, 1 minute less than under Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts to anglers and the fishing industry during the exhibition period would be lower than those described in Alternative 1a; revenue losses would be about $28,000. These losses would mean short-term minor to moderate impacts to outfitters and guides

July is the busiest month for rafting on the Arkansas River and companies operate at peak or near peak levels. Therefore, no additional rafting activities would occur under this alternative and there would be no additional income to the industry or employees during the exhibition period.

Impacts to the hunting industry during the exhibition period would be the same as described under Alternative 1a.

Benefits to touristic and other local businesses would be slightly higher than those described for Alternative 1a due to additional visitor spending money in the area under Alternative 2.

Visitor Spending. The number of visitors expected during the exhibition period is higher more than for Alternative 1a, mainly due to the July exhibition period. Net visitor spending in the PAA and SAA would amount to $26.0 million over the exhibition period, with total economic output of $54.0 million. Table 4-35 illustrates the economic, employment, and income effects of visitor spending under Alternative 2, by geographic location.

Table 4-35. Net Economic Output, Employment and Income Created by OTR Visitor Spending during Exhibition, Alternative 2

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$12,587,000	$11,114,000	$23,701,000
SAA	$13,466,000	$16,779,000	$30,245,000
Total	$26,053,000	$27,893,000	$53,946,000
Employment (Person Hours)			
PAA	283,611	214,410	498,021
SAA	321,881	338,171	660,052
Total	605,492	552,581	1,158,074
Personal Income			
PAA	$4,204,000	$2,580,000	$6,784,000
SAA	$4,767,000	$4,740,000	$9,507,000
Total	$8,971,000	$7,320,000	$16,291,000

Note: Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Effects on employment and personal income due to visitor spending during the exhibition period would be beneficial, minor and short-term.

b. Demographic Effects

Demographic impacts would be similar to those of Alternative 1a, except that the maximum delay time for westbound traffic would be 9.5 minutes during peak periods, 1 minute less than under Alternative 1a. Impacts to residents of the PAA as a result of traffic delays would be minor to moderate and short-term.

c. Housing Effects

Housing impacts would be slightly greater than described for Alternative 1a, since a higher number of visitors would stay overnight in the PAA or SAA. There would be adequate accommodations in the PAA and SAA to meet the needs of these visitors. Impacts to housing facilities in the PAA would be moderate to significant and short-term as hotels and other accommodations would be filled to capacity during the exhibition period. Housing facilities in the SAA would experience minor short-term impacts, given the number of overnight visitors expected to stay in the SAA and the capacity of those facilities.

d. Public Facilities and Services

Local water and wastewater system impacts would be similar to those described for Alternative 1a. Impacts to schools during the exhibition period would be the same as described under Alternative 1a. Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety section.

e. Fiscal Impacts

OTR spending patterns during the exhibition period would be the same as described under Alternative 1a; no sales tax revenues would be generated by any OTR activities.

Visitor spending would generate about $1.5 million of sales and occupancy tax revenue under Alternative 2, including the following:

- $438,000 of local (city and county) taxes in the PAA, including $156,000 in tax revenues to Salida, $104,000 to Chaffee County, $97,000 to Cañon City, $69,000 to Fremont County and $12,000 to Buena Vista;
- $517,000 of local (city and county) taxes in the SAA; and
- $542,000 of state level sales tax revenue.

Net tax revenue generated under Alternative 2 would be about 8% greater than for Alternative 1a due to a slightly larger number of visitors. These sales tax revenues would be beneficial, negligible to minor and short-term.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting

Colorado Arts Climate. The impact of OTR on Colorado's arts community and participation in art events by residents and visitors would be the same as described for Alternative 1a.

g. Quality of Life- PAA

Impacts to the quality of life in Fremont and Chaffee counties as a result of the OTR exhibition would be the same as described for Alternative 1a.

4.14.5.3 Alternative 2 Summary

During the installation, exhibition and demobilization periods, OTR construction activities, OTR expenditures and net visitor spending would generally result in minor to moderate short-term increases in employment, personal income, local business activity and sales tax revenues. The fishing industry in the PAA is likely the only sector of the local economy that would experience a loss of business and a loss of revenue because of OTR activities. Traffic delays and congestion during the exhibition period have the potential for negligible impacts to commercial business activity and minor to moderate impacts to PAA residents. Local service providers, including emergency services, would be able to meet the demands of both visitors and residents from the beginning of the installation period through the end of the demobilization period. There would be some potential for delays to school transportation services during the installation, exhibition and demobilization periods, but these would be negligible to minor. Table 4-36 provides a summary of socioeconomic impacts resulting from OTR installation, exhibition, and demobilization under Alternative 2.

This page intentionally blank

Table 4-36. Summary of Socioeconomic Impacts during the Installation/ Demobilization and Exhibition Periods, Alternative 2

	Installation/ Demobilization	Exhibition	Total
OTR Expenditures	$25,135,000	$253,000	$25,388,000
Materials and Supplies	$6,730,000	$0	$6,730,000
Wages	$5,068,000	$253,000	$5,321,000
Other	$13,338,000	$0	$13,338,000
Total Visitation	76,000	361,000	$437,000
Net Visitation	42,000	261,000	$303,000
Net Visitor Spending	$3,850,000	$26,053,000	$29,903,000
Sales Tax Revenue			
Local Sales Tax Revenue	$244,000	$956,000	$1,200,000
State Sales Tax Revenue	$183,000	$542,000	$725,000
Local Business Impacts			
Fishing Industry	($102,000)	($28,000)	($130,000)
Rafting Industry Revenue	$118,000	$0	$118,000
Rafting Employee Wages	$30,000	$0	$30,000
Ag/ Mining/ Other	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays
Hunting Industry	($192,000)	($1,500)	($193,500)
Touristic and Other Local Businesses	Included in economic output	Included in economic output	Included in economic output
Economic Output (including above impacts)	$59,558,000	$53,917,500	$113,475,500
Employment (FTEs)	272	NA	NA
Employment (Person Hours)	NA	1,158,074	NA
Personal Income	$11,631,000	$16,291,000	$27,922,000
Resident Impacts	Potential for increased travel time	Maximum of 7.5 to 9.5 minute travel time delays on U.S 50	Increased travel times
Public Facilities and Services			
Water/ Sewage	Can meet demands	Can meet demands	Can meet demands
Schools	Potential for delays	No impact	Potential for delays
Protection and Emergency Medical Services	Can meet demands	Can meet demands	Can meet demands

Notes: (1) Dollars expressed in 2009 constant terms.

(2) Local sales tax revenue indicates tax dollars collected by jurisdictions within the PAA and SAA only.

Source: Harvey Economics 2009.

This page intentionally blank

4.14.6 Alternative 3

Complete details describing Alternative 3 are included in Chapter 2.0. The following assumptions provide the basis of the socioeconomic impact analysis for Alternative 3:

- **Installation and demobilization periods**: A total of 203 OTR employees; total costs of $21.8 million, including $4.4 million for wages and $5.8 million for materials and supplies; the spending patterns and demands for services of 33,000 visitors, including 20,000 new visitors, during the installation period and during the demobilization period; and potential for traffic delays on US 50.
- **Exhibition period**: 246 OTR employees; $219,000 for wages; the spending patterns and demands for services of net new visitors to the PAA and SAA; and increased traffic volume and congestion, including a maximum of 7.5-9.5 minutes of increased travel time on US 50, depending on direction of travel.

4.14.6.1 Installation and Demobilization

a. Economic Output, Employment and Income

Installation and Demobilization Activities. Construction activities would occur as described for Alternative 1a; but would be scaled down according to the number of panels under Alternative 3. Employment and wage data for Alternative 3 is provided in Table 4-37.

Table 4-37. OTR Installation and Demobilization Employment Summary, Alternative 3

Type of Worker	Number of Workers	Months of Work	Total Number of Hours	Hourly Wage	Total Wages
Surveyors	2	15	7,000	$25	$200,000
Anchor and ATF Installation					
Anchor drilling	11	14	32,500	$20	$773,000
ATF installation	11	8	18,600	$20	$442,000
Steel Cable Installation	14	2	6,200	$30	$209,000
Fabric Installation					
Fabric panel installation	18	2	7,700	$30	$291,000
Fabric panel unfurling	18	7 days	900	$15	$17,000
Demobilization	131	3	86,300	$25	$2,459,000
TOTAL	**203**		**159,200**		**$4,391,000**

Note: Total wages include $28 per diem.

Sources: OTR Corp, Harvey Economics 2009.

Total economic output, employment and wages resulting from OTR installation and demobilization activities under Alternative 3 are shown in Table 4-38.

Table 4-38. Economic Output, Employment and Income Created by OTR Installation and Demobilization Activities, Alternative 3

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$4,298,000	$3,146,000	$7,444,000
SAA	$5,216,000	$5,456,000	$10,672,000
Rest of Colorado	$10,811,000	$16,358,000	$27,169,000
Total	$20,325,000	$24,960,000	$45,285,000
Employment (FTEs)			
PAA	24	20	44
SAA	40	44	84
Rest of Colorado	16	23	39
Total	80	88	167
Personal Income			
PAA	$1,318,000	$823,000	$2,141,000
SAA	$2,196,000	$1,891,000	$4,087,000
Rest of Colorado	$878,000	$1,036,000	$1,914,000
Total	$4,392,000	$3,750,000	$8,142,000

Notes: (1) Employment has been converted to the number of full-time equivalents (FTEs). Actual OTR employees would work varying numbers of hours depending on the type of work.

(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.

Sources: OTR Corp, DOLA 2009, Harvey Economics 2009

Spending on OTR installation and demobilization activities under Alternative 3 would have a minor, short-term beneficial impact on employment and personal income in the region.

Local Business Activity. Agricultural operations, mining operations and other businesses that rely on US 50 for transportation of goods and services would experience the same types of impacts as described for Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts to anglers and the fishing industry during the installation and demobilization periods would be the same as described in Alternative 1a. Although there would be fewer panels and more space in between them, concerns about a quality fishing experience would still exist.

Impacts to the rafting industry during the installation period would be the same as described under Alternative 1a. Demobilization impacts would be slightly less than those described in Alternative 1a; additional industry revenues would be about $108,000 and additional employee earnings would be about $27,000. These revenues and earnings would have a beneficial, short-term, minor to moderate impact on rafting companies and guides.

Impacts to the hunting industry during the installation and demobilization periods would be the same as described for Alternative 1a.

Impacts on tourist and other local businesses would be less than for Alternative 1a, due to a lower number of expected visitors and lower visitor spending, as described below.

Visitor Spending. The number of visitors during the installation and demobilization periods would be somewhat less than Alternative 1a. A total of 33,000 visitors, including 20,000 net visitors would visit during each period under Alternative 3. Table 4-39 illustrates the economic, employment and income effects of visitor spending under Alternative 3, by geographic location.

Table 4-39. Net Economic Output, Employment and Income Created by OTR Visitor Spending during Installation and Demobilization, Alternative 3

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$2,508,000	$2,214,000	$4,722,000
SAA	$836,000	$1,042,000	$1,878,000
Total	$3,344,000	$3,256,000	$6,600,000
Employment (FTEs)			
PAA	28	21	49
SAA	10	10	20
Total	37	31	69
Personal Income			
PAA	$838,000	$514,000	$1,352,000
SAA	$296,000	$294,000	$590,000
Total	$1,134,000	$808,000	$1,942,000

Notes: (1) Employment is defined as full time equivalents (FTEs).
(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2010.

Net visitor spending due to OTR installation and demobilization activities under Alternative 3 would have a minor, short-term beneficial impact on employment and personal income in the region.

b. Demographic Effects

Demographic impacts, including impacts to local residents from traffic delays, would be the same as described for Alternative 1a.

c. Housing Effects

Under Alternative 3, housing impacts during installation and demobilization would be similar to those of Alternative 1a, except that about 1,000 fewer visitors would stay in the PAA or SAA overnight. The PAA and SAA have adequate accommodations to meet the needs of overnight visitors and impacts to housing facilities would be minor.

d. Public Facilities and Services

Impacts upon water and wastewater providers and facilities during the installation and demobilization periods would be the same as described under Alternative 1a. Impacts to schools during the installation and demobilization periods would be the same as described under Alternative 1a.

Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety.

e. Fiscal Impacts

Sales tax revenue generated by OTR expenditures would be less than Alternative 1a because fewer materials would be needed to install the smaller number of panels. Sales and occupancy tax revenue generated by visitor spending would be lower than that of Alternative 1a due to the smaller number of visitors. About $123,000 of net local taxes would be collected under Alternative 3 within the PAA and SAA as a result of visitor spending. Sales and occupancy tax revenue generated by visitor spending and collected within the PAA includes $35,000 to Salida, $24,000 to Chaffee County, $19,000 to Cañon City, $13,000 to Fremont County and $7,000 to Buena Vista. Table 4-40 provides the tax revenue generated during installation and demobilization under Alternative 3.

Table 4-40. Local and State Sales and Occupancy Tax Revenue Collected during the OTR Installation and Demobilization Periods, by Source, Alternative 3

Source of Tax Revenue	PAA	SAA	State
OTR Purchases	$45,000	$44,000	$127,000
Visitor Spending	$97,000	$26,000	$32,000
Total	**$142,000**	**$70,000**	**$159,000**

Notes: (1) Local sales taxes include applicable county and city level taxes.
(2) Revenue is based on sales tax rates as of October 2009.
Sources: OTR Corp, Colorado Department of Revenue, Harvey Economics 2009.

Tax revenue collected on OTR purchases and visitor purchases would be negligible and short-term for the PAA, SAA, and the state.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting- Quality of Life

Impacts to the quality of life of residents of the PAA would be the same as those described for Alternative 1a. No permanent change to the quality of life in Fremont or Chaffee counties would occur as a result of installation or demobilization activities under Alternative 3.

4.14.6.2 Exhibition

a. Economic Output, Employment and Income

OTR Activities. The employment, wages and total earnings of OTR personnel under Alternative 3 would be less than that described for Alternative 1a, with 246 monitors and supervisors earning a total of about $219,000 over the 2-week period. Impacts to employment and income from OTR activity during the exhibition period would be negligible and short-term.

Local Business Activity. Impacts to businesses that rely on transportation of goods and services would be the similar to those described for Alternative 1a, except that the maximum delay time for westbound traffic would be 9.5 minutes during peak periods, 1 minute less than under Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts to anglers and the fishing industry during the exhibition period would be the same as described in Alternative 1a; concern about the experience would discourage some anglers from visiting the area. Benefits to the rafting industry during the exhibition period would be the same as described under Alternative 1a. The attraction of the OTR would remain strong for rafters, even with the smaller exhibition size.

Impacts to the hunting industry during the exhibition period would be the same as for Alternative 1a.

Benefits to touristic and other local businesses would be slightly lower than those described for Alternative 1a due to fewer visitors expected under Alternative 3.

Visitor Spending. The number of visitors during the exhibition period would be less than Alternative 1a. Net visitor spending in the PAA and SAA would amount to about $21.6 million, with total economic output of $44.6 million. Table 4-41 illustrates the economic, employment and income effects of visitor spending under Alternative 3, by geographic location.

Table 4-41. Net Economic Output, Employment and Income Generated by OTR Visitor Spending during Exhibition, Alternative 3

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$10,713,000	$9,460,000	$20,173,000
SAA	$10,854,000	$13,524,000	$24,378,000
Total	$21,567,000	$22,984,000	$44,551,000
Employment (Person Hours)			
PAA	241,390	182,491	423,881
SAA	259,436	272,566	532,002
Total	500,826	455,056	955,882
Personal Income			
PAA	$3,578,000	$2,196,000	$5,774,000
SAA	$3,842,000	$3,821,000	$7,663,000
Total	$7,420,000	$6,017,000	$13,437,000

Note: Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Effects on employment and personal income due to visitor spending during the exhibition period would be beneficial, minor and short-term.

b. Demographic Effects

Demographic impacts would be similar to those of Alternative 1a, except that the maximum delay time for westbound traffic would be 9.5 minutes during peak periods, 1 minute less than under Alternative 1a. Impacts to residents of the PAA as a result of traffic delays would be minor to moderate and short-term.

c. Housing Effects

Housing impacts would be similar to those described for Alternative 1a. There would be adequate accommodations in the PAA and SAA to meet the needs of overnight visitors. Impacts to housing facilities in the PAA would be moderate to significant and short-term, as hotels and other accommodations would be filled to capacity during the exhibition period. Housing facilities in the SAA would experience minor short-term impacts, given the number of overnight visitors expected to stay in the SAA and the capacity of those facilities.

d. Public Facilities and Services

Local water and wastewater system impacts would be similar to those described for Alternative 1a. Impacts to schools during the exhibition period would be the same as described under Alternative 1a.

Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety section.

e. Fiscal Impacts

No sales tax revenues would be generated by any OTR activities during the exhibition period under Alternative 3.

Visitor spending would generate about $1.2 million of sales and occupancy tax revenue for Alternative 3, including the following:

- $377,000 of local (city and county) taxes in the PAA, including $134,000 in tax revenues to Salida, $90,000 to Chaffee County, $82,000 to Cañon City, $58,000 to Fremont County and $12,000 to Buena Vista;
- $415,000 of local (city and county) taxes in the SAA; and
- $448,000 of state level sales tax revenue.

Net tax revenue generated under Alternative 3 would be about 11% lower than for Alternative 1a. These sales tax revenues would be beneficial, negligible to minor and short-term.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting

Colorado Arts Climate. The impact of OTR on Colorado's arts community and participation in art events by residents and visitors would be similar to that described for Alternative 1a. However, the smaller OTR event and reduced visitation numbers would potentially result in less publicity and excitement for the arts in general.

g. Quality of Life- PAA

Impacts to the quality of life in Fremont and Chaffee counties as a result of the OTR exhibition would be the same as described for Alternative 1a.

4.14.6.3 Alternative 3 Summary

During the installation, exhibition and demobilization periods, OTR construction activities, OTR expenditures and net visitor spending would generally result in minor to moderate short-term increases in employment, personal income, local business activity and sales tax revenues. The fishing industry in the PAA is likely the only sector of the local economy that would experience a loss of business and a loss of revenue because of OTR activities. Traffic delays and congestion during the exhibition period have the potential for negligible impacts to commercial business activity and minor to moderate impacts to PAA residents. Local service providers, including emergency services, would be able to meet the demands of both visitors and residents from the beginning of the installation period through the end of the demobilization period. There would be some potential for delays to school transportation services during the installation, exhibition and demobilization periods, but these would be negligible to minor. Table 4-42 provides a summary of socioeconomic impacts resulting from OTR installation, exhibition and demobilization under Alternative 3.

This page intentionally blank

Table 4-42. Summary of Socioeconomic Impacts during the Installation/ Demobilization and Exhibition Periods, Alternative 3

	Installation/ Demobilization	Exhibition	Total
OTR Expenditures	$21,784,000	$219,000	$22,003,000
Materials and Supplies	$5,832,000	$0	$5,832,000
Wages	$4,392,000	$219,000	$4,611,000
Other	$11,559,000	$0	$11,559,000
Total Visitation	66,000	320,000	$386,000
Net Visitation	36,000	220,000	$256,000
Net Visitor Spending	$3,344,000	$21,567,000	$24,911,000
Sales Tax Revenue			
Local Sales Tax Revenue	$211,000	$791,000	$1,002,000
State Sales Tax Revenue	$159,000	$448,000	$607,000
Local Business Impacts			
Fishing Industry	($110,000)	($34,000)	($144,000)
Rafting Industry Revenue	$108,000	$1,502,000	$1,610,000
Rafting Employee Wages	$27,000	$378,000	$405,000
Ag/ Mining/ Other	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays
Hunting Industry	($192,000)	($1,500)	($193,500)
Touristic and Other Local Businesses	Included in economic output	Included in economic output	Included in economic output
Economic Output (including above impacts)	$51,583,000	$44,515,500	$96,098,500
Employment (FTEs)	236	NA	NA
Employment (Person Hours)	NA	955,882	NA
Personal Income	$10,084,000	$13,437,000	$23,521,000
Resident Impacts	Potential for increased travel time	Maximum of 7.5 to 9.5 minute travel time delays on U.S 50	Increased travel times
Public Facilities and Services			
Water/ Sewage	Can meet demands	Can meet demands	Can meet demands
Schools	Potential for delays	No impact	Potential for delays
Protection and Emergency Medical Services	Can meet demands	Can meet demands	Can meet demands

Notes: (1) Dollars expressed in 2009 constant terms.

(2) Local sales tax revenue indicates tax dollars collected by jurisdictions within the PAA and SAA only.

Source: Harvey Economics 2009.

This page intentionally blank

4.14.7 Alternative 4

Complete details describing Alternative 4 are included in Chapter 2.0. The following assumptions provide the basis of the socioeconomic impact analysis for Alternative 4:

- **Installation and demobilization periods**: A total of 96 OTR employees; total costs of $7.5 million, including $1.5 million for wages and $2.0 million for materials and supplies; the spending patterns and demands for services of 15,000 visitors, including 9,000 new visitors, during the installation period and during the demobilization period; and potential for traffic delays on US 50.
- **Exhibition period**: 85 OTR employees; $76,000 for wages; the spending patterns and demands for services of net new visitors to the PAA and SAA; and increased traffic volume and congestion, including a maximum of 5.5-10.5 minutes of increased travel time on US 50, depending on direction of travel.

4.14.7.1 Installation and Demobilization

a. Economic Output, Employment and Income

Installation and Demobilization Activities. The construction sequence would occur as described for Alternative 1a, but at a substantially scaled back level. OTR costs, employment and wage data for Alternative 1a were scaled to portray those of Alternative 4 based on the number of panels. Employment and wage data for Alternative 4 are provided in Table 4-43.

Table 4-43. OTR Installation and Demobilization Employment Summary, Alternative 4

Type of Worker	Number of Workers	Months of Work	Total Number of Hours	Hourly Wage	Total Wages
Surveyors	2	7.5	2,400	$25	$69,000
Anchor and ATF Installation					
Anchor drilling	7	7	11,200	$20	$268,000
ATF installation	7	4	6,400	$20	$153,000
Steel Cable Installation	10	1	2,100	$30	$72,000
Fabric Installation					
Fabric panel installation	12	1	2,700	$30	$101,000
Fabric panel unfurling	6	7 days	300	$15	$6,000
Demobilization	45	3	29,900	$25	$851,000
TOTAL	**90**		**55,000**		**$1,520,000**

Note: Total wages include $28 per diem.

Sources: OTR Corp, Harvey Economics 2009.

Total economic output, employment and wages resulting from OTR installation and demobilization activities under Alternative 4 are shown in Table 4-44.

Table 4-44. Economic Output, Employment and Income Created by OTR Installation and Demobilization Activities, Alternative 4

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$1,488,000	$1,089,000	$2,577,000
SAA	$1,806,000	$1,889,000	$3,695,000
Rest of Colorado	$3,742,000	$5,662,000	$9,404,000
Total	$7,036,000	$8,640,000	$15,676,000
Employment (FTEs)			
PAA	8	7	15
SAA	14	15	29
Rest of Colorado	6	8	14
Total	28	30	58
Personal Income			
PAA	$456,000	$285,000	$741,000
SAA	$760,000	$654,000	$1,414,000
Rest of Colorado	$304,000	$358,000	$662,000
Total	$1,520,000	$1,297,000	$2,817,000

Notes: (1) Employment has been converted to the number of full-time equivalents (FTEs). Actual OTR employees would work varying numbers of hours depending on the type of work.

(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.

Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Spending on OTR installation and demobilization activities under Alternative 4 would have a minor, short-term, beneficial impact on employment and personal income in the region.

Local Business Activity. Agricultural operations, mining operations and other businesses that rely on US 50 for transportation of goods and services would experience the same types of impacts as described for Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts to anglers and the fishing industry during the installation and demobilization periods would be similar to those described in Alternative 1a, except that revenue losses would be $58,000 due to the compressed installation schedule. Although there would be far fewer panels under Alternative 4, the publicity of the OTR project would tend to discourage anglers. Impacts to the industry would be minor and impacts to outfitters and guides would be moderate; all impacts would be short-term.

Benefits would accrue to the rafting industry during the installation and demobilization periods because, although there would be fewer panels, the attraction would still be there. During installation and demobilization, additional industry earnings would be about $49,000 and additional employee earnings would be about $12,000. These impacts would be minor and short-term.

Revenue losses to the hunting industry in the PAA would be less than for Alternative 1a due to the shorter installation period. The 14-month installation period under Alternative 4 would affect one hunting season and revenue losses to outfitters, guides and other businesses would amount to about $65,000. Demobilization period impacts would be the same as described for Alternative 1a. Overall impacts to the hunting industry would be short-term and minor.

Impacts on tourist and other local businesses would substantially lower than for Alternative 1a due to a lower number of visitors.

Visitor Spending. The number of visitors during the installation and demobilization periods would be less than Alternative 1a. A total of 15,000 visitors, including 9,000 net new visitors would visit during each period under Alternative 4. Table 4-45 sets forth the economic, employment and income effects of visitor spending under Alternative 4, by geographic location.

Table 4-45. Net Economic Output, Employment and Income Generated by OTR Visitor Spending during Installation and Demobilization, Alternative 4

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$1,140,000	$1,007,000	$2,147,000
SAA	$380,000	$473,000	$853,000
Total	$1,520,000	$1,480,000	$3,000,000
Employment (FTEs)			
PAA	13	10	22
SAA	4	5	9
Total	17	14	31
Personal Income			
PAA	$381,000	$234,000	$615,000
SAA	$135,000	$134,000	$269,000
Total	$516,000	$368,000	$884,000

Notes: (1) Employment is defined as full time equivalents (FTEs).
(2) Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Net visitor spending due to OTR installation and demobilization activities under Alternative 4 would have a minor, short-term beneficial impact on employment and personal income in the region.

b. Demographic Effects

Demographic impacts, including impacts to local residents from traffic delays, would be similar to those described for Alternative 1a, except that the duration of impacts would occur over a period of one year. Construction traffic during installation would be heavier due to the compressed time frame; construction traffic during demobilization traffic would be the same as under Alternative 1a. Visitor traffic during installation would be only slightly more concentrated since most of that visitation would occur during the blossoming period, similar to under Alternative 1a. Overall, traffic impacts to residents would be negligible to minor and short-term.

c. Housing Effects

Housing impacts during installation and demobilization would be less than those of Alternative 1a. An estimated 2,000 net new overnight visitors would be housed within the PAA and SAA. About 1,000 visitors would visit during the blossoming period and 800 would visit in the first week of demobilization. The PAA and SAA would have adequate accommodations to meet the needs of these visitors and impacts to housing facilities would be minor.

d. Public Facilities and Services

Impacts upon water and wastewater providers and facilities during the installation and demobilization periods would be the same as described under Alternative 1a.

Impacts to schools during the installation and demobilization periods would be the same as described under Alternative 1a.

Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety section.

e. Fiscal Impacts

Sales tax revenue generated by OTR expenditures would be less than Alternative 1a because fewer materials would be needed to install the smaller number of panels. Sales and occupancy tax revenue generated by visitor spending would be lower than that of Alternative 1a due to the smaller number of visitors. About $56,000 of net local taxes would be collected under Alternative 4 within the PAA and SAA as a result of visitor spending. Sales and occupancy tax revenue generated by visitor spending and collected within the PAA includes $16,000 to Salida, $11,000 to Chaffee County, $9,000 to Cañon City, $6,000 to Fremont County and $3,000 to Buena Vista. Table 4-46 provides the tax revenue generated during installation and demobilization under Alternative 4.

Table 4-46. Local and State Sales and Occupancy Tax Revenue Collected during the OTR Installation and Demobilization Periods, by Source, Alternative 4

Source of Tax Revenue	PAA	SAA	State
OTR Purchases	$16,000	$15,000	$44,000
Visitor Spending	$44,000	$12,000	$15,000
Total	**$60,000**	**$27,000**	**$59,000**

Notes: (1) Local sales taxes include applicable county and city level taxes.
(2) Revenue is based on sales tax rates as of October 2009.
Sources: OTR Corp, Colorado Department of Revenue, Harvey Economics 2009

Tax revenue collected on OTR purchases and visitor purchases would be negligible and short-term for the PAA, SAA and the state.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting- Quality of Life

Impacts to the quality of life of residents of the PAA would be the same as those described for Alternative 1a, except that construction and visitor traffic would be limited to a 14-month period during installation. No permanent change to the quality of life in Fremont or Chaffee counties would occur as a result of installation or demobilization activities under Alternative 4.

4.14.7.2 Exhibition

a. Economic Output, Employment and Income

OTR Activities. The employment, wages and total earnings of OTR personnel under Alternative 4 would be less than that described for Alternative 1a. An estimated 85 monitors and supervisors would be hired, earning a total of about $76,000 over the two week period. Impacts to employment and income from OTR activity during the exhibition period would be negligible and short-term.

Local Business Activity. Impacts to agricultural operations, mining operations and other businesses that rely on transportation of goods and services would be the similar to those described for Alternative 1a, except that the maximum delay time for eastbound traffic would be 5.5 minutes during peak periods, 2 minutes less than for Alternative 1a. Impacts to these businesses would be negligible and short-term.

Impacts to anglers and the fishing industry during the exhibition period would be the same as described in Alternative 1a, even though visitation and related crowds would be much less. The event itself and associated publicity would tend to repel anglers during the exhibition period.

Impacts to the rafting industry during the exhibition period would be the same as described under Alternative 1a. Even with fewer panels, the novelty would be an attraction.

Impacts to the hunting industry during the exhibition period would be the same as described for Alternative 1a.

Benefits to touristic and other local businesses would be substantially lower than those described for Alternative 1a due to fewer visitors and less visitor spending in the area under Alternative 4.

Visitor Spending. Under Alternative 4, the number of exhibition period visits would be substantially less than for Alternative 1a (145,000 compared to 344,000), and therefore the amount of visitor spending would also be considerably lower. Net visitor spending in the PAA and SAA would amount to $3.6 million, about 85% less than for Alternative 1a, and total economic output would amount to $7.0 million, about 84% less than for Alternative 1a. Table 4-47 illustrates the economic, employment and income effects of visitor spending under Alternative 4, by geographic location.

Table 4-47. Net Economic Output, Employment and Income Generated by OTR Visitor Spending during Exhibition, Alternative 4

	Direct	Induced/ Indirect	Total
Economic Output			
PAA	$2,672,000	$2,360,000	$5,032,000
SAA	$891,000	$1,110,000	$2,001,000
Total	$3,563,000	$3,470,000	$7,033,000
Employment (Person Hours)			
PAA	60,209	45,518	105,726
SAA	21,291	22,368	43,659
Total	81,499	67,886	149,385
Personal Income			
PAA	$893,000	$548,000	$1,441,000
SAA	$315,000	$314,000	$629,000
Total	$1,208,000	$862,000	$2,070,000

Note: Induced/ indirect and total output, employment and income numbers include impacts to local governments.
Sources: OTR Corp, DOLA 2009, Harvey Economics 2009.

Effects on employment and personal income due to visitor spending during the exhibition period would be beneficial, minor and short-term.

b. Demographic Effects

Demographic impacts would be similar to those of Alternative A, except that the maximum delay time for eastbound traffic would be 5.5 minutes during peak periods, 2 minutes less than for Alternative 1a. Demographic impacts would be negligible and short-term under Alternative 4.

c. Housing Effects

Housing impacts would be less than those described for Alternative 1a. Fewer visitors would stay overnight in the PAA or SAA. There would be adequate accommodations in the PAA and SAA to meet the needs of these visitors. Impacts to housing facilities in the PAA would be moderate to significant and short-term as hotels and other accommodations would be filled to capacity during the exhibition period. Housing facilities in the SAA would experience negligible short-term impacts, given the number of overnight visitors expected to stay in the SAA and the capacity of those facilities.

d. Public Facilities and Services

Local water and wastewater system impacts would be similar to those described for Alternative 1a, except that overall and peak demands from visitors would be considerably lower, due to the lower number of visitors.

Impacts to schools during exhibition period would be the same as described under Alternative 1a.

Emergency services would be provided as described for Alternative 1a and as described in the Public Health and Safety section.

e. Fiscal Impacts

No sales tax revenues would be generated by any OTR activities during the exhibition phase under Alternative 4.

Net visitor spending would generate about $205,000 of sales and occupancy tax revenue under Alternative 4, including the following:

- $108,000 of local (city and county) taxes in the PAA, including $39,000 in tax revenues to Salida, $26,000 to Chaffee County, $20,000 to Cañon City, $12,000 to Fremont County and $10,000 to Buena Vista;
- $27,000 of local (city and county) taxes in the SAA; and
- $71,000 of state level sales tax revenue.

Net tax revenue generated under Alternative 4 would be about 85% lower than for Alternative 1a. These sales tax revenues would be beneficial, negligible to minor and short-term.

Any costs to public service providers, including emergency services such as police, fire and medical, resulting from construction activities or the increase in area visitors would be reimbursed by OTR Corp as part of the developed cost recovery agreements, as discussed for Alternative 1a.

f. Social Setting

Colorado Arts Climate. The impact of OTR on Colorado's arts community and participation in art events by residents and visitors would be similar to that described for Alternative 1a. However, the smaller OTR event and reduced visitation numbers would potentially result in less publicity and excitement for the arts in general.

g. Quality of Life- PAA

Impacts to the quality of life in Fremont and Chaffee counties as a result of the OTR exhibition would be the same as described for Alternative 1a.

4.14.7.3 Alternative 4 Summary

During the installation, exhibition and demobilization periods, OTR construction activities, OTR expenditures and net visitor spending would generally result in minor to moderate short-term increases in employment, personal income, local business activity and sales tax revenues. The fishing industry in the PAA is likely the only sector of the local economy that would experience a loss of business and a loss of revenue because of OTR activities. Traffic delays and congestion during the exhibition period have the potential for negligible impacts to commercial business activity and minor to moderate impacts to PAA residents. Local service providers, including emergency services, would be able to meet the demands of both visitors and residents from the beginning of the installation period through the end of the demobilization period. There would be some potential for delays to school transportation services during the installation, exhibition and demobilization periods, but these would be negligible to minor. Table 4-48 provides a summary of socioeconomic impacts resulting from OTR installation, exhibition, and demobilization under Alternative 4.

Table 4-48. Summary of Socioeconomic Impacts during the Installation/ Demobilization and Exhibition Periods, Alternative 4

	Installation/ Demobilization	Exhibition	Total
OTR Expenditures	$7,541,000	$76,000	$7,617,000
Materials and Supplies	$2,019,000	$0	$2,019,000
Wages	$1,520,000	$76,000	$1,596,000
Other	$4,001,000	$0	$4,001,000
Total Visitation	30,000	145,000	$175,000
Net Visitation	16,000	45,000	$61,000
Net Visitor Spending	$1,520,000	$3,563,000	$5,083,000
Sales Tax Revenue			
Local Sales Tax Revenue	$86,000	$134,000	$220,000
State Sales Tax Revenue	$59,000	$71,000	$130,000
Local Business Impacts			
Fishing Industry	($58,000)	($34,000)	($92,000)
Rafting Industry Revenue	$49,000	$1,502,000	$1,551,000
Rafting Employee Wages	$12,000	$503,000	$515,000
Ag/ Mining/ Other	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays	Potential for negligible amounts of lost revenue due to traffic delays
Hunting Industry	($127,000)	($1,500)	($128,500)
Touristic and Other Local Businesses	Included in economic output	Included in economic output	Included in economic output
Economic Output (including above impacts)	$18,491,000	$6,997,500	$25,488,500
Employment (FTEs)	89	NA	NA
Employment (Person Hours)	NA	149,385	NA
Personal Income	$3,700,000	$2,069,000	$5,769,000
Resident Impacts	Potential for increased travel time	Maximum of 5.5 to 10.5 minute travel time delays on U.S 50	Increased travel times
Public Facilities and Services			
Water/ Sewage	Can meet demands	Can meet demands	Can meet demands
Schools	Potential for delays	No impact	Potential for delays
Protection and Emergency Medical Services	Can meet demands	Can meet demands	Can meet demands

Notes: (1) Dollars expressed in 2009 constant terms.

(2) Local sales tax revenue indicates tax dollars collected by jurisdictions within the PAA and SAA only.

Source: Harvey Economics 2009.

This page intentionally blank

4.14.8 Alternative Comparisons

Tables 4-49 and 4-50 provide a comparison of the socioeconomic impacts that would occur during the installation and demobilization periods and during the exhibition period for all alternatives.

Table 4-49. Summary of Socioeconomic Impacts during the Installation/ Demobilization Periods, by Alternative

	Alternative 1a	Alternative 1c	Alternative 1d	Alternative 2	Alternative 3	Alternative 4
OTR Expenditures	$31,000,000	$31,000,000	$31,000,000	$25,135,000	$21,784,000	$7,541,000
Materials and Supplies	$8,300,000	$8,300,000	$8,300,000	$6,730,000	$5,832,000	$2,019,000
Wages	$6,250,000	$6,250,000	$6,250,000	$5,068,000	$4,392,000	$1,520,000
Other	$16,450,000	$16,450,000	$16,450,000	$13,338,000	$11,559,000	$4,001,000
Total Visitation	72,000	92,000	46,000	76,000	66,000	30,000
Net New Visitation	40,000	52,000	26,000	42,000	36,000	16,000
Net New Visitor Spending	$3,648,000	$4,661,000	$2,330,000	$3,850,000	$3,344,000	$1,520,000
Sales Tax Revenue						
Local Sales Tax Revenue	$260,000	$297,000	$212,000	$244,000	$211,000	$86,000
State Sales Tax Revenue	$216,000	$225,000	$203,000	$183,000	$159,000	$59,000
Local Business Impacts						
Tourism, other businesses	See output	See output	See output	See output	See output	See output
Fishing Industry	($110,000)	($118,000)	($73,000)	($102,000)	($110,000)	($58,000)
Rafting Industry Total	$118,000	$148,000	$59,000	$118,000	$108,000	$49,000
Rafting Wages	$30,000	$37,000	$15,000	$30,000	$27,000	$12,000
Ag/ Mining/ Other	Negligible lost revenue	Negligible lost revenue	Negligible lost revenue	Negligible lost revenue	Negligible lost revenue	Negligible lost revenue
Hunting Industry	($192,000)	($192,000)	($127,000)	($192,000)	($192,000)	($127,000)
Economic Output (includes above categories)	$71,342,000	$73,333,000	$68,844,000	$59,558,000	$51,583,000	$18,491,000
Employment (FTEs)	313	334	286	272	236	89
Personal Income	$13,705,000	$14,294,000	$12,940,000	$11,631,000	$10,084,000	$3,700,000
Resident Impacts	Increased travel time	Increased travel time	Increased travel time	Increased travel time	Increased travel time	Increased travel time
Public Facilities and Services						
Water/ Sewage	Meets demands	Meets demands	Meets demands	Meets demands	Meets demands	Meets demands
Schools	Potential for delays	Potential for delays	Potential for delays	Potential for delays	Potential for delays	Potential for delays
Protection and Emergency Medical Services	Meets demands	Meets demands	Meets demands	Meets demands	Meets demands	Meets demands

Note: Dollars expressed in 2009 constant terms.

Table 4-50. Summary of Socioeconomic Impacts during the Exhibition Period, by Alternative

	Alternative 1a	Alternative 1c	Alternative 1d	Alternative 2	Alternative 3	Alternative 4
OTR Expenditures	$312,000	$468,000	$312,000	$253,000	$219,000	$76,000
Materials and Supplies	$0	$0	$0	$0	$0	$0
Wages	$312,000	$468,000	$312,000	$253,000	$219,000	$76,000
Other	$0	$0	$0	$0	$0	$0
Total Visitation	344,000	439,000	224,000	361,000	320,000	145,000
Net New Visitation	244,000	314,000	149,000	261,000	220,000	45,000
Net New Visitor Spending	$24,193,000	$33,186,000	$12,465,000	$26,053,000	$21,567,000	$3,563,000
Sales Tax Revenue						
Local Sales Tax Revenue	$887,000	$1,220,000	$454,000	$956,000	$791,000	$134,000
State Sales Tax Revenue	$503,000	$698,000	$250,000	$542,000	$448,000	$71,000
Local Business Impacts						
Tourism, other businesses	See output	See output	See output	See output	See output	See output
Fishing Industry	($34,000)	($51,000)	($64,000)	($28,000)	($34,000)	($34,000)
Rafting Industry Total	$1,502,000	$1,877,000	$0	$0	$1,502,000	$1,502,000
Rafting Wages	$378,000	$472,000	$0	$0	$378,000	$503,000
Ag/ Mining/ Other	Negligible lost revenue	Negligible lost revenue	Negligible lost revenue	Negligible lost revenue	Negligible lost revenue	Negligible lost revenue
Hunting Industry	($1,500)	($1,500)	($1,500)	($1,500)	($1,500)	($1,500)
Economic Output (includes above categories)	$50,015,500	$69,002,500	$25,252,500	$53,917,500	$44,515,500	$6,997,500
Employment (Person Hours)	1,074,238	1,483,943	541,247	1,158,074	955,882	149,385
Personal Income	$15,108,000	$20,908,000	$7,568,000	$16,291,000	$13,437,000	$2,069,000
Resident Impacts	Maximum 10.5 minute delays on US 50	Maximum 10.5 minute delays on US 50	Maximum 9.5 minute delays on US 50	Maximum 9.5 minute delays on US 50	Maximum 9.5 minute delays on US 50	Maximum 10.5 minute delays on US 50
Public Facilities and Services						
Water/ Sewage	Meets demands	Meets demands	Meets demands	Meets demands	Meets demands	Meets demands
Schools	No impact	Potential delays	Potential delays	No impact	No impact	No impact
Protection and Emergency Medical Services	Meets demands	Meets demands	Meets demands	Meets demands	Meets demands	Meets demands

Note: Dollars expressed in 2009 constant terms.

4.15 PUBLIC HEALTH AND SAFETY

The method of analyzing public health and safety deals almost entirely with the ability of emergency responders to address man-made and natural emergencies in a potentially congested traffic corridor. Natural and man-made events, such as flooding, fires, rockfall, boating accidents, and hazardous material spills are not uncommon in the Project Area. Project-related traffic would contribute to the intensity of impacts that already occur in the Project Area. The methodology used to calculate and examine each of these natural and man-made events, which may occur within the project corridor, can be found in the Incident Frequency Study, Appendix E.

Assumptions

- Agencies would communicate and cooperate with each other and OTR Corp in accordance with a collaboratively approved emergency response plan to coordinate fire, law enforcement, traffic control, and medical services.

Safety Measures

- Law enforcement with digital trunk radios would be staged in existing riverside pullouts in each fabric panel area and at Parkdale, Five Points, Salt Lick, Pinnacle Rock, Texas Creek, and Lone Pine.
- Uniformed traffic control officers would be stationed throughout the greater Project Area to monitor and control key intersections on weekends to ensure no-stopping restrictions are observed and to maintain orderly traffic flow, as well as to make certain of a rapid incident response time.
- Temporary speed reductions of 10 mph would apply during daylight hours at all exhibition sites.
- Portable variable message signs would be located in five strategic locations in the corridor and would be used to communicate event information unless an emergency or unusual condition occurs, at which time they would be re-tasked with emergency messages.
- Pedestrian travel would not be allowed along US 50 during the exhibition period. Bicycle travel along US 50 would be prohibited Fridays, Saturdays, and Sundays during the exhibition.
- Towing and vehicle assistance personnel would be staged at the Parkdale Boat Launch (downstream of the Parkdale Viewing Center), Five Points Recreation Site, Texas Creek Staging Area, and at the Vallie Bridge Limited Rest Stop during the week prior to the exhibition period and the exhibition period.
- An event command post would be located at the Texas Creek Staging Area. During the viewing period between 8:00 am and 8:00 pm, law enforcement, security personnel, the OTR event supervisor, and traffic maintenance contractor representatives would be on site to ensure timely decision making and response times as well as effective coordination.
- Approximately 100-150 monitors would be stationed throughout the corridor and distributed between the fabric panel areas. Monitors would be available from 8:00 am to 6:00 pm daily, and are intended to maintain surveillance and communicate with the fabric panel area supervisor in the event of an emergency.
- Approximately 25 project staff and/or monitors would be stationed at each visitor center to distribute information and answer questions regarding the stipulations along US 50, fire danger minimization, viewing opportunities, traffic conditions, and other pertinent information.
- Medical concerns would be addressed by the following:
    - Staging an ambulance with paramedics at Parkdale and Texas Creek everyday during the week prior to and during the exhibition phase between sunrise and sunset.
    - First aid stations would be located at each of the limited rest stops in the corridor to allow treatment of minor nonlife threatening injuries. They would be staffed by trained paramedics between 8:00 am and 8:00 pm during the exhibition period.

  - A medical helicopter would be staged at the Texas Creek Staging Area during the week prior to the exhibition phase and during the exhibition phase between sunrise and sunset.

- Fire hazards would be managed through an information campaign at the information centers, in the media, and on portable variable message signs in the corridor. Firefighting equipment would be staged at Texas Creek during the exhibition phase. Local fire departments would be provided with supplementary communications equipment, if necessary. To ensure that a small fire would be controlled quickly, smaller caches of handheld firefighting equipment would be located at the Parkdale Viewing Center and Vallie Bridge Limited Rest Stop. All work crews would be trained in quick response wildfire suppression techniques as well.
- Hazardous material spill containment, mitigation, and cleanup equipment would be staged at the Texas Creek equipment laydown area. Staff located on site during the exhibition phase would be trained in hazardous materials containment and mitigation.
- Water supplies for human consumption would be located at each limited rest stop. Water would be trucked in by tanker truck on a daily basis or as needed. Approximately 84 portosans would be procured through local or regional vendors. The location and quantity of the portosans is given in Table 4-51.

Table 4-51. Portosan Locations and Quantity

Location	Quantity
Parkdale	25
Texas Creek	25
Fremont Road	10
Five Points	7
Vallie Bridge	7
Salida Information Center	10

Scoping Issues

Issues related to public health and safety as identified during the scoping process, include the following:

- Project crowds in a relatively confined area would impede emergency response to a man-made emergency or natural event, such as a fire, flood, boating accidents, and rockfall.
- Adequate staffing by fire, law enforcement, and medical services.
- Panel failure during the exhibit caused by weather failure or man-made events.
- Rafting safety during cable stringing.

4.15.1 No Action Alternative

Under the No Action Alternative, no temporary work of art for public viewing would be installed. The No Action Alternative would not entail direct impacts to public safety. Impacts associated with staffing and equipment needs for event, traffic, and emergency response management, as well as fire protection and law enforcement would be avoided. Concerns regarding public endangerment as the project is installed and displayed, as well as access to the Arkansas River for user safety and rescue would also not be realized.

However, if the No Action Alternative were selected, local emergency response personnel would not gain the experience of participating in a large-scale and complex public safety plan. The project provides a unique opportunity to work collaboratively with CDOT, emergency response agencies, the public safety community, and local public works agencies to develop emergency and incident response plans that would benefit the Arkansas Valley before, during, and after OTR. These plans would support current protocols and identify technological and operational applications to enhance communication, cooperation, and coordination.

4.15.2 Alternative 1a

4.15.2.1 Installation

Installation would occur over a 28-month period. Activities during the installation phase would have a low level of intensity throughout the corridor in terms of visitation, but a relatively high level of intensity in terms of localized construction type activities than the exhibition phase. This results in impacts that are very similar to that of a roadway construction project. Work requiring lane closures on US 50 would not be performed during peak summer months. Normal traffic control activities and devices as defined in the MUTCD and CDOT's Standard for Traffic Control Plans shown in their M & S Standards would be used.

Although traffic would be noticeably heavier immediately prior to the exhibition phase, US 50 should be able to accommodate the anticipated traffic level based upon the capacity of the highway and the anticipated travel volume during this phase. A combination of lower traffic volume during nonsummer months and the short length of potential lane closures (approximately 400 feet, no less than 10.0 miles apart) would result in delays which are expected to be minor and within normal parameters.

Health and safety issues may arise from the cable stringing process. Rafters face a safety risk as construction crew's work on both sides of the river to install the display. The more dangerous part of the installation would be when the cables holding the display are strung across the river using a .22-caliber line gun. Installation crews would be at risk from rockfall throughout the installation process; however, the risk would be relatively low as the exposure period to rockfall is short and the crews would not be in close proximity to the slopes from which rockfall generally occurs (information on potential rock-fall locations can be found in Section 4.12). In addition, recreational users on the river would be at risk from injury if cable stringing failure occurred or became entangled in low-hanging cable. Implementation of the mitigation measures presented in Chapter 5.0 that would restrict users from entering construction areas during cable stringing until deemed safe and passable could be expected to reduce the level of impact to a negligible level, depending on the specifics of the plan that is ultimately implemented.

A formal command post would not be in place during the installation phase. Coordination would occur from the staging area. Any emergency encountered during this phase would be reported, via DTR, through the existing channels and handled through existing procedures.

4.15.2.2 Exhibition

It is estimated 358,000 visitors may view the display during the 2-week exhibition phase. The increased visitation would bring benefits to the area, but would also present a risk to public health and safety, as over 14,000 vehicles may drive through the Project Area during the maximum viewing period. Increased congestion would augment the intensity of impacts which already occur periodically in the canyon, as well as potentially bring new impacts to the Project Area.

Nearly 36,000 visitors are expected to view the display by auto during the peak viewing period, with an average of 2.5 people per car. The automobile visitation corresponds to approximately 14,320 vehicle trips on a weekend during the viewing period. Approximately 1,050 vehicles driven by visitors are expected to drive westbound during the peak weekend viewing time of 12:00 pm. Through and local travel is expected to be about 250 vehicles westbound during the peak viewing hour. Therefore, a total of nearly 1,300 vehicles are expected to drive westbound on US 50 during the peak hour of viewing.

The *Highway Capacity Manual (2000)* states that the capacity of a two-lane highway is 3,200 vehicles in both directions and 1,700 vehicles in a single direction. It is expected that visitor demand on the highway would not outstrip capacity; however, a slight increase in visitor numbers may outstrip the capacity of the highway resulting in congested traffic as well as public health and safety concerns, should an evacuation need to occur or emergency services were needed within the Project Area. Vehicle congestion would increase the magnitude of any natural disturbance in the Project Area.

Natural disturbances to the Project Area are varied by nature. They include the potential for summertime flashfloods, rockfall, hail and lightning, erratic winds and localized micro-bursts, as well as the risk of fire. The rockfall risk to workers and visitors would be the same as the installation phase, if not slightly higher due to the increase in visitation. Natural events occur often enough where local agencies have built in response mechanisms. Normal agency response actions, which would be set into place whenever a natural disturbance occurs, would be impeded by project-related traffic within the corridor.

The project would also create manmade impacts. Panel failure during the exhibit may endanger rafters, not only from the falling display, but also if the panels dam the river and prove to be an impassible obstruction. The display itself may hinder rescuers from reaching rafters in a timely manner, further complicating rescue efforts. Additional boaters would increase boating accidents and consequently the need for swift water rescues. Visitors may endanger themselves by attempting to see the display outside the designated viewing area. This would put visitors at risk of injuring themselves on the steep slopes along the river and possibly stumbling into the river. Adequate water supplies and sanitation are also a concern in light of the amount of visitors expected to visit the Project Area. This is a risk since the viewing period would take place during the warm summer months. Heat-related illness may result if visitors are not able to stay hydrated. The emergency response effort to treat visitors suffering from heat stress and dehydration may be slowed by increased project congestion and may even add to congestion. Project associated traffic would also impede response time to any hazardous spills that may occur within the Project Area.

Normal response times may not be possible in the event of a natural or man-made emergency due to project congested roadways within the corridor. Infrequent escape routes also add to evacuation concerns. Roadways leading out of the Project Area, aside from US 50, are SH 9 and SH 69. Approximately 20.0 miles separate these two roadways. Furthermore, the increased visitation and congestion comes at a time when economic conditions are forcing agencies to reevaluate their ability to maintain staffing and equipment. Some agencies may cut personnel and equipment in response to budget concerns. Project-related crowds may cause a scenario where agencies cannot provide adequate equipment and personnel to efficiently respond to emergencies.

Health and safety impacts would be greatest during the exhibition phase of the project, but they would also be short-lived, falling in intensity when the viewing period closes. Visitation would drop after the exhibition period, but would still remain relatively high for the following two weeks.

4.15.2.3 Demobilization

Health and safety impacts for this phase of the project would be less than the installation phase, due to the shorter time-period of 3 months compared to 28 months. Potential health and safety risks would be comparable to those discussed for Alternative 1a.

4.15.3 Alternative 1c

4.15.3.1 Installation

Health and safety impacts associated with this alternative would be comparable to Alternative 1a.

4.15.3.2 Exhibition

Health and safety impacts associated with this alternative would be comparable to or slightly greater than Alternative 1a. Visitation would increase approximately 29% from Alternative 1a; however, the magnitude of impacts would be the same and the duration would be longer due to the extended viewing period. This alternative adds an extra week to the viewing period, extending it to three weeks. The removal of commercial boating rations may result in an increased presence of novice and private boaters, potentially increasing the potential for boating accidents and accidental drowning.

4.15.3.3 Demobilization

Health and safety impacts for this phase of the project would be less than the installation phase, due to the shorter time-period of 3 months compared to 28 months. Impacts would be the same as Alternative 1a.

4.15.4 Alternative 1d

4.15.4.1 Installation

This alternative would compress the installation schedule into one year instead of two, slightly decreasing the risk of construction accidents. However, if adequate construction crews and relief workers are not provided during the intense work schedule, the potential for construction-related accidents from human error may increase.

4.15.4.2 Exhibition

The smaller footprint of this alternative as well as the later summer timing (avoidance of severe summer storms) would result in reduced impacts compared to Alternative 1a. This alternative would generate approximately 29% less visitation, due to the September timing of the viewing period. An increase in rafters and subsequent rafting associated impacts may be expected as this alternative would enforce event-only or temporary rations that allow for additional boat capacity between Salida and Vallie Bridge during the exhibition period. This could bring an additional 21,400 rafters to the Project Area.

4.15.4.3 Demobilization

Health and safety impacts for this phase of the project would be less than the installation phase, due to the shorter time-period of 3 months compared to 28 months; however, the later timing of this phase may result in a greater chance construction crews would encounter severe winter weather and weather-related accidents.

4.15.5 Alternative 2

4.15.5.1 Installation

The smaller size of the display would bring less construction and associated health and safety impacts to the Project Area than Alternative 1a.

4.15.5.2 Exhibition

Health and safety impacts associated with this alternative would be comparable to slightly less than Alternative 1a. This alternative and Alternative 1a would generate roughly the same visitation, but fewer boaters would equate to less boating accidents.

4.15.5.3 Demobilization

Health and safety impacts for this phase of the project reduced from the installation phase, due to the shorter time-period of 3 months compared to 28 months. Impacts would be the same as Alternative 1a.

4.15.6 Alternative 3

4.15.6.1 Installation

The smaller size of the display would reduce construction and associated health and safety impacts to the Project Area compared to Alternative 1a.

4.15.6.2 Exhibition

Health and safety impacts associated with this alternative would be comparable to slightly less than Alternative 1a. This alternative and Alternative 1a would generate roughly the same visitation. Fewer boaters would equate to less boating accidents.

4.15.6.3 Demobilization

Health and safety impacts for this phase of the project would be less than the installation phase, due to the shorter time-period of 3 months compared to 28 months. Impacts would be the same as Alternative 1a.

4.15.7 Alternative 4

4.15.7.1 Installation

The smaller size of the display would bring less construction and associated health and safety impacts to the Project Area than Alternative 1a. Additionally, the installation schedule would be compressed into one year instead of two. However, if adequate construction crews and relief workers are not provided during the intense work schedule, the potential for construction-related accidents from human error may increase.

4.15.7.2 Exhibition

The smaller size of this alternative would result in reduced health and safety impacts compared to Alternative 1a. This alternative would generate approximately 58% less visitation than Alternative 1a. Fewer boaters would equate to less boating accidents.

4.15.7.3 Demobilization

Health and safety impacts for this phase of the project would be less than the installation phase, due to the shorter time-period of 3 months compared to 28 months. Impacts would be the same as Alternative 1a.

4.16 TRANSPORTATION AND TRAFFIC

The analysis of transportation and traffic effects is based on visitation estimates, various travel assumptions, traffic modeling results, and associated analyses. A detailed traffic study presents the original and refined visitation estimates, methods, and assumptions for generating estimated traffic volumes, travel patterns, and environmental consequences for each alternative (Appendix D).

Visitation estimates for the action alternatives were analyzed with respect to the unique characteristics of each alternative. The extent and location of the fabric panels and other factors were used to further refine the anticipated travel patterns. In addition, travel patterns were calculated for individual days of the week and times of the day. These results provided peak day and peak period of the day travel estimates. These estimates were further refined to account for travel routes, the average number of passengers in visitor vehicles, and other factors.

VISSIM software was used to develop overall corridor operation and performance metrics for the US 50 project corridor for the projected exhibition year (2013), with and without the project alternatives. The limits of the modeled area include Fremont Road on the east, to the west end of the County Line panel installation on the west. VISSIM is a microsimulation modeling software that has several advantages to traditional modeling software, given the uniqueness of the proposed project. VISSIM was used to model the entire day, specific routing of vehicles, and variable constraints such as dwell time in parking lots. However, the biggest advantage of the VISSIM software is the ability to report unique and relevant performance measures. Traditional performance measures, such as LOS, can be limited in analyzing special events generating unique and temporary travel demands. The VISSIM analysis and results were supplemented with selected use of HCM analysis modeling to develop LOS estimates at key US 50 intersections.

The visitation estimates used for transportation and traffic modeling are presented in Table 4-52, by alternative. The resulting traffic estimates for the Action Alternatives are presented in Table 4-53. These estimates form the basis of the impact analyses for each alternative.

Table 4-52. Visitation Estimates for the Action Alternatives (number of persons)

Timeframe	1a	1c	1d	2	3	4
Installation Phase: Overall	36,000	46,000	23,000	38,000	33,000	15,000
Exhibition Phase: Overall	344,000	439,000	224,000	361,000	320,000	145,000
Exhibition Phase: Peak Day- Sat or Sun	34,400 /day	34,400 /day	25,846 /day	36,100 /day	32,000 /day	14,500 /day
Exhibition Phase: Fri or Mon	25,800 /day	25,800 /day	17,231 /day	27,075 /day	24,000 /day	10,875 /day
Exhibition Phase: Tue, Wed or Thu	17,200 /day	17,200 /day	8,615 /day	18,050 /day	16,000 /day	7,250 /day
Demobilization Overall	36,000	46,000	23,000	38,000	33,000	15,000

Table 4-53. Traffic Estimates for the Action Alternatives (number of vehicles)

Timeframe	1a	1c	1d	2	3	4
Installation Phase: Overall	12,862	16,429	9,286	13,571	11,786	5,357
Exhibition Phase: Overall	118,620	151,379	84,483	124,483	110,345	50,000
Exhibition Phase: Peak Day- Sat or Sun	11,862 /Day	11,676 /Day	9,748 /Day	12,448 /Day	11,034 /Day	5,000 /Day
Exhibition Phase: Fri or Mon	8,897 /Day	8,897 /Day	6,499 /Day	9,336 /Day	8,279 /Day	3,750 /Day
Exhibition Phase: Tue, Wed or Thu	5,931 /Day	5,931 /Day	3,249 /Day	6,224 /Day	5,517 /Day	2,500 /Day
Demobilization Overall	12,862	16,429	9,286	13,571	11,786	5,357

The assumed number of visitors per vehicle is 2.9.

4.16.1 No Action Alternative

The No Action Alternative would result in transportation and traffic conditions in 2013 that would be similar to those that occurred in recent years (See Section 3.16). Incremental annual increases in traffic associated with local, state, and national growth would be expected to slightly increase vehicle volumes and slightly reduce levels of service relative to conditions in previous years. The anticipated incremental

increase in vehicle volumes would be expected to generate minimal effects on congestion, safety, access, and mobility throughout the year.

Expected travel times in 2013 are as follows:

- Westbound US 50 from Fremont Road to County Line Section 55.4 Minutes
- Eastbound US 50 from County Line Section to Fremont Road 54.5 Minutes

Table 4-54 presents estimated 2013 traffic volumes, in absence of the proposed project, by US 50 segment. Table 4-54, Table 4-55, and Table 4-56 provide 2013 LOS for roadways and intersections under 2013 No Action conditions.

Table 4-54. 2013 No Action Traffic Volumes for Segments of US 50

US 50 Roadway Segment	Peak Summer Weekend Daily Traffic Volumes
West of Coaldale	5,650
West of CR 1A	6,950
East of CR 1A	7,000
West of SH 69	5,750
East of SH 69	5,700
East of CR 3	5,850
West of SH 9	8,250
East of SH 9	10,050
West of CR 3A (Royal Gorge)	10,700
East of CR 3A (Royal Gorge)	12,500
West of SH 115	20,100
East of SH 115	10,800

Source: OTR 2006)

Notes: 2005 ATR vs. 2008 ATR data resulted in conclusion of no appreciable growth

Includes local and visitor traffic

Table 4-55. 2013 No Action Roadway Level of Service

Roadway Segment	Weekend Mid-Day Peak Hour		
	Average Travel Speed (mph)	Percent Time Spent Following	Level of Service
West of Coaldale	51.2	54.6	C
West of CR 1A	50.1	60.8	C
East of CR 1A	50.2	60.4	C
West of SH 69	50.9	56.4	C
East of SH 69	50.4	59.4	C
East of CR 3	50.4	58.8	C
West of SH 9	49.6	62.8	C
East of SH 9	48.1	69.4	D
West of CR 3A	48.7	67.0	D
East of CR 3A	45.7	76.5	D
	Average Travel Speed (mph)	Density (pc/mi/l	Level of Service
West of SH 115	59.5	7.6	A
East of SH 115	59.5	4.5	A

Source: OTR 2006

pc/mi/ln = passenger cars per mile per lane

Note: Includes local and visitor traffic

Table 4-56. 2013 No Action Intersection Level of Service

Intersection	Weekend Mid-Day Peak Hour			
	Delay (sec)	Approach	Volume (veh/hr)	Level of Service
US 50 at SB US 285	24.1	SBL	200	C
US 50 at NB US 285	29.5	WBL	147	D
US 50 at CR 1A	15.0	NB	29	B
US 50 at SH 69	10.5	NB	33	B
US 50 at CR 3	9.6	NB	63	A
US 50 at SH 9	13.9	SBL	79	B
US 50 at 3A	51.3	NBL	51	F
US 50 EB at SH 115	22.5	EBL	289	C
US 50 WB at SH 115	21.3	WBL	60	C

Source: OTR 2006

NBL = North Bound Left Turn SBL= South Bound Left Turn EBL = East Bound Left Turn

WBL = West Bound Left Turn NB = Northbound Note: Includes local and visitor traffic

4.16.2 Alternative 1a

4.16.2.1 Installation

a. Effects on the Regional Transportation Network

The installation phase of Alternative 1a would not include substantial improvements to the regional roadway network, nor would it create functional limitations on the system. Few, if any travel diversions would be anticipated.

During the school year, school buses could experience minor, short-duration, and temporary delays as a result of slow moving vehicles and occasional temporary lane closures. No school bus stops or access points would be closed or blocked.

Freight rail tracks on the north side of US 50 between Salida and Parkdale would be used for project related freight hauling. However, no changes or interruptions of service to the Royal Gorge passenger rail service would be anticipated. No conflicts with other freight hauling operations on these tracks are anticipated.

No airport or airspace effects would be expected to occur during the installation phase of the project. Curiosity flights would not be expected or would be quite limited because the cables and their associated foundations would not be easy to see from an aircraft flying over the corridor.

b. Effects on Project Area Traffic Operations and Performance

The Alternative 1a installation phase is expected to occur over a period of approximately two years (28 months). No installation activity would occur on the US 50 side of the river in the busier months of June, July, and August. An estimated 36,000 visitors are expected to see the corridor during the installation phase. Installation phase traffic operations and performance outcomes would be the result of visitor traffic, construction traffic, and construction obstructions.

Visitor traffic during the installation phase would generate 12,862 vehicles over the two-year period in the project corridor, with 6,431 vehicles during the peak week and 1,286 vehicles on the busiest day (Saturday or Sunday). This visitor travel added to US 50 in late July or the very beginning of August would occur when construction is near completion and relatively low levels of construction traffic would be added. This incremental increase in traffic would add temporary and minor travel time delay and congestion to normal July conditions. At all other times (nonpeak periods), installation phase visitor traffic would create no measurable operation or performance effects.

Construction traffic volumes would be low relative to anticipated visitation volumes. Construction traffic on US 50 would not be significant in June, July, and August, and lane closures would not occur during this period. During this timeframe, construction would be focused on the north side of the river using the railroad for access. Consequently, construction traffic volumes would have no measurable effects on operations or performance during the summer months.

During nonsummer months, installation phase construction obstructions would result from slow moving trucks and occasional lane closures over a period of approximately two years. Slow moving trucks would create short-duration minor effects and delays. Lane closures would create short-duration minor delays in various locations distributed geographically and over time. Multiple lane closures would be separated by a

minimum distance of 10 miles. Some informal pulloffs would be closed when installation activities require parking large vehicles in these areas, taking up all available parking for visitors. Multiple pulloff closures on the same day would not be expected.

c. Effects on Traffic Safety

The potential effects on traffic safety include slightly higher than normal levels of traffic and the presence of additional driver distractions. These effects would be offset to some extent by slightly slower travel speeds throughout the corridor. A wide range of measures common to all alternatives are proposed to address installation phase influences on traffic safety. With all of the proposed installation phase commitments, such as work zone traffic control, the risk of increased vehicle crashes would be minor and short-term.

d. Effects on Mobility and Access

The potential effects on mobility and access during the installation phase would be minor and short-term. A slight decrease in mobility associated with lane closure and slow moving construction and hauling vehicles would be expected, but not during the busy summer periods. Interstate and intrastate travelers would not be expected to take alternate routes as a result of associated delays.

No existing public or private roads or driveways would be blocked during the installation phase. Short-duration temporary disruptions could occur in some locations on occasion, as construction vehicles maneuver through the corridor and take their positions in specific installation areas. With all of the proposed installation phase commitments, the effects on mobility and access would be minor and short-term.

4.16.2.2 Exhibition

a. Effects on Project Area Traffic Operations and Performance

Exhibition phase effects on key intersections are presented below. The determination of these effects was based on the HCM using Highway Capacity Software (HCS) for unsignalized two-way stop-controlled intersections. Two conditions for intersection operations are shown:

- Current Unsignalized Condition
- Anticipated Temporary Flagger Controlled Condition

The LOS results indicate that intersections in the project area would be congested, and normal performance standards would not be met during the peak period(s) on peak day(s) (Saturday and Sunday from about 10:00 am to 4:00 pm). However, the intersection LOS measure for traffic performance is most frequently applied to normal peak period conditions rather than temporary conditions or special events. Therefore, other measures were developed for the evaluation of exhibition phase traffic conditions and significance findings. Table 4-57 shows the LOS definitions for Class I two-lane highways.

Table 4-57. Levels of Service (LOS) Definitions for Class I Two-Lane Highways

A	Average speed is in excess of 55 mph. Motorists are able to drive at their desired speed. Passing demand is well below passing capacity, platoons of three or more vehicles are rare. Percent time following is not greater than 35%.
B	Average speed is at least 55 mph. Passing demand needed to maintain desired speeds becomes significant and approximates the passing capacity. Percent time following is no greater than 50%.
C	Average speed is at least 45 mph. There are noticeable increases in platoon formation, platoon size and frequency of passing impediments. Passing demand exceeds passing capacity. Percent time spent following is no greater than 65%
D	Average speed is at least 40 mph. Traffic flow is unstable. Passing demand is high, while passing capacity approaches zero. Mean platoon sizes of 5 to 10 vehicles are common. Turning vehicles and roadside distractions cause major shock waves in the traffic stream. Percent time spend following is no greater than 80%.
E	Average speed drops below 40 mph. Passing becomes virtually impossible and platooning becomes intense as slower vehicles or other interruptions are encountered. Percent time spent following is greater than 80%.
F	Traffic flow is heavily congested with traffic demand exceeding capacity. Passing demand is high, yet no opportunities are available.

UNSIGNALIZED INTERSECTIONS

Level of Service	Delay Range (in seconds)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Source: 2000 Highway Capacity Manual

The VISSIM model was used to produce additional measures of traffic performance. The effects for Alternative 1a, presented in Table 4-58 and Table 4-59, are described in the following discussions along with the overall accumulated exhibition phase delays during the peak period of the peak day. In summary, these effects would be considered short-term but significant, requiring the proposed set of event management measures, additional mitigation, and measures tailored to actual conditions during the event (See Chapters 2.0 and 5.0). During nonpeak times, the temporary delays would be considered minor to moderate, short-term effects.

Table 4-58. Weekend Peak Hour Level of Service at Major Intersections

Intersection	Approach	No Build HCM LOS	Alternative 1a HCM LOS - U	Alternative 1a HCM LOS - M	Alternative 1c HCM LOS - U	Alternative 1c HCM LOS - M	Alternative 1d HCM LOS - U	Alternative 1d HCM LOS - M
US 50 at SB US 285	SB Left	C	F	C	F	C	F	C
US 50 at NB US 285	WB Left	D	F	D	F	D	F	D
US 50 at CR 1A	NB	B	F	D	F	D	F	D
US 50 at SH 69	NB	B	F	D	F	D	D	D
US 50 at CR 3	NB	A	C	-	C	-	B	-
US 50 at SH 9	SB Left	B	F	D	F	D	F	D
US 50 at CR 3A	NB Left	F	F	D	F	D	F	D
US 50 EB at SH 115	EB Left	C	F	B	F	B	E	B
US 50 WB at SH 115	WB Left	C	E	D	E	D	D	D

U = Unsignalized

M = Mitigated

Intersection	Approach	Alternative 2 HCM LOS - U	Alternative 2 HCM LOS - M	Alternative 3 HCM LOS - U	Alternative 3 HCM LOS - M	Alternative 4 HCM LOS - U	Alternative 4 HCM LOS - M
US 50 at SB US 285	SB Left	F	C	F	C	F	B
US 50 at NB US 285	WB Left	F	D	F	D	F	D
US 50 at CR 1A	NB	F	D	F	D	E	D
US 50 at SH 69	NB	F	D	E	D	C	D
US 50 at CR 3	NB	D	-	C	-	B	-
US 50 at SH 9	SB Left	F	D	F	D	E	D
US 50 at CR 3A	NB Left	F	D	F	D	F	D
US 50 EB at SH 115	EB Left	F	B	E	B	D	B
US 50 WB at SH 115	WB Left	E	D	E	D	D	D

U = Unsignalized

M = Mitigated

Table 4-59. Peak Day Exhibition Phase Performance Results for all Alternatives

Performance Measure	No Build	Alt 1a	Alt 1c**	Alt 1d**	Alt 2**	Alt 3**	Alt 4**
Maximum Travel Time* (Minutes)							
WB 50	55.4	81.6	72.0	71.1	72.0	72.8	65.6
EB 50	54.5	66.9	66.7	65.4	65.6	65.7	62.0
Maximum Delay Exiting Parking Lots (Minutes)							
Fremont Road	NA	3.7	3.7	3.7	3.7	3.8	2.9
Parkdale	NA	55.1	7.3	6.1	8.0	6.9	5.9
Texas Creek	NA	4.7	3.2	3.1	3.5	3.0	3.3
95th Percentile Queues Lengths @ Parking Lot Intersections (Feet)							
Fremont Road							
WBRT	NA	25	25	25	25	25	25
EBLT		100	100	50	125	75	125
Parkdale							
EB	NA	1275	1075	225	1375	600	25
WB		9350	150	25	175	100	25
Texas Creek							
WB	NA	200	175	25	175	100	25
EBLT		25	25	25	25	25	25
EB		25	25	25	50	25	25
Maximum Vehicles Parked in the Parking Lots							
Parkdale (900 spaces)	NA	894	705	511	756	739	289
Texas Creek (35 spaces)	NA	35	31	23	42	31	16

* Fremont Road (CR 3A) to County Line Panel Section

** Alternatives include auxiliary lanes at Parkdale Parking Lot

Travel Time Delay: US 50 Local Traffic (East/West Travel). Various factors would increase US 50 travel times during the exhibition. The primary factor to evaluate is the increased vehicle volumes during the exhibition relative to the capacity of US 50. There are a wide range of incident possibilities that could add to the delay associated with increased vehicle volumes.

Estimated traffic volumes for Alternative 1a and the other alternatives were run through the VISSIM model under the conditions set forth in Chapter 2.0 for managing exhibition phase traffic. Under these conditions, , the estimated peak period westbound and eastbound travel time delays for local through traffic traveling from Fremont Road (CR 3A) on the east to the County Line Panel Section on the west were calculated. With Alternative 1a, the delay is estimated to be approximately 26 minutes in the westbound direction and 12 minutes in the eastbound direction relative to 2013 No Action conditions. These delays are generally caused by:

- Lower overall average speeds throughout the corridor
- Occasional stops for through traffic at primary intersections
- Slower speeds in panel viewing areas

Less delay would be experienced on nonpeak days and during nonpeak periods.

Additional delay, not accounted for in the VISSIM model, would or could be caused by:

- Travel conditions beyond the project/modeling limits
- Accidents and associated emergency response requirements
- Natural phenomena (landslide, falling rocks, rain, hail, etc.)
- Motorists driving far lower than assumed speeds near panel sites or elsewhere (VISSIM model assumed 25 mph speed through panel sites)
- Reduced travel speed by out of state visitors who are not familiar/comfortable with the roadway geometry and terrain.

The following discussions provide additional information about these sources of additional delay.

Travel Time Delay: US 50 Background Traffic (Left Turns and U-Turns at Intersections). Motorists using north/south roads and driveways that intersect US 50 would be subject to delays during the exhibition, especially motorists seeking to make a left turn onto US 50 during the peak period. The vast majority of these movements would be made by local traffic and recreational users rather than exhibition visitors. During the peak period of the exhibition phase, it is anticipated that delays for left turns from driveways and minor intersections would be between 1 to 2 minutes, depending on “platooning” of vehicles (discussed below). The overall number of these movements would be relatively low. While open pullouts might be attractive to visitors, these locations are quite likely to be full at most times. This is expected to create platooning of vehicles, which will provide opportunities for turning movements. Most motorists entering turnouts would be making a right turn in and a right turn out rather than left turns in and left turns out. Consequently, the overall number of these conflicting movements would be relatively low.

Major roadway intersections and intersections associated with open recreation sites would be controlled with temporary signals operated by a trained traffic technician to minimize overall intersection delays. Estimated maximum left turn delays may stretch into minutes where passing is limited or not possible, but individual delays would be at the discretion of the traffic control officer based on traffic conditions. Estimated right turn delays would be expected to be minimal, except at Parkdale and Fremont Road. The remaining low volume intersections would not be controlled, so motorists would need to find safe gaps in the traffic for making turns. These delays are not expected to be substantial due to "platooning" of vehicles. In other words, a series of gaps between groups of vehicles would be created ahead of slower moving vehicles, naturally causing groups of vehicles to travel together in groups or platoons.

Similar levels of delay would be expected at locations where eastbound motorists choose to make a left turn into designated recreation sites with parking and access control, and westbound and eastbound motorists who could choose to make a left turn into undesignated parking areas (pullouts/pulloffs) that remain open during the exhibition and are not controlled.

A total of 56 pullouts/pulloff opportunities would be closed, leaving a remainder of 79 locations where motorists could elect to turn left (42 on the north side of US 50 and 37 on the south side of US 50). These turning movements could add delay and overall travel time that was not estimated with the VISSIM model.

The only prohibited left turn movement for eastbound motorists would be at Parkdale. Eastbound motorists seeking access to Parkdale would be required to proceed further east to the Fremont Road Information Center. At Fremont Road, these motorists would make a left turn into the parking lot then turn around in the parking lot. Signing on US 50 would direct traffic to this safer U-turn opportunity.

Some motorist may make legal but potentially unsafe left turns across traffic into and out of pullouts, with some motorists effectively making u-turns, in various locations within the corridor. Safety concerns would increase with increasing traffic volumes. During the exhibition peak periods, temporary median barriers would prevent left turns into and out of pullouts between Texas Creek and Parkdale. These barriers would be used at approximately six pullouts in key locations

In order to respond to the demand for u-turns, a special facility for this purpose is mitigation measure identified for a site near Texas Creek. (See Chapter 5.)

Travel Time Delay: Parkdale Intersection and Parking Lot Performance. Travel time delay at the Parkdale intersection and parking lot performance was analyzed for Alternative 1a (no acceleration or deceleration lane conditions) and under mitigated conditions (similar to Alternatives 1c, 1d, 2, and 3). Table 4-60 clarifies the conditions with and without acceleration and deceleration lanes.

Table 4-60. Parkdale Parking Lot Intersection Auxiliary Lane Analysis

Intersection Condition	Maximum WB Through Movement Delay on US 50 at Parkdale Intersection (Minutes)	Maximum Delay out of Parking Lot (Minutes)	95th Percentile Queue Lengths WB/EB (Feet)
No Acceleration or Deceleration Lane	7.3	55.1	9350/1275
Acceleration Lane Only	3.9	7.9	5,495/1,210
Deceleration Lane Only	0.4	22.0	230/1,525
Acceleration and Deceleration Lane	0.3	7.9	170/1,245

Based on the delays presented in Table 4-60, the acceleration and deceleration lanes are needed as a mitigation measure for Alternative 1a. Without these auxiliary lanes, the westbound US 50 queues at Parkdale would be almost 2 miles in length. This would equate to through movement delays reaching approximately 8 or more minutes in just this one location. In addition, delays for vehicles exiting Parkdale would be just under an hour. These conditions would improve considerably with the inclusion of either an acceleration or deceleration lane, but through movement delays on US 50 and/or parking lot delays would be considered substantial in either case (see Table 4-60).

VISSIM modeling results for parking lot delays assume free-flow conditions in and out of the parking lots are achieved and that the design of the parking lots provides for efficient loading and unloading. VISSIM modeling results for the Parkdale parking lot indicate that the demand for parking at Parkdale would reach 894 spaces, close to the planned capacity of 900 spaces. VISSIM modeling results for the Texas Creek parking lot indicates that the demand for parking at Texas Creek would be about 35 spaces. Parking lot closures due to limited capacity are not anticipated in either location.

Delay for northbound motorists crossing the one lane bridge at Texas Creek are not anticipated based on anticipated traffic volumes, and because flaggers located at both ends of the bridge will work together to avoid delays and prioritize the northbound movement.

Travel Time Delay: Beyond the Project Limits.

Cañon City US 50 Intersections. Alternative 1a visitor routing estimates indicate that many visitors would pass through Cañon City to and from the exhibition area using US 50. The peak period for traffic in both directions within Cañon City would occur on Saturday or Sunday between about 11:00 am and 2:00 pm, but would be only slightly lower between about 10:00 am and 11:00 am and 2:00pm to 4:00 pm. These traffic volumes would create heavy traffic conditions resulting in decreased LOS at intersections (see Table 4-61). With these LOS levels, travel time through Cañon City between 11:00 am and 2:00 pm would be expected to increase by about 1.5 minutes in the westbound direction and by about 30 seconds in the eastbound direction. This limited increase in travel time for through-movements on US 50 reflects how the signal timing favors the through movements on US 50. Overall travel times are shown in Table 4-62.

Table 4-61. Level of Service in Cañon City

Intersection	2013 No Action		2013 Alternative 1a		2013 Alternative 1c		2013 Alternative 1d	
	HCM LOS	Delay (sec)	HCM LOS	Delay (sec)	HCM LOS	Delay (sec)	HCM LOS	Delay (sec)
US 50/Mackenzie Avenue								
Overall	B	14.5	B	19.9	B	15.7	B	14.5
NB	D	49.1	D	41.7	D	41.7	D	49.1
US 50/Justice Center Road								
Overall	B	10.6	A	9.2	A	9.1	B	10.6
NBTH/LT	D	43.7	D	50.1	D	50.1	D	43.7
US 50/ Dozier St.								
Overall	B	13.3	D	35.2	C	25.0	B	13.3
SBLT	D	37.8	E	63.5	D	42.5	D	37.8
WBTH	B	12.9	D	52.4	C	34.3	B	12.9
US 50/ Raynolds Avenue								
Overall	C	28.8	D	38.6	D	36.3	C	28.8
NBTH/LT	E	67.9	E	79.4	E	79.4	E	67.9
EBLT	C	21.1	D	47.4	C	32.3	C	21.1
WBTH	C	30.9	D	51.6	D	44.8	C	30.9
US 50/ Orchard Avenue								
Overall	B	16.6	B	19.4	B	16.5	B	16.6
NBTH/LT	E	64.5	E	60.4	E	60.4	E	64.5
EBLT	C	30.2	D	47.4	D	40.7	C	30.2
US 50/15th Street								
Overall	C	26.8	C	34.4	C	24.8	C	27.1
SBLT	E	64.8	E	64.8	E	76.1	E	64.8
SBTH	E	64.9	E	64.9	E	76.1	E	64.9
EBLT	C	34.3	D	54.3	D	49.6	D	35.2
US 50/ 9th Street								
Overall	D	36.4	E	57.6	D	44.7	D	36.4
NBTH	E	76.8	F	136.1	E	70.2	E	76.8
NBRT	D	51.1	E	57.3	D	49.9	D	51.1
NBLT	C	30.7	D	47.3	C	33.2	C	30.7
SBTH	D	43.3	F	151.5	D	48.1	D	43.3
SBLT	E	69.6	F	125.5	E	76.4	E	69.6
EBTH	D	49.3	E	78.9	E	74.7	D	49.3
WBLT	C	31.3	E	72.8	E	58.9	C	31.3
US 50/3rd Street								
Overall	A	7.1	A	8.2	A	6.5	A	7.1

Intersection	2013 Alternative 2		2013 Alternative 3		2013 Alternative 4	
	HCM LOS	Delay (sec)	HCM LOS	Delay (sec)	HCM LOS	Delay (sec)
US 50/Mackenzie Avenue						
Overall	C	21.2	B	17.8	B	14.7
NB	D	41.7	D	41.7	D	49.1
US 50/Justice Center Road						
Overall	A	9.3	A	9.2	A	9.4
NBTH/LT	D	50.1	D	43.7	D	43.7
US 50/ Dozier Street						
Overall	C	34.5	C	34.2	B	18.9
SBLT	E	63.5	E	63.5	D	49.4
WBTH	D	47.8	D	53.0	C	25.1
US 50/ Raynolds Avenue						
Overall	D	39.6	D	41.5	C	31.8
NBTH/LT	E	79.4	E	73.5	E	71.1
EBLT	E	56.3	E	56.8	D	36.9
WBTH	D	53.0	E	56.7	D	35.6
US 50/ Orchard Avenue						
Overall	C	20.4	B	18.4	B	17.7
NBTH/LT	E	60.4	E	60.4	E	60.4
EBLT	D	48.6	D	49.2	D	43.5
US 50/15th Street						
Overall	D	37.1	D	37.9	C	27.9
SBLT	E	64.8	E	70.5	E	70.5
SBTH	E	64.9	E	70.2	E	70.2
EBLT	D	52.3	E	64.4	D	49.4
US 50/ 9th Street						
Overall	E	61.6	D	50.4	D	43.8
NBTH	F	166.3	E	69.0	E	70.2
NBRT	E	78.8	D	52.1	E	58.4
NBLT	E	62.9	D	40.4	D	41.7
SBTH	F	145.8	D	44.8	D	44.8
SBLT	F	142.5	E	66.5	E	76.4
EBTH	E	75.2	E	72.8	D	53.8
WBLT	E	73.8	E	67.1	E	76.3
US 50/3rd Street						
Overall	A	9.5	A	7.7	A	7.8

Table 4-62. Corresponding Travel Time through Cañon City

Alternative	Travel Time (seconds) WB	Travel Time (seconds) EB	Travel Time (minutes) WB	Travel Time (minutes) EB
2013 No Action	471.7	488.8	7.9	8.1
Alternative 1a	584.7	512.2	9.7	8.5
Alternative 1c	513.3	497.5	8.6	8.3
Alternative 1d	611.9	510.3	10.2	8.5
Alternative 2	580.4	503.6	9.7	8.4
Alternative 3	487.0	494.5	8.1	8.2
Alternative 4	584.7	512.2	9.7	8.5

Salida US 50 Intersections. In Salida, conditions would be similar to those described for Cañon City, except that the peak hour volumes would be considerably lower and the peak period would occur slightly later in the afternoon. These traffic volumes would create heavy traffic conditions resulting in decreased LOS at intersections (see Table 4-63). With these LOS levels, travel time through Salida between noon and 3:00 pm would be expected to increase in both directions.

Salida roadway LOS was estimated using 2008 CDOT annual ADT counts. Coaldale automatic traffic recorder (ATR) data was used to estimate the mid-July to mid-August weekend peak hour traffic. The traffic volumes were grown to estimate 2013 traffic volumes based on CDOT's growth factor. HCM software was used to calculate the eastbound and westbound roadway LOS at locations with CDOT data. Table 4-63 shows the results. All roadway segments operate at a LOS "C" or better for all alternatives.

Table 4-63. Intersection Level of Service in Salida

Roadway Segment	2013 No Action HCM LOS EB	2013 No Action HCM LOS WB	2013 Alternative 1a HCM LOS EB	2013 Alternative 1a HCM LOS WB	2013 Alternative 1c HCM LOS EB	2013 Alternative 1c HCM LOS WB	2013 Alternative 1d HCM LOS EB	2013 Alternative 1d HCM LOS WB
East of G St	B	B	B	C	B	C	B	C
East of E St	B	B	C	C	C	C	B	C
East of Teller St	B	B	B	B	B	B	B	B
West of SH 291	A	A	B	B	B	B	A	B
East of SH 291	A	A	A	B	A	B	A	B

Intersection	2013 Alternative 2 EB	2013 Alternative 2 WB	2013 Alternative 3 EB	2013 Alternative 3 WB	2013 Alternative 4 EB	2013 Alternative 4 WB
East of G St	B	C	B	C	B	C
East of E St	B	C	B	C	B	C
East of Teller St	B	C	B	B	B	B
West of SH 291	B	B	B	B	A	B
East of SH 291	A	B	A	B	A	A

The presence of an information center in Salida would increase turning movements in the vicinity of the selected site. A final site for this facility has not been selected; however, two of the sites under consideration are located in the downtown vicinity and would result in increased turning movements in the downtown area, while the third site is located at the eastern edge of the community.

Anticipated downtown traffic from the information center would be adequately accommodated by a mix of downtown streets. The existing lane configuration of US 50 at the downtown sites provides for left turn access into the downtown sites. If queues develop from motorists waiting to turn left at primary access locations (I Street, State Street, and Milford Street), motorists would have other options for turning left into the downtown area and through traffic would be able to drive past the queue.

Left turns from I Street, State Street, Milford Street, and other downtown streets onto US 50 could be delayed by through traffic. However, the resulting queues are not expected to be long. If relatively long queues develop, motorists would have alternative locations to make left turns. Right turns into and out of the downtown sites would be accommodated without much delay.

In general, the eastern site would present distinct traffic advantages relative to the downtown site because the existing intersection has acceleration, deceleration, and left turn lanes and fewer conflicting movements from surrounding uses.

US 285/US 50 Intersection. The northbound and southbound US 50/US 285 intersection movements would operate at LOS F under existing unsignalized conditions. Estimated delay under these conditions would be approximately 2 to 5 minutes. Consequently, a temporary signal would be needed to maintain adequate performance at this intersection during peak periods. With a temporary signal, the LOS would be improved to LOS C and D. Estimated delays under these conditions relative to 2013 No Action conditions would be negligible (see Table 4-61).

US 50 Intersection/SH 115. The eastbound and westbound movements at the US 50/SH 115 intersection would operate at LOS F with unsignalized conditions. Estimated delays under these conditions would be minimal for right turns onto US 50. Left turns from US 50 to northbound SH 115 would be delayed. Consequently, a temporary signal would be needed to maintain adequate performance at this intersection during peak periods. With a temporary signal, the operations would be improved to LOS B and D. Estimated delay under these conditions relative to 2013 No Action conditions would be negligible (see Table 4-61).

Other Regional Routes and Local Roads. Other regional routes, intersections, and local roads beyond Salida and Cañon City would be expected to have heavier traffic than under normal August conditions, but the resulting conditions would not be expected to change significantly because of the dispersion of traffic on the regional and local roadway network.

Travel Time Delay: Crashes and Other Incidents. If vehicle crashes or other incidents, such as a rock fall, flooding, or hail, occur that require emergency response, minor to significant delays would be expected along US 50 under peak period and nonpeak periods. A wide range of possible incidents could occur and each possibility could create a unique condition and corresponding levels of delay. The incidents that would be expected to create the most delay would be multiple vehicle collisions and serious crashes involving fatalities and/or injuries, or natural events that require road closure. The incidents that would be

expected to create the least delay would be minor accidents (fender benders) and routine traffic stops for moving violations or parking violations.

Two incident delay scenarios were simulated in the VISSIM model. A 5-minute incident was modeled to assess the effects of a minor fender bender collision or flat tire. A 20-minute incident was modeled to assess the effects of a major collision. This modeling was performed because the probability of an incident during the exhibition is likely to be increased relative to typical conditions. Some factors that may contribute to an increased probability for incidents include the fact that many of the visitors will be unfamiliar with US 50, higher levels of traffic, and exhibition features and activities present at numerous locations along US 50 contributing to driver distraction.

The 5-minute delay scenario generated a vehicle queue of approximately 1.2 miles. The model estimated that delayed conditions would last approximately 43 minutes. The maximum queue would involve slightly over 250 vehicles while traffic is stopped. Approximately 750 total vehicles would be delayed before the traffic returns to normal speeds.

The 20-minute delay scenario generated a vehicle queue of approximately 2.9 miles. The model estimated that delayed conditions would last approximately 138 minutes. The maximum queue would involve slightly over 600 vehicles while traffic is stopped. Approximately 2,450 total vehicles would be delayed before the traffic returns to normal speeds.

Actual incident conditions would vary based on incident severity, location, and time of day. Both scenarios assume that traffic is released in both directions at the same time at the end of the incident. If traffic must be alternated in a one-way operation, the delays would be greater. In addition to delays on US 50, a queue created by an incident could impact traffic accessing US 50, including access to major intersections, private property, recreation areas, and project parking areas. An Event Management Plan, including an Incident Management Plan, will be created prior to the exhibit to further develop strategies for minimizing incident delays.

The 2008 Event Management Plan anticipated minor incidents, major incidents, and incidents that might require road closure, detours, or corridor evacuation. A variety of measures in the 2008 Event Management Plan are proposed to handle a wide range of incident possibilities. Examples of key emergency measures designed to create rapid responses and minimize incident delay include:

- Exhibition phase communications would be managed through a command post to ensure seamless communications among emergency service providers and proper execution of an overall communication plan.
- Emergency services and vehicles would be located in the corridor during the exhibition phase to ensure their availability and timely response during the exhibition.
- A medical helicopter would be staged at Texas Creek during the exhibition to ensure that there is a medical transportation option with quick response times.
- Law enforcement or security vehicles and personnel would be staged in existing river side pullouts in each fabric panel area, and at Parkdale, Five Points, Salt Lick, Pinnacle Rock, Texas Creek, Lone Pine, and at the west and east ends of the project corridor.

- Firefighting equipment would be staged at Texas Creek, and smaller caches of hand-held firefighting equipment would be located at Parkdale, Vallie Bridge, and at the west and east ends of the project corridor to minimize visitor traffic interference and response times.
- Towing and vehicle assistance personnel would be staged at Parkdale Boat Access, Five Points, Texas Creek, Vallie Bridge, and at the west and east ends of the project corridor to provide assistance.
- Hazardous materials containment, mitigation materials, and equipment would be placed at the staging and laydown area so they are quickly available.
- A Corridor Evacuation Plan, developed in conjunction with local agencies and emergency management staff, would be in place. Law enforcement personnel, emergency service providers, and information centers/signs would be available in the corridor during the exhibition phase for plan implementation.

These measures and others would be in place during the exhibition and would address risks and potential delays from crashes and natural incidents.

Travel Time Delay: Especially Slow Drivers (Visitors). The exhibition provides motorists with various opportunities to drive past areas where fabric panels are visible from the westbound lane. Some drivers may try to drive far slower than posted speeds near panel sites or elsewhere when they are alone on the road or when other motorists are following them. In some instances, this delay would be acceptable to motorists following the slow driver and would encourage an overall reduction in speeds. In other instances, travel well below the posted speed would be unacceptable to motorists who are not traveling along US 50 to see the art. While some of this sort of delay has been modeled, there could be instances where delay is beyond what has been estimated using the VISSIM model. The extent of the delay caused by especially slow drivers would depend on when the slowdown occurs, how often such slowdowns occur, and how effective monitors and law enforcement presence can discourage especially slow speeds and/or stopping in various viewing locations. Various measures are proposed to prevent vehicles from stopping or from driving slower than the posted speeds. The overall delay findings presented in Table 4-59 reflect an average of 25 mph within panel locations and occasional vehicle stops in panel areas. These occasional stops are not allowed, but are expected to occur. One reason for such stops would be a driver stopping for a quick photograph. Longer stops in panel areas may also occur, but on-site monitors will be in place to prevent these occurrences. The short stops will create platoons of vehicles. In some instances, the platoons that are delayed by such stops are likely to make up the delay by catching the platoon ahead of them. In other cases, additional delays would be experienced. The estimated delay from short stops and slow vehicles in panel sites is included in the VISSIM model results presented in Table 4-59.

Overall Operation and Performance Findings. The overall accumulated exhibition phase delays during the peak period of the peak day would be considered significant short-term effects requiring the proposed set of event management measures, additional mitigation, and measures tailored to actual conditions during the event. At other times, the temporary delays would be considered moderate to minor short-term effects.

b. Effects on the Regional and Local Transportation Network: Mobility and Access

National, State and Local Travel Diversions. Anticipated vehicle volumes on US 50 and related travel delays during the exhibition phase may cause travel diversions for the 2-week exhibition period. These

diversions would incrementally increase vehicle travel on other roads in the area, thereby increasing travel times and travel costs. Interstate and intrastate truck traffic that would normally use US 50 during the exhibition phase may choose to take different routes during the peak periods of the peak days, or shift their travel to off-peak times. Given that the surrounding alternate routes are rural routes that have low or no congestion, the impacts of diverted traffic are not expected to be significant or create new congestion issues.

Residential, business, and tourism traffic accustomed to US 50 travel conditions in a normal early August period would be delayed, and various locations along US 50 would be inaccessible due to parking prohibitions and use restrictions. Mobility and access associated with residential driveways and residential areas intersecting with US 50 would be reduced during heavy traffic periods. Left turns in and out of these intersections would experience more delays during busy peak periods resulting in mobility and access effects, especially between Parkdale and Texas Creek.

Diversions to the north or south, for example SH 160 or roadways located southwest of the project corridor, would be expected to be minor and limited because the accumulated peak day peak period delays do not appear to be long enough to justify the extended detour/diversion travel times. If delays somehow reached that point, the duration of that condition would be relatively short and would only impact a portion of the background traffic.

School Bus Service Disruptions. The exhibition phase for Alternative 1a would be in the first two weeks of August when most elementary, middle, and high school students are not attending classes. No school bus transit service disruptions would be anticipated during this timeframe.

Royal Gorge Passenger Rail Ridership. Alternative 1a would have various impacts on Royal Gorge passenger rail ridership. The existing passenger service does not provide any view of the art due to the location of the railroad's turn back position at Parkdale. Consequently, train access to Parkdale would have virtually no impact on train ridership demand. However, many art visitors would not only be expected to view the art, but may also choose to ride the train through Royal Gorge. This would increase train ridership demand. Finally, many potential rail riders would elect to avoid the exhibition phase and would defer their train trip to another time of year or year, or would choose to go elsewhere and do other things during the exhibition phase. This would decrease ridership demand. The net effect is uncertain, but an overall increase in demand is expected given all of the attention that would be focused on the area. A response to additional demand by the private rail operator is not part of Alternative 1a, but a response is likely to occur.

The Royal Gorge railroad operators may address the anticipated temporary increase in demand in various ways:

- Longer trains with more passenger capacity under the existing schedule
- More trains with the same passenger capacity under a new more frequent schedule
- More trains and longer trains under a more frequent schedule
- Enhanced and/or different services with each trip, including specialty services
- Increased trip pricing during the high demand periods

Longer trains in Cañon City could have local effects on roadway intersections that are blocked during train movements.

Freight Rail Effects. The Royal Gorge passenger trains share the tracks with freight operations. If the passenger rail service schedule changes in response to increased demand caused by Alternative 1a, any effects on freight operations would need to be resolved prior to changing the schedule. Consequently, no indirect exhibition phase freight rail effects would be expected.

Airport and Airspace Effects. The exhibition is expected to generate interest in airplane and helicopter flyovers where the art can be viewed from the air. Alternative 1a proposes temporary airspace restrictions in addition to existing airspace restrictions to prevent airspace congestion above US 50 between Cañon City and Salida, and related nuisances such as aircraft noise in exhibition areas. Outside of the immediate project area, no significant airport or airspace effects would be expected.

Emergency Response Effects. Emergency response vehicles could be delayed to various degrees along the US 50 corridor during the exhibition due to a variety of factors. A series of measures was presented in Chapter 2.0 to address this issue, including staging a medical helicopter at Texas Creek, staging ambulances at Parkdale and Texas Creek, and other measures intended to maintain reasonable response times in an emergency. Nevertheless, traffic congestion and other project-related incidents could result in delayed response times for some emergency services during the exhibition period.

c. Effects on Traffic Safety

Potential effects on traffic safety during the exhibition phase include:

- Higher than normal levels of traffic, congestion, and delays can create driver frustration and lead to driver misjudgment or error.
- Driver distractions including, but not limited to, art viewing, sightseeing, people watching, driving through unfamiliar cone zones, increased driving on unfamiliar roads, increased driving at night, and increased number of impaired drivers in the corridor.
- Adding traffic to areas where geologic risks exist.

These factors would increase potential safety risks and the possibility for crashes, but would be offset to some degree by slower travel speeds throughout the corridor (lower average accident severity) and a high level of monitoring and law enforcement presence. A wide range of measures common to all alternatives are proposed to address exhibition phase influences on traffic operations and safety. The overall effect on traffic safety is expected to be moderate and short-term.

4.16.2.3 Demobilization

The effects of the demobilization phase of Alternative 1a would be the same as those described for the installation phase, with two exceptions.

Visitor traffic on the busiest Saturday and Sunday of the demobilization would be slightly less than the busiest Saturday and Sunday of installation, because the anticipated visitation in the week after exhibition is expected to be less than the week prior to the exhibition.

The demobilization phase is far shorter than the installation phase and occurs into the fall season when background tourist travel levels are reduced. Anticipated lane closures would occur on 24 days of an approximate demobilization period of 90 days (3 months). The anticipated lane closures would be more frequent than the closures during the installation phase, but the individual delays would still be minimal.

4.16.3 Alternative 1c

4.16.3.1 Installation

Alternative 1c has the highest visitation estimate for the installation phase (47,000 visitors with Alternative 1c vs. 36,000 visitors with Alternative 1a). However, these higher estimates would not generate a substantial difference relative to the results presented for Alternative 1a.

4.16.3.2 Exhibition

The exhibition phase effects of Alternative 1c would be the same as Alternative 1a, with two exceptions. Alternative 1c includes the acceleration/deceleration lanes at Parkdale, and it includes one additional week during the exhibition period. The benefit from the acceleration/deceleration lanes would be an overall travel time savings of 10 minutes in the westbound direction relative to Alternative 1a without these lanes.

Exhibition period visitation in the third week would be expected to drop to about 45% of the visitation in the first two weeks of Alternative 1c (172,000 for the first two week vs. 95,000 in the third week). Effects during the third week would be similar to the first week, but the intensity of those temporary effects would be substantially reduced, making them moderate rather than significant effects.

Alternative 1c would create an additional week of demand on law enforcement, emergency, and highway support staff. This may require expanding the geographic area used to find sufficient numbers of people available to provide support staff services, or burden local area agencies with the added demand for personnel.

4.16.3.3 Demobilization

Alternative 1c has the highest visitation estimates for the demobilization phase. However, these higher estimates would not generate a substantial difference between the results presented for Alternative 1a.

4.16.4 Alternative 1d

4.16.4.1 Installation

The effects of Alternative 1d would be the same as those for Alternative 1a, except that a similar amount of installation phase work would occur over a period of one year rather than two years (380 days/28 months). This difference would reduce the time period where the project delays motorists, but would double the frequency of the delays during the installation phase. However, even with the shorter installation phase, lane closures and pulloff area closures would not be expected in more than one location at a time.

4.16.4.2 Exhibition

The effects of Alternative 1d during the exhibition would be the same as those associated with Alternative 1a, except for benefits of the acceleration/deceleration lanes (see Alternative 1c), changes in traffic operations and performance outcomes, and September vs. August bus service effects.

a. Effects on the Regional and Local Transportation Network Operations and Performance

Alternative 1d is expected to generate 120,000 fewer visitors than Alternative 1a, but peak weekends in September are likely to attract a far higher proportion of visitors relative to weekdays than the same comparison during the summer vacation season.

Although the September weekends would be busy, the traffic volumes and associated effects on weekdays are expected to be substantially less than those calculated for Alternative 1a.

b. School Bus Service Delays

The exhibition phase for Alternative 1d would be in September when most elementary, middle, and high school students are attending classes and weekday bus service is provided along US 50. As a result, some school bus transit service delay would be anticipated in September. The 6:00 am to 8:00 am service would not be delayed as much as midday kindergarten service, and the 4:00 pm to 6:00 pm service.

The anticipated delay would relate to traffic volumes for Friday and Monday, and Tuesday through Thursday. Most September traffic is expected on Saturday and Sunday, with Friday and Monday having one-half the traffic as a busy weekend day and Tuesday through Thursday having one-third the traffic as a busy weekend day. Based on these factors and the bus routes, the anticipated delays would generally be less than five minutes. This short-term impact would be considered minor.

Safety concerns associated with school children potentially crossing US 50 at or near US 50 during the exhibition is a potentially significant effect that could be mitigated with precautions defined by the school district, CDOT, and CSP.

4.16.4.3 Demobilization

The demobilization effects would be similar to those described for Alternative 1a. Alternative 1d offers a minor reduction in the level of effects because the demobilization activities would occur after the summer peak traffic period.

4.16.5 Alternative 2

4.16.5.1 Installation

The installation effects would be the same as Alternative 1a, but with a slightly higher visitation (38,000 vs. 36,000 with 1a) during the installation phase. However, this difference is inconsequential.

4.16.5.2 Exhibition

The installation effects would be the same as Alternative 1a, but with the benefits of the acceleration/deceleration lanes and a higher visitation and vehicle travel under Alternative 2. Overall westbound travel times through the corridor would be 10 minutes lower than Alternative 1a, but some intersection LOS would be worse.

4.16.5.3 Demobilization

The demobilization effects would be the same as Alternative 1a, but with a slightly higher visitation (38,000 vs. 36,000 with 1a) during the demobilization phase. However, this difference is inconsequential.

4.16.6 Alternative 3

4.16.6.1 Installation Phase

The installation effects would be the same as described for Alternative 1a, but with a slightly lower visitation. This difference is inconsequential.

4.16.6.2 Exhibition Phase

The exhibition period effects would be similar to Alternative 1a, except with the benefits of the acceleration/deceleration lanes and with slightly improved traffic operations and performance. The slight reductions in visitation provide minor benefits.

4.16.6.3 Demobilization

The demobilization effects would be the same as described for Alternative 1a, but with a slightly lower visitation. This difference is inconsequential.

4.16.7 Alternative 4

4.16.7.1 Installation

Alternative 4 would considerably reduce the number of days of lane closures. Additionally, the visitation reduction projected during the Alternative 4 installation period would substantially reduce effects from Alternative 1a.

4.16.7.2 Exhibition

The exhibition period effects would be similar to Alternative 1a, except that Alternative 4 would offer improved traffic operations and performance relative to Alternative 1a. Reductions in visitation provide benefits. With Alternative 4, no acceleration or deceleration lanes at the US 50/Parkdale intersection would be needed because the Parkdale area would not be open to visitors.

Based on the facilities proposed at the Texas Creek visitor area and their location on the south side of the bridge, traffic volumes using this facility would not be expected to be especially high. Bridge capacity should be adequate for event management purposes. Intersection control and temporary measures to manage commercial parking lot motor vehicle movements would be needed in this location.

4.16.7.3 Demobilization

Alternative 4 would considerably reduce the number of days of lane closures. Additionally, the visitation reduction projected during the Alternative 4 demobilization period would substantially reduce effects from Alternative 1a.

4.17 HAZARDOUS MATERIALS

Hazardous materials, if released to the environment in sufficient quantities (i.e., uncontrolled releases), have the potential to cause impacts to air, soil, surface water, and groundwater, as well as the potential to impact health to project workers and the public.

For purposes of this analysis, uncontrolled releases are defined as the release to the environment of a hazardous material in a quantity that exceeds reporting limits imposed by applicable regulations, or that is contained in media generated or managed at concentrations that the CDPHE would regulate disposition of that media as a solid waste (subsequently referred to as contaminated soil and contaminated water). Under federal and state environmental regulatory programs release reporting requirements, limiting the amounts of hazardous materials that may be released to the environment, are set at levels deemed to be protective of human health and the environment. Accordingly, any such releases below reportable, allowed, or permitted levels would constitute no significant environmental effect. Section 3.17 lists the applicable release reporting requirements for hazardous materials. Additional regulatory programs that impose requirements that specify activities designed to limit potential releases as discussed later in this section. The applicant has committed to conducting the action (under all alternatives) in a manner that complies with all applicable laws, regulations, and rules, and would prepare environmental management planning documents that describe specific measures to be taken that support and implement the overall commitment to compliance with applicable regulatory requirements. Collectively, these measures (regulatory requirements, applicant committed actions, and procedures) are referred to below as appropriate control measures.

The potential impacts associated with the use and management of hazardous materials within the Project Area fall into six categories. Each of these categories relates to a specific activity or set of activities that involve the presence, use, or management of hazardous materials. The nature and duration of these activities, the mechanism through which these activities could result in an uncontrolled release, and the potential impacts associated with an uncontrolled release during each are summarized by alternative in the following section. Each alternative identifies the associated project periods or phases; installation, exhibition, and demobilization/restoration.

An aspect of regulatory requirements that relates to a number of the activities discussed below is the Colorado Solid Waste Management Regulations. Under the general provisions of these regulations, the generator of a waste is required to characterize their waste, either through testing, or by knowledge of the process generating the waste. Based on the character of the waste, they are required to dispose of it appropriately. In complying with these requirements relative to contaminated or potentially contaminated soil, the applicant would need to consult with CDPHE to establish acceptable sampling protocols (sampling methods, number of samples, and the analyses to be performed), and to establish acceptable protocols for determining acceptable disposal facilities/locations . This would apply to soil unearthed from anchor drilling along the UPRR ROW, and to soil collected/excavated as part of any spill cleanup activities.

Project Activities and Potential Release Mechanisms and Resultant Impacts

Distinct project activities and potential release mechanisms and potential resultant impacts associated with each activity can be summarized in the following sections.

Hazardous Materials Transportation

Hazardous material transportation would be conducted during installation and demobilization phases of the project and transportation would take place along the project corridor (US 50). Transportation of hazardous materials by road entails some degree of risk of accidents. Accidents involving vehicles carrying hazardous materials entails some risk of the uncontrolled release of those materials. In the US 50 corridor through the Project Area, the roadway is in close proximity to the Arkansas River. Accidents involving vehicles carrying hazardous materials, and resulting in uncontrolled releases could impact significant areas of soil, shallow groundwater, and the Arkansas River, and could also conceivably result in injuries to workers and members of the public. Contaminated soil or contaminated water generated during spill response and cleanup activities would be managed as a solid waste under applicable CDPHE requirements. US DOT regulations for the transportation of hazardous materials are designed and enforced to reasonably minimize risk of a release. Emergency planning and response plans are designed and implemented to minimize the impacts of a release. As discussed in Section 3.16, the accident rate on US 50 through the Project Area is well within the expected range when compared with other roadways in the category of Rural Mountainous Two-Lane Highways in Colorado.

A potential for an incremental increase in accidents involving vehicles carrying hazardous materials resulting from project activity appears to be associated with two aspects of the project. Project activity would require that some hazardous materials (primarily petroleum products including fuels, hydraulic oil, and lubricants, but also very small quantities of other products) be transported to the project corridor. This activity would incrementally increase the number of vehicles transporting hazardous materials in the Project Area, which could incrementally increase the accident rate for such vehicles. The increased traffic levels associated with people viewing the project (potentially during construction and exhibition) could incrementally increase the accident rate involving project related vehicles carrying hazardous materials routinely being transported through the Project Area. CDOT does not have data for the number of vehicles carrying hazardous materials through the Project Area, so a quantitative evaluation of potential accidents associated with vehicles carrying hazardous materials is not possible.

Hazardous Materials Storage

Hazardous material storage would occur during all phases of the project. A variety of hazardous materials used by the project would be stored at the Texas Creek CSA. Storage of hazardous materials entails some degree of risk that vessels and associated lines and hoses could fail or be compromised in ways that result in uncontrolled releases. This risk is primarily associated with stored liquids. The uncontrolled release of stored hazardous liquids could impact significant areas of soil, shallow groundwater, Texas Creek, and the Arkansas River, and could also conceivably result in injuries to workers. Any contaminated soil or contaminated water generated in any spill response and cleanup activities would be managed as a solid waste under applicable CDPHE requirements.

Project activity would require that significant amounts of hazardous materials be stored in aboveground storage tanks, and smaller containers. Federal Spill Prevention, Control, and Countermeasure (SPCC) plan regulations promulgated under the Clean Water Act (40 CFR Part 112) require that facilities with storage capacity for petroleum products in excess of 1,320 gallons have and follow the provisions of an SPCC Plan. It is assumed the project would have greater than 1,320 gallons of petroleum storage capacity at the CSA. SPCC Plan requirements are designed to reduce the potential for uncontrolled releases, prevent such releases from reaching water, and assure prompt and appropriate responses to reduce impacts.

Equipment Fueling and Maintenance Operations

Equipment fueling would be conducted during the installation and demobilization/restoration periods of the project. Equipment fueling operations would take place overnight at designated parking/fueling locations. Equipment maintenance activities would take place at the CSA. The activity of fueling and conducting maintenance operations on vehicles and heavy equipment entails a risk of hose, line, or valve failure that could result in uncontrolled releases of hazardous materials. An uncontrolled release could impact soil, shallow groundwater, or nearby surface water (Texas Creek or the Arkansas River). Contaminated soil or water generated in spill response and cleanup activities would be managed as a solid waste under applicable CDPHE requirements.

Heavy Equipment Operation

Operation of heavy equipment (primarily drilling for placing cable anchor points) would take place throughout the project corridor during mobilization and restoration periods of the project. The operation of heavy equipment entails a risk of component failures that could result in the release of fluids. Heavy equipment typically employs hydraulic control systems and some periodic failure of pressurized hydraulic lines and fittings during equipment operation is to be expected. Three of the four drill rigs planned for use in anchor drilling employ a hydraulically operated drill unit with typically greater hydraulic oil capacity than most heavy equipment to be used on the project. This equipment would be parked overnight at or near drilling locations. To the extent possible, parking locations would be more than 100 feet from the Arkansas River. An uncontrolled release of hydraulic oil could, to some extent, impact soil, shallow groundwater, or nearby surface water (Texas Creek or the Arkansas River). Contaminated soil or water generated in spill response and cleanup activities would be managed as a solid waste under applicable CDPHE requirements. Compared to other petroleum products, hydraulic oil has a much lower toxicity (Park 2009). Containment equipment would be located with every drilling operation/location and personnel would be trained in recognizing, containing, and mitigating releases. In addition to drilling operations, it is assumed that containment equipment would also be located with every heavy equipment operation team and that such teams would be trained in recognizing, containing, and mitigating releases.

Anchor Drilling on Railroad Side of River

Surface soils in the immediate vicinity of the UPRR rail line may contain a few hazardous substances at concentrations above background levels. These hazardous substances have been identified as residues of historically applied herbicides throughout the project corridor; arsenic and 2,3,7,8-TCDD. Available information indicates such potentially contaminated soils (at the trace concentrations potentially present) would not be expected to meet the criteria for classification as either hazardous materials under USDOT regulations or hazardous waste under CDPHE solid waste management regulations. They would however, be considered a solid waste under CDPHE regulations. Depending on actual concentrations, they may be considered by CDPHE to be contaminated soil. As such, the applicant is required to determine applicable disposal requirements under CDPHE solid waste regulations. These soils would be managed in accordance with applicable CDPHE requirements. Because of the impervious nature of rock, drill cuttings from anchor drilling into rock locations would not be impacted, and would not be classified as either a solid waste or potentially contaminated soil.

Anchor drilling may unearth such potentially contaminated soils. If left in place on the surface after drilling, unearthed soils would become subject to migration through accelerated erosion that they would not be exposed to at depth. If soil unearthed in drilling actually contains these contaminants, the

migration of fine-grained soil particles and adsorbed contaminants could potentially constitute an uncontrolled release of hazardous substances, depending on concentrations of the contaminants and soil volumes. Such releases depending on contaminant concentrations, could impact surface soil and the Arkansas River. Environmental management plans committed to by the applicant require that drill cuttings and "excavated material" (i.e., wastes generated) from drilling locations along the UPRR ROW be collected, containerized, and transported from drilling locations either directly to an off-site disposal facility, or to a designated waste container storage area pending off-site disposal. However, since some of these soils may be contaminated from previous uses, waste characterization and appropriate disposal would occur under applicable CDPHE requirements.

Unearthed soils near the highway are not anticipated to be impacted. The management of such soils does not carry the reasonable potential for any uncontrolled release of hazardous materials. As such, they may be put to beneficial use. It is conceivable, but unlikely, that drilling (on both the highway side and railroad side of the Arkansas River) could encounter unanticipated subsurface contamination from unreported historic releases. Environmental management plans provide for the removal of such materials from the drilling site and for proper disposal. This activity would be conducted during the installation period of the project.

Analysis of Potential Impacts

In the following analysis, the potential for all six activities to result in uncontrolled releases, during each of the three project phases is considered. To the extent they are not discussed above, the nature of appropriate control measures is then considered. The resultant likely duration, context (area affected), and severity of impacts (if any) is presented and discussed. Under Alternative 1a, these factors are considered and discussed in detail. Limited actors that might vary the potential hazardous materials related impacts associated with other alternatives change under some alternatives. In the discussion of each alternative, the changes that vary enough from Alternative 1a to constitute a material difference in the potential for an uncontrolled release is identified and discussed.

4.17.1 No Action Alternative

Under this alternative, there would be no project, and no potential uncontrolled releases of hazardous substances. No impacts from the project would occur.

4.17.2 Alternative 1a

4.17.2.1 Installation

a. Road Transportation of Hazardous Materials

Under this alternative, the road transportation of hazardous materials would take place during the 28-month installation period of the project. The impacts associated with this activity would be classified as short-term impacts. These hazardous materials include diesel fuel; gasoline; hydraulic oil; motor oil; greases/lubricants; anti-freeze; lead-acid batteries, paints, cement, and water reducing agent; and solvents used for equipment operation and maintenance. These materials would be transported to and through the Project Area via US 50. Accidents involving vehicles carrying hazardous materials could result in uncontrolled releases of such materials to the Arkansas River, affecting the entire Project Area. The reporting and response requirements discussed in Section 3.17 are intended to assure that responses

would reduce such impacts. Specific measures to define response actions would be defined by the applicant in environmental management planning documents.

As noted in Chapter 2.0, the accident rate for the segment of US 50 through the Project Area is not in excess of that comparable to roads in other parts of Colorado. Table 3-84 identifies six accidents (over the 14-year period from 1994-2008) that resulted in significant releases of hazardous materials to the Arkansas River. Such releases could result in significant impacts. The Federal Motor Safety Carrier Administration reports, "Hazmat crashes, fatalities, and injuries are low relative to the amount of hazmat that moves on the highway…. Motor carriers that transport hazardous materials, their drivers, and the federal, state, and local government agencies that regulate the transportation of hazmat can take satisfaction in the fact that hazmat crashes are under-represented in the overall crash picture." (Craft 2004)

Table 3-87 reflects (in 2008 data) an annual average daily flow of 250 trucks per day. While CDOT traffic count data has identified the number of trucks using US 50, no data is available from CDOT identifying the number of trucks carrying hazardous materials. The Federal Motor Carrier Safety Administration reports that, "The 1997 Commodity Flow Survey, conducted by the U.S. Census Bureau, estimated that hazmat accounted for 11% of all tons transported by trucks" (Craft 2004). On this basis, of the 250 truck trips per day through the project corridor, approximately 27 would represent hazmat loads. The specific quantities of hazardous materials anticipated to be used have not been identified by the applicant. Accordingly, the number of vehicles/trips involving transportation of hazardous materials to be used on the project cannot be accurately quantified.

However, using the national data of 11% of truck traffic being hazardous material traffic, and anticipated hazardous material use for the project, a conservative order of magnitude assessment can be made of the increase in hazardous materials traffic resulting from project activities. This provides a reasonable basis for evaluating the impact of increased hazardous materials transportation resulting from the project. Of the hazardous materials to be used on the project, diesel fuel is expected to represent the largest quantities. Anchor drilling would require the maximum diesel fuel usage. Chapter 2 indicates the simultaneous use of three drilling units mounted on Cat 325 excavators during this activity. Typical fuel consumption for a Cat 325 excavator is 25 liters per hour (or 6.5 gallons per hour). Assuming use of all three units simultaneously for 6 hours per day times 5 days per week, the weekly fuel consumption would be 585 gallons per week. Assuming a 1,000-gallon diesel storage tank at the CSA, that would represent a diesel fuel delivery for project use once every 12 days. At 250 trucks per day, truck traffic during 12 days would be 3,000 trucks. Assuming 11% of these trucks carried hazardous materials that would represent 330 trucks. The addition of one truck carrying diesel fuel for the project to those 330 trucks would represent a 0.033% increase in truck traffic and a 0.30% increase in hazardous materials traffic. Even doubling these conservative numbers, the impact on hazardous materials traffic during the installation period would be characterized as a negligible impact.

b. Hazardous Materials Storage

Under Alternative 1a, hazardous materials would be stored at the CSA. This would occur throughout the entire 28-month installation period of the project. The impacts associated with this activity would be classified as short-term impacts. Such storage would be provided at the CSA. The applicant has committed to placing hazardous material storage at least 100 feet from any water body or wetland. Based on the location of the CSA, releases of hazardous materials within this area could impact soils, reach Texas Creek, and reach the Arkansas River (via Texas Creek), affecting the entire Project Area.

While specific information on the location(s) of storage, and the design and operation of storage units and equipment has not been provided by the applicant, this information would be provided in environmental management planning documents. This information would support the applicant's commitment that all hazardous materials would be stored to prevent accidental spillage or other harm to the Project Area. It is assumed that bulk liquids storage would be in aboveground storage tanks. As noted previously, diesel fuel is expected to be the hazardous material used and stored in the greatest quantities. It is assumed that an amount greater than 660 gallons would be stored. Under Colorado Division of Oil and Public Safety (OPS) Storage Tank regulations (7 C.C.R. 1101-14), for any aboveground tanks storing petroleum with a capacity greater than 660 gallons the owner (the applicant in this case) must submit an application for a permit, and the permit must be approved prior to installation. OPS regulations dictate, in detail, the design and operation of such tanks to assure they minimize the potential for accidental releases. These regulations also require compliance with all other applicable laws, rules, and regulations (including fire codes and local zoning codes and other ordinances).

At all facilities with storage capacity for petroleum greater than 1,320 gallons, regulations under the Federal Clean Water Act, at 40 CFR Part 112, require that the facility prepare and implement a SPCC plan. It is assumed that petroleum storage capacity in excess of 1,320 gallons would be provided, and such a plan prepared and implemented. SPCC plans and the specific requirements within such plans are directed at: a) design and operational features that minimize the potential for uncontrolled releases of petroleum to occur (e.g., provision of secondary containment), and for any releases reaching waters of the U.S., and b) assuring planned, effective responses to any releases to minimize the impacts.

SPCC requirements, in conjunction with OPS requirements minimize, to the extent practical, the potential for accidental releases from petroleum storage tanks during normal operation of such tanks. In accordance with mitigation measure WATER-5 discussed in Section 5.10 Water Resources, hazardous materials storage at the CSA would not take place within the 100-year floodplain.

Given these appropriate control measures which would be applied, the potential for an uncontrolled release of stored hazardous materials, during normal operation or as a result of flooding, is minimized to the extent practical and is considered negligible. Accordingly, the impacts associated with a potential release of stored hazardous materials would be classified as negligible.

c. Equipment Fueling and Maintenance Operations

Under Alternative 1a, the maintenance, and some fueling of heavy equipment and other project vehicles would take place at the CSA, throughout the 28-month implementation period. Heavy equipment fueling, over the same time period, would take place during overnight equipment parking at or near drilling locations for anchor placement. The impacts associated with this activity would be classified as short-term impacts. As discussed in Section 4.10 Water Resources*,* spills from equipment failure or accidental overflows could conceivably reach Texas Creek Gulch, and hence the Arkansas River, affecting the Project Area with moderate to significant impacts.

At the CSA, the applicant has committed to no equipment fueling within 100 feet of any water body or wetland. Fueling at the CSA would be done from a fuel storage tank and the operational requirements under OPS regulations would apply (and include equipment inspection and no unattended fueling). The applicant would prepare environmental planning management documents addressing fueling and maintenance operations. These plans (and the SPCC plan) would confine fueling operations to an area or areas designed and located to minimize the potential for any spills during fueling to reach water bodies.

Given these appropriate control measures, which would be applied, the potential for releases during fueling operations would be reduced to the extent practical. Given this, impacts associated with a potential release of hazardous materials during equipment fueling and maintenance would be classified as negligible.

As discussed in Section 4.10 Water Resources*, t*he applicant has committed to refueling procedures to minimize the potential for adverse impacts. The applicant has also committed to developing additional procedures and providing training to further limit the potential for leaks or spills (OTR 2010b). These measures would include moving equipment being fueled further than 100 feet from the river or wetland as much as possible and practical, unless the equipment is located on a paved surface. Spill kits would be present to enable immediate spill responses. Crews would be trained to respond to fuel leaks or spills. Equipment servicing would be done within the Texas Creek Staging Area, except in emergency situations such as when a drill might be immovable. For equipment and work on the railroad side of the project, fuel would be stored on railroad cars. The same refueling procedures would be used on the railroad side to reduce the potential for spills.

In accordance with mitigation measure WATER-3 discussed in Section 5.10 Water Resources, the use of drip pans, berming, or absorbent pads to catch potential spills, the use of automatic shut-off devices, and conducting any fueling operations under constant observation/attendance, the potential for releases would be minimized to the extent practical.

Given these appropriate control measures, which would be applied, the potential for releases during fueling operations would be reduced to the extent practical. Given this, impacts associated with a potential release of hazardous materials during equipment fueling would be classified as negligible.

Obviously, some causes of spills would be more or less likely than others. The potential for an extreme flood is discussed in this section, and locations that are more generally prone to rockslides or debris flows are identified in Tables 4-14 (Rockfall Hazard Areas) and 4-15 (Potential Debris Flow Areas at Tributary/Ephemeral Streams), respectively. The likelihood, severity, and extent of impacts from spills or leaks of fuel or lubricants would vary widely. However, because of the potential for severe, widespread impacts to water quality, additional mitigation (WATER-3 in Chapter 5.0) is recommended. Implementation of recommended measure WATER-3 would reduce the potential for water quality impacts from spills or leaks to a negligible or minor intensity.

d. Heavy Equipment Operation

Heavy equipment would be operated throughout the project corridor throughout the 28-month implementation and 3-month demobilization and restoration periods of the project. The impacts associated with this activity would be classified as short-term impacts. The primary use of heavy equipment would be for the placement of anchor points along both sides of the Arkansas River. During use (or overnight parking), heavy equipment can be the source of leaks and releases of fluids. With equipment operating near the Arkansas River, such releases have the potential to reach and impact the entire Project Area. While it is conceivable a piece of equipment could end up in the river (which would release some quantities of a variety of hazardous materials), the probability of such a scenario is considered to be very low. The potential for rockslides or debris flows, or vandalism to result in releases to the Arkansas River exists, but the probability is also to be considered very low. The most likely scenario of any significant release of hazardous materials would be the failure of a pressurized hydraulic line.

The applicant has committed to locating spill response and containment equipment with each equipment operations team to provide for prompt response and containment actions in the event of a release. The applicant has also committed to training each installation/restoration crew in recognizing, containing, and mitigating hazardous materials spills/releases. The applicant would prepare environmental management planning documents addressing equipment operations. It is assumed such plans would provide for daily (or more frequent) inspections of hydraulic lines, which would minimize the potential for unanticipated line failure.

Failure of a hydraulic line could conceivably result in loss of most of a piece of equipment's hydraulic oil capacity. However, hydraulic line failure generally results in loss of important functional capability, causing the operator to shut the equipment down and depressurizing the failed line before much oil is lost. Hydraulic oil, while a petroleum product, is of much lower toxicity than fuel (Park 2009).

While equipment would be parked overnight at or near anchor drilling work sites, the applicant has committed to overnight equipment parking at locations 100 feet or more away from any water or wetlands if at all possible (OTR 2010b). In accordance with mitigation measure WATER-3 discussed in Section 5.10 Water Resources*,* parking locations would, additionally, not be in areas where rockslides or debris flows would be likely.

Given these appropriate control measures which would be applied, the potential for releases during equipment operations would be minimized to the extent practical. The potential for any releases that might occur to be an uncontrolled release that would have significant environmental consequences would also be minimized (based on both the quantities and nature of materials). Given this, impacts associated with a potential release of hazardous materials during equipment operations would be classified as negligible.

e. Anchor Drilling on Railroad Side of River

Anchor points would be drilled to the appropriate design depth based on subsurface conditions. Under Alternative 1a, this activity would take place over a 28-month period. The impacts associated with this activity would be classified as short-term impacts. At each of 2,275 anchor sites, four anchor holes would be drilled (for a total of 9,100 anchor points). Half of the drilling locations (approximately 1,140) would be on the UPRR ROW. It is estimated that approximately 1.8 cubic feet of soil would be unearthed at each drill site (four drill holes per site), which would represent a total soil volume of approximately150 cubic yards. This drilling would be accomplished using the drilling equipment described in Chapter 2.0.

As discussed above, the potential for some level of historic soil contamination in surface soils within the ROW is recognized. Soils produced from drilling anchor points within the ROW would be presumptively handled as contaminated soil. The proportion of holes that would be drilled at locations underlain by soils, and by rock is unknown. Drill cuttings from locations underlain by rock would not be considered potentially contaminated, nor would cuttings from the highway side of the river.

Unearthed contaminated soil, if left in place and exposed to rainfall, could migrate as an uncontrolled release to the river, potentially affecting the Project Area. Such materials could conceivably represent a source of air particulate emissions as fugitive dust. However, the anticipated potential concentrations of hazardous materials are at trace levels, where significant dust concentrations of such material would not represent significant quantities or concentrations of hazardous substances.

The applicant has committed to collecting and containerizing the subsurface materials unearthed by drilling operations on the UPRR side of the river, handling them as potentially contaminated and transporting them to the CSA for storage prior to disposition. They would be managed in accordance with Colorado Solid Waste Management Regulations, and specific waste characterization and disposal criteria that would be established by the applicant in consultation with CDPHE. These appropriate control measures, which would be applied to preclude the potential for significant amounts of contaminated soil becoming available for migration to the Arkansas River. Accordingly, the impacts associated with a potential release of hazardous materials during anchor point drilling would be classified as negligible.

4.17.2.2 Exhibition

Hazardous materials related impacts during the exhibition period would be limited to two weeks, which is considered short-term. Such impacts could occur throughout the Project Area.

With construction completed, no road transportation of hazardous materials would be anticipated, so there would be no impacts associated with transport of project-related hazardous materials impacts. One concern, that has been identified, is that the increase in vehicle traffic during exhibition may increase the potential for an accident involving a vehicle transporting (nonproject related) hazardous materials. There is no quantitative basis for evaluating this concern. There is some potential for people to be viewing the art while driving, which would suggest some increased risk of them being involved in an accident, and it is conceivable such an accident could involve a collision with a vehicle carrying hazardous materials. However, two factors suggest this should also be classified as a negligible impact. Increased traffic would result in significantly reduced speed. This would tend to reduce, rather than increase the potential for accidents. Reduced speeds would also act to reduce the likely severity of accidents, reducing the potential for an accident involving hazardous materials to result in an uncontrolled release. Given these factors, impacts associated with the transportation of hazardous materials during the exhibition period would be classified as negligible.

Hazardous materials storage at the CSA would continue during this period, as would the identified, associated negligible impacts discussed under the installation period, above. With the completion of construction, construction-related activity (fueling operations, heavy equipment operation, and anchor drilling) and the related impacts discussed under the installation period, above, would not be anticipated. In the event emergency repair to project infrastructure or the art work were required, the impacts associated with such activity would comparable to (though of shorter duration than) those identified for the construction period.

4.17.2.3 Demobilization

Impacts related to hazardous materials during the demobilization period would be limited to a 3-month period, which is considered short-term. Such impacts could occur throughout the Project Area.

The expected intensity of these impacts, for road transportation of hazardous materials, hazardous materials storage, fueling operations, and heavy equipment operation, would the same as that identified above for the installation period (i.e., negligible). The impacts identified as associated with the anchor drilling on the railroad side of the Arkansas River would not be present.

During demobilization, removal of anchors from this side of the river would occur. At some locations anchors would be cut off at a depth of one foot, and imported soil would be placed to restore the location. The restoration process (removal of anchors to a depth of one foot) would involve minimal disturbance of

adjoining (potentially contaminated) soil, and any disturbed soil would be covered. Accordingly, the potential for an uncontrolled release of contaminated soil is effectively eliminated. Given this, the adverse effects of a release of contaminated soil during restoration of anchor points would be classified as a negligible impact.

4.17.3 Alternative 1c

4.17.3.1 Installation

Under Alternative 1c, the installation period and associated activities that generate hazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.3.2 Exhibition

Under Alternative 1c, the associated activities that generate hazardous waste would be the same as under Alternative 1a. However, the viewing period would be extended by one week. Accordingly, the associated impacts slightly increase compared to those discussed and presented under Alternative 1a.

4.17.3.3 Demobilization

Under Alternative 1c, the demobilization period and associated activities that generate hazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.4 Alternative 1d

4.17.4.1 Installation

Under Alternative 1d, the installation period would be shortened from 28 to 14 months. This would result in the time period over which the potential for installation related uncontrolled releases would exist being cut in half, compared to Alternative 1a. Except for this difference in duration, the impacts associated with all hazardous materials-related activities would be the same as discussed and presented under Alternative 1a.

4.17.4.2 Exhibition

Under Alternative 1d, the exhibition period and associated activities that generate hazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.4.3 Demobilization

Under Alternative 1d, the demobilization period and associated activities that generate hazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.5 Alternative 2

4.17.5.1 Installation

Under Alternative 2, the number of anchor points drilled on the railroad side of the Arkansas River would be reduced from the 4,600 under Alternative 1a to 3,700. This would result in some reduction in the time required for drilling (and later removal) of anchor points. Any time reductions realized would result in the reduction of the time period over which the potential for installation related uncontrolled releases would exist compared to Alternative 1a. Except for this difference in duration, the impacts associated with all hazardous materials-related activities would be the same as discussed and presented under Alternative 1a.

4.17.5.2 Exhibition

Under Alternative 2, the exhibition period and associated activities that generate hazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.5.3 Demobilization

Under Alternative 2, the demobilization period and associated activities that generate hazardous waste would be shorter than under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.6 Alternative 3

4.17.6.1 Installation

Under Alternative 3, the number of anchor points drilled on the railroad side of the Arkansas River would be reduced from the 4,600 under Alternative 1a to 3,200. This would result in some reduction in the time required for drilling (and later removal) of anchor points. Any time reductions realized would result in the reduction of the time period over which the potential for installation related uncontrolled releases would exist compared to Alternative 1a. Except for this difference in duration, the impacts associated with all hazardous materials-related activities would be the same as discussed and presented under Alternative 1a.

4.17.6.2 Exhibition

Under Alternative 3, the exhibition period and associated activities that generate hazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.6.3 Demobilization

Under Alternative 3, the demobilization period would be shorter than under Alternative 1a, but associated activities that generate hazardous waste would be the same. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.7 Alternative 4

4.17.7.1 Installation

Under Alternative 4, the number of anchor points drilled on the railroad side of the Arkansas River would be reduced from the 4,600 under Alternative 1a to 1,000. This would result in the reduction in the time

required for drilling of anchor points from 28 to 14 months and reduction of the time period over which the potential for installation related uncontrolled releases would exist compared to Alternative 1a. Except for this difference in duration, the impacts associated with all hazardous materials-related activities would be the same as discussed and presented under Alternative 1a.

4.17.7.2 Exhibition

Under Alternative 4, the exhibition period and associated activities would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.7.3 Demobilization

Under Alternative 4, the demobilization period and associated activities would be shorter than under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.17.8 Summary and Conclusions

As described in the analysis above, the potential for uncontrolled releases of hazardous materials exists in six aspects of planned project activity. Based on the analysis of all six aspects of planned activities, the potential for uncontrolled releases is very low.

Context is important in consideration of potential versus actual risk. Hazardous materials are highly regulated, under a variety of programs. Large amounts of hazardous materials are transported by road (including road adjacent to rivers), and construction activity of the general nature of that involved in this project (the operation of heavy equipment, and storage of construction related hazardous materials in proximity to rivers), routinely take place in relatively comparable settings. Actual uncontrolled releases of hazardous materials from such activities are a very uncommon event.

For each of the activities that present the potential for uncontrolled releases of hazardous materials, there are factors that mitigate that potential. These factors work to reduce the probability of an actual uncontrolled release:

- Federal and state laws, rules and regulations prohibit the use and handling of hazardous materials in ways that have been determined to represent an unacceptable threat to human health and the environment. These enforceable standards address the transportation, storage, use, and disposal of hazardous materials.
- The applicant has committed to compliance with all applicable laws, rules, and regulations.
- The applicant has also committed to a number of measures intended to further minimize the potential for accidental releases of hazardous materials during project work.
- The applicant would, before undertaking the project, prepare environmental management planning documents, and has committed to follow the requirements set forth in these documents. These documents would address all activities involving the handling of hazardous materials, including defining CDPHE requirements for the characterization and disposition of potentially contaminated soil. These documents would be reviewed by the BLM (and in some cases by other agencies permitting processes), and would be approved only upon a

determination that they provide adequate and appropriate protections against foreseeable actions that could result in uncontrolled releases.

For all analyzed activities, there are at least two, and in most instances five such layers of appropriate control measures. Each of these layers of control measures reduces the potential for accidental releases. Multiple layers further reduce such potential. The combined effect of these layers is to reduce the probability of identified potential sources of uncontrolled releases manifesting as actual uncontrolled releases. That leads to the conclusion that the reasonably foreseeable impacts associated with hazardous materials must be classified as negligible.

4.17.8.1 Regulatory Requirements

A range of federal, state, and local regulatory programs define the universe of hazardous materials, and the transportation and release reporting requirements for such materials. The following additional regulatory programs/requirements apply to the use, storage, and disposition of hazardous materials:

- Colorado Oil Tank Regulations 7 C.C.R. 1101-14; Aboveground Petroleum Storage Tanks – The key relevant requirements include: Registration, Performance Standards, General Operating Requirements, Release Reporting, Investigation and Confirmation, Release Response and Corrective Action, and Financial Responsibility.
- Colorado Solid Waste Regulations 6 C.C.R. 107-3 Hazardous Waste Regulations – The key relevant requirements include Definitions, Generator Requirements (determination if a solid waste is a hazardous waste and management requirements if so determined).

4.17.8.2 Environmental Management Planning Documents

The applicant would develop environmental management planning documents to describe specific measures to be taken that support and implement the overall commitment to compliance with applicable regulatory requirements. Specific environmental management plans would include, but not be limited to:

- SPCC Plan identifies measures to prevent a discharge of oil into navigable waters;
- Emergency Response Plan (this information could be included in the SPCC Plan) – identifies response actions, including logistics and reporting requirements in the event of an uncontrolled release; and
- Materials Management Plan (or equivalent) – identifies measures to appropriately handle, store, characterize, and use/dispose of potentially contaminated materials.

4.18 WASTE (NONHAZARDOUS)

Introduction

Waste materials, if not managed properly, would have the potential to impact water quality and aesthetic resources of the Arkansas River, and capacities of local landfills and sanitation services. These potential impacts were identified as issues during the scoping process, and are thereby addressed in this section. It is not anticipated that waste materials meeting the regulatory definitions of hazardous waste at 40 CFR

Part 261 would be generated by project activities. To the extent they may be generated as spill cleanup residues from hazardous materials spills, they are addressed in Section 4.17. For the purposes of this analysis, nonhazardous waste includes construction waste and debris, waste water, and other trash from the project installation and demobilization phases, soil generated during the construction phase that may be contaminated, but that does not meet the regulatory definitions of hazardous waste (potentially contaminated soil, as defined and discussed in detail in Section 4.11), trash and recyclables from project visitors during the exhibition phase, sanitation services during the project installation, exhibition, and demobilization phases, and exhibition materials from the exhibition phase and subsequently removed during the demobilization phase.

Nonhazardous Waste Project Commitments

The applicant has committed to the following design measures in an effort to minimize impacts from nonhazardous waste.

- All nonhazardous waste management and disposal activities would be conducted in accordance with Colorado Solid Waste management Regulations.
- Trash and recycle bins would be placed at the Texas Creek CSA and laydown areas for construction debris and other trash generated during the project installation and demobilization phases. These facilities would be serviced at least weekly or more frequently if determined necessary.
- A location designed with sufficient containment to receive cement grout wash water and cement waste from anchor grouting would be available at the CSA. This cement washout area would be cleaned out weekly and the cement waste would be transported to a facility permitted to receive solid waste.
- Portable toilets would be provided at the CSA during the project installation and demobilization phases for project personnel. These facilities would be serviced weekly or as needed.
- Waste management and recycling services would be procured through local or regional vendors. Solid waste, trash, and recycling bins would be located at each major information center, Vallie Bridge Limited Rest Stop, and at Five Points Recreation Site. In addition, smaller trash and recycling receptacles would be provided throughout each information center parking area. In addition to daily servicing of the trash and recycling facilities during the exhibition period, approximately 25 monitors would be stationed at each of the major information centers to assist visitors with questions and information and to monitor trash localized within the specific information areas. The project corridor would be swept daily by project monitors during the exhibition period to collect any trash that was not properly captured in available receptacles.
- Portable toilets would be provided at each information area, the Five Points Recreation Area, and the Vallie Bridge Limited Rest Stop. A total of 84 portable toilets would be provided during the exhibition period with 10 additional units kept in reserve if needed. These facilities would be serviced on a daily basis during the exhibition period.
- Cleanup crews would check all project usage areas, as well as the highway corridor overall, for trash and litter daily during the 3 month removal period and at the end of the restoration period to ensure that all material generated by the work crews has been picked up and removed.

- After removal, all project materials would be industrially recycled or delivered to salvage yards, including the fabric panels, steel cables, carabiners, and other supporting hardware.

4.18.1 No Action Alternative

Under this alternative, there would be no impacts associated with project-related nonhazardous waste since the project would not occur.

4.18.2 Alternative 1a

4.18.2.1 Installation

a. Capacities of Area Landfills and Sanitation Services

Under Alternative 1a, waste materials would be generated and sent for disposal to area landfills and sanitary services during the 28-month installation period of the project. Portable toilets would be provided by local sanitation services for project construction staff during installation. The impacts of this activity would be classified as short-term impacts, and would be localized to the landfills and sanitation services providing disposal capacity. Concerns regarding local landfill capacities and availability of local sanitation services were identified during the scoping process. Research relative to these concerns was performed during the preparation of this EIS and is presented in Chapter 3. Based on that research, one local landfill in Chaffee County maintains a capacity of approximately 30 years and currently there are no limitations on the quantity of waste delivered to that landfill, number of trash bins available for project use, or waste transport frequencies during the project installation, exhibition, or demobilization phases. Research regarding the availability of portable toilets and availability of servicing of the portable toilets indicates that local vendors have the capacity to provide over 125 portable toilets as well as servicing of those as needed. Waste generated from portable toilets would also be transported to the landfill under waste manifest and disposed of in the solidification basin at the landfill. Based on the availability of these resources, impacts to these local waste disposal resources would be negligible for each respective potential mechanism of impact identified in the following paragraphs.

Construction Debris. Under this alternative, construction debris would be generated by the project during the installation phase of the project. The impacts associated with this would be classified ad short-term impacts. Given the potential to impact water quality and aesthetic resources of the Arkansas River, if improperly managed, these impacts would appropriately classified as affecting the Project Area. Construction debris includes, but is not limited to unused construction materials, packaging materials, and cement waste generated during construction and cement washout. Construction debris would be transported to the Texas Creek CSA and placed in either trash receptacles or recycle bins as appropriate. Trash from receptacles at the CSA would be transported to a permitted solid waste landfill on a weekly basis (or more frequently if necessary). Waste grout and wash water would be transported to the CSA, placed into a designated, contained location, and, once the cement hardens, it would be transported weekly (at a minimum) to a permitted solid waste landfill. Given the measures committed to by the Applicant, the effects of loose, uncontained construction debris impacting area resources would be classified as negligible.

Potentially Contaminated Soil in the UPRR ROW (installation phase). Under this alternative, anchor points would be drilled to the appropriate design depth based on subsurface conditions. This activity would take place over a 28-month period. On this basis, the impacts associated with this activity would be

classified as short-term. At each of 2,275 anchor sites, four anchor holes would be drilled (for a total of 9,100 anchor points). Half of the drilling locations (approximately 1,140) would be on the UPRR ROW. It is estimated that less than 1.1 cubic yards of soil would be unearthed at each drill site (four drill holes per site), which would represent a total soil volume of less than 1,250 cubic yards on the UPRR ROW. This drilling would be accomplished using the drilling equipment described in Chapter 2.0.

The potential for some level of historic soil contamination in shallow soils within the UPRR ROW is recognized. The impacts associated with the unearthing of this material (the potential for migration to the Arkansas River) would occur in the Project Area. These potentially contaminated soils would be managed in accordance with Colorado Waste Management Regulations, including specific waste characterization and disposal protocols developed in consultation between the Applicant and CDPHE.

If the soil is determined to be contaminated in accordance with CDPHE regulations, the soil would be transported to a solid waste disposal facility properly permitted to receive and dispose of it. Soil that is determined to not be contaminated is not considered a waste material unless the applicant decides to dispose of the soil as a solid waste. Given the measures committed to by the applicant, the effects of loose, uncontained contaminated soil impacting area resources would be classified as negligible.

4.18.2.2 Exhibition

a. Visitor Trash and Recyclables

Under this alternative, 344,000 visitors are expected during the 2-week exhibition phase of the project. The impacts related to the trash and recyclables generated by these visitors would be classified as short-term. Improper management of these waste materials would impact the aesthetic resources along the Arkansas River corridor, throughout the Project Area. Receptacles for trash and recyclables would be available. Any materials not used during installation of the panels would be recycled or disposed of appropriately. During the exhibition phase, any waste materials discovered outside of trash receptacles and subsequently not a functional component of the display panels would be identified during regular monitoring of the project corridor and managed appropriately. Given the measures committed to by the Applicant, the effects of loose, uncontained visitor trash and recyclables impacting area resources would be negligible.

b. Sanitation Services

Under this alternative, portable toilets would be required at visitor areas during the 2-week exhibition period to service the estimated 344,000 visitors. The impacts associated with this would be classified as short-term, and because of the potential to impact water quality and the aesthetic resources of the Arkansas River corridor, classified as impacting the Project Area. The project has committed to a total of 84 portable toilets during the exhibition period. Although no regulations govern the use of portable toilets for events, the Portable Sanitation Association International (PSAI) is a recognized authority in the industry and provides guidelines for the number of units per crowd size for special events (PSAI 2009). Based on the visitation estimates, during peak day visitation an estimated 34,400 visitors are expected. No data or projections have been developed as to the average duration of visitations. For purposes of this analysis, an average visitation of two hours is assumed. According to the PSAI special event extended chart breakdown, PSAI recommends 89 units for this number of people, for the assumed duration. The project commitment of 84 portable toilets is essentially consistent with the PSAI recommended number of 89 units during peak hours. Given the measures committed to by the applicant and the PSIA guidelines, the effects of sanitation-related impacts would be negligible.

4.18.2.3 Demobilization

a. Capacities of Area Landfills and Sanitation Services, and Construction Debris

Under this alternative, demobilization would take place over a three month period, hence the impacts associated with nonhazardous waste generation and management would be classified as short-term. The impacts would be as described above under the installation phase, though for shorter duration. These impacts would affect the Project Area, and be classified as negligible.

b. Exhibition Materials

Under this alternative, approximately 5.9 miles of panels with supporting cables and anchors would be placed over the Arkansas River. Following the exhibition phase, all project materials would be removed and industrially recycled or delivered to salvage yards. The storage, management, and monitoring of exhibition related debris would be performed as described above under the installation phase. Accordingly, the effects of loose, uncontained exhibition materials impacting area resources would be throughout the Project Area, and classified as negligible.

4.18.3 Alternative 1c

4.18.3.1 Installation

Under Alternative 1c, the installation period would be shortened from 28 to 14 months. This would result in the time period over which the potential for nonhazardous waste impacts to exist being cut in half, compared to Alternative 1a. Except for this difference in duration, the impacts associated with all nonhazardous waste related activities would be the same as discussed and presented under Alternative 1a.

4.18.3.2 Exhibition

Under Alternative 1c, associated activities that generate nonhazardous waste would be the same as under Alternative 1a. However, the exhibition period would be a week longer. Accordingly, the associated impacts would slightly increase compared to Alternative 1a.

4.18.3.3 Demobilization

Under Alternative 1c, the demobilization period and associated activities that generate nonhazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.18.4 Alternative 1d

4.18.4.1 Installation

Under Alternative 1d, the installation period and associated activities that generate nonhazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.18.4.2 Exhibition

Under Alternative 1d, the exhibition period and associated activities that generate nonhazardous waste would be the same as under Alternative 1a, with the exception that the projected visitor numbers during

peak viewing days would be reduced, which would reduce waste generation. Accordingly, the associated impacts would be the same, though of smaller magnitude, as discussed and presented under Alternative 1a.

4.18.4.3 Demobilization

Under Alternative 1d, the demobilization period and associated activities that generate nonhazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.18.5 Alternative 2

4.18.5.1 Installation

Under Alternative 2, the installation period and associated activities that generate nonhazardous waste would be the same as under Alternative 1a, though of shorter duration, because of a reduction in the number of anchor points to be placed. Accordingly, the associated impacts would be slightly reduced from those discussed and presented under Alternative 1a.

4.18.5.2 Exhibition

Under Alternative 2, the exhibition period and associated activities that generate nonhazardous waste would be the same as under Alternative 1a. Accordingly, the associated impacts would be the same as discussed and presented under Alternative 1a.

4.18.5.3 Demobilization

Under Alternative 2, the demobilization period and associated activities that generate nonhazardous waste would be shorter than under Alternative 1a. Accordingly, the associated impacts would be slightly reduced from those discussed and presented under Alternative 1a.

4.18.6 Alternative 3

4.18.6.1 Installation

Under Alternative 3, the installation period and associated activities that generate nonhazardous waste would be the same as under Alternative 1a, though of shorter duration, because of a further reduction in the number of anchor points to be placed. Accordingly, the associated impacts would be reduced from those discussed and presented under Alternative 1a.

4.18.6.2 Exhibition

Under Alternative 3, the exhibition period and associated activities that generate nonhazardous waste would be the same as under Alternative 1a, though visitation would be somewhat reduced. Accordingly, the associated impacts would slightly reduced from those as discussed and presented under Alternative 1a.

4.18.6.3 Demobilization

Under Alternative 3, the demobilization period and associated activities that generate nonhazardous waste would be less than under Alternative 1a. Accordingly, the associated impacts would be reduced from those discussed and presented under Alternative 1a.

4.18.7 Alternative 4

4.18.7.1 Installation

Under Alternative 4, the installation period and associated activities that generate nonhazardous waste would be reduced from the 28 months under Alternative 1a to 14 months and the Project Area would be reduced to 1.4 miles of panels, reducing the total amount of waste generation. Accordingly, the associated impacts would be greatly reduced from those discussed and presented under Alternative 1a.

4.18.7.2 Exhibition

Under Alternative 4, the number of visitors during peak hours of the exhibition would be reduced. Accordingly, the associated impacts would greatly reduced from those discussed and presented under Alternative 1a.

4.18.7.3 Demobilization

Under Alternative 4, the demobilization period and associated activities cover less area and occur over a shorter duration than under Alternative 1a. Accordingly, the associated impacts would be greatly reduced from those discussed and presented under Alternative 1a.

4.19 REALTY AUTHORIZATIONS AND LAND USE

This section describes impacts to realty authorizations and land use on public and private lands within the Analysis Area, following guidance from local land use policy and land management agencies. The Analysis Area includes a 500-meter buffer on either side of the Arkansas River/US 50, stretching between the towns of Salida on the west and Cañon City on the east, and includes existing ROW, access roads, and surrounding land uses. Impacts include direct changes or disruptions to existing and planned land uses that may occur during the installation, exhibition, and demobilization phases of the proposed project and Alternatives. Because over half (approximately 57%) of the land within the Analysis Area is administered by the BLM, impacts include those related to existing Recreation and Public Purposes (R&PP) permits and management objectives for special management areas. While this section addresses the physical impacts of land use change, other related issues are discussed in Section 4.20 Recreation, 4.14 Socioeconomics, Social Impacts, Section 4.15 Public Safety, and Section 4.21 Visual Resources.

4.19.1 No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed and no realty authorizations would be provided. Existing lands uses and authorizations would not be affected by the OTR project.

4.19.2 Alternative 1a

4.19.2.1 Installation

a. Overview

The predominant land uses found within the Analysis Area, which include recreational lands, rural residential, agricultural and open lands, establish the rural character found along the Arkansas River and adjoining lands. While limited development, such as the gravel mine near Parkdale and scattered buildings

and businesses at the various unincorporated towns along US 50, is present it does not detract from the area's overall rural character.

As described in Chapter 3.0, a primary objective of current land use policy documents in Chaffee and Fremont counties is to uphold the rural character and visual quality of the Arkansas River and the adjoining lands as an asset to their communities. Maintaining existing land uses supports those objectives. Furthermore, the BLM's management objectives also permit recreational uses, uses related to resource management and wildlife protection, and limited mining and ROW activities.

With those objectives in mind, the presence of construction crews surveying anchor points, installing anchors, ATFs and cables, and conducting other installation activities, as well as the presence of heavy machinery, vehicles, and other equipment, would lead to a temporary disruption of people's ability to enjoy the rural lifestyle and natural character found along the Arkansas River and adjoining lands. These impacts would be minor, short-term, and limited to the immediate panel footprints and staging areas within the project area, allowing existing uses to continue with minimal interruption. Impacts to land use are intertwined with recreation and visual resources; more detailed discussions of those topics can be found in those sections.

During installation, approximately 60.0 acres of BLM lands would be directly affected by construction activities. The largest single area of effect would be Texas Creek, where approximately 56.0 acres would be affected by staging areas, parking area improvements, and other construction activities. All of this effect would be temporary and short-term. An additional 50.0 acres of BLM land would be directly affected by fabric panels, cables, anchor transition frames, and construction activities. This would be a short-term, moderate effect on BLM lands.

Project effects on specific BLM land use designations are discussed separately in the remainder of this section and other sections of this chapter.

b. Impacts to BLM R&PP Leases and Mining Claims

The BLM has one R&PP lease issued to the CDPOR that applies to 16 locations within the AHRA; 7 of those are located within the project area, ranging in size from 2.0 to 40.0 acres. The lease is issued for 'recreational development and fee collection in conjunction with overall management of the Arkansas Headwaters Recreation Area, under guidance provided by the Arkansas River Recreation Management Plan.' Additionally, there is an R&PP lease issued by the BLM to the Fremont School District RE-3 Cotopaxi (COC-57771), which authorizes land for a baseball diamond and bathroom facility. A detailed discussion of the impacts to recreational resources can be found in Section 4.20 Recreation. Other than traffic flow issues and other activities that would affect recreational uses, the installation phase of the proposed project would not impact the existing R&PP sites.

The presence of construction crews, vehicles, and equipment would create temporary disruption of access to mining claims present within the Analysis Area. There are approximately two dozen mining claims in Chaffee and Fremont counties, which may increase or decrease at anytime throughout the project duration. Depending on the coordination of access for the claimants to these areas, as well as the handling of unconsolidated materials during installation, there may be minor impacts to mining claims during this phase. Impacts to mining within the Analysis Area are discussed in more detail in Section 4.11 Soil Resources, and Section 4.12 Geologic Substrate and Terrain.

c. Impacts to BLM Special Management Areas

The BLM's two Special Management Areas located within the Analysis Area, the Arkansas Canyonlands ACEC and the McIntyre Hills WSA, and while no ground disturbing activities are proposed, both have unique resource conditions and management criteria that would be impacted by the Artists' Proposed Action. These effects are discussed in Section 4.23, Wilderness and Study Management Areas.

d. Impacts to Private Lands

Most project activities would occur on BLM lands; however, direct effects to private lands would occur at a number of locations, including the Parkdale Viewing Center, Fremont Road Information Center, and Salida Information Center. The total area affected would be approximately 18.0 acres at Parkdale Viewing Center, 10.0 acres at Fremont Road Information Center, and approximately 2.0 acres at the Salida Information Center. Each of these areas would have parking spots, visitor facilities, and informational materials about the project. There would be no conflicts with existing land uses at these sites. Any effects would be short-term and all sites would likely return to their previous use after the project was completed.

The primary use on private lands found within the Analysis Area is rural; large lot residential properties, agricultural lands, or vacant, undeveloped property. There are approximately 200 homes located along US 50, nearby or adjacent to the Arkansas River. Most of these are clustered around the unincorporated towns west of Texas Creek. The planning documents for Chaffee and Fremont counties emphasize the value that these communities have on their rural lifestyle and natural surroundings.

There are no proposed project installation activities in the small communities located along US 50 within the project area. The project would therefore not have any direct impacts to private land uses along US 50. Uses such as rural residential, small scale agriculture, and retail businesses would be able to continue. These communities include, from west to east, Cleora, Wellsville, Swissvale, Howard, Vallie, Coaldale, Pleasanton, Cotopaxi, Texas Creek, Parkdale, Echo, and Fink. However, impacts related to traffic would occur. These effects are discussed in more detail in Section 4.16 Transportation. Short-term economic effects would also occur, including increased spending at local businesses. These effects are discussed in Section 4.14 Socioeconomics.

No significant impacts to existing land use on private lands would occur during the installation phase. Any effects would be short-term, minor, and not likely to result in any land use changes.

4.19.2.2 Exhibition

Similar to the impacts described for the installation phase of the Artists' Proposed Action, the presence of fabric panels, vehicles, observers, and staff during the viewing phase would lead to a temporary disruption of people's ability to enjoy the rural lifestyle and natural character found along the Arkansas River and adjoining lands. These impacts would be minor, short-term, and limited to the immediate panel footprints and viewing areas within the project area.

Given the limited duration of the exhibition period, when most visitation would occur, no long-term land use changes would be expected to occur as a result of the project.

The impacts to land use described here closely relate to other resources; detailed discussions of those additional impacts can be found in the following sections: Section 4.20 Recreation, 4.14 Socioeconomics, Social Impacts, Section 4.16 Transportation and Traffic, and Section 4.15 Public Safety.

a. Impacts to BLM R&PP Leases and Mining Claims

The exhibition phase of the project would result in short-term impacts to the existing land uses found on the R&PP lease's 16 corresponding sites. However, these impacts are centered on recreational use of those sites. A detailed discussion of those impacts can be found in Section 4.20 Recreation, and would have no effect on the R&PP lease itself.

There are approximately two dozen mining claims in Chaffee and Fremont counties, which may increase or decrease at anytime throughout the project duration. Depending on the coordination of access for the claimants to these areas, there may be minor impacts to mining claims during the exhibition phase. Impacts to mining within the Analysis Area are discussed in more detail in Section 4.11 Soil Resources, and Section 4.12 Geologic Substrate and Terrain.

b. Impacts to BLM Special Management Areas

Effects on special management areas are discussed in Section 4.23.

c. Impacts to Private Lands

No proposed project exhibition activities would be located in the small communities located along US 50 in the project area. Therefore, no impacts to existing land uses would be expected. Uses such as rural residential, small scale agriculture, and retail businesses would continue. These communities include, from west to east, Cleora, Wellsville, Swissvale, Howard, Vallie, Coaldale, Pleasanton, Cotopaxi, Texas Creek, Parkdale, Echo, and Fink. However, impacts related to traffic would occur and are discussed in more detail in Section 4.16, Transportation. Short-term economic effects would also occur, including increased spending at local businesses. These effects are discussed in Section 4.14 Socioeconomics, Social Impacts.

No significant impacts to existing land use on private lands would occur during the exhibition phase. Any effects would be short-term, minor, and not likely to result in any land use changes within the Project Area.

4.19.2.3 Demobilization

The presence of construction crews, heavy machinery, vehicles, and other equipment needed for the demobilization of the Artists' Proposed Action would result in impacts similar to those that would occur during the construction phase.

a. Impacts to BLM R&PP Leases and Mining Claims

The impacts on BLM R&PP lease sites on recreational use are discussed in depth in Section 4.20. Otherwise, no additional impacts would occur to these areas during the demobilization phase of the project

The presence of construction crews, vehicles, and equipment would disrupt access to mining claims present within the project area. There are approximately two dozen mining claims in Chaffee and Fremont counties, which may increase or decrease at anytime throughout the project duration. Depending on the coordination of access for the claimants to these areas, as well as the handling of unconsolidated materials during demobilization, there may be minor impacts to mining claims during this phase. Impacts to mining within the Analysis Area are discussed in more detail in Section 4.11 Soil Resources, and Section 4.12 Geologic Substrate and Terrain.

b. Impacts to BLM Special Management Areas

Impacts to these areas would be the same as was described for the installation phase of the project.

c. Impacts to Private Lands

Impacts to these lands would be the same as was described for the installation phase of the project.

4.19.3 Alternative 1c

All impacts on realty and land use would be the same as under Alternative 1a, for all project phases.

4.19.4 Alternative 1d

All impacts on realty and land use would be the same as under Alternative 1a, for all project phases.

4.19.5 Alternative 2

Under Alternative 2, the amount of area affected by installation activities and panel placement would be reduced. The amount of BLM land affected by project activities would be reduced to approximately 60.0 acres. All other impacts on realty and land use would be the same as under Alternative 1a, for all project phases.

4.19.6 Alternative 3

Under Alternative 3, the amount of area affected by installation activities and panel placement would be reduced. The amount of BLM land affected by project activities would be reduced to approximately 60.0 acres. All other impacts on realty and land use would be the same as under Alternative 1a, for all project phases.

4.19.7 Alternative 4

Under Alternative 4, the amount of area affected by installation activities and panel placement would be reduced. The amount of BLM land affected would be reduced to approximately 46.0 acres. All other impacts on realty and land use would be the same as under Alternative 1a.

4.20 RECREATION RESOURCES

Recreation is a primary land use within the OTR Project Area. The impact analysis considered recreation resources within the Analysis Area, which includes the corridor along US 50 and the Arkansas River between Salida and Parkdale. This analysis primarily focuses on recreation sites and activities occurring on, or directly adjacent to, the Arkansas River. However, regional recreation sites and activities not immediately bordering the river that may be affected by the Project Area are also considered. Recreation uses in the Project Area include: boating, angling, wildlife viewing and bird watching, camping, hiking and mountain biking, rock climbing, OHV use, hunting and shooting, horseback riding, placer mining, scenic driving, festivals and events, and other local attractions.

Several recreation-related issues were raised during the public scoping period for installation, exhibition, demobilization, and other elements of the OTR project, including:

- Economic impacts to recreation industries
- Duration of installation and removal impacts on river and river access for recreation
- Effects on natural canyon/river experience and natural beauty
- Impacts on nearby area's bicycle and hiking trails and off-road use
- Cable and fabric panel impacts on recreation, including fishing activities and rafting
- River safety and conflicts with fabric panels
- Exceeding visitor carrying capacity during the busy summer season
- Recreation experience of viewing artwork
- Attraction of new types of visitors to area
- Railroad access and use potential

Potential direct and indirect effects to recreation resources, the recreation setting and the recreation experience that would be caused by all stages of the proposed project were assessed. The Artists' Proposed Action and alternatives would have direct and indirect impacts on recreation opportunities within the Project Area and at regional recreation destinations outside the Project Area.

Sources consulted for the analysis included the Royal Gorge Resource Area Record of Decision and Approved Resource Management Plan, Arkansas River Recreation Management Plan, Arkansas Headwaters Recreation Area Trails Master Plan, Arkansas River Water Needs Assessment, other relevant plans and guidance, and interviews with BLM and State Parks recreation specialists. The Socioeconomics, Transportation, Sound Resources, and Visual Resources sections of this EIS were consulted to determine impacts to all recreational uses. Any negative impacts to game and nongame species identified in the Wildlife section of the EIS were assessed for their impacts to wildlife viewing and hunting. Impacts to river flows found in the Hydrology section were reviewed for impacts to river based activities, and impacts to fish populations identified in the Aquatic Biology section were assessed for impacts to angling.

4.20.1 No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed and recreational resources would not be affected by the OTR project.

4.20.2 Alternative 1a (Artists' Proposed Action)

4.20.2.1 Installation

a. Impacts Common to all Activities

Certain project activities would cause impacts to recreational uses within the Project Area. Twenty to 30 people, including construction crews, supervisors, engineers and other project employees would be present throughout the Project Area over the course of installation. The presence of employees surveying anchor points, installing anchors, ATFs and cables, and conducting other installation activities may impact

the recreation experience. The additional human presence along the river at panel locations may detract from the natural scenery of the river, as some users prefer minimal human interaction during recreation activities. This impact would be limited to the immediate panel footprints and staging areas within the Project Area.

The presence of private security personnel to patrol installation and staging areas could temporarily increase safety for users. Security personnel at panel locations would be able to observe and respond more rapidly to any illegal or safety-related incidents in the area. Because personnel would only be located near panel locations, this beneficial impact would be limited to the immediate panel footprint and staging areas within the Project Area.

An added 36,000 visitors would be present in the Project Area during installation, with the majority viewing the panels during the blossoming stage, in the two weeks prior to exhibition. This would result in 12,862 vehicles in the Project Area, overall, with 6,431 vehicles during the peak week and 1,286 vehicles on the busiest day (Saturday or Sunday). As a result, there would be a minor increase in travel time during peak periods only, compared to the No Action Alternative, as noted in Section 4.16 Transportation and Traffic. The increase in travel time would have a minor effect on recreation travel during installation.

No additional user facilities would be available at AHRA sites during installation. As more visitors are present in the Project Area, this could lead to crowding of the existing bathrooms, parking lots, and other facilities. This crowding would impact access to parking and may diminish the user experience for all recreation activities that utilize AHRA sites. REC-2, as described in Chapter 5, would mitigate the effects of crowding.

Installation activities along the Arkansas River that impact access and the recreation experience for traditional recreation activities could displace users to other recreation sites in the region or state, outside the Project Area. This displacement would result in a loss of revenue to AHRA from traditional visitation, as well as diminished recreation opportunities overall. Displacement of users for specific recreation activities is described below.

The blossoming of fabric panels would create an added recreation attraction in the Project Area. This would draw additional visitors that would likely participate in recreational uses besides viewing the fabric panels. These impacts are further addressed in the descriptions of specific activities below.

Boating. Installation activities would have a direct effect on rafting, kayaking, and other forms of boating on the Arkansas River. Construction-related traffic may have a short-term effect on US 50 and other local roadways by delaying access to recreational sites within the Project Area, due to the slow-moving nature of trucks hauling materials, the closure of traffic lanes on US 50, and the additional number of vehicles overall. Work-crews would be expected to carpool to work sites, and lane closures would not occur during the peak summer months (June, July and August), so the impact to travel time for both commercial and private boating would be minimized.

The closure of informal parking pullouts to public use, in addition to project vehicles utilizing pullouts, would impact river access for private and commercial boating. Informal pullouts provide parking for boating put-ins, take-outs and scouting of rapids. Closures would extend from one to two days in length, only one pullout would be closed at one time, and access would continue to be provided for commercial rafting vehicles. Mitigation measure REC-1 (Chapter 5.0) would reduce this impact.

The presence and operation of construction equipment along the river would also affect the boating experience. Anchor drilling activities, test loading of anchors, and ATF installation would produce noise and air and dust emissions, and may restrict access to riverbanks at panel locations. The presence of anchors, ATFs, cables, fabric panels, vehicles and machinery would affect the natural scenery of the river corridor, which could impact the boating experience.

Installation of cables and fabric panels would also affect the boating experience. Cable installation is scheduled to occur just prior to the exhibition period (June and July), which coincides with the peak boating season. The process of installing cables could occasionally interfere with boat traffic traveling downstream, especially during days and times of peak use. However, cable installation would not lead to ongoing interruptions of boating activities. As described in Chapter 2.0, safety spotters would be placed upriver and downriver of installation activities in order to alert boaters of activity and safely stop boating traffic, if necessary. Mitigation measure REC-4 would ensure that boating safety zones are identified on the river and that river spotters are properly trained to maintain boater safety.

Installation activities would also create a potential safety hazard for boaters. These activities could restrict access to riverbanks at some locations, which is necessary for rescuing boaters that fall in the water and need to "eddy out" below a rapid.

The installation process may offer an added attraction to some boaters as well. Boaters interested in the project would have the opportunity to view the installation of the panels and may feel like they are directly witnessing the artistic process. The local rafting industry would benefit from additional revenue, as described in Section 4.14 Socioeconomics, Social Impacts, and Section 4.15 Public Safety. The blossoming of the fabric panels in particular, which would occur in the six to seven days before exhibition, would create an added attraction that enhances the river experience for some boaters. Installation activities are expected to result in an increased visitor presence along the Arkansas River and US 50 corridor. An additional 36,000 visitors in the Project Area would create extra noise, crowding at put-in and take-out points near the panels, reduced parking availability, and increased traffic and travel delays on US 50.

Overall, the installation phase of the project would result in moderate, short-term effects on boating use in the Project Area. The primary contributor to rating these effects as moderate is the interruptions of boating movements that may occur during the peak use season and potential crowding at put-ins, take-outs, and along the river.

Angling. Analysis of angling impacts is based on the AHRA's 1995 angling use information and CDOW's 2007 creel census (Bridges, et al. 2000 and Policky 2008). Although the 1995 data was not collected in recent years, it is the most current information on total angler numbers in the AHRA. The recent CDOW creel census, which only surveyed certain segments of the river, showed little variation between angler use for 2007 compared to 1995, so it is assumed that angler use on the Arkansas River has remained relatively constant for the past 15 years. The AHRA manages 150 miles of river in total, and the Project Area comprises approximately 43 of these miles (29%).

Installation activities would have a direct effect on angling on the Arkansas River. The installation period would potentially affect around 47,000 anglers throughout the AHRA (including angling locations outside the immediate Project Area) over the course of two years (Bridges, et al. 2000). For the most part, however, impacts would be concentrated within the Project Area, and there would be little or no installation effects on anglers upstream of Salida or downstream of Cañon City. Angling would be particularly affected in the spring and fall months, when angling use peaks.

Construction-related traffic may have a short-term effect on US 50 and other local roadways by delaying access to recreational sites and informal pullouts within the Project Area due to the slow-moving nature of trucks hauling materials, the closure of traffic lanes on US 50, and the additional number of vehicles. Peak angling use occurs in the spring and fall, outside of the primary summer months, when lane closures may occur. In the months of August, September, and October, when angling use is at its highest, there are more than 100 anglers that would potentially travel the US 50 corridor throughout the AHRA each day (Bridges, et al. 2000). These anglers could be temporarily impacted by minor increases in travel time due to lane closures.

The closure of informal parking pullouts to public use, in addition to project vehicles utilizing pullouts, would have a short-term impact on access for angling, as informal pullouts provide the majority of parking for anglers along the Arkansas River and are therefore critical for river access. Closures would only occur from one to two days in length and only one pullout would be closed at a time, minimizing the overall impact of pullout closures. Mitigation measure REC-1 (Chapter 5) would further reduce this impact.

The presence and operation of construction equipment along the river would impact angling access and the quality of the recreation experience. Anchor drilling activities, test loading of anchors, and ATF installation would produce noise, air, and dust emissions, and could limit access to riverbanks at panel locations. Riverbank access is important for float, walk and wade, and shore fishing. The presence of anchors, ATFs, cables, fabric panels, vehicles and machinery would affect the natural scenery of the river corridor, which would in turn impact the angling experience. The presence of cables, which would be in place for up to several weeks prior to the exhibition period in June and July, would also affect fishing activities in the immediate vicinity, as it would present an obstacle for casting and risk of tangled lines.

Because float fishing occurs by boat, the impacts of installation activities and visitation on float fishing would be similar to those described for boating, in addition to angling-specific impacts. Float fishing activities may be more heavily affected by installation than shore and fly fishing, since float anglers would likely encounter more construction activities as they travel farther down the river.

An additional 36,000 visitors in the Project Area throughout installation would create extra noise, crowding along the river near panels, reduced parking availability, and increased traffic and travel delays on US 50. Such impacts would reduce access, diminish the quality of the angling experience, and result in the temporary displacement of anglers to other segments of the Arkansas River and other rivers in the region or state. In July, when blossoming would occur and the highest number of anglers would be displaced, more than 2,800 anglers throughout the AHRA could be impacted over the course of the month (Bridges, et al. 2000). Anglers on the Arkansas River outside of the Project Area would less likely be impacted than anglers in the Project Area. Furthermore, the local angling industry would experience reduced revenue as a result of installation, as described in Section 4.14 Socioeconomics, Social Impacts, and Section 4.15 Public Safety.

Restricted access and visitor impacts at the Vallie Bridge, Lone Pine, and Parkdale AHRA sites would impact access for special needs fishing provided at these sites. Special needs fishing access is already limited within the AHRA, so additional crowding or restrictions would further reduce angling opportunities within the Project Area.

It is possible that some anglers who experience impacts or are not in support of the project would not return to the Arkansas River in future years. However, as the project would be temporary, this is expected to result in a negligible long-term impact overall.

The impacts of construction activities on aquatic species, including fish, are described in Section 4.3 Aquatic Biology. Sedimentation, the removal of riparian vegetation, and increased vibrations and noise levels would impact aquatic wildlife, which would affect the angling experience.

The combined effects of the installation phase of the project would result in short-term impacts to fishing throughout the project area. Anglers would be highly affected, primarily during blossoming (the last two weeks of installation), and moderate to significant displacement may occur at a regional scale. The intensity of these effects would be significant overall.

Wildlife Viewing and Bird Watching. Impacts of project-related traffic and US 50 lane closures on wildlife viewing and bird watching would be the same as those described under boating. Peak wildlife viewing and bird watching occurs in the spring, summer and fall, when installation (including blossoming) activities are scheduled to occur. The closure of informal parking pullouts to public use and project vehicles parking in pullouts would have a short-term impact to access for wildlife viewing and bird watching, as informal pullouts provide parking and access for wildlife viewers along the Arkansas River. Because closures would be limited in time and number, this impact would be minimized. Unless the number of project vehicles utilizing pullouts for parking is also limited, the presence of project vehicles in pullouts may cause greater impacts to access during the late spring, summer and early fall months. Mitigation measure REC-1 (Chapter 5) would reduce this impact. Traffic impacts would be limited to the Project Area.

The presence and operation of construction equipment along the river, including staging operations at Texas Creek, would likely impact the wildlife viewing and bird watching experience. Anchor drilling activities, test loading of anchors, and the installation of ATFs, cables, carabiners and fabric panels would produce noise, air and dust emissions, which would place stress on bighorn sheep, other large mammals, and avian species, and would displace wildlife from the area surrounding the panels. See Sections 4.1 Terrestrial Wildlife and Habitat and 4.2 Avian Wildlife and Habitat for additional information. Because wildlife viewing and bird watching is dependent on the presence of wildlife at viewing areas and along the river, these installation activities would displace wildlife viewers as well. The presence of anchors, ATFs, cables, fabric panels, vehicles and machinery would affect the natural scenery of the river corridor, which could further impact the viewing experience. As noted in Section 4.2, the network of cables at panel locations would increase the likelihood of avian strikes, further impacting the bird watching experience.

The blossoming of the fabric panels would adversely impact the wildlife viewing experience. The unfurling of fabric panels could create noise and visual disruption. The fabric panels would prevent riverbank access for wildlife at the panel locations, as well. This would likely displace viewers to other segments of the river or other wildlife viewing areas in the region or state. The impacts of increased visitor presence and traffic in the Project Area would be the same for wildlife viewing and bird watching as described for angling. In addition, the increased number of visitors and noise created would disrupt and displace wildlife to other locations, as described in Sections 4.1 and 4.2. These impacts would be short-term within the Project Area.

On the whole, installation would result in moderate, short-term impacts to wildlife viewing and bird watching. As a result of high amounts of traffic and human disturbance displacing wildlife and wildlife viewers, impacts would likely occur at a regional level.

Camping. Impacts of project-related traffic and US 50 lane closures on camping would be the same as those described under boating. The closure of informal parking pullouts and project vehicles utilizing pullouts would have a short-term impact on camping near Texas Creek. A dispersed camping area east of

Texas Creek is only accessible by a pullout, which is within 0.5 mile of the fabric panels. Closure of this pullout would restrict camping access. Because closures would be limited overall, this impact would be temporary, and localized at this dispersed camping location.

The presence and operation of construction equipment along the river would likely impact camping access and experience. Anchor drilling activities, test loading of anchors, and the installation of ATFs, cables, carabiners and fabric panels would produce noise, air and dust emissions and may restrict access to riverbanks. See Section 4.9 Atmosphere, Air Resources, and Air Quality, and Section 4.24 Sound Resources and Noise for additional information. Noise would be particularly disruptive to campers, especially when construction occurs during the night. Many boaters on overnight trips camp along the riverbanks, so operations along the river may prevent access to preferred camping sites at Maytag and similar dispersed camping destinations. Construction operations would occur within the peak summer months, when camping use is also at its highest. Impacts would be particularly concentrated at Salida East, Point Barr, Rincon, Vallie Bridge, Texas Creek Travel Management Area, Five Points, and Maytag. Installation operations may displace camping use to AHRA, BLM, and USFS camping areas outside the Project Area.

The impacts of the blossoming of fabric panels on camping would be the same as those described under boating. An increased number of visitors in the Project Area, especially during blossoming, would affect camping availability and the visitor experience. Crowding is likely to occur at designated campsites, dispersed camping locations on BLM and USFS lands, and at private campgrounds. Campgrounds would likely be full to capacity, which would displace campers to other sites in the region and state. Noise, a sense of crowding, and concerns about the security of belongings at campsites is likely to adversely impact the camping experience. Increased travel time could diminish user experience and result in further displacement. More traffic would also result in crowding at parking areas near campsites.

Natural resource and wildlife impacts may result from additional dispersed camping, as well. Campers who are inexperienced or unfamiliar with regulations may not utilize responsible camping techniques that minimize impact. Higher densities of campers may result in increased bear conflicts, impacts on sensitive wildlife populations, trampling at campsites, and improper waste disposal. At the Hayden Creek USFS campground, increased concentrations of campers may affect the greenback cutthroat trout population in the south prong of Hayden Creek. Mitigation measures REC-6, REC-7, REC-8, and REC-9 (Chapter 5.0) would reduce these impacts.

The impacts of installation on camping would be short-term and localized at campsites within the Project Area. Overall, these impacts would be moderate in intensity, primarily as a result of sound impacts from construction and crowding at developed campsites. Moderate displacement would occur at a regional level, as well.

Hiking and Mountain Biking. Impacts of project-related traffic and US 50 lane closures on hiking and mountain biking would be the same as those described under boating. The closure of informal parking pullouts and vehicles utilizing pullouts would have a short-term impact on trail access. Informal pullouts provide parking for trails in the South Fern Leaf Gulch area, the McIntyre Hills WSA, and a system of BLM trails south of Salida. Limited closure or reduced parking availability at pullouts would restrict access to these trails.

Anchor drilling activities, test loading of anchors, and the installation of ATFs, cables, carabiners and fabric panels would produce noise, air and dust emissions, which would likely impact trail experience and the natural setting of trails near the river, especially at Texas Creek, the Tunnel area, Five Points, and the

McIntyre Hills WSA. See Section 4.9 Atmosphere, Air Resources, and Air Quality, and Section 4.24 Sound Resources and Noise for additional information. These impacts would be short-term and limited to the immediate panel footprint within the Project Area. Project activities at the Texas Creek Staging Area could impact the trail user experience at Texas Creek if staging activities and project-related traffic reduce parking availability or interfere with vehicle access. This would affect trail access for both the AHRA site and Travel Management Area in that location. Since Texas Creek is a major access point for trail activities, any restrictions on access would temporarily impact hiking and mountain biking at that location.

The blossoming of panels would create an added attraction that enhances the trail experience for many hikers and mountain bikers. This temporary impact would be beneficial, and limited to the panel locations within the Project Area. Additional visitors in the Project Area would create extra noise, crowding at trailheads and along trails, reduced parking availability, increased traffic and travel delays on US 50, and displacement of some trail users, particularly during blossoming.

Overall, installation would result in moderate impacts to hiking and mountain biking, with the most impact occurring during blossoming when visitation to the Project Area is high. While most impacts would be localized on trails within the Project Area, installation may also result in minor displacement of users to other trails in the state or region.

Rock Climbing. Effects of project-related traffic and US 50 lane closures on rock climbing would be the same as those described under boating. Restricted access to highway pullouts, in addition to panel viewers, tour buses, and project vehicles utilizing pullouts, could have a short-term impact on climbing access at the Falls Gulch climbing area. Falls Gulch is accessed by an informal pullout with a capacity of three to four vehicles. Unless project-related parking is restricted at this pullout, climbing could be temporarily limited at this site. Project activities at the Texas Creek Staging Area could impact rock climbing at sites north of Texas Creek. If staging activities and project-related traffic reduce parking availability or interfere with vehicle access at Texas Creek, this would affect access to nearby climbing sites. Any restrictions on access would temporarily impact rock climbing at Texas Creek. The impact of additional visitor presence in the Project Area would result in impacts similar to hiking and mountain biking. Collectively, the effects of installation on rock climbing would be minor, short-term, and localized. Installation could result in minor displacement of climbers at a regional level.

OHV Use. Impacts of project-related traffic and US 50 lane closures on OHV use would be the same as those described under boating. The effects of additional visitation and associated traffic would be similar to those described for hiking and mountain biking, with impacts mostly concentrated at Texas Creek.

Project activities at the Texas Creek Staging Area could impact access for OHV use at Texas Creek. OHV use is the primary activity at Texas Creek, and over 7000 visitors enter the Texas Creek Travel Management Area each year. If staging activities and project-related traffic reduce parking availability or interfere with vehicle access at Texas Creek Travel Management Area, including at the Texas Creek bridge, it would temporarily and significantly restrict opportunities for OHV use. This impact would be localized at Texas Creek.

The blossoming of panels would create an added attraction for OHV users in the Project Area, which would enhance the recreation experience. OHV users who do not normally visit this area may use the trails near the panels during exhibition. While OHV use is widespread on BLM land throughout the Project Area, it does not typically occur along the river where the panels would be located, so this would be an indirect impact. Conversely, the effects of increased visitor presence on access and recreation experience for OHV

use would result in the temporary displacement of some OHV users to other motorized trails in the region or state.

The combined effects of installation on OHV use could be significant at Texas Creek as a result of staging area impacts. Impacts would be minor throughout the rest of the Project Area, with minor displacement occurring at a regional level.

Hunting. The presence and operation of construction equipment along the river would likely impact hunting. Increased traffic and human activity may disturb wildlife, which would affect wildlife distribution and the quality of hunting activities. Anchor drilling activities, test loading of anchors, and the installation of ATFs, cables, carabiners and fabric panels would produce noise, air and dust emissions. As described under wildlife viewing and bird watching and in Section 4.1 Terrestrial Wildlife and Habitat, these activities would displace wildlife from the surrounding area, which could change the distribution of wildlife during hunting seasons. This disturbance could displace hunters from their preferred hunting sites in GMUs 57, 58, 581, 86, 69, 691, S47, S7, S60, S68, S49 and other nearby GMUs, as well. The presence of anchors, ATFs, cables, fabric panels, vehicles and machinery would affect the natural scenery of the river corridor, which could further impact the hunting experience.

Project activities at the Texas Creek Staging Area could impact access to hunting sites near Texas Creek in GMUs 58and S7. Texas Creek Travel Management Area is an important staging area for hunting north of the Arkansas River. If project-related activities and traffic reduce parking availability or interfere with vehicle access to the Texas Creek Travel Management Area, as described for OHV use, this would affect hunting access as well. Closure of this area would restrict access to the western boundary of S49 and eliminate one of only a few public land access points to S7, especially during the fall and winter hunting seasons.

The unfurling of fabric panels could create noise and visual disruption and prevent riverbank access for wildlife at the panel locations. This would likely displace wildlife and impact wildlife distribution, particularly for bighorn sheep, as described in Section 4.1 Terrestrial Wildlife and Habitat. Bighorn sheep hunting season would begin in early August, immediately after blossoming, so a temporary disruption to the distribution of wildlife near the Project Area could displace hunters from their preferred hunting sites and affect hunters scouting sheep populations prior to hunting. The increased number of visitors and noise would disrupt and displace wildlife to other locations, as well. Additional relevant impacts to wildlife are described in Sections 4.1 Terrestrial Wildlife and Habitat and 4.2 Avian Wildlife and Habitat.

Closures of informal pullouts may restrict access for hunters scouting bighorn sheep ahead of season in the Project Area. Because pullout closure would be limited to one pullout closure from 1 to 2 days in length at a time during installation, this would have little overall effect on hunters. Mitigation measure REC-1 (Chapter 5.0) would likely reduce this impact.

Installation would result in short-term, moderate impacts to hunting. The level of impact was determined based on impacts to wildlife distribution and restricted access to preferred hunting locations. These impacts would be regional or greater in extent, as both resident and nonresident hunters could be affected by project activities, and wildlife could be affected outside the immediate Project Area.

Horseback Riding. The effects of project-related traffic, US 50 lane closures, closure of informal pullouts, additional visitation, and other installation activities on horseback riding would be the same as those described for hiking and mountain biking. In addition, horses could be disturbed by noise near trails, which

would diminish the horseback riding experience. These temporary impacts to horseback riding would be minor and localized at trails within the Project Area. Some regional displacement would also occur.

Placer Mining. Recreational placer mining includes activities that occur at the Point Barr AHRA site (R&PP Lease) and on open BLM lands. Analysis of effects in this section does not apply to claimed areas, as claims represent a possessory right to the minerals by the claimant. However, other nonmining recreational activities, such as camping, may occur in claimed areas. Impacts of project-related traffic, US 50 lane closures, and the closure of informal pullouts on recreational placer mining would be similar to those described under angling. Unless the number of project vehicles utilizing pullouts for parking is limited in time and number, the presence of project vehicles in pullouts may affect placer mining activities, as well. Mitigation measure REC-1 (Chapter 5.0) would reduce this impact.

The presence and operation of construction equipment along the river would likely impact placer mining access and the quality of the recreation experience. Anchor drilling activities, test loading of anchors, and ATF installation would produce noise, air and dust emissions, and may restrict access to riverbanks at panel locations. See Section 4.9 Atmosphere, Air Resources, and Air Quality and Section 4.24 Sound Resources and Noise for additional information. Riverbank access is important for setting up equipment and conducting mining activities. Restrictions on access to riverbanks may displace miners from their preferred locations.

Installation of cables and fabric panels would affect placer mining access and the recreation experience, as well as the safety of miners. Cables pulled across the river may temporarily interfere with placer mining activities on shore and in the river and create a potential safety hazard for nearby miners. This would restrict the locations where mining can occur. Construction and installation activities would particularly impact the Point Barr recreation area, near the proposed Tunnel panel. The placer mining season runs from April 1 to September 30 at Point Barr. In order to minimize noise impacts to camping at the nearby Rincon AHRA site, installation activities would occur during peak placer mining hours at this panel location.

The unfurling of fabric panels during blossoming could create noise, result in safety concerns and restrict riverbank access at the panel locations. This may displace miners to other segments of the river. Blossoming may also create an attraction for placer miners. Miners may time or locate their mining activities to coincide with the blossoming of the panels, which would enhance the recreation experience. The impacts of increased visitor presence and traffic on placer mining would be the same as impacts to angling.

The combined impacts of installation activities on placer mining would be similar to those described for angling. Impacts would be short-term, localized at Point Barr and other placer mining sites within the Project Area, and moderate in intensity.

Scenic Driving. Construction-related traffic may have a short-term effect on US 50 and other local roadways by delaying the time of travel through the Project Area due to the slow-moving nature of trucks hauling materials, the closure of traffic lanes on US 50, and the additional amount of vehicle traffic. Given that scenic driving is popular in the summer and fall, added project-related traffic would impact the scenic driving experience along US 50. More traffic on US 50 and Collegiate Peaks Scenic Byway could also affect the nearby Gold Belt National Scenic Byway.

The presence and operation of construction equipment along the river may impact the recreation experience for scenic driving. Staging area activities, anchor drilling activities, test loading of anchors, and

the installation of ATFs, cables, carabiners and fabric panels would produce visual impacts. Because other industrial activity is already present in the US 50 corridor, these temporary visual impacts would be limited. See Section 4.21 Visual Resources for more information. Increased visitor presence associated with installation activities would create extra noise, reduced parking availability, and increased traffic and travel delays on US 50. Such impacts to the scenic driving experience may likely result in some scenic drivers rerouting trips to avoid the US 50 corridor.

Installation activities may likely create an additional attraction for scenic driving. Travelers interested in the project would have the opportunity to view the installation of the panels and may feel like they are directly witnessing the artistic process. The blossoming of fabric panels would attract additional scenic drivers and enhance the recreation experience. People may travel along US 50 instead of other routes in order to experience the unfurling of the fabric panels. It is impossible to quantify the number of people that would avoid US 50 compared to those who would be attracted to the installation despite these impacts; however, it is assumed that the blossoming of panels would be primarily beneficial for scenic driving activities.

Overall, installation would result in short-term, minor impacts on scenic driving. The extent of these impacts would be limited to the Project Area, including the Gold Belt National Scenic Byway.

Festivals and Events. Construction-related traffic may have a short-term effect on US 50 and other local roadways by delaying the time of travel through the Project Area. This traffic could impact travel to events in Salida, Cañon City and along the US 50 corridor. The closure of informal parking pullouts to public use, in addition to project vehicles parking in pullouts, could have a short-term impact on events along the Arkansas River in the Project Area. Informal pullouts provide parking for boating put-ins, take-outs and scouting of rapids, which occurs during FIBArk and other river events.

The presence and operation of construction equipment along the river and at the Texas Creek Staging Area would likely impact boating access and diminish the recreation experience during river events, including FIBArk. Cable and fabric panel installation is scheduled to occur during the month of June, which could overlap with the FIBArk boating event. These impacts would be similar to those described for boating.

Most major local events are most likely to occur outside of the proposed blossoming period, when project-related visitation would be lower. Visitor traffic would result in an increased time in travel to Salida and Cañon City, where many local events occur, which could diminish the recreation experience of visitors.

The overall effects of installation on local festivals and events would be short-term. Impacts would mostly be limited to the Project Area, though some regional events could also be impacted. Depending on the timing of project activities in relation to river festivals and other events, impacts could be significant. Implementation of mitigation measure REC-13 (Chapter 5.0) could be expected to reduce the level of impact on the FIBArk event from significant to minor, depending on the plan that is ultimately implemented.

Other Local Attractions. Construction-related traffic and visitor traffic may have a short-term effect on US 50 and other local roadways by delaying the time of travel through the Project Area. As many visitors to Cañon City and Salida travel along US 50 to visit nearby local attractions, an increase in travel time could impact the overall visitor experience.

The increased number of visitors in the Project Area during blossoming could have both beneficial and adverse impacts on nearby local attractions, such as the Royal Gorge Bridge and Park, the Royal Gorge Tourist Train, and nearby National Park Service sites. The installation and blossoming of the fabric panels would attract visitors who would visit local attractions in addition to viewing the panels. The increased number of visitors would likely cause crowding at these attractions, which may diminish the experience of visitors and prevent some from visiting altogether. However, the increase in visitors to these attractions would also benefit these sites by providing additional revenue and attracting visitors who may not normally travel to the area.

Overall, increased visitation in the Project Area would temporarily and beneficially impact other local attractions. This regional-level impact would likely be significant.

Upland Recreation Permits. All impacts of installation activities on hunting apply to RGFO upland recreation permits for hunting, as well. Hunting trip operators with permits may be displaced temporally and spatially during hunting seasons as a result of installation activities. Diminished access or recreation experience may also adversely impact revenue for local hunting outfitters, as described in Section 4.14 Socioeconomics, Social Impacts and Section 4.15 Public Safety. This impact would be temporary during hunting seasons, moderate, and occurring at a regional level.

The impacts of installation activities on upland recreation permits for mountain biking, rock climbing and horseback riding would be the same as those described under each respective activity. Revenue for outfitters providing these recreation activities could be impacted by the project installation, as well.

The impacts of installation activities on upland recreation permits for ATV and Jeep tours would be the same as those described under OHV use. Impacts on upland recreation permits for Motorcycle Trials competitions would be the same as those described under both OHV use and Festivals and Events. These impacts may affect revenue for outfitters providing OHV experiences, as well.

4.20.2.2 Exhibition

a. Impacts Common to All Activities

The impact of increased law enforcement and project personnel in the Project Area during exhibition would have the same impacts as described for installation. The presence of panel monitors throughout the Project Area would cause additional human presence near access points along the river, which could affect the quality of the recreation experience. However, the presence of visitors would cause a greater impact to recreation experience than panel monitors.

Project-related traffic, including tow trucks, vehicles transporting potable water, and traffic created by project staff would impact the time of travel to sites along US 50 and through the highway corridor for recreational users, as described for installation. However, this impact would be slight compared to visitor traffic, which would cause the majority of travel delays in the Project Area.

An estimated total of 344,000 visitors would be present in the Project Area during exhibition, primarily to view the panels. This would result in 118,620 vehicles in the Project Area, overall, and 11,862 vehicles per day during peak periods. The associated increase in travel time would be 20 minutes for westbound travelers and 8.1 minutes for eastbound travelers, compared to the No Action Alternative. Refer to Section 4.16 Transportation and Traffic for more information.

Exhibition activities along the Arkansas River that impact access and the recreation experience for traditional recreation activities could displace users to other recreation sites in the region or state, outside the Project Area. This displacement would result in a loss of revenue to AHRA from traditional visitation, as well as diminished recreation opportunities overall. Displacement of users for specific recreation activities is described below.

Boating. Exhibition of the fabric panels would directly affect rafting, kayaking, and other boating uses on the Arkansas River. The presence of the panels above the river for the 2-week exhibition period has the potential to both diminish and enhance the boating experience. The panels could restrict riverbank access, as described for installation, though breaks between panel sections at each panel location would minimize this impact. The distance or clearance between the panels and the river, and therefore boats traveling down the river, may also affect boater safety. Section 4.10 Water Resources, provides additional information on water levels and clearances. River flows are not at their peak height and speed during the first two weeks of August, when exhibition would occur.

The panels would create an added attraction that enhances the river experience for boaters. Many boaters would travel to the Arkansas River specifically to view the panels via raft or kayak. Many visitors to the exhibition who do not normally raft or kayak would participate in boating trips during this period, as well. In addition to affecting the boating experience, the added attraction would benefit boating outfitters that operate on the Arkansas River by creating extra demand for trips, as described in Section 4.14 Socioeconomics, Social Impacts, and Section 4.15 Public Safety.

The exhibition would lead to a considerable increase in visitors along the Arkansas River and US 50 corridor. An estimated 344,000 people in the Project Area during exhibition would result in more kayakers and rafters, creating crowding at put-in and take-out points near the panels and on the river. On the segment of the river from Salida to Vallie Bridge, current rations limit boating traffic to ten commercial boats per day on most days in early August. Private boating is not rationed, so an unlimited number of private rafts and kayaks may travel this segment. Commercial outfitters might violate rationing during the exhibition period in order to provide trips that pass under all eight panels in the Project Area. These factors could result in a significant increase in boating traffic on this segment. Boating use that exceeds or violates rations would impact commercial rationing in future years, based on the existing AHRA Rationing Plan (AHRA 2009a). Mitigation measures REC-11 and REC-12 (Chapter 5.0) would reduce impacts associated with rationing.

The segment of the river from Vallie Bridge to Parkdale is more heavily used for boating than the segment between Salida and Vallie Bride. Currently, no commercial or private boating rations are in effect during August for this segment of river, so an unlimited number of kayaks and rafts may travel this segment each day. During exhibition, the absence of rationing would result in a significant increase in boating traffic, as many visitors would want to view the panels by boat. This increase in number of boats would likely be greater than the increase in boats between Salida and Vallie Bridge. A greater number of boats and boaters on the river would likely result in visitor perceptions of crowding, which diminishes the recreation experience. In addition, boating traffic in exceedance of defined river capacities would activate rationing for specific days on this segment in future years. Mitigation measure REC-12 (Chapter 5.0) would institute event-only boat rations that would reduce these impacts.

The large number of visitors in the Project Area during exhibition would result in increased traffic and travel delays on US 50 and reduced parking availability for commercial and private boaters. An increase in travel time may interfere with the ability of commercial rafting companies to operate trips on schedule,

and may also cause frustration for private boaters traveling by personal vehicle through the Project Area. A greater amount of oncoming traffic would make left turns into pullouts difficult for drivers, especially for eastbound travelers accessing pullouts on the north side of the road, which could limit parking access. Additional parking traffic would pressure existing parking lots in the Project Area. Parking that is close to put-ins and take-outs is critical for boating access. Furthermore, commercial boating vehicles typically require oversized parking spaces. Visitors viewing the fabric panels may park at AHRA developed sites to view panels or participate in other forms of recreation, which reduces parking availability for boating put-ins and take-outs.

The closure of informal parking pullouts within 0.5 mile of each panel, in addition to panel viewers, tour buses, and project vehicles utilizing pullouts, would have a short-term impact on boating access. Informal pullouts provide parking for boating put-ins, take-outs and scouting rapids. Since 56 pullouts (41%) of the estimated 135 pullouts in the Project Area would be closed within 0.5 mile of the panel locations, only 79 (59%) would be available for public parking. The majority of the available pullouts would be located between Salida and Vallie Bridge, with about 18 pullouts remaining open between Vallie Bridge and Parkdale, where the panels would be most concentrated. Given that there are boating put-ins and take-outs near every panel, boating access would be limited overall.

Pedestrian use on US 50 would be restricted at all times during the exhibition. Since some boaters, particularly private boaters, walk along the highway to scout rapids or access the river, this restriction would likely affect boating in the Project Area.

The minor visitor information center at Texas Creek would provide additional parking for visitors. A temporary parking lot with a capacity of approximately 40 cars would create extra day-use parking near the Texas Creek Travel Management Area and AHRA site. This would expand boating access in the area and reduce impacts to parking availability at Texas Creek. The impacts of project activities at the Texas Creek Staging Area during exhibition would be the same as the impacts to boating during installation.

The Limited Rest Stop at Vallie Bridge would provide limited access to visitors viewing the panels, while allowing access for private and commercial boating and other recreational uses. Because Vallie Bridge provides access for various activities, distinguishing between panel viewers and other recreation users would be challenging at this site. With limited parking available at this site, even temporary visitor traffic and added visitor presence is likely to cause a high level of crowding and reduced parking availability for private and commercial boating. During periods of peak visitation, this may prevent boating access and displace commercial and private users altogether. Mitigation measure REC-3 (Chapter 5.0) would reduce the level of impact at Vallie Bridge.

An added 900 parking spaces at the Parkdale Viewing Center would create more parking availability for private and commercial boaters. However, the concentrated high visitor presence associated with the viewing area may likely create more traffic and congestion near the parking area, as well as crowding along the river. This crowding could temporarily restrict access and impact the recreation experience at Parkdale, one of the most heavily used river access points in the Project Area.

While not fee-collecting AHRA sites, the Salida East, Texas Creek, Salt Lick, and Maytag sites provide important river access for commercial boaters. Although Salt Lick lies within the 0.5-mile buffer surrounding the Three Rocks and Spike Buck panels, and Maytag lies within 0.5 miles of the Texas Creek and Maytag panels, these sites would not be considered informal pullouts and would not be closed during the exhibition period. Salt Lick is heavily used for boating access, and over 500 boaters use this site as a

put-in in the month of August. Maytag is used by private boaters and boaters on overnight river trips. Therefore, any closure of the Salt Lick or Maytag areas would limit boating access, and would likely displace boaters to other put-in locations in the Project Area. Mitigation measure REC-5 (Chapter 5.0) would ensure that all nonfee AHRA sites, including Salt Lick and Maytag, would remain open during exhibition, which would prevent these impacts.

During the first two weeks of August, commercial boating companies are typically at or near capacity, in terms of customers served (Nahomenuk 2010). Finding additional boats, guides and transportation may limit outfitters' abilities to accommodate additional customers and trips. This would reduce the overall socioeconomic benefit to outfitters, as described in Section 4.14 Socioeconomics, Social Impacts, and Section 4.15 Public Safety.

The impacts to access and experience for commercial and private boating described above would result in the temporary displacement of boaters to other rivers in the region or state during exhibition, as some boaters would seek to avoid added traffic and crowding on the roads and the river, as well as reduced access.

Overall, exhibition would result in short-term impacts to boating, which would be primarily limited to the Project Area. These impacts would occur at a significant level, due to increased boating traffic, restricted access to put-ins and take-outs and the closure of informal pullouts typically used for boating access. Moderate regional displacement of boaters would likely also occur. Implementation of the mitigation measures presented in Chapter 5.0 could be expected to reduce the level of impact on boating, depending on the plan that is ultimately implemented.

Angling. Exhibition of the fabric panels would adversely impact angling on the Arkansas River. Nearly 4,000 anglers typically visit the AHRA (including angling sites outside of the immediate Project Area) in the month of August, and these users could be affected during the 2-week exhibition. For the most part, effects would be concentrated within the Project Area, and impacts on anglers upstream of Salida or downstream of Cañon City would be comparatively reduced.

The presence of the panels above the river for the 2-week exhibition period would likely restrict riverbank access and interfere with angling activities at panel locations. The clearance of the panels would be too low for effective casting at some points underneath the panels, which could lead to tangled lines and lures. In effect, this would temporarily eliminate all opportunities for angling at panel sites within the Project Area, preventing anglers from fishing at their preferred location and displacing them to other segments of the river and other rivers in the region or state. Of the approximately 43 miles of river within the Project Area, only 5.9 miles would be covered by panels, so it would still be possible to fish within much of the Project Area. This would limit the extent of these effects on angling. Section 4.10 Water Resources, provides additional information on water levels and clearances.

Exhibition would lead to a considerable increase in visitors along the Arkansas River and US 50 corridor. The presence of 344,000 visitors in the Project Area would result in more boating traffic on the river and crowding along the shoreline, as described above. The segment of the river from Salida to Vallie Bridge, which includes three panel locations, is normally managed for fishing and is heavily used by anglers. A significant increase in boating traffic in this segment would likely diminish the recreation experience of anglers and lead to user conflicts. Crowding could also interfere with access to sections of the river for float, shore and walk and wade anglers. Because float fishing occurs by boat, the impacts of installation activities and visitation on float fishing would be similar to those described for boating, in addition to

angling-specific impacts. Float anglers would likely be most impacted by the exhibition. The added presence of visitors and boats would disturb fish populations, which would further affect the angling experience. See Section 4.3 Aquatic Biology for more information.

The segment of the river from Vallie Bridge to Parkdale is used less intensively by anglers. While the overall intensity of impacts to angling in this segment would be lower than impacts between Salida and Vallie Bridge, this segment would be highly impacted as well.

Increased traffic and travel delays on US 50, difficulty turning left into pullouts, and reduced parking availability would also affect angling. Visitor traffic would be heavier on the weekends than the weekdays, so displacement of anglers would be lower during the week and highest on weekend days. The angling experience is best in the morning and the evening when flies are most active, so a delay in travel time at these hours, when panel viewing is expected to be very popular, may prevent anglers from fishing at the preferred time of day. A greater amount of oncoming traffic would make left turns into pullouts difficult for drivers, especially for eastbound travelers accessing pullouts on the north side of the road. Informal pullouts provide most of the parking for anglers along the Arkansas River and are therefore critical for river access. In areas where panel monitors are not present to direct traffic, this would likely limit access to pullouts and reduce parking availability for anglers.

The closure of informal parking pullouts to public use, in addition to project-related vehicles and other users parking in pullouts, would have an additional short-term impact on angling access. Since 56 pullouts in the Project Area (41% of the total available pullouts) would be closed during exhibition, the amount of parking for angling would be significantly reduced. However, more pullouts would remain open in the Salida-Vallie Bridge segment (61 pullouts) than the Vallie Bridge-Parkdale segment (18 pullouts). Because angling use is concentrated above Vallie Bridge, this would lessen the effect of pullout closures on this segment. Additionally, because many anglers walk along the highway after fishing, restrictions on pedestrian use along US 50 would make it more difficult for anglers to access their vehicles.

The impacts to access, angling opportunities, and the recreation experience for angling described above would result in a significant level of temporary displacement of anglers to other rivers in the region or state during exhibition, as anglers would seek to avoid additional traffic and crowding on the roads and the river, as well as reduced river access. Some anglers may avoid the Project Area completely during the viewing period, and may instead visit AHRA sites outside the Project Area or other rivers in the region or state.

The local angling industry would experience a decrease in revenue as a result of exhibition, as described in Section 4.14 Socioeconomics, Social Impacts, and Section 4.15 Public Safety. It is possible that some anglers who experience impacts or are not in support of the project would not return to the Arkansas River in future years. However, as the project would be temporary, this is expected to result in significant short-term impacts, but negligible long-term impacts overall.

The effects of the Vallie Bridge Limited Rest Stop and the Parkdale Viewing Center on angling would be similar to the impacts to boating.

The effects of panel presence and shading on photosynthesis and water temperature are described in Section 4. 3 Aquatic Biology. Potential panel release and additional noise impacts are also noted. These effects on aquatic species, including fish, would impact the quality of the angling experience.

Overall, the effects of exhibition would result in significant short-term impacts to angling. This level of impact is based on additional boating traffic on the river, high visitation and vehicle traffic, and the closure of informal pullouts that serve as primary access points for angling. Most impacts would occur at within the Project Area and at a regional level.

Wildlife Viewing and Bird Watching. The 2-week exhibition of fabric panels would affect the wildlife viewing and bird watching experience. Because the majority of Colorado residents and visitors (90%) are interested in visiting wildlife viewing locations or traveling to view wildlife, a large number of potential viewers could be impacted by the exhibition (Vaske, et al. 2001). The fabric panels would create a visual disruption and prevent riverbank access for wildlife at the panel locations, which would alter the distribution of wildlife along the river and in the Project Area, potentially displacing viewers to other segments of the river or other wildlife viewing areas in the region or state.

The impacts of increased visitor presence and visitor traffic on wildlife viewing and bird watching would be similar to the impacts described for angling. Sections 4.1 Terrestrial Wildlife and Habitat and 4.2 Avian Wildlife and Habitat describe the impacts of increased foot traffic and panel viewers on wildlife in the Project Area. The increased number of visitors and noise would disrupt and displace wildlife to other locations, which would displace viewers as well. Because wildlife viewing is best in the mid-morning and late afternoon, impacts would be particularly notable at these times. Also, an increased potential for medical helicopter evacuations and the presence of fixed or rotary aircraft in the Project Area could moderately impact wildlife and avian species, as noted in Sections 4.1 and 4.2.

The impacts of the closure of US 50 pullouts on wildlife viewing and bird watching would be similar to the impacts described for angling. While informal pullouts are less heavily used for wildlife viewing as they are for angling, there is little difference in the overall level of impact.

The impacts of project activities at the Texas Creek Staging Area during exhibition would be the same as described for installation. The impacts of the Limited Rest Stop at Vallie Bridge on wildlife viewing and bird watching would be similar to impacts on boating. The impacts of additional parking at the Parkdale Viewing Center on wildlife viewing and bird watching would be similar to impacts on boating. However, because Parkdale is not a heavily used wildlife viewing location, the level of impact would be lower than described for boating.

The combined impacts of exhibition on wildlife viewing and bird watching would be short-term and significant, primarily due to impacts to wildlife presence and distribution. Impacts would be regional in extent, as wildlife populations and wildlife viewers may be displaced outside of the Project Area.

Camping. Exhibition of the fabric panels would directly affect developed and dispersed camping in the Project Area. Panels could restrict riverbank access at dispersed camping sites along the river, particularly near Maytag. This would limit where boaters on overnight or multi-day trips are able to camp.

The panels would enhance the camping experience, as well. Many visitors traveling to view the panels would want to camp in the Project Area during their trip, and many visitors to the exhibition who do not normally camp in the area would also utilize campgrounds during this period. In addition to affecting the camping experience, the added attraction would benefit AHRA, USFS, and private campgrounds in the area by generating higher demand and camping-related revenue.

An increased number of visitors in the Project Area would affect camping availability and the quality of the experience. Crowding would occur at designated campsites, at dispersed camping locations on BLM and USFS lands, and at private campgrounds. Demand for campgrounds would likely extend beyond the Project Area. Campgrounds would fill to capacity, which would increase camping competition and displace campers to other sites in the region and state. Noise, a sense of crowding, litter, sanitation issues, resource damage, increased fire risk, and concerns about the security of belongings at campsites would adversely impact the camping experience, especially at the Rincon, Vallie Bridge, Five Points, Hayden Creek, Coaldale and Oak Creek campgrounds, as well as dispersed camping areas in the Texas Creek Travel Management Area, Maytag, Point Barr and Salida East. Impacts of camping on natural resources and wildlife would be intensified, compared to the Installation phase. Mitigation measure REC-6, REC-7, REC-8, and REC-9 (Chapter 5.0) would help to reduce human impacts at dispersed and developed camping areas.

The large number of visitors in the Project Area during exhibition would result in increased traffic and travel delays on US 50 and reduced parking availability for camping at AHRA sites and dispersed camping locations. An increase in travel time would likely diminish the camping experience and result in the temporary displacement of visitors to campgrounds outside the Project Area. Campers in RVs typically require oversized parking spaces, and all campers require overnight parking near a campsite. Crowding at parking areas would reduce parking availability, and consequently access to camping areas. The closure of informal parking pullouts within 0.5 mile of each panel would have a short-term impact on camping east of Texas Creek, at a dispersed camping area that is only accessible by a pullout located within 0.5 mile of the fabric panels.

The concentration of visitors at the Texas Creek Visitor Area could impact camping access at that location. The number of visitor vehicles at the visitor area could overflow into the Texas Creek Travel Management Area parking area, which would reduce parking availability for visitors camping near Texas Creek or in Texas Creek Travel Management Area. However, panel viewers are more likely to visit during the day, which may reduce parking competition, overall.

The overall effects of exhibition would result in significant short-term impacts to camping. The significance of these effects is based on crowding at camping areas and reduced access to dispersed and developed camping locations. These impacts would be localized at campgrounds and dispersed camping sites within the Project Area, but would extend to other campgrounds in the region as well.

Hiking and Mountain Biking. The 2-week exhibition of the panels would create an added attraction that enhances the trail experience for many hikers and mountain bikers. Many visitors to the project would also participate in trail activities while they are in the Project Area, leading to additional trail use. An increase in trail users in the area would lead to congestion on trails and at trailheads, which would diminish the trail user experience and could cause user conflicts. The effects of increased visitor presence on access and the quality of the recreation experience for hiking and mountain biking would result in the temporary displacement of some trail users to other trails in the region or state.

The large number of visitors in the Project Area during exhibition would result in increased traffic and travel delays on US 50 and reduced parking availability for trail activities. An increase in travel time would likely diminish the trail user experience and result in the temporary displacement of visitors to trails outside the Project Area. Additional parking traffic would pressure existing parking lots that are normally used for trail activities. Visitors viewing the fabric panels could park at AHRA developed sites to view panels or participate in other forms of recreation, which may likely reduce parking availability for trail

users. This could significantly affect trail access at the Lone Pine, Texas Creek, and Five Points recreation areas.

The closure of informal parking pullouts within 0.5 mile of each panel, in addition to panel viewers, tour buses, and project vehicles utilizing pullouts, would have a short-term impact on trail access. Informal pullouts provide parking for trails in the South Fern Leaf Gulch area, the McIntyre Hills WSA, and the system of BLM trails south of Salida. Closure or reduced parking availability at pullouts would significantly restrict access to these trails.

The impacts of project activities at the Texas Creek Staging Area on hiking and mountain biking would be the same as during installation. The impacts of the Texas Creek Visitor Area on hiking and mountain biking would be the same as the impacts of project activities at the Texas Creek Staging Area.

Exhibition would result in significant impacts to hiking and mountain biking, mostly due to increased visitation and crowding on trails. These short-term impacts would be localized at trails in the Project Area. Moderate displacement of trail users to other trails in the region may also occur.

Rock Climbing. The exhibition of panels would create an added attraction for rock climbers in the Project Area. Rock climbers who do not normally climb at locations within the Project Area may come to climb in this area as a result of the exhibition. However rock climbing opportunities are limited in the Project Area and climbing is not a primary recreation activity.

The impacts of increased visitor presence and traffic on access and the quality of the recreation experience for rock climbing would be similar to impacts to hiking and mountain biking. Impacts would be especially concentrated at the Falls Gulch climbing area between Coaldale and Canyon Trading Post. Visitation and traffic impacts may extend to the Shelf Road climbing area. Furthermore, increased visitor presence and traffic would result in the temporary displacement of some rock climbers to other climbing sites in the region or state.

Restricted access to highway pullouts could have a short-term impact on climbing access at Falls Gulch, as well. Falls Gulch is accessed by an informal pullout with a capacity of three to four vehicles. While this pullout is not within 0.5 mile of any panels and would not be closed, any project-related vehicles parked in this area would reduce parking availability and access for climbing.

The impacts of project activities at the Texas Creek Staging Area on rock climbing would be the same as those during installation. The impacts of the Texas Creek Visitor Area on rock climbing would be the same as the impacts of project activities at the Texas Creek Staging Area.

Collectively, the effects of exhibition would result in moderate short-term impacts to rock climbing. While these impacts would primarily be localized at climbing sites within the Project Area, displacement of climbers to other climbing areas in the region or state may occur as well.

OHV Use. Exhibition would create an added attraction for OHV users in the Project Area, which would enhance the recreation experience, as described for installation. The impact of additional visitor presence and traffic near trails on OHV use would be similar to impacts to hiking and mountain biking. Additional parking traffic would pressure existing parking pullouts, lots, and sites used for OHV access in the Project Area. Parking near motorized trails is critical for OHV access. Increased visitor presence and traffic may result in the temporary displacement of some OHV users to other motorized trails in the region or state.

The impacts of project activities at the Texas Creek Staging Area on OHV use would be the same as those during installation. The impacts of the Texas Creek Visitor Area on OHV use would be the same as those described for hiking and mountain biking.

The overall effects of exhibition would result in significant short-term impacts to OHV use, with impacts concentrated in the Texas Creek Travel Management Area. These impacts would be localized on OHV trails in the Project Area, with possible displacement of users occurring at a regional level.

Hunting. Bighorn hunting season runs from early August through the end of the month, and is the only hunting season open during the first two weeks of August, when the exhibition would occur. Because only 5 archery licenses for bighorn are allocated for the game management units in the Project Area, the exhibition would directly impact a small number of hunters. However, impacts to access and recreation experience for bighorn sheep hunters would be significant during this time period, as bighorn sheep permits are limited, competitive and greatly valued by hunters. Four of the five archery licenses are allocated to Colorado residents, and only one is allocated to a nonresident hunter, making it very difficult and costly to obtain a permit in a given year. Auction and raffle permits are even more competitive and expensive. Receiving a bighorn sheep license represents a major investment for hunters, and is a highly prized opportunity. The licensing system does not allow flexibility among game management units, so hunters with permits in the project area would have no options for relocation during exhibition.

The impacts of exhibition, including increased visitor presence and traffic, on hunting would be similar to impacts on wildlife viewing and bird watching. Closures of informal pullouts would restrict access for hunters scouting bighorn sheep in the Project Area. At the County Line panel site, US 50 pullouts are the only areas where sheep hunters can pull off the road and observe sheep across the river; the closure of pullouts near this panel would impede hunting activities at this site.

The impacts of project activities at the Texas Creek Staging Area on hunting would be the same as those described under installation. The impacts of the Texas Creek Visitor Area on hunting would be the same as the impacts of project activities at the Texas Creek Staging Area.

In all, exhibition activities would result in significant short-term impacts to bighorn sheep hunting. These impacts would occur at a regional or greater level, as exhibition could affect nonresident and international hunters, in addition to local and Colorado hunters.

Horseback Riding. The impact of the exhibition of panels, increased visitor presence and traffic, and the closure of informal pullouts on horseback riding would be similar to the impacts described under hiking and mountain biking. Additional parking traffic would pressure existing parking lots used for trail activities in the Project Area. Visitors viewing the fabric panels may park at AHRA developed sites to view panels or participate in other forms of recreation, which may likely reduce parking availability for trail users, including horseback riders. Equestrian users require oversized parking spaces for horse trailers, so reduced parking availability for large vehicles would significantly affect access to trails in the Project Area. The impacts of increased visitor presence on access and recreation experience for horseback riding would result in the temporary displacement of some equestrian users to other trails in the region or state.

The impacts of project activities at the Texas Creek Staging Area on horseback riding would be the same as those during installation. The impacts of the Texas Creek Visitor Area on horseback riding would be the same as the impacts described under boating. The overall effects of exhibition on horseback riding would

be short-term and significant. Impacts would be localized at trails in the Project Area, though moderate displacement of trail users to other trails in the region may also occur.

Placer Mining. The exhibition of panels would impact placer mining in the Project Area. The presence of panels could restrict riverbank access at the panel locations, which would limit the locations where placer mining can occur. This may displace miners from their preferred locations to other segments of the river. The exhibition would create an additional attraction for placer miners, as well. Miners may plan their mining activities to coincide with exhibition or locate themselves near panel locations on the river. Thus, the panels would enhance the recreation experience. These impacts would be concentrated at Point Barr recreation area, near the Tunnel panel.

The impacts of increased visitor presence and traffic, the closure of informal pullouts, and restricted pedestrian use on US 50 on placer mining would be the same as impacts to angling. While informal pullouts are less heavily used for placer mining as they are for angling, the difference in the level of impact is insignificant.

The impacts to access and experience for placer mining described above could result in the temporary displacement of miners to other sections of the Arkansas River during the exhibition, as miners could seek to avoid traffic, crowding, and reduced access on the roads and the river.

The combined effects of exhibition on placer mining would lead to significant short-term impacts to recreational placer mining. These impacts would be limited to Project Area, and localized at Point Barr, in particular. A minor level of displacement may also occur within the region.

Scenic Driving. The exhibition of the panels would attract additional scenic drivers and would enhance the recreation experience. People would likely travel along US 50 in place of other routes in order to experience the fabric panels. However, the visitor presence associated with exhibition would cause increased traffic and travel delays on US 50, which may adversely impact the scenic driving experience. The closure of informal parking pullouts to public use, in addition to project vehicles utilizing pullouts, would have a short-term impact to access for scenic driving. Informal pullouts provide parking for brief stops for breaks, photos and sightseeing. Additional parking would be created at the visitor rest areas, which would reduce this impact.

Additional restrooms, potable water and other facilities would be available at the Vallie Bride Limited Rest Stop during exhibition. This expanded rest area would provide extra amenities for scenic drivers in the Project Area. The Parkdale Viewing Center would expand recreation access and scenic opportunities. An added 900 parking spaces at the viewing area would create more parking availability for scenic drivers and sightseers. Access to the panel would allow scenic drivers to stop and directly view the project, which would enhance the recreation experience.

Overall, the effects of exhibition would significantly benefit scenic driving as a result of the added attraction created by the panels. Impacts would be short-term and limited to the Project Area.

Festivals and Events. The exhibition of panels would not occur during any major river events, and so would have no impact on festivals and events along the Arkansas River in the Project Area. However, exhibition could impact festivals and events in Salida, Cañon City, and other local communities. The additional number of visitors in the Project Area during exhibition would likely result in increased visitation

at festivals and events. Project visitors would stay overnight in towns near the Project Area, and could also participate in local events during their stay.

The impacts of increased visitor traffic on local festivals and events would be similar to impacts on scenic driving. Additional restrooms, potable water and other facilities would be available at the Vallie Bride Limited Rest Stop and the Parkdale Viewing Center during exhibition. This expanded rest area would provide extra amenities for travelers en route to nearby festivals and events.

The effects of exhibition would result in significant short-term impacts to local festivals and events, overall. These impacts would be localized in communities throughout the Project Area and the region, and would be primarily beneficial.

Other Local Attractions. Additional visitation in the Project Area during exhibition would have both beneficial and adverse impacts on nearby local attractions, such as the Royal Gorge Bridge and Park, the Royal Gorge Tourist Train, and National Park Service sites. The attraction of the exhibition would draw visitors to other attractions, which would likely cause crowding at these sites. However, the increase in visitors to these attractions would also benefit the sites themselves by providing additional revenue and drawing visitors who may not normally travel to the area.

The increase in visitor traffic during exhibition would impact travel time along US 50, which could diminish the recreation experience of visitors to local attractions. Visitors traveling along US 50 to the Royal Gorge Bridge and Park, the Royal Gorge Tourist Train, and nearby National Park Service sites could experience frustrations and trip delays.

The Parkdale Viewing Center would attract a high concentration of project visitors during exhibition. The number of visitors at this location would be associated with an increase in traffic. Because the Royal Gorge Bridge and Park and the Royal Gorge Tourist Train are close to Parkdale, the greater volume of traffic in the area could increase travel time or prevent access to these attractions for visitors. The impact of additional rest facilities at Vallie Bridge on local attractions would be the same as described for festivals and events.

On the whole, the effects of exhibition would result in significant short-term impacts to other local attractions. These impacts would occur at a regional level.

Upland Recreation Permits. All impacts of exhibition activities on hunting also apply to RGFO upland recreation permits for hunting. Hunting trip operators with permits may be displaced temporally and spatially during hunting seasons as a result of exhibition. Diminished access or recreation experience may also adversely impact revenue for outfitters, as described in Section 4.12 Socioeconomics, Social Impacts, and Section 4.15 Public Safety. These temporary impacts would only apply to bighorn sheep hunting during exhibition in the first two weeks of August, and would be significant at a regional level.

The impacts of exhibition activities on all other upland recreation permits would be the same as described for installation. Impacts on these permits would be short-term, significant, and regional in extent.

4.20.2.3 Demobilization

a. Impacts Common to All Activities

The presence of fabric panels directly following exhibition would create an added recreation attraction in the Project Area. This would draw visitors that would likely participate in recreational uses in addition to

viewing the fabric panel removal. These impacts are further addressed in the descriptions of specific activities below.

The presence of 12-15 workers on construction crews removing hardware, deconstructing, and conducting other demobilization and restoration activities throughout the Project Area may impact the recreation experience. The additional human presence along the river at panel locations may detract from the natural scenery of the river, as some users prefer minimal human interaction during recreation activities. This impact would be limited to the immediate panel footprints and staging areas within the Project Area. The presence of private security personnel to patrol removal and staging areas would result in similar to those described for installation. No additional user facilities would be available at AHRA sites during removal. The associated impacts would be the same during removal as during installation.

An added 36,000 visitors would be present in the Project Area during removal, with the majority viewing the panels in the 4 to 6 weeks following removal. This would result in 12, 862 vehicles in the Project Area, overall. The associated increase in travel time would be minor, compared to the No Action Alternative, as noted in Section 4.16 Transportation and Traffic.

The restoration of vegetation and soils at panel locations and staging areas could result in temporary trail closures, which may impact access to the river. Residual evidence of project activities, including anchor holes patched with mortar and anchor equipment left in the ground, would impact the natural scenery along the river. These visual effects could affect the quality of the river as a recreational resource. This long-term impact would be limited to the Project Area. Removal activities along the Arkansas River that impact access and the quality of the recreation experience could displace users to other recreation sites in the region or state, outside the Project Area. Displacement related to specific recreation activities is described below.

A permanent interpretive exhibit that provides information to visitors about the Over the River project would be installed at the Texas Creek AHRA site. This exhibit would have a negligible, long-term, beneficial impact on recreation in the Project Area.

Removal activities along the Arkansas River that impact access and the recreation experience for traditional recreation activities could displace users to other recreation sites in the region or state, outside the Project Area. This displacement would result in a loss of revenue to AHRA from traditional visitation, as well as diminished recreation opportunities overall. Displacement of users for specific recreation activities is described below.

Boating. Removal activities would have a direct effect on rafting, kayaking, and other forms of boating on the Arkansas River. Project-related traffic may have a short-term effect on US 50 and other local roadways by delaying access to recreational sites, as described for installation. Given that removal would not occur during the peak boating season, the impact to travel time for both commercial and private boating would be negligible. The closure of informal parking pullouts to public use, in addition to project vehicles utilizing pullouts, would impact access for private and commercial boating, as described for installation. Closures would only occur after peak boating season ends.

The presence and operation of removal equipment along the river would likely impact boating access and diminish experience. Removal of fabric panels, cables, ATFs and anchors would produce noise and air emissions, and may restrict access to riverbanks at panel locations. Since removal would occur outside of the peak boating season, impacts to boating would be minimized.

Removal of cables and fabric panels may affect boating access and experience, as well as the safety of boaters. The process of removing cables could occasionally interfere with boat traffic traveling downstream, especially during days and times of higher use. However, cable removal would not lead to on-going interruptions of boating activities. As described in Chapter 2.0, safety spotters would be placed upriver and downriver of installation activities in order to alert boaters of activity and safely stop boating traffic, if necessary. Mitigation measure REC-4 (Chapter 5.0) would ensure that boating safety zones are identified on the river and that river spotters are properly trained to maintain boater safety.

The removal of fabric panels may offer a temporary added attraction to boaters. Boaters interested in the project would have the opportunity to view the removal of the panels and may feel like they are directly witnessing the artistic process. Even though the removal would occur after peak rafting season, projects activities would likely attract additional boaters in the weeks directly following exhibition. The local rafting industry would benefit from additional revenue, as described in Section 4.14 Socioeconomics, Social Impacts, and Section 4.15 Public Safety.

Removal activities would lead to an increased visitor presence along the Arkansas River and US 50. Additional visitors in the Project Area would create extra noise, crowding at put-in and take-out points near the panels, reduced parking availability, and increased traffic and travel delays on US 50. Such impacts to access and experience for commercial and private boating could result in the temporary displacement of boaters to other rivers in the region or state. The effects of an increased number of visitors in the Project Area would be concentrated in the weeks directly following exhibition.

Project activities at the Texas Creek Staging Area could impact river access at Texas Creek, as described for installation.

The collective effects of removal activities would result in moderate short-term impacts to boating. These impacts would be limited to the Project Area. This rating of the impact is primarily based on potential interruptions of boating traffic along the river during fabric panel and cable removal and the additional visitor presence in the Project Area; removal activities would not occur during peak boating season.

Angling. Removal activities would have a direct effect on angling on the Arkansas River. In the three months immediately following exhibition, September, October and November, nearly 8,700 anglers in the overall AHRA could be affected by removal activities. In particular, September and October are peak months for angling recreation (Bridges, et al. 2000). For the most part, effects would be concentrated within the Project Area, and impacts to anglers would be lower upstream of Salida and downstream of Cañon City.

Project-related traffic may have a short-term effect on US 50 and other local roadways by delaying access to recreational sites and informal pullouts within the Project Area. The closure of informal parking pullouts to public use, in addition to project vehicles utilizing pullouts, would also have a short-term impact on angling access, as described for installation. Angling use peaks during the last two weeks of August; this coincides with the first two weeks of demobilization, when the highest level of removal activity would occur.

The presence and operation of removal equipment along the river would likely impact angling access and the recreation experience. Removal of fabric panels, cables, ATFs and anchors would produce noise and air emissions, and may restrict access to riverbanks at panel locations. The presence of anchors, ATFs, cables,

fabric panels, vehicles and machinery would affect the natural scenery of the river corridor, which could impact the angling experience.

Removal of cables and fabric panels would affect the angling experience, as well as the safety of anglers. Cables pulled across the river may temporarily interfere with float, walk and wade, and shore fishing and may restrict access to riverbanks for angling. Removal equipment along the river may interfere with angling equipment, as fishing line and lures could snag in the cables, fabric, or other materials. This would restrict the locations where anglers can cast, diminishing the angler experience. The impacts of removal activities on aquatic species, including fish, are described in Section 4.3 Aquatic Biology.

Because float fishing occurs by boat, the impacts of installation activities and visitation on float fishing would be similar to those described for boating, in addition to angling-specific impacts.

Additional visitors in the Project Area, with the majority viewing the panels in the two weeks after exhibition, would create extra noise, crowding along the river near panels, reduced parking availability, and increased traffic and travel delays on US 50. Such impacts would reduce access and diminish the experience for all forms of angling and would result in the temporary displacement of anglers to other segments of the Arkansas River and other rivers in the region or state. Some anglers may avoid the Project Area completely during removal. Moreover, the local angling industry would experience reduced revenue as a result of demobilization, as described in Section 4.14 Socioeconomics, Social Impacts, and Section 4.15 Public Safety.

It is possible that some anglers who experience impacts or are not in support of the project would not return to the Arkansas River in future years. However, as the project would be temporary, this is expected to result in a significant short-term impact, but negligible long-term impact overall.

The combined effects of removal would result in short-term impacts to fishing throughout the project area. Overall, the intensity of impacts would be significant, primarily due to interference of removal activities with angling access and equipment, and the overlap of removal activities with peak angling season. Anglers within the Project Area would be highly affected, and moderate to significant displacement may occur at a regional scale.

Wildlife Viewing and Bird Watching. Impacts of project-related traffic and US 50 lane closures on wildlife viewing and bird watching would be the same as those described under installation. The impacts of the closure of informal parking pullouts and project vehicles utilizing pullouts on wildlife viewing and bird watching would be the same as impacts to angling. Because informal pullouts are less heavily used by wildlife viewers than by anglers, this impact would be reduced in comparison.

The presence and operation of removal equipment along the river would likely impact the wildlife viewing and bird watching experience. Removal of fabric panels, cables, ATFs and anchors would produce noise and air emissions, and may restrict riverbank access for wildlife at panel locations. These activities would displace wildlife, and subsequently wildlife viewers, from the surrounding area. See Sections 4.1 Terrestrial Wildlife and Habitat and 4.2 Avian Wildlife and Habitat. The presence of anchors, ATFs, cables, fabric panels, vehicles and machinery would affect the natural scenery of the river corridor, which could further impact the viewing experience within the Project Area. The impact of project staging activities at Texas Creek on wildlife viewing and bird watching would be the same as those described under installation.

The impacts of increased visitor presence and traffic in the Project Area would be the same for wildlife viewing and bird watching as described for angling. In addition, the increased number of visitors and noise created would disrupt and displace wildlife to other locations, which would displace viewers as well.

Overall, removal would result in moderate, short-term impacts to wildlife viewing and bird watching. These impacts would mostly be localized near panel locations, with minor displacement of viewers occurring at a regional level.

Camping. Impacts of project-related traffic, US 50 lane closures, and the closure of informal parking pullouts on camping would be the same as those described for installation. Peak camping occurs in the summer months, which does not coincide with most removal activities.

The presence and operation of removal equipment along the river would likely impact camping access and experience in the same ways described under installation. Removal operations may displace camping use to regional AHRA and USFS campsites, outside the Project Area.

The removal of panels would create an added attraction that would enhance the camping experience. Even though the removal would occur after peak camping season, project activities would likely attract additional campers in the weeks directly following exhibition. An increased number of visitors in the Project Area and associated traffic would cause impacts to camping similar to those during installation.

Collectively, the impacts of removal on camping would be minor, since most activities would occur after the peak camping season. Impacts would occur at dispersed camping areas and developed campgrounds at a regional level, and minor displacement of campers may also occur.

Hiking and Mountain Biking. Impacts of project-related traffic, US 50 lane closures, and the closure of informal parking pullouts on hiking and mountain biking would be the same during removal as for installation. The presence and operation of removal equipment along the river would likely cause the same impacts as during installation. The impact of project staging activities at Texas Creek on hiking and mountain biking would be the same as those described under installation, as well.

The removal of panels would create an added attraction that enhances the trail experience for many hikers and mountain bikers. Additional trail users may be attracted to the Project Area during the weeks directly following exhibition to view the panels. Additional visitors in the Project Area, with the majority viewing the panels during the two weeks after exhibition, would create extra noise, crowding at trailheads and along trails, reduced parking availability, and increased traffic and travel delays on US 50. The impacts of increased visitor presence on access and recreation experience for hiking and mountain biking would result in the temporary displacement of some trail users to other trails.

The overall effects of removal would result in minor impacts to hiking and mountain biking, due to increased traffic and crowding on trails. While most impacts would be localized at trails within the Project Area, removal may also result in minor displacement of users to other trails in the region.

Rock Climbing. Impacts of project-related traffic and US 50 lane closures on rock climbing would be the same as those described under installation. The effects of restricted access to highway pullouts, in addition to panel viewers, tour buses, and project vehicles parking in pullouts would be the same as those described under exhibition. Project activities at the Texas Creek Staging Area would cause the same impacts to climbing during removal as those described for installation, as well.

The removal of panels would create an added attraction for rock climbers in the Project Area. Because rock climbing is not a primary recreation activity in the Project Area, this temporary impact would be minimal. The additional visitor presence in the Project Area, with the majority viewing the panels directly after exhibition, would create extra noise, crowding near panels, reduced parking availability, and increased traffic and travel delays on US 50. The impacts of additional visitors on access and the quality of the rock climbing experience would result in the temporary displacement of some climbers to other trails in the region or state.

In general, the effects of removal on rock climbing would be minor and short-term. Impacts would be localized at climbing sites within the Project Area, with minor displacement of climbers occurring at the regional level.

OHV Use. Impacts of project-related traffic and US 50 lane closures on OHV use would be the same as those described for installation. Project activities at the Texas Creek Staging Area would cause the same impacts to OHV use during removal as those during installation, as well.

The removal of panels would create an added attraction for OHV users in the Project Area, which would enhance the recreation experience. OHV users who do not normally visit this area may use the trails near the panels during removal. While OHV use is widespread on BLM land throughout the Project Area, it does not occur along the river where the panels are located, so this impact would be indirect and limited to the Project Area.

Additional visitors in the Project Area, with the majority viewing the panels during the two weeks after exhibition, would create extra crowding at trailheads and along trails in the Texas Creek area, reduced parking availability at Texas Creek, and increased traffic and travel delays on US 50. The effects of increased visitor presence on access and the quality of the recreation experience for OHV use would result in the temporary displacement of some OHV users to other motorized trails in the region or state.

The combined effects of removal on OHV use would be moderate at Texas Creek and minor throughout the rest of the Project Area, with minor displacement occurring at a regional level. The rating for the impact to OHV use is based on restricted access and crowding on trails at Texas Creek, in particular.

Hunting. Removal activities would occur during the hunting seasons for bighorn sheep, deer, elk, antelope, black bear, turkey, waterfowl and small game. Given that over 13,800 licenses are sold for the game management units near the Project Area for these species each year, a considerable number of hunters could be affected by removal activities.

The presence and operation of removal equipment along the river would likely cause the same impacts to hunting as to wildlife viewing and bird watching. Removal operations would likely be more intensive during the first weeks of removal. The impacts of project activities at the Texas Creek Staging Area on hunting would be the same as those described under installation.

The impacts of increased visitor presence and visitor traffic on hunting would be similar to the impacts described for exhibition. Because more hunting seasons are open during removal than during exhibition, these temporary impacts to hunting access and experience would likely be more notable than impacts in the other stages. Visitor impacts would be concentrated during the first weeks of removal, and would be regional in extent.

Overall, removal would result in short-term, moderate impacts to hunting. These impacts would be regional or greater in extent, as both resident and nonresident hunters could be affected by project activities, and wildlife could be affected outside the immediate project area.

Horseback Riding. The effects of project-related traffic, US 50 lane closures, closure of informal pullouts, additional visitation, and other removal activities on horseback riding would be the same as those described for hiking and mountain biking. In addition, horses could be disturbed by noise near trails, which would diminish the horseback riding experience. These temporary impacts to horseback riding would be minor and localized at trails within the Project Area. Some regional displacement would also occur.

Placer Mining. Impacts of project-related traffic, US 50 lane closures, the closure of informal pullouts, the presence and operation of construction equipment, and the removal of cables and fabric panels on recreational placer mining would be similar to those described for angling.

The removal of panels would create an additional attraction for placer miners. Miners may plan or locate their mining activities to coincide with the removal of the panels, which would enhance the recreation experience, especially near the Point Barr AHRA site. The impacts of increased visitor presence and traffic to placer mining would be the same as impacts to angling.

The combined impacts of removal activities on placer mining would be similar to those described for angling. Impacts would be short-term, localized at Point Barr and other placer mining sites within the Project Area, and moderate in intensity.

Scenic Driving. The effects of project-related traffic, lane closures on US 50, and the closure of informal parking pullouts during removal on scenic driving would be the same as those described for installation. The presence and operation of removal equipment along the river may impact the recreation experience for scenic driving. Staging area activities and removal of fabric panels, cables, ATFs and anchors would produce visual impacts, as described in Section 4.21 Visual Resources. Because other industrial activity is already present in the US 50 corridor, these temporary visual impacts would be limited.

Removal activities may likely create an additional attraction for scenic driving. Travelers interested in the project would have the opportunity to view the removal of the panels and may feel like they are directly witnessing the artistic process. People may travel along US 50 in place of other routes in order to experience the removal of the fabric panels, as described for installation.

Increased visitor presence associated with removal activities, especially in the first two weeks of removal, would create extra noise, reduced parking availability, and increased traffic and travel delays on US 50. Such impacts to the scenic driving experience may likely result in some scenic drivers rerouting trips to avoid the US 50 corridor.

Overall, the effects of removal would result in impacts to scenic driving similar to those described for installation. Impacts would be short-term, minor and limited to the project-area.

Festivals and Events. The removal of panels would not occur during any major river events, and so would have no impact on festivals and events along the Arkansas River in the Project Area. However, removal could impact festivals and events in Salida, Cañon City, and other local communities.

The effects of project-related traffic and lane closures on US 50 on festivals and events would be the same as those described for installation. The impacts of increased visitor traffic would be similar to impacts on scenic driving. The additional number of visitors in the project are during removal would likely result in increased visitation at festivals and events. Visitors to the project would stay overnight in towns near the Project Area, and could participate in local events during their stay. The overall effects of removal on local festivals and events would be short-term. Impacts would mostly occur at a regional level, with impacts potentially occurring in communities within the Project Area as well. Impacts would occur at a moderate level and would be concentrated in the weeks directly following exhibition.

Other Local Attractions. The effects of project-related traffic and lane closures on US 50 on other local attractions would be the same as those described for installation. The impacts of increased visitor traffic on other local attractions would be similar to impacts on scenic driving. The increased number of visitors in the Project Area during removal would cause impacts similar to those described for installation. Removal activities would result in short-term, moderate level impacts on other local attractions, overall. Impacts would be regional in scale.

Upland Recreation Permits. In general, the effects of removal activities would result in impacts to upland recreation permits similar to those described for installation.

4.20.3 Alternative 1c

4.20.3.1 Installation

An added 46,000 visitors would be present in the Project Area during installation, with the majority viewing the panels during blossoming. This would result in 16,429 vehicles in the Project Area, which is higher than Alternative 1a, as noted in Section 4.16 Transportation and Traffic.

Installation activities for Alternative 1c would not differ from those in Alternative 1a. Therefore, the impact of installation on all recreational resources, uses, access and experiences would be the same as those under Alternative 1a.

4.20.3.2 Exhibition

The impact of exhibition activities on recreation for Alternative 1c would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

Under Alternative 1c, the exhibition period would be 21-28 days in length, which is 1 to 2 weeks longer than for Alternative 1a. This extended exhibition would increase the duration of all exhibition impacts on recreation resources, access and the experience. A greater overall level of impacts would accompany the longer viewing period.

The 3 to 4-week exhibition would lead to an increase in visitation to 439,000 total estimated visitors. Because the additional visitation would be distributed over a longer viewing period, the impacts of increased visitor presence in the Project Area on recreation would be the same as those described for each activity in Alternative 1a.

Added visitation would result in 151,379 vehicles in the Project Area, overall, and 11,676 vehicles per day during peak periods. The associated increases in travel time of 10 minutes (westbound) and 8.1 minutes (eastbound) would be similar or less than for Alternative 1a. See also Section 4.16 Transportation and Traffic.

Alternative 1c would restrict access to AHRA recreation sites for any activities not related to the OTR project. Closing these sites to public use would have a significant impact on recreation access for many activities in the Project Area.

Boating. The 3-week viewing period would attract significantly more boaters to the Project Area during the last two weeks of August. Given that the VFMP only attempts to maintain target flows of 700 cfs through August 15, flows typically drop considerably after the first two weeks in August (VFMP 2006). The resulting flows are not ideal for boating, so fewer boating trips occur after this date. However, with the exhibition period expanded into the third and fourth week in August, more boating trips would occur after August 15 than usual. The exhibition of panels would extend the typical boating season, enhance the boating experience, and benefit commercial operators during the last two weeks of August.

Temporary, event-only boating rations under Alternative 1c would affect boating access and the quality of the experience during exhibition. Temporary rations would result in an increase of 5,400 boaters on the river during the 3-week exhibition, in addition to what would be expected for Alternative 1a. The Arkansas River is typically crowded with boating traffic in early August, particularly on the segment between Vallie Bridge and Parkdale, and Alternative 1c would manage the additional boating traffic that would result from project visitation. Event-only rations would allow more boating traffic between Salida and Vallie Bridge, where boating is currently limited to ten boats per day on many days. The augmentation of rations would allow more boaters to pass under the three panels upstream of Vallie Bridge, enhancing the recreation experience on this segment. This would extend the recreation experience for boaters wishing to view the panels by allowing longer trips underneath more panels. It would also provide an opportunity for additional, shorter boating trips on a less-traveled section of the river.

Event-only rations would limit the number of boats per day between Vallie Bridge and Parkdale. While the temporary rations may allow boating traffic to surpass defined river capacities, these exceedances may not be as severe as under Alternative 1a, as boating is not currently rationed on the Vallie Bridge-Parkdale segment for any days in August.

The overall effects of exhibition on boating would be significant. This rating is based on an extended viewing period and temporary rations, which would allow for more opportunities for boating and could be accompanied by additional boating traffic on the river. Impacts would be short-term and primarily limited to the Project Area, though moderate regional displacement of boaters would likely also occur.

Angling. The longer viewing period would particularly impact angling use in the Project Area. The viewing period would extend into the last two weeks of August, when flows on the Arkansas River drop and angling use peaks. Therefore, impacts to angling would be greater during this period. Nearly 4,000 anglers visit the entire AHRA in August, and impacts to these users would be greater under Alternative 1c than Alternative 1a (Bridges, et al. 2000). Impacts to aquatic wildlife would also increase with a longer viewing period, as described in Section 4.3 Aquatic Biology.

Event-only commercial boating rations under Alternative 1c would impact the quality of the angling experience. An increase in boating use, especially on the segment of river between Salida and Vallie

Bridge, would cause crowding along the river. Crowding would interfere with angling activities, such as casting and locating fish, which would diminish the recreation experience for anglers and lead to increased conflict between river users. Added boating use may also impact angler safety along the river.

An increase in boating-related traffic resulting from temporary boating rations would impact access for anglers. Because vehicles for both boating and angling depend on informal pullouts for parking and access to the river, an increased number of commercial buses and vans utilizing pullouts could reduce parking availability, and therefore river access, for anglers.

The closure of AHRA sites to public use would have a major impact on recreation access for many activities in the Project Area, including angling. Since angling is a common activity at many AHRA sites, this would temporarily restrict access for anglers during exhibition.

Overall, the effects of exhibition under Alternative 1c would result in greater impacts to angling than Alternative 1a. A viewing period that extends later into August, increased boating use between Salida and Vallie Bridge, and the closure of AHRA sites to angling use would cause significant impacts to angling at a regional level. Exhibition impacts and the displacement of anglers may extend beyond the exhibition period, but would still be short-term in nature.

Wildlife Viewing and Bird Watching. The impacts of restricted access to AHRA recreation sites on wildlife viewing and bird watching would be the same as those to angling. These impacts would be particularly notable at the Canyon Trading Post, Lone Pine, and Five Points recreation areas, where wildlife viewing commonly occurs. This impact to access would be significant, short-term, and localized at AHRA sites in the Project Area.

Camping. Impacts of restricted access to AHRA recreation sites on camping would be the same as those to angling. These impacts would be concentrated at the Salida East, Point Barr, Rincon, Vallie Bridge, and Five Points recreation areas, where developed or dispersed camping commonly occurs. As these campsites are typically filled to capacity during peak summer months, this would result in a significant, short-term impact to camping access, which would likely result in additional displacement to dispersed camping locations in the Project Area and the region.

Hiking and Mountain Biking. Impacts of restricted access to AHRA recreation sites on hiking and mountain biking would be the same as those to angling. These impacts would be concentrated at the Point Barr, Lone Pine, Texas Creek, and Five Points recreation areas, which offer trail access. This restriction would significantly impact access to trail recreation during exhibition. Impacts would be short-term and localized at AHRA sites in the Project Area.

Hunting. The extended viewing period would lead to hunting impacts similar to those described under Alternative 1a. The restrictions at AHRA sites would limit access for hunters in the Project Area. Hunting access is important at the Five Points and Pinnacle Rock AHRA sites, in particular. Impacts would be significant at these sites, and may lead to further displacement of hunters at a regional level.

Horseback Riding. Impacts of restricted access to AHRA recreation sites on horseback riding would be the same as those described for hiking and mountain biking.

Placer Mining. The impacts of event-only commercial boating rations and restricted access to AHRA sites on placer mining would be the same as those described for angling.

4.20.3.3 Demobilization

An added 46,000 visitors would be present in the Project Area during removal. This would result in 16,429 vehicles in the Project Area, overall. The associated increase in travel time would be minor, compared to the No Action Alternative, as noted in Section 4.16 Transportation and Traffic.

Demobilization and restoration activities for Alternative 1c would not differ from those in Alternative 1a. Therefore, the impact of demobilization and restoration on all recreational resources, uses, access and experiences would be similar to those under Alternative 1a.

4.20.4 Alternative 1d

4.20.4.1 Installation

The impact of installation activities on recreation for Alternative 1d would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

Under Alternative 1d, all installation activities would be compressed into 14 months. This accelerated schedule would reduce the duration, but not necessarily the intensity, of impacts for all installation activities except blossoming. A compressed installation schedule could result in more intensive construction activities in the Project Area and may cause greater impacts to some recreation resources and uses, as described below.

An added 23,000 visitors would be present in the Project Area during installation, which is less than Alternative 1a. This would result in 9,286 vehicles in the Project Area, as noted in Section 4.16 Transportation and Traffic.

In Alternative 1d, the blossoming of fabric panels would occur during the last week of August or the first week of September. The later blossoming would impact some activities differently than a late July blossoming, as proposed in Alternative 1a. These impacts are further addressed in the descriptions of specific activities below. Because the exhibition would occur in September, the timing of installation activities may be altered. However, any deviation from the impacts described for Alternative 1a would be insignificant.

Boating. The late blossoming period in Alternative 1d would occur after the peak boating season ends. Boating use typically drops considerably after August 15, when the VFMP ends and natural flows are typically insufficient for boating activities (VFMP 2006). Because the blossoming of panels would be a major boating attraction, more boaters than usual would make trips down the river during the week before exhibition, assuming that there are adequate flows. The increase in the number of private and commercial boaters would be significantly greater than average numbers of boaters at this time of year. Because changes in boating pressure may extend to sections of the Arkansas River outside the Project Area, these impacts would be temporary and regional in extent.

Angling. The 14-month installation schedule would have increased impacts on angling, compared to Alternative 1a. A condensed schedule would result in more construction activity during the months of peak angling use (August, September, October, March, April and May). All installation-related impacts to angling described for Alternative 1a would be intensified under this accelerated schedule.

The late blossoming period in Alternative 1d would occur during peak angling use. In total, nearly 4,000 anglers visit the AHRA in August, and angling use is especially heavy during the last two weeks of the month, when river flows are lower (Bridges, et al. 2000). Additional boats on the river during blossoming would interfere with angling and impact access and the quality of the experience during peak angling season. These temporary impacts would be greater under Alternative 1d than Alternative 1a. Because changes in river flows and boating pressure may extend to sections of the Arkansas River outside the Project Area, these impacts would be regional in extent.

Hunting. Because the accelerated construction schedule would require more installation activity to occur in the fall and winter months than in the 28-month schedule, project activities would likely cause a greater impact to hunting than described in Alternative 1a. Hunting seasons for Bighorn sheep, deer, elk, antelope, black bear, mountain lion, turkey and small game primarily occur between August and March, when additional construction activity would occur in the Project Area. As described in Section 4.1 Terrestrial Wildlife and Habitat, the accelerated installation schedule could cause a greater impact to the presence and distribution of wildlife near the river compared to Alternative 1a, which would impact the hunting experience. The diminished hunting experience in the Project Area may further displace hunters to other game management units in the region or state during installation.

The late blossoming period would lead to impacts to hunting in addition to those described under Alternative 1a. Because bighorn sheep, antelope, deer and elk hunting open in August, and black bear hunting opens in early September, blossoming would coincide with each of these seasons. More than 13,800 licenses are sold for all of these species in the game management units within the Project Area. Increased visitor presence and traffic during the blossoming period would significantly impact hunting, as the recreation experience would be diminished and many hunters would be displaced from the Project Area. These impacts would be short-term and regional in scale.

Festivals and Events. An accelerated construction schedule may adversely impact festivals and events along the river. Project activities may occur more intensively and extensively along the Arkansas River during the summer months, which would overlap with FIBArk and other major river events. The presence and operation of construction equipment and other installation activities could highly impact FIBArk, the largest annual event occurring in the AHRA, compared to Alternative 1a. If installation activities are not restricted during the FIBArk event, these temporary impacts would be significant within the Project Area.

4.20.4.2 Exhibition

The impact of exhibition activities for Alternative 1d would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

A September exhibition would result in a decrease in visitation, to 224,000 estimated total visitors. The lower visitor presence would lead to a reduction in traffic, travel time and other visitor impacts. Visitation would result in 84,483 total vehicles in the Project Area and 9,748 vehicles per day during peak periods. The associated increase in travel time would be 9.3 minutes for westbound travelers and 6.5 minutes for eastbound travelers, which is slightly less than under Alternative 1a. See also Section 4.16 Transportation and Traffic. The impacts of visitor presence in the Project Area would be significant, nonetheless.

The addition of project-specific commercial boating rations would result in an increased number of boating trips in the Project Area during exhibition, which would result in impacts to various recreation activities.

Alternative 1d would restrict access to AHRA recreation sites for all activities. Closing these sites to recreation use would have a significant impact on recreation access for many activities in the Project Area. Impacts of these closures on angling, wildlife viewing and bird watching, camping, hiking and mountain biking, horseback riding, hunting and placer mining would be the same as the effects of restricted access to AHRA sites described for Alternative 1c.

Boating. Under Alternative 1d, the exhibition period would occur in early or mid September. Boating use drops considerably after August 15, when the VFMP ends and natural flows are typically insufficient for boating activities, so the exhibition would not overlap with peak boating use (VFMP 2006). The exhibition of panels would attract additional boating use, as described in Alternative 1a. Because it is assumed that there would be sufficient flows for boating, the late exhibition would extend the peak boating season into September, creating significantly greater interest in boating than typically occurs in this month.

Boating use is not typically rationed in September, as river capacities are rarely exceeded at this time of year. Mitigation measure REC-12 (Chapter 5.0) would institute temporary, event-only commercial boating rations to allow commercial boating use above defined river capacities for September without penalizing commercial outfitters in future years through rationing. The temporary rations would limit the total number of boats on the river, which would control the overall amount of boating traffic during exhibition. Due to the fact that substantially less boating use occurs in September than in August, these temporary rations would result in an increase of boaters in the Project Area during exhibition, compared to typical September use. This significant change in boating use could lead to more boating traffic above and below the Project Area. As a result of high boating use outside of the peak season, boaters would be more likely to experience conflicts with other users during this time.

The closure of AHRA recreation sites to all forms of recreation, including project-specific visitation, would temporarily and significantly impact boating access and the quality of the recreation experience. AHRA sites comprise the majority of boating put-in and take-out points, so the closure of these sites would limit river access for both commercial and private boating. Since boaters would be required to put in above Salida East and take out below Parkdale, or at available informal pullouts or private access sites, boating trips may be necessarily long, and boaters would have limited opportunities to shorten trips for safety or other reasons. This could significantly reduce boating opportunities in the Project Area during exhibition.

Temporary, event-only rations and the closure of AHRA recreation sites would have conflicting impacts on boating during exhibition. While temporary rations would likely provide new boating opportunities and attract additional boaters, the closure of AHRA sites would restrict access and limit boating. Although temporary rations alone may enhance the boating experience, the combination of these two elements under Alternative 1d would likely result in significant, adverse impacts to boating access and the recreation experience.

Angling. Additional boating use in the Project Area, as a result of the temporary, event-only commercial boating rations, would significantly impact angling access and the quality of the experience during exhibition. Because exhibition would occur in September, during a period of typically high angling use, additional boating use could result in an increase in conflict between anglers and boaters on the river. Almost 3,300 anglers visit the AHRA (including sites outside the Project Area) in September, or about 110 anglers per day, and these users could be significantly impacted or displaced by exhibition activities (Bridges, et al. 2000). The later exhibition and additional boating traffic would result in greater impacts to angling, compared to Alternative 1a. Section 4.3 Aquatic Biology notes that the increased presence of boaters on the river could have a minor effect on trout populations, as well.

Hunting. The later exhibition would lead to impacts to hunting in addition to those described under Alternative 1a. Because bighorn sheep, antelope, deer and elk hunting open in August, and black bear hunting opens in early September, exhibition would coincide with each of these seasons. More than 13,800 licenses are sold for all of these species in the game management units within the Project Area. Increased visitor presence and traffic during exhibition would significantly impact hunting, as the recreation experience would be diminished and many hunters would be displaced from the Project Area. These impacts would be short-term and regional in scale.

Placer Mining. The temporary, event-only commercial boating rations would result in the same impacts to placer mining as those described for angling.

4.20.4.3 Demobilization

The impacts of demobilization on recreation resources, access and experiences in Alternative 1d would be the same for all activities as for Alternative 1a, except as noted below.

An added 23,000 visitors would be present in the Project Area during removal. This would result in 9,286 vehicles in the Project Area, which is considerably less than under Alternative 1a. The associated increase in travel time would be minor, compared to the No Action Alternative, as noted in Section 4.16 Transportation and Traffic.

Heavy angling use occurs through October, and many anglers fish well into November and December. Removal activities would overlap with these months, which could affect more than 6,000 anglers in the AHRA overall. These impacts would be similar or reduced compared to Alternative 1a, as fewer anglers would be potentially impacted (Bridges, et al. 2000).

A later demobilization period would result in slightly reduced impacts to most recreation uses compared to Alternative 1a. Removal would not begin until mid or late September, outside of peak use for many recreation activities in the Project Area. However, this shift in timing would not considerably alter the level of impact to these activities. Because removal activities would occur outside of the peak boating and camping seasons in particular, adverse impacts to these uses would be somewhat lower than those described for Alternative 1a.

4.20.5 Alternative 2

4.20.5.1 Installation

The impact of installation activities on recreation for Alternative 2 would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

Compared to Alternative 1a, the panel configuration in Alternative 2 would lessen impacts to recreation during installation. Fewer panel locations in the Project Area would reduce the extent of impacts for all installation activities that are limited to the immediate panel footprint within the Project Area. No localized impacts would occur at the County Line, Tunnel, and Vallie Bridge locations, which would reduce impacts to recreation uses at the Salida East, Point Barr, Rincon and Vallie Bridge AHRA sites.

An added 38,000 visitors would be present in the Project Area during installation, which is higher than in Alternative 1a. This would result in 13,571 vehicles in the Project Area, as noted in Section 4.16 Transportation and Traffic.

Boating. Under Alternative 2, blossoming would occur sometime between mid-June and mid-July, earlier than Alternative 1a. This would overlap with the period of highest commercial boating use on the Arkansas River. The additional number of boaters associated with blossoming would cause increased crowding on the river during this time, which would likely exceed defined commercial boating capacities. This would diminish boating access and the recreation experience throughout the Project Area and create added safety issues. Impacts of an earlier blossoming on the quality of the boating experience could be significant. These impacts would be short-term and limited to the Project Area.

Angling. A configuration of fewer panels would reduce the extent and intensity of impacts to angling during installation. No panels would be present on the segment of the river between Salida and Vallie Bridge, which is managed primarily for angling use, and receives more angling pressure than the segment between Vallie Bridge and Parkdale. Since localized installation impacts would not occur on this stretch of river, there would be fewer impacts to angling, overall. Installation of anchors, ATFs, cables, and fabric panels, as well as the blossoming of panels would likely have no impacts to angling on this stretch of river.

Localized impacts, such as anchor, ATF, cable, and fabric panel installation and the blossoming of fabric panels would still occur on the stretch of river between Texas Creek and Parkdale. The effects of installation activities described in Alternative 1a would apply to this stretch of river under Alternative 2. Impacts would be especially concentrated near Parkdale, where heavy fishing use occurs.

An earlier blossoming would further reduce impacts to angling. Angling use typically drops during the higher summer flows in June and early July, and increases throughout July until it peaks at the end of August. In June and July, around 980 and 2,800 anglers (respectively) typically visit the overall AHRA and could be affected by blossoming activities, which is less than in Alternative 1a (Bridges, et al. 2000). Because blossoming would occur during a period of moderate rather than heavy angling use, the impacts of blossoming would be moderate, short-term, and limited to the stretch of river from Texas Creek to Parkdale.

The installation period in Alternative 2 would result in the least overall impact to angling, compared to all alternatives except the No Action Alternative.

Wildlife Viewing and Bird Watching. A configuration of fewer panels would reduce the extent and intensity of impacts to wildlife viewing and bird watching during installation. Although wildlife viewing is popular throughout the Project Area, it is concentrated at the Canyon Trading Post, Lone Pine and Five Points AHRA recreation sites. As no panels would be constructed upstream of Texas Creek in Alternative 2, impacts of installation on wildlife viewing and bird watching would be minimized at Canyon Trading Post

and Lone Pine. Installation of anchors, ATFs, cables, and fabric panels, as well as the blossoming of panels would likely have no impacts to wildlife viewing on this stretch of river.

Localized impacts, such as anchor, ATF, cable, and fabric panel installation and blossoming would still occur on the stretch of river between Texas Creek and Parkdale. The impact of installation activities described in Alternative 1a would apply to this stretch of river under Alternative 2. These impacts would be especially concentrated near Five Points, where heavier wildlife viewing use occurs.

Camping. All impacts occurring at the Project Area level described for Alternative 1a would be the same for Alternative 2. A configuration of fewer panels would reduce the extent and intensity of impacts to camping during installation. Since the presence and operation of construction equipment, installation of anchors, ATFs, cables, and panels, and the blossoming of panels would only occur between Texas Creek and Parkdale, impacts of construction activities and blossoming on camping would be concentrated at the Texas Creek, Five Points, and Maytag camping areas. Localized impacts would not occur at Salida East, Point Barr, Rincon, or Vallie Bridge.

Hiking and Mountain Biking. All impacts occurring at the Project Area level described for Alternative 1a would be the same for Alternative 2. A configuration of fewer panels would reduce the extent and intensity of impacts to hiking and mountain biking during installation. Because installation activities would not occur at the County Line, Tunnel and Vallie Bridge panel locations, there would be no localized impacts to trails near these sites, including at the Point Barr AHRA site. All impacts to trails between Texas Creek and Parkdale would be the same as those described for Alternative 1a.

Hunting. A configuration of fewer panels would reduce the extent of impacts to hunting during installation. As no panels would be constructed at the County Line, Tunnel and Vallie Bridge locations, impacts to hunting would be concentrated between Texas Creek and Parkdale. This would result in a smaller affected area, but the level of impacts would be the same as those described in Alternative 1a.

An earlier blossoming would further reduce impacts to hunting in the Project Area. Because the hunting seasons for all big game do not open until August or September, impacts of blossoming on wildlife presence and distribution would have a short-term, minor impact on hunting, overall.

Horseback Riding. The effects of a reduced number of panels in the Project Area on horseback riding would be the same as those described for hiking and mountain biking.

Placer Mining. A configuration of fewer panels would reduce the extent and intensity of impacts to placer mining during installation. Because the Tunnel panel would not be installed under Alternative 2, impacts localized impacts would not occur near the Point Barr recreation site. Installation activities at other panel locations and throughout the Project Area would still impact placer mining activities, as described in Alternative 1a. Since placer mining is most concentrated at Point Barr, the overall level of impact to placer mining in the Project Area would be lower than in Alternative 1a as a result of the removal of the Tunnel panel.

Festivals and Events. If blossoming occurs in June, the earlier blossoming could overlap with the FIBArk river event. If blossoming activities continue as proposed during river events, the unfurling of panels, visitor presence, and additional traffic could interfere with this major event. Unless blossoming is timed to avoid FIBArk, these impacts would be short-term, significant, and limited to the Project Area.

4.20.5.2 Exhibition

The impact of exhibition activities on recreation for Alternative 2 would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

A fewer number of panels in Alternative 2 would reduce localized impacts at panel locations during exhibition. Because the County Line, Tunnel and Vallie Bridge panels would be eliminated in this alternative, no impacts would be concentrated at these locations, which would also reduce impacts to recreation uses at the Salida East, Point Barr, Rincon and Vallie Bridge AHRA sites.

A late-June or July exhibition, earlier than that of Alternative 1a, would cause an increase in the number of visitors to the installation. The earlier viewing period would result in an estimated total of 361,000 visitors. This additional visitation would increase the impacts of visitor presence in the Project Area, including visitor traffic. Additional visitation would result in 124,483 vehicles in the Project Area, with 12,448 vehicles per day during peak periods. The associated increase in travel time would be 9.6 minutes for westbound travelers and 8.1 minutes for eastbound travelers (See also Section 4.16 Transportation and Traffic) The overall effects of project visitation would be greater for Alternative 2 than for Alternative 1a.

Boating. A configuration of fewer panels would lead to concentrated boating use between Texas Creek and Parkdale during exhibition. Because the County Line, Tunnel and Vallie Bridge panels would be eliminated, there would be little additional boating demand between Salida and Texas Creek. Boaters would primarily be attracted to the lower segment of the river, which could lead to increased crowding between Texas Creek and Parkdale. This would likely contribute to a higher concentration of boating use on the Texas Creek-Parkdale segment, with lower boating use on the Salida-Texas Creek segment, compared to Alternative 1a.

An additional 14 informal pullouts between Salida and Vallie Bridge would be available under Alternative 2, increasing access for private boating in particular.

Under Alternative 2, the early exhibition would overlap with the period of highest commercial boating use on the Arkansas River. The additional number of boaters associated with exhibition would cause increased crowding on the river during this time. This would temporarily diminish boating access and the quality of the experience, create additional safety issues, and lead to increased conflicts between user groups on the river. This would result in greater overall boating impacts, compared to Alternative 1a.

Angling. A configuration of fewer panels would reduce the extent and intensity of impacts to angling during exhibition. In Alternative 2, no panels would be present between Salida and Vallie Bridge. This segment of the river is managed primarily for angling use, and receives more angling pressure than the segment between Vallie Bridge and Parkdale. Since localized impacts would not occur on this stretch of river, there would be fewer impacts to angling. As a result of the elimination of the panels upstream of Texas Creek, 14 fewer pullouts along US 50 would be closed to angling use. This would increase access for angling, compared to Alternative 1a.

However, localized impacts and pullout closures would still occur on the stretch of river between Texas Creek and Parkdale. The impacts of exhibition described in Alternative 1a would apply to this stretch of river under Alternative 2.

An earlier viewing period would further reduce impacts to angling. Angling use typically drops during the higher summer flows in June and early July, and increases throughout July until it peaks at the end of August. A June exhibition could affect around 980 anglers in the overall AHRA, while a July exhibition could affect over 2,800 anglers in the overall AHRA (Bridges, et al. 2000). Because exhibition would occur during a period of moderate angling use, impacts to angling access and experience would be lower than in Alternative 1a. The effects of exhibition in Alternative 2 would result in reduced impacts to angling compared to Alternative 1a. Overall, impacts to angling would be moderate for this Alternative.

The exhibition period in Alternative 2 would result in the least overall impact to angling, compared to all alternatives except the No Action Alternative.

Wildlife Viewing and Bird Watching. A configuration of fewer panels would reduce the extent and intensity of impacts to wildlife viewing and bird watching during exhibition. Although wildlife viewing is popular throughout the Project Area, it is concentrated at the Canyon Trading Post, Lone Pine and Five Points AHRA recreation sites. As no panels would be constructed upstream of Texas Creek in Alternative 2, impacts of exhibition on wildlife viewing and bird watching would be minimized at Canyon Trading Post and Lone Pine. However, localized impacts would still occur on the stretch of river between Texas Creek and Parkdale as described in Alternative 1a, with impacts concentrated near Five Points. The earlier viewing period in Alternative 2 would have increased impacts on breeding birds, as described under Section 4.2 Avian Wildlife and Habitat. Overall, the impacts of exhibition on wildlife viewing and bird watching would still be significant, even though the extent of the impacts would be reduced.

Hunting. Under Alternative 2, no hunting seasons would be open during exhibition. Consequently, exhibition would cause lower levels of impact to hunting than in Alternative 1a. However, the earlier viewing period may still impact fall hunting. The presence of fabric panels could create visual disruption and prevent riverbank access for wildlife at the panel locations. Additional visitation near the river could also prevent river access for wildlife, and would likely displace big game species. Bighorn sheep hunting season would begin in early August, soon after the exhibition, so a disruption to the distribution of wildlife near the Project Area could displace hunters from their preferred hunting sites or affect hunters scouting bighorn populations prior to hunting. This impact would be short-term and moderate within the Project Area.

Placer Mining. A configuration of fewer panels would reduce the extent and intensity of impacts to placer mining during exhibition. Because the Tunnel panel would not be installed in Alternative 2, impacts would not be localized near the Point Barr recreation site, where placer mining is most concentrated. Exhibition effects at other panel locations and throughout the Project Area would still impact placer mining activities, as described in Alternative 1a. However, the overall level of impact to placer mining in the Project Area would be lower than in Alternative 1a as a result of the removal of the Tunnel panel.

Festivals and Events. If exhibition occurs in June, it could overlap with the FIBArk river event. FIBArk takes place annually during mid or late-June on the Arkansas River. The panels, visitor presence, and additional traffic could interfere with this or other major river events. Unless exhibition is timed to avoid FIBArk, these impacts would be short-term, significant, and limited to the Project Area.

Upland Recreation Permits. All impacts of exhibition activities on hunting also apply to RGFO upland recreation permits for hunting. Because no hunting seasons would be open during the exhibition, hunting would be less impacted in Alternative 2 than in Alternative 1a, as described above.

4.20.5.3 Demobilization

The impact of demobilization activities on recreation for Alternative 2 would not differ from those in Alternative 1a, except as noted below. A configuration of fewer panels would reduce the extent and intensity of impacts during removal, as described under installation.

As a result of the earlier removal period, Alternative 2 would result in the least overall impact to angling, compared to all action alternatives.

An earlier removal period would result in greater impacts to most recreation uses, aside from angling, compared to Alternative 1a. Removal would begin in July or early August, which overlaps with peak recreation use in the Project Area. As a result, the impacts of removal on all recreation uses would be more significant under Alternative 2 than Alternative 1a.

An added 38,000 visitors would be present in the Project Area during removal. This would result in 13,571 vehicles in the Project Area, which is slightly higher than under Alternative 1a, as noted in Section 4.16 Transportation and Traffic.

4.20.6 Alternative 3

4.20.6.1 Installation

The impact of installation activities on recreation for Alternative 3 would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

Under Alternative 3, only 4.1 total miles of panels would occur at the eight panel locations identified for Alternative 1a. Consequently, visitation during installation would decrease to 33,000 total visitors due to reduced overall interest in the project. This decrease in visitation compared to Alternative 1a would cause a slight reduction in traffic and other visitor impacts. A total of 11,786 vehicles would travel the Project Area during installation, as described in Section 4.16 Transportation and Traffic. Because the difference in the overall effects would be negligible, the impacts of visitor presence during installation and blossoming for all activities would be similar to those described in Alternative 1a.

Wildlife Viewing and Bird Watching. The altered panel configuration would minimize impacts wildlife and birds in the Project Area, particularly bighorn sheep, raptors, migratory birds and bats. As a result, the impacts of installation at panel locations on wildlife presence and distribution would be lower than in Alternative 1a, which would in turn reduce impacts to wildlife viewing and bird watching. See Sections 4.1 Terrestrial Wildlife and Habitat and 4.2 Avian Wildlife and Habitat for more information.

Hunting. The impacts of the altered panel configuration on hunting would be similar to those described for wildlife viewing and bird watching.

Upland Recreation Permits. All impacts of installation activities on hunting also apply to RGFO upland recreation permits for hunting. Because the panel configuration for Alternative 3 would be altered to minimize impacts to wildlife, hunting would be less impacted in Alternative 3 than in Alternative 1a, as described above.

4.20.6.2 Exhibition

The impact of exhibition activities on recreation for Alternative 3 would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

Since only 4.1 total miles of panels would occur at the eight panel locations under Alternative 3, visitation during exhibition would decrease to 320,000 total visitors as a result of reduced overall interest in the project. This decrease in visitation compared to Alternative 1a would cause a slight reduction in traffic and other visitor impacts. A total of 110,345 vehicles would be present in the Project Area, with 11,034 vehicles per day during peak periods. The associated increase in travel time would be 9.7 minutes for westbound travelers and 7.2 minutes for eastbound travelers (See also Section 4.16 Transportation and Traffic). Because the difference in the overall effects would be negligible, the impacts of visitor presence during exhibition for all activities would be similar to those described in Alternative 1a.

The shorter overall mileage of panels could result in reduced impacts to river-based recreation, such as boating, angling and placer mining. The longest panel sections proposed in Alternative 1a, at Texas Creek, Spike Buck and Parkdale would experience the greatest reductions in length in Alternative 3. Since panels would still be present at each of the eight proposed locations, however, the difference in the overall level of impact to river access and recreation experience would likely be negligible. Thus, the impacts of the panel configuration in Alternative 3 on river-based recreation would be similar to those under Alternative 1a, except as noted below.

Since the total mileage of the panels would be shortened in Alternative 3, fewer highway pullouts would fall within 0.5 mile of the panel locations. Therefore, fewer pullouts would be closed to public access during exhibition. This would reduce the impact of pullout closures on all recreation activities, especially boating, angling, and placer mining, as described below.

Boating. Fewer pullout closures along US 50 would increase access for commercial and private boating, compared to Alternative 1a. Some panels would be shorter overall, with additional breaks between panel sections. This could allow for more access to riverbanks for boaters, particularly between Salt Lick and Parkdale, which could increase boater safety compared to Alternative 1a. However, the combined effects of exhibition on boating would still be significant, as described for Alternative 1a.

Angling. Fewer pullout closures along US 50 may increase access for angling, compared to Alternative 1a. Regardless, the overall effects of exhibition on angling would still be significant under Alternative 3.

Wildlife Viewing and Bird Watching. In Alternative 3, the panel configuration would be altered to minimize impacts to wildlife and birds in the Project Area, particularly bighorn sheep, raptors, migratory birds and bats. As a result, the impacts of exhibition at panel locations on wildlife presence and distribution would be lower than in Alternative 1a, which would in turn reduce impacts to wildlife viewing and bird watching (See also Sections 4.1 Terrestrial Wildlife and Habitat and 4.2 Avian Wildlife and Habitat).

Hunting. The impacts of the altered panel configuration for Alternative 3 on hunting would be similar to those described for wildlife viewing and bird watching.

Placer Mining. Fewer pullout closures along US 50 would increase access for placer mining, as described for angling. However, impacts to placer mining during exhibition would still be significant, overall.

Upland Recreation Permits. All impacts of exhibition activities on hunting also apply to RGFO upland recreation permits for hunting. Because the panel configuration for Alternative 3 would be altered to minimize impacts to wildlife, hunting would be less impacted than in Alternative 1a, as described above.

4.20.6.3 Demobilization

The impact of demobilization activities on recreation for Alternative 3 would not differ from those in Alternative 1a, except as noted below.

As a result of the reduced panel configuration and decreased overall interest in the project, visitation during removal would decrease to 33,000 total visitors. This decrease in visitation compared to Alternative 1a would cause a slight reduction in traffic and other visitor impacts. A total of 11,786 vehicles would be present in the Project Area, overall, as noted in Section 4.16 Transportation and Traffic.

Because the difference in overall effects would be negligible, the impacts of visitor presence during removal and restoration for all activities would be similar to those described in Alternative 1a.

Impacts of removal on wildlife viewing and bird watching, as well as hunting, would be the same as those described for installation.

4.20.7 Alternative 4

4.20.7.1 Installation

The impact of installation activities on recreation for Alternative 4 would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

Alternative 4 would include a reduction in overall panel length and elimination of some panel locations. Accordingly, there would be no localized impacts at the Texas Creek, Maytag, Three Rocks, and Spikebuck panel sites during installation. Localized impacts at the Parkdale panel would be reduced to the 0.3-mile segment at the eastern end of the panel site. All localized impacts at the County Line, Tunnel and Vallie Bridge locations would be the same as those described in Alternative 1a.

The extent of installation impacts occurring throughout the Project Area may be reduced, as well. Because all of the panels below Vallie Bridge, except part of the Parkdale panel, would be eliminated, impacts may be more heavily concentrated between Salida and Vallie Bridge during installation. The installation period would be shortened to 14 months for Alternative 4. The reduced duration of installation would produce impacts similar to those described in Alternative 1d. Workforce, lane closures, and other construction needs would also be reduced due to fewer panel locations.

The altered panel configuration in Alternative 4 would cause a substantial decrease in visitation during installation, compared to Alternative 1a. As only 15,000 visitors would be present in the Project Area during installation, including blossoming, the intensity of visitor-related impacts on all recreation activities, including vehicle traffic, would be reduced. A total of 5,357 vehicles would be present in the Project Area during installation.

Boating. The altered panel configuration in Alternative 4 would result in an overall decrease in impacts to boating access and the quality of the experience. The majority of the panels would be located on the stretch of river between Salida and Vallie Bridge, which is primarily managed for angling recreation. As a result of existing boating rations, considerably less boating use typically occurs on this segment of the river. Current rationing measures limit commercial operations to ten boats per day on this segment of river for many days during the peak season. This would allow fewer opportunities for boaters to view the installation and blossoming of the panels. While blossoming would still create a significant added attraction for boaters in the Project Area, overall interest would likely be reduced compared to Alternative 1a.

Due to the added attraction of blossoming for boating, rationing restrictions would likely be violated by commercial operators during this period. The violation of rationing limits could result in a change in the number of rations given to each operator in future years. This impact to operators would potentially be significant, long-term, and limited to the segment of river between Salida and Vallie Bridge.

Angling. The 14-month installation schedule would have increased impacts on angling, compared to Alternative 1a. All installation-related impacts to angling described for Alternative 1a would be intensified under this accelerated schedule, as described for Alternative 1d.

Wildlife Viewing and Bird Watching. The altered panel configuration would reduce overall impacts to wildlife viewing and bird watching. The Canyon Trading Post, Lone Pine, and Five Points AHRA sites are popular locations for wildlife viewing. Alternative 4 would eliminate localized installation impacts to wildlife viewing at these sites. Because less construction and installation activity would occur throughout the Project Area in Alternative 4, impacts to wildlife would be reduced. Overall, this would lead to fewer impacts to wildlife viewing and bird watching, compared to Alternative 1a (See also Sections 4.1 Terrestrial Wildlife and Habitat and 4.2 Avian Wildlife and Habitat).

Camping. In Alternative 4, no localized impacts to camping would occur at Maytag, Five Points, or within the McIntyre Hills WSA during installation. However, activities occurring within the Project Area, but not localized at specific locations, would still impact these campsites, as described in Alternative 1a.

Hiking and Mountain Biking. In Alternative 4, no localized impacts to trail use would occur at Five Points or within the McIntyre Hills WSA. However, activities occurring within the Project Area, but not localized at specific locations, would still impact trails in these areas, as described in Alternative 1a.

Hunting. The altered panel configuration would reduce overall impacts to hunting, as described for wildlife viewing and bird watching. Impacts to wildlife presence and distribution, and therefore hunting access and experience, would be lower under Alternative 4 than Alternative 1a (See Section 4.1 Terrestrial Wildlife and Habitat for more information).

Horseback Riding. Impacts of installation on horseback riding in Alternative 4 would be the same as those described for hiking and mountain biking.

Upland Recreation Permits. All impacts of exhibition activities on hunting also apply to RGFO upland recreation permits for hunting. Because the panel configuration for Alternative 4 would be altered, hunting would be less impacted than in Alternative 1a, as described above.

4.20.7.2 Exhibition

The impact of exhibition activities on recreation for Alternative 4 would not differ from those in Alternative 1a, except as noted below.

a. Impacts Common to All Activities

The Alternative 4 panel configuration would reduce localized impacts at panel locations during exhibition. Since the Texas Creek, Maytag, Three Rocks, and Spike Buck panels would be eliminated in this Alternative, no impacts would be concentrated at these panel sites, and the greatly decreased panel length at Parkdale would reduce localized impacts in this location as well. This would, in turn, reduce impacts to recreation uses at the Texas Creek, Pinnacle Rock, Five Points, Spike Buck and Parkdale AHRA sites and the Maytag and Salt Lick undeveloped recreation sites.

The altered panel configuration in Alternative 4 would cause a substantial decrease in visitation during installation, compared to Alternative 1a. As only 141,000 visitors would be present in the Project Area during exhibition, the intensity of visitor-related impacts on all recreation activities, including vehicle traffic, would be reduced in comparison to Alternative 1a. An estimated 50,000 vehicles would be present in the Project Area, with 5,000 vehicles per day during peak periods. This considerably lower amount of vehicle traffic would result in delays of 8.5 minutes for westbound travelers and 6.5 minutes for eastbound travelers.

Fewer panel locations in the Project Area would reduce the number of US 50 pullouts closed during exhibition. Pullouts closed within 0.5 mile of the Texas Creek, Maytag, Three Rocks, and Spike Buck panel locations under Alternative 1a would not be closed under Alternative 4. Similarly, fewer pullouts would be closed around the smaller Parkdale panel. This would reduce the impacts of pullout closures on all recreational activities, compared to Alternative 1a.

The Parkdale Viewing Center would be eliminated in Alternative 4. This would lessen or remove the related impacts to all recreation activities described in Alternative 1a.

Boating. The altered panel configuration in Alternative 4 would result in an overall decrease in impacts to boating access and the recreation experience. The majority of the panels would be located on the stretch of river between Salida and Vallie Bridge, which is primarily managed for angling recreation. As a result of existing boating rations, considerably less boating use typically occurs on this segment of the river. Current rationing measures limit commercial use to ten boats per day on this segment of river. This would diminish the opportunities for boaters to view the exhibition of the panels. While exhibition would still create a significant added attraction for boaters in the Project Area, overall interest and beneficial impacts to the boating experience would likely be reduced compared to Alternative 1a. Due to the added attraction of exhibition for boating, rationing restrictions or defined carrying capacities would likely be violated by commercial operators during this period. The violation of rationing limits could result in a change in the number of rations given to each operator in future years.

Because 40 fewer informal pullouts along US 50 would be temporarily closed in Alternative 4, more pullouts would be available for boating access, particularly between Vallie Bridge and Parkdale. The Salt Lick undeveloped recreation area would remain open for boating access, as well. This would considerably reduce the intensity of impacts related to pullout closures, compared to Alternative 1a.

Angling. Since no panels would be constructed between Vallie Bridge and Parkdale, aside from the shortened panel at Parkdale, impacts to angling on this segment of the river would be considerably reduced in comparison to Alternative 1a. However, impacts to angling on the Salida-Vallie Bridge segment, where boating use would be heaviest during exhibition, would be intensified compared to those described in Alternative 1a for this segment. Salida-Vallie Bridge is the most heavily used segment of river for angling in the Project Area.

Fewer informal pullouts would be closed between Vallie Bridge and Parkdale in Alternative 4, which would allow for more angler parking and access along US 50 than in Alternative 1a. Overall, impacts to angling would still be significant, short-term, and regional in nature.

Wildlife Viewing and Bird Watching. An altered panel configuration would reduce overall impacts to wildlife viewing and bird watching. The Canyon Trading Post, Lone Pine, and Five Points AHRA sites are popular locations for wildlife viewing. Alternative 4 would eliminate localized exhibition impacts to wildlife viewing at these sites. Because less visitor and project activity would occur throughout the Project Area in Alternative 4, impacts to wildlife would be reduced, as described in Sections 4.1 Terrestrial Wildlife and Habitat and 4.2 Avian Wildlife and Habitat. Overall, this would lead to fewer impacts to wildlife viewing and bird watching, compared to Alternative 1a.

Camping. Because the Texas Creek panel would be removed under Alternative 4, informal pullouts would not be closed near this site. This would eliminate the impact to dispersed camping areas near Texas Creek described in Alternative 1a. No localized exhibition impacts would occur at Maytag, Five Points, or within the McIntyre Hills WSA. However, activities occurring within the Project Area, but not localized at specific sites, would still impact these campsites during exhibition, as described in Alternative 1a.

Hiking and Mountain Biking. No localized impacts to trail use would occur at Five Points or within the McIntyre Hills WSA. However, activities occurring within the Project Area, but not localized at specific locations, would still impact trails in these areas, as described in Alternative 1a.

Hunting. The altered panel configuration would reduce overall impacts to hunting. Impacts to wildlife presence and distribution, and therefore hunting access and experience, would be lower under Alternative 4 than for Alternative 1a (See also Section 4.1 Terrestrial Wildlife and Habitat).

Horseback Riding. Impacts of exhibition on horseback riding in Alternative 4 would be the same as those described for hiking and mountain biking.

4.20.7.3 Demobilization

The impact of demobilization activities for Alternative 4 would not differ from those in Alternative 1a, except as noted below.

Because Alternative 4 would result in a reduction in overall panel length and elimination of some panel locations, there would be no localized impacts at the Texas Creek, Maytag, Three Rocks, and Spikebuck locations during removal. Localized impacts at the Parkdale panel would be reduced to the 0.3-mile segment at the eastern end of the panel site. All localized impacts at the County Line, Tunnel and Vallie Bridge locations would be the same as those described in Alternative 1a.

The extent of removal impacts occurring throughout the Project Area may be reduced, as well. Because all of the panels below Vallie Bridge, except part of the Parkdale panel, would be eliminated, impacts may likely be concentrated between Salida and Vallie Bridge during removal. Workforce, lane closures, and other construction needs would also be reduced as a result of fewer panel locations.

The altered panel configuration in Alternative 4 would cause a substantial decrease in visitation during removal, compared to Alternative 1a. As only 15,000 visitors would be present in the Project Area during removal, the intensity of visitor-related impacts on all recreation activities would likely be reduced in comparison to Alternative 1a. An estimated 5,357 vehicles would be present in the Project Area during removal.

Impacts of Alternative 4 on other recreation activities, including boating, wildlife viewing and bird watching, camping, hiking and mountain biking, hunting, and horseback riding would be similar to those described for installation.

4.21 VISUAL / AESTHETIC RESOURCES

The proposed project (under all action alternatives) would affect the visual setting as follows:

- Temporary and short-term visual resource changes during installation, exhibition, and removal from panel displays and staging areas, and visitor traffic and traffic control activities.
- Long-term and residual effects of the temporary project from construction and deconstruction and compliance with VRM Class II long-term objectives. Restoration of native habitats, specifically riparian and wetland habitats, may continue beyond 5 years.
- The proposed project would be highly visible within the Bighorn Sheep Canyon, especially from US 50 travelers and river users during installation, exhibition, and removals.

Methodology and Assumptions

In accordance with the BLM Visual Resource Management (VRM) system, potential impacts were evaluated through KOPs, Visual Contrast Rating Worksheets (Form 8400-4), data analysis, and literature review for all action alternatives. In October 2009, field reconnaissance with BLM staff, agency scoping, and literature review identified 13 KOPs for each of the panel locations and staging areas. Short and long-term contrast ratings documented the existing landscape character, degree of contrast of the proposed project, measures to mitigate effects, and compliance with management objectives from the KOPs. The difference between the existing visual condition and future visual condition is referred to as the degree of contrast. The contrast ratings considered vegetation, viewer distance, duration of view, visual absorption capacity, and design features. This evaluation was conducted for each alternative from every KOP. Contrast rating worksheets documented the extent of visual effects as none, weak, moderate, or strong, as defined below:

- **None**: No discernable effect, or effect is at the lowest level of detection and causes very little or no disturbance or improvement
- **Weak**: Effect that is slight but detectable, with some perceptible effects of disturbance or improvement.

- **Moderate**: Effect is readily apparent and has measurable effects of disturbance or improvement.
- **Strong**: Effect is readily apparent and has measurable effects of disturbance or improvement that are of local, regional, or global importance.

Impacts from the installation, exhibition, and removal phases are assumed to be short-term (up to 5 years). Some impacts from project demobilization would be long-term, as described under demobilization of each action alternative.

Impacts assume that reclamation and restoration activities are successful in mitigating long-term vegetation, riparian/wetland, noxious weeds, soil, and geology impacts. If reclamation is not successful, then long-term visual resource impacts would remain.

BLM Visual Resource Management and Works of Art

The BLM is "responsible for ensuring that the scenic values of these public lands are considered before allowing uses that may have negative visual impacts" (BLM 2009). The BLM uses VRM classifications to describe the different degrees of modification allowed to the basic elements of the landscape, which are derived from overlaying maps of scenic quality, visual sensitivity levels, and distance zones.

The VRM system is primary designed to evaluate and minimize the impacts of resource extraction (mining, timber harvesting, etc.), infrastructure projects (energy, road development, etc.), and land management activities (recreation, grazing, etc.). Temporary, large-scale environmental works of art do not fit neatly into VRM evaluation for several reasons:

- Whereas resource extraction and infrastructure projects typically avoid areas with high scenic quality, visibility, and/or viewer sensitivity, OTR's location is predicated on the Bighorn Sheep Canyon's scenic characteristics, visibility, and other qualities of the river corridor. "The Artists' Goals and Objectives for the OTR Temporary Work of Art" list specific aesthetic qualities of the Arkansas River necessary to realize the Artists' objectives, such as "vertical and horizontal terrain undulations; interesting geological conditions in both texture and color variations; diversity in slope aspects; [and] diversity in river orientations" (OTR 2008a).
- Whereas VRM seeks to minimize visibility and contrast by modifying project design and location (BLM 2010a), the Artists contend that "together, each element, detail, shape, color, and contrast forms the whole work of art. None of these areas, or sections within areas, may be removed without damaging the integrity, intent, and harmony of the temporary work of art as a whole" (OTR 2008a). Minimizing this effect, as would normally be required per VRM guidance, is not the intent of the OTR project and as such, the utility and applicability of VRM to a temporary work of art is problematic for mitigation purposes.
- Whereas VRM compliance is determined on the basis of the project's contrast against the natural line, form, color, and texture, the Artists intentionally emphasize contrast as a positive aesthetic attribute: "This portion of the Arkansas River has the necessary unique configurations of lighting and landscape conditions that would provide the contrasts in line, form, color, and texture with the luminous fabric panels, which elements are critical to achieving the artists' goals and objectives for OTR." (OTR 2008a). OTR Corp envisions that the natural beauty of the

river is part of the temporary work of art, with translucent fabric panels emphasizing the configuration, color, and texture of the river as it meanders (J.F. Sato 2007).

- Whereas VRM considers sensitivity levels or public reaction to changes in scenic quality in calculating impacts, the intention of OTR includes eliciting public reactions, both negative and positive. To date, public reaction to OTR is highly divergent. A project's visual attractiveness, interpretation, or public acceptance is not a criterion for BLM approval.

Therefore, conclusions regarding the visual impacts of a temporary work of environmental art may be seen as subjective. Indeed, "there is obviously still a subjective dimension to landscape aesthetics. Each viewer brings perceptions formed by individual influences of culture, visual training, familiarity with local geography, [and] personal values" (BLM 1985). For the purposes of this analysis, it is important to recognize that large-scale environmental works of art create visual contrasts in the natural environment to purposefully evoke positive or negative reactions. Inherent to OTR is an advertent attempt to force all viewers to see the landscape differently.

In evaluating OTR, VRM is "used as a guide, tempered by common sense, to ensure that every attempt is made to minimize potential visual impacts" (BLM 2010a).

Aesthetic Response and User Type

As stated above, sensitivity levels are a measure of public concern for the maintenance of scenic quality. "Visual sensitivity will vary with the type of users. Recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change" (BLM 2010a). In this analysis, viewer types were classified into two groups: visitors and area residents.

Visitors are from outside the local area and less familiar with the Analysis Area compared to area residents. Most visitors along US 50 between Cañon City and Salida would see the Analysis Area by private cars. The number of stops and percentage of vehicles stopping within the Project Area increases between May and September when more visitors are using US 50 and stopping at fishing areas, rafting sites, restaurants, shops, and other establishments, as described in Section 4.16, Transportation and Traffic. Visitors may be involved in several recreational activities (scenic driving, boating, hiking, fishing, camping, etc.) as described in Section 4.20 Recreation Resources. As recreationists approach their destination or travel through areas with high visual quality, they have heightened expectations of what they are going to see. Projected visitation would be highest in the one week prior to the exhibition period, during the exhibition period, and during the two weeks immediately following the exhibition period.

Area residents (i.e., local, residential, or commercial traffic viewers) would be more familiar with the Analysis Area and commute to or through the Analysis Area on a regular basis. Commuters' expectations for visual quality and change may differ from that of visitors.

Prior to arriving into the Analysis Area, area residents and visitors would be aware of the project through local, national, and global media as well as traffic devices. Each group, especially visitors who elect to see the project, would likely have somewhat different expectations and reactions to the project, such as curiosity, shock, appreciation, etc.

4.21.1 No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed and visual resources would not be potentially affected by the OTR project.

4.21.2 Alternative 1a

4.21.2.1 Installation

Visual impacts would occur during installation of the project as a result of panel display construction, staging area construction, visitor traffic and traffic control devices, and the 2-year construction duration.

a. Impacts from Panel Displays

The following activities during installation would modify visual resources:

- Anchor drilling and soil disturbance (approximately 9,000 anchors)
- Installation of ATFs, cables, and panels (5.9 miles at 8 sites)
- Presence of work crews and equipment along US 50 and the railroad
- Development of limited rest stops and viewing areas at Texas Creek, Parkdale, Fremont Road, Vallie Bridge, Five Points AHRA Site, and Salida
- Construction of auxiliary lanes and a one-way bridge at Harvey Bridge

Anchor drilling and soil disturbance would result in sequential openings of consistent size and spacing within the panel display areas, when viewed while moving. Anchors would be most visible from US 50 and from watercraft where they are (a) in unvegetated areas such as in solid rock, (b) adjacent to the highway, or (c) below the railroad on steep north slopes. During the anchor drilling phase, visual contrast would result from a minimum of four drilling crews and large drilling units. The movement of machinery and dust, construction lighting, and contrasting colors and forms of equipment would result in moderate contrasts compared to existing visual conditions.

Vegetation clearing, grading, and disturbed vegetation would occur at anchor locations that require foot traffic or overland travel, resulting in new bands of weak to moderate lines, color, and texture compared to existing conditions. Degradation of vegetative habitat and/or riparian areas adjacent to the Arkansas River would be highly visible to river users.

Minor repairs or improvements to the UPRR would require additional equipment and crews that would increase the contrasts described above.

Installation of ATFs, cables, and panels would result in similar contrasts as above, with project visibility and visual contrasts increasing with time, reaching a maximum during the “blossom stage.” As a major modification to the existing character of the landscape, the installed project would dominate the view and be the major focus of viewer attention. These construction activities and associated impacts would be highly visible from US 50, watercraft, and AHRA within 0.5 miles of the panel displays.

b. Impacts from Staging Area Construction

The Parkdale Viewing Center would be highly visible from US 50, the Arkansas River, and passenger rail trains. The site is located at the eastern entrance to Bighorn Sheep Canyon on private land west of the Parkdale Boat Launch AHRA site. As such, the volume and duration of sensitive viewers would be high. The viewing area has low existing scenic quality due to past land uses, site grading, the railroad and rail cars, and dumping, and is adjacent to a 100-acre active mining operation that has impacted the visual quality of the natural landscape. While the majority of the Parkdale Viewing Center and gravel mine are screened from view (through natural and constructed berms), bare soils and mining operations (dust, noise, heavy machinery) are highly visible from US 50 and the AHRA site.

During construction of the Parkdale Viewing Center, a high volume of construction traffic and equipment, site grading of up to 18.0 acres for parking approximately 900 vehicles, installation of portosans, dumpsters, garbage cans, and signage would result in strong contrasts in form, line, color, and texture and short-term effects to visual resources. When seen from US 50 and the Arkansas River, the viewing area would be visible above and behind the panel displays. Site layout and additional facilities to support project construction are not described in detail by OTR Corp. It is anticipated that viewing area construction would be highly visible from viewers on US 50 and passenger rail trains, but not from the Arkansas River or AHRA site viewers due to screening from terrain. Mitigation measure VISUAL-1 (Chapter 5.0) would reduce Parkdale Viewing Center construction effects.

The Texas Creek Limited Rest Stop would be highly visible from CR 27, partially screened on a terrace above US 50, and not visible from Arkansas River views. As such, the volume and duration of sensitive viewers would be moderate. Past land uses on the 56-acre site include agriculture, ranching, and homesteads and – more recently – OHV uses, bounded by the Arkansas River, Texas Creek Gulch, and railroad. Retail commercial uses are located at the Texas Creek Bridge. Despite these uses, the site enjoys high existing scenic quality due in part to its western ranch character and contribution to an enclosed canyon valley viewshed.

During construction of the Texas Creek Limited Rest Stop, a high volume of construction traffic and equipment, site grading of up to 56.0 acres for parking and storage stockpiles, installation of portosans, dumpsters, garbage cans, signage, a 4,000 sf warehouse/office building, and mock panel test area would result in strong contrasts in form, line, color, and texture and short-term effects to visual resources. Site layout and additional facilities to support project construction are not described in detail by OTR Corp. It is anticipated that viewing area construction activities and dust would be highly visible from viewers on US 50 and CR 27, but not from Arkansas River viewers due to screening from terrain. The warehouse and buildings would be visible from US 50 and potentially the Arkansas River, depending on their height and location. Mitigation measure VISUAL-2: Texas Creek Limited Rest Stop and VISUAL-3: Exterior Treatment of Texas Creek Warehouse and other Temporary Buildings (Chapter 5.0) would reduce effects from construction.

The Fremont Road Staging Area would be highly visible at the junction of US 50 and CR 3a. The 10-acre site is located in a tourism retail node surrounded to the west, south, and east with parking and retail buildings. A 5-acre electrical substation lies 0.5 miles to the northeast beyond the site. The character of tourism retail stores is dated and eclectic, with several billboards and abandoned and/or vacant buildings. As such, the volume and duration of sensitive viewers would be moderate. Past land uses on the 10-acre site include retail, parking, and rangeland. Overall, the site has low scenic quality due to adjacent land uses that dominate the foreground along US 50.

During construction of the Fremont Road Staging Area, a high volume of construction traffic and equipment, site grading of up to 10.0 acres for parking approximately 900 cars, installation of portosans, dumpsters, garbage cans, and signage would result in moderate contrasts in form, line, color, and texture and short-term effects to visual resources. Site layout and additional facilities to support project construction are not described in detail by OTR Corp. It is anticipated that viewing area construction activities and dust would be highly visible from viewers on US 50 and CR 3a.

At Five Points AHRA Site and Vallie Bridge Limited Rest Stop, portosans, dumpsters, garbage cans, and signage would be added to existing parking lots, vault toilets, and signage resulting in weak, short-term effects to visual resources.

Lighting to support project construction would be required (nighttime construction is anticipated), but is not described in detail by OTR Corp. The degree of contrast associated with nighttime lighting depends on distance to US 50 and local roads, residential areas, and overnight camping areas; the intensity of specific lighting sources; and the background or ambient level of combined nighttime lighting in the study area. Short-term impacts from the use of exterior lighting for nighttime safety and security during construction may contribute substantially to ambient nighttime lighting conditions. Mitigation measure VISUAL-4 (Chapter 5.0) would reduce lighting contrasts. Given the anticipated duration of construction-related lighting, impacts to nighttime scenic quality would be temporary (i.e., would not permanently alter the nighttime viewshed).

c. Impacts from Visitor Traffic and Traffic Control Activities and Devices

For purposes of this assessment, visitor traffic, traffic control activities, and devices include traffic levels, congestion (slow-moving or stopped traffic) and delays, VMS, the presence of uniformed officers/security personnel, emergency services and response, and other visitor services related to traffic and road use. With exception to auxiliary lanes along US 50 at the Harvey Bridge intersection and upgrades to the Harvey Bridge, there are no planned visitor traffic management activities during the installation phase of the project beyond those that would typically be associated with a construction project under this alternative. These typical construction-like activities include periodic lane closures, VMS at strategic locations, periodic increases in construction vehicle traffic, and security patrols, among others. While these activities may result in periodic, location-specific traffic delays and/or congestion, they are not anticipated to detract significantly from the scenic quality of the Project Area. Harvey Bridge and auxiliary lane construction would result in dust, the presence of construction vehicles, and congestion. Most activities, such as construction traffic and traffic congestion, may be visible to both recreationists and area residents during the installation phase.

For recreationists, the presence of construction traffic and/or traffic congestion installation may detract from their overall experience (see impacts to recreation, Section 4.20). Construction activities would be comparable in duration and intensity to regular highway maintenance projects; in general, potential visual-related recreation experience impacts are not anticipated to be significant for most recreationists given the location-specific and periodic (i.e., temporary) nature of specific activities. Short-term visual impacts would increase as the installation nears completion, especially during the blossoming phase.

For area residents, the introduction of traffic-related installation activities in the Project Area would also likely result in a temporary degradation of scenic quality. Similar to recreationists' visual resource impacts, these potential impacts are anticipated to be location-specific and short-term (2 years). Furthermore, since area residents would be exposed to traffic-related installation activities on a more routine basis, they

are likely to grow accustomed to the level of activity and related visual contrast resulting from these installation actions. This is not to say that traffic-related impacts to visual resources would not occur during the installation phase; rather they would be minimized as area residents become accustomed to the presence of these types of activities on the landscape.

Given the duration of the installation phase (2 years), an anticipated increase in visitor (i.e., people travelling to the Project Area specifically to view the work of art) traffic is not expected until "blossoming" in the final week(s) (see impacts to transportation, Section 4.16). Since there would be no specific traffic management strategies planned during the installation phase, visitor traffic delays and congestion are likely during this final week. Lines of slow-moving or stopped traffic, or crowding on the river may form during this time and would likely result in a moderate to strong change in scenic quality compared to the rest of the installation stage. As the planned work of art is a short-term special event, traffic delays and congestion would be anticipated and expected by viewers. Visitors, who would primarily view the (in progress) work of art by vehicle, would likely be the least sensitive to the visual effects of traffic congestion since they would expect to share the experience with others and views may be enhanced by slower traffic speeds. As with the remainder of the installation period, this potential impact would likely impact recreationists and area residents more than visitors.

Alternative 1a potential visual resource impacts resulting from visitor traffic and traffic control activities and devices would likely be moderate during the installation phase of the project. Anticipated visual resource impacts are expected to be minimal and not significant because traffic and related actions would be periodic and transient (i.e., location-specific depending on the installation activity in process) and the presence of installation/construction vehicles, traffic, and related support facilities would be comparable (and thus typical) to other construction activities along highway corridors. However, during the "blossoming" stage, visual effects may increase from lines of slow-moving or stopped traffic.

d. Summary of Visual Impacts during Installation

The anticipated 2-year timeframe of installation is such that short-term visual impacts would likely occur simultaneously along the US 50 and UPRR corridors, except during the peak summer season (June 1-August 31) on the highway side of the river and during bighorn lambing season (April 15-June 30) on the railroad side of the river. While viewer attitudes towards the completed work of art may be positive or negative during exhibition, viewer attitudes towards ongoing panel display installation, staging area construction, and traffic volumes and control devices over a 2-year installation period would likely be negative. Opportunities for scenic driving and watchable wildlife would likely be reduced. These activities and physical changes would be visible up to 0.5 miles from each of eight panel displays and three staging areas, for a total of approximately 19.0 miles along US 50 or the Arkansas River.

The scale of visual change (5.9 miles in 8 sites) and the project's visibility adjacent to US 50 and the Arkansas River, with a long viewing duration (over 8 minutes for viewers traveling 45.0 mph) within a recreational corridor over a 2-year period, would result short-term, significant visual impacts.

4.21.2.2 Exhibition

Visual impacts would occur during the exhibition of the project resulting from panel displays and traffic and event management activities during a 2-week period.

a. Impacts from Panel Displays

During its 2-week period of display, changes in all of the basic elements (form, line, color, texture) associated with the project would be readily apparent in the characteristic landscape. Alternative 1a would considerably and temporarily transform the characteristic landscape and attract attention at a regional or global scale of importance.

The majority of visitors and area residents would experience the project in motion, either by driving or boating. From US 50, the rhythmic and sequential panel displays would dominate the view and be the major focus of viewer attention. Each of the eight distinct areas provides unique elements that together create a wide contrast in line, form, color, light, and texture, while highlighting the contours of the banks of the river. OTR Corp envisions that the project would appear dramatically different depending on whether it is approached from the western entrance (from Salida, heading east) or the eastern entrance (from Cañon City, heading west), and depending on the time of day and lighting conditions in which the panel displays are viewed (J.F. Sato 2007). Viewers would see the majority of the project driving westbound, which would provide the least obstructed views from the highway or vegetation. Viewers driving eastbound would see less than half of the project (BLM 2009f).

From boats on the Arkansas River, the rhythmic and sequential panel displays would dominate the view and be the major focus of viewer attention. Panel displays would be suspended 8 to 25 feet above the water, depending on the height of the banks. OTR Corp envisions that when "seen from underneath, the translucent fabric will enhance the contrast of the clouds, mountains, and vegetation. These waves of fabric will play off the natural lighting throughout the day, transitioning from shimmering pink in the morning light, to shiny silver in the mid-day sun, to golden as the sun sets" (OTR 2010a). All panel displays, including anchor points and ATFs, where not screened by vegetation, would be visible to boaters.

At the Parkdale Viewing Center and Texas Creek Limited Rest Stop, visitors would be able to walk to and around the panel displays. Potential disturbance from installation of anchor points, cables, and panels would be apparent. Cross-country hiking opportunities are limited within view of the project. However, when viewed from elevated locations (along ridgelines or peaks), the project would appear as light-colored, shimmering bands mirroring the river's configuration.

b. Impacts from Event and Traffic Management

The experiential quality of temporary, large-scale environmental works of art result in special events that attract thousands, if not millions of visitors to an area during a short period of time (Christo and Jeanne-Claude's last project, The Gates, was exhibited in New York City's Central Park for two weeks in February 2005 and attracted over a million visitors). As such, visitors (i.e., viewers) approach the work of art with the anticipation of sharing the experience with others, often in very crowded situations. While large crowds or long lines of slow-moving or stopped traffic would normally constitute an impact per VRM guidance, visitors to temporary works of art may perceive these impacts to be negligible so long as their view of the work of art remains unobstructed.

During the exhibition stage of the project, visitor traffic management, control activities, and devices would include temporary speed reductions (10 mph), project staff and law enforcement stations, tow and vehicle assistance trucks, and a medical helicopter, among others for a 2-week period. Area residents and recreationists would be aware of the project through local, national, and global media as well as traffic devices. Use during this period is expected to be about 344,000 visitors, with peak use occurring on weekend days. Traffic delays and congestion (resulting in long lines of slow-moving or stopped traffic

within the project viewshed) and crowding are expected during the exhibition phase. While traffic delays/congestion and associated traffic control activities and devices may result in strong visual contrasts and significant impacts, they are not anticipated to detract from the visual experience of visitors. The significance of anticipated visual resource impacts is tempered by the short duration of the exhibition phase (2 weeks) and the event nature of the work of art.

In addition to traffic, the presence of uniformed officers, full parking lots, waste management facilities, portosans, and other event management measures associated with the exhibition phase of the project would all strongly detract from the scenic quality of the Project Area. Visual impacts from the Texas Creek Limited Rest Stop, Parkdale Viewing Center, Fremont Road Information Center, and Salida Information Center would be generally similar to effects from installation. Additionally, these event and rest stop locations would have high vehicular and pedestrian crowding. While recreationists and area residents may consider event management activities visual annoyances (during the brief exhibition phase), visitors are unlikely to experience a degradation in the scenic quality of the work of art because of these impacts. Visitors tend to have pre-conceived expectations for special events, which include higher anticipated crowding levels. While high crowding levels may influence a visitor's experience (even if expected), they would not significantly degrade visual quality as long as views of the work of art are not obstructed.

Nighttime lighting to support event management at staging areas and along US 50 would be required, but is not described in detail by OTR Corp. Impacts from the use of exterior lighting for nighttime safety and security during the exhibition phase may contribute substantially to ambient nighttime lighting conditions and views from US 50 and AHRA sites. Mitigation measure VISUAL-4 (Chapter 5.0) would reduce lighting contrasts. Given the anticipated duration of event-related lighting, impacts to nighttime scenic quality would be temporary (i.e., would not permanently alter the nighttime viewshed).

c. Summary of Visual Impacts During Exhibition

Alternative 1a would considerably and temporarily transform the characteristic landscape and attract attention at a regional or global scale of importance. When viewed in motion (from a vehicle or boat), the rhythmic and sequential panel displays would dominate the view and be the major focus of viewer attention.

4.21.2.3 Demobilization

Visual impacts would occur during the demobilization of the project as a result of panel display removal and revegetation activities, staging area breakdown and removal, and visitor traffic and traffic control devices. Except where noted below, all demobilization impacts to visual resources are anticipated to be short-term and completed in the first 3 months after the exhibit (pending weather conditions), except for some staging and revegetation areas that may take longer to recover.

Public awareness of the project, combined with local tourism retailers and interpretive exhibits highlighting the project's legacy, would heighten viewer sensitivity and awareness towards any remaining physical traces. Rafting outfitters and recreational or tourist guides may point out physical traces to viewers. Physical traces of the project may include interpretive exhibits, and restored anchor points and staging areas.

a. Impacts from Removal of Panel Displays

Removal of the work of art would be similar to its installation, though in the opposite order, and would include the following activities that would modify visual resources in the Project Area:

- Removal of panels and above-ground anchors
- Return excavated soil to anchor locations
- Revegetation of disturbed areas with BLM-approved native plant seed mixture
- Presence of work crews and equipment along US 50 and the railroad

During the panel and anchor removal phase, including the return of excavated soil and revegetation of disturbed areas, visual contrast would result from work crews and their associated equipment. The movement of machinery and dust, construction lighting, and contrasting colors and forms of equipment would result in moderate contrasts compared to existing visual conditions. All demobilization activities and associated impacts would be highly visible from US 50, watercraft, and the AHRA within 0.5 miles of the panel locations.

In loose soils for one to two years after restoration, revegetating anchor points would remain as regularly repeating, uniform patches of moderate contrasts in line, color, and texture compared to existing conditions, with soil stabilization measures apparent and/or new vegetation at higher or lower density and texture than adjacent, undisturbed areas depending on restoration success. Weak to moderate contrasts may remain for up to 20 years until revegetating patches with plant density, composition, and size appear similar to adjacent, undisturbed areas. In general, anchor points on looser materials would be effectively restored (per the restoration activities and Design Features described in Chapter 2.0) so that only negligible to weak visual contrasts are apparent beyond 5 years. As such, while revegetating areas may lessen the scenic quality of the Project Area in the near-term, they are not anticipated to pose a long-term (more than 5 years) significant impact to visual resources.

In solid rock, anchor points would appear as uniformly sized patches where the color and texture may contrast with undisturbed rock. Due to the size and regular spacing of disturbed rock faces, restored anchor points in solid rock would potentially be discernable to stationary viewers (e.g., at AHRA sites) and watercraft users within 200 to 500 feet. The visual contrast of physical traces in solid rock would be weak with some perceptible effects of disturbance. Mitigation measure VISUAL-5 (Chapter 5.0) would further reduce the visual contrast of physical traces in solid rock.

b. Impacts from Staging Area De-Construction

During the demobilization phase, all three staging areas (Parkdale, Texas Creek, and Fremont Road) would be dismantled and removed. Similar to the installation of the staging areas, visual contrast would result from work crews, equipment, movement, and dust. All staging area materials would be appropriately recycled or discarded off site. Staging area demobilization activities and associated impacts would be highly visible from US 50, as well as other adjacent areas within 0.5 miles of the staging areas.

Lighting to support removal of the staging areas would be required (nighttime demobilization is anticipated), but is not described in detail by OTR Corp. The degree of contrast associated with nighttime lighting depends on distance to US 50 and local roads, residential areas, and overnight camping areas; the intensity of specific lighting sources; and the background or ambient level of combined nighttime lighting

in the study area. Short-term impacts from the use of exterior lighting for nighttime safety and security during the demobilization phase may contribute substantially to ambient nighttime lighting conditions. Mitigation measure VISUAL-4 (Chapter 5.0) would reduce lighting contrasts. Given the anticipated duration of demobilization-related lighting, impacts to nighttime scenic quality would be temporary (i.e., would not permanently alter the nighttime viewshed).

c. Impacts from Visitor Traffic and Traffic Control Activities and Devices

Under Alternative 1a, potential visual resource impacts resulting from visitor traffic and traffic control activities and devices would likely be minimal during the demobilization phase of the project. Similar to the installation phase, there would be no special traffic management measures during the demobilization phase. As such, anticipated visual resource impacts are expected to be minimal and not significant because traffic and related actions would be periodic and transient (i.e., location-specific depending on the demobilization and restoration activity in process), and the presence of demobilization/construction vehicles, traffic, and related support facilities would be comparable (and thus typical) to other construction activities along highway corridors.

Since traffic would gradually return to normal after the initial demobilization of the project, visual resource impacts from traffic, traffic management activities, and/or associated traffic control devices would be similar to those during the installation phase.

d. Summary of Visual Impacts During Demobilization

Public awareness of the project, combined with local tourism retailers and interpretive exhibits highlighting the project's legacy, would heighten viewer sensitivity and awareness towards any remaining physical traces. Rafting outfitters and recreational or tourist guides may point out physical traces to viewers. Physical traces of the project may include interpretive exhibits, and restored anchor points and staging areas.

The anticipated duration of demobilization activities (about 3 months) is such that short-term visual impacts would likely occur simultaneously along the US 50 and UPRR corridors as a result of the removal of the work of art and subsequent revegetation of disturbed areas, dismantling of the three project staging areas, and traffic/traffic management activities. Viewer attitudes towards ongoing panel removal, staging area construction, and traffic volumes and control devices during the demobilization phase would likely be mixed: visitors may have a positive attitude since they are at the Project Area to view the removal of the project, while some recreationists and area residents may perceive all demobilization activities negatively since they would result in temporary strong visual contrasts. Demobilization activities and physical changes would be visible up to 0.5 miles from each of eight panel displays and three staging areas, for a total of approximately 19.0 miles along US 50 or the Arkansas River. All visual contrasts during the demobilization phases are anticipated to be short-term; only visual contrasts resulting from revegetating areas may last longer. With application of visual resource mitigation measures, there would be no anticipated long-term, significant impacts to visual resources in the Project Area.

Interpretive exhibits along US 50 or at AHRA sites are not proposed by OTR but may be installed by other organizations. Interpretive exhibits (of unknown size and location) are anticipated to result in indirect, long-term beneficial visual effects, as viewers expect interpretation as part of their desired recreational experience within the AHRA.

e. Compliance with Visual Resource Objectives

The project would result in a short-term, major modification of the existing character of the landscape that would dominate the view and be the major focus of viewer attention. It would temporarily transform the characteristic landscape and attract attention at a regional or global scale of importance. Table 4-64 summarizes the degree of change by KOP and compliance with visual resource objectives for each alternative. Short-term mitigation measures described in Chapter 5.0 would reduce the degree of visual impacts from lighting and staging areas at Parkdale and Texas Creek. Where within view of the panel displays and staging areas, VRM Class II objectives would not be met in the short-term as construction nears completion, during the exhibition period, or immediately following during demobilization. VRM Class II objectives would be met in the long-term following demobilization with application of mitigation measures.

The Arkansas Canyonlands ACEC is managed to protect, enhance, and interpret scenic values, among others. Where within view of the panel displays and staging areas, BLM VRM Class II objectives within the Arkansas Canyonlands ACEC would not be met in the short-term. By definition, this would be a significant, short-term visual impact. Class II guidance states that the level of change to the characteristic landscape should be low. The project would not create long-term changes to the landscape that conflict with VRM guidance; most visual effects would vanish after removal of facilities and restoration of disturbed sites.

BLM Visual Resource Management and Works of Art, temporary, large-scale environmental works of art are problematic to evaluate because VRM compliance is determined based on an objective measurement of visual change from existing conditions, rather than on a subjective interpretation of a project's aesthetic meaning, value, and beauty. One purpose of large-scale environmental works of art is to create visual contrasts in the natural environment to purposefully evoke positive or negative reactions. Works of art and the aesthetic experience they elicit are dependent on a viewer's interpretation, preference, and perception, among other factors.

Note: the Fremont County Master Plan is currently being revised. Visual objectives in the December 6, 2009 version have also been considerably revised. Compliance with Fremont County policies would be determined following approval of the revised master plan (anticipated summer 2011).

Table 4-64. VRM Compliance by KOP and Alternative

KOP	OTR Project Component	Location/Heading	VRM Class	Short-Term VRM Class Achieved						Long-Term VRM Class Achieved
				1a	1c	1d	2	3	4	All Alternatives
3	Texas Creek	River-based view downstream toward panels	2	No	No	No	No	No	-	Yes
10	Maytag	US 50 view westbound	2	No	No	No	No	No	-	Yes
11	Maytag	US 50 view eastbound	2	No	No	No	No	No	-	Yes
14	Three Rocks	US 50 view westbound	2	No	No	No	No	Yes	-	Yes
21	Parkdale Staging Area (on private land)	US 50 view westbound + eastbound	2	-	-	-	-	-	-	Yes

KOP	OTR Project Component	Location/Heading	VRM Class	Short-Term VRM Class Achieved						Long-Term VRM Class Achieved
				1a	1c	1d	2	3	4	All Alternatives
22	Parkdale Staging Area (on private land)	Harvey Bridge - downstream + upstream	2	-	-	-	-	-	-	Yes
26	Parkdale	US 50 view westbound + eastbound	2	No	No	No	No	No	-	Yes
27	Spike Buck	US 50 view westbound	2	No	No	No	No	No	-	Yes
29	Vallie Bridge	US 50 view westbound + eastbound	2	No	No	No	No	No	No	Yes
32	County Line	US 50 view westbound	2	No	No	No	-	No	No	Yes
36	Tunnel	CR 45, Riverbank - downstream + upstream	2	No	No	No	-	No	No	Yes
49	Texas Creek Limited Rest Stop	US 50 view westbound + eastbound	2	No	No	No	No	No	No	Yes
51	Fremont Road Staging Area (on private land)	US 50 / Fremont Road	-	-	-	-	-	-	-	Yes

4.21.3 Alternative 1c

The impact of installation, exhibition, and demobilization activities for Alternative 1c would not differ from those in Alternative 1a, except as noted below.

4.21.3.1 Exhibition

The 3-week exhibition period under Alternative 1c is not anticipated to substantially alter the presence and/or magnitude of visual resource impacts from vehicle traffic and event management.

Alternative 1c would remove all commercial boat rations (capacity limits) during the exhibition period. The resulting increase in commercial rafting activity under Alternative 1c is estimated to increase rafting visitors by approximately 5,400. Additional rafting vehicles on US 50, crowding at AHRA boating sites, and lines of boats on the river may have a minor, short-term effect on the visual quality of the setting.

4.21.4 Alternative 1d

The impact of installation, exhibition, and demobilization activities for Alternative 1d would not differ from those in Alternative 1a, except as noted below.

Under Alternative 1d, all installation activities would be compressed into 14 months. This accelerated schedule would reduce the duration of impacts for all installation activities except blossoming. A compressed installation schedule could result in more intensive construction activities in the Project Area.

During installation of Alternative 1d, impacts from traffic, traffic management activities, and traffic control devices on visual resources would be similar to those previously described under Alternative 1a. While the duration of the installation phase is shorter under Alternative 1d (1 year) compared to Alternative 1a (2 years), the majority of visitor use would still occur during the week before the exhibition phase of the project. As such, anticipated visual resource impacts under Alternative 1d would be similar to those described under Alternative 1a, of short duration, and not significant to visitors as well as most recreationists and area residents.

In Alternative 1d, the blossoming of fabric panels would occur during the last week of August or the first week of September. Because the exhibition would occur in September, the timing of installation activities may be altered and the proposed project would receive substantially less visitation compared to Alternative 1a. However, any deviation from the impacts described for Alternative 1a would be inconsequential.

4.21.5 Alternative 2

Alternative 2 varies from the Artists' Proposed Action (Alternative 1a) in that it would include only the Artists' proposed panels located east of Texas Creek, a total of approximately 4.8 miles of panels at five sites in the project corridor. The impact of installation, exhibition, and demobilization activities for Alternative 2 would be similar to those in Alternative 1a, except no activities would occur west of Texas Creek. Fewer panel locations in the Project Area would reduce the extent of impacts for all installation, exhibition, and demobilization activities within the Project Area, with no localized impacts at the County Line, Tunnel, and Vallie Bridge locations. VRM Class II objectives would be met at County Line, Tunnel, and Vallie Bridge locations, but not at the remaining five panel locations. Table 4-65 summarizes the change in visual effects and compliance with visual resource objectives.

4.21.5.1 Installation

Visual impacts would continue to occur east of Texas Creek during installation of the project as a result of panel display construction, staging area construction, visitor traffic and traffic control devices, and the 2-year construction duration. These impacts would be similar to those in Alternative 1a, except the 4.8 miles of panels proposed under Alternative 2 would require fewer steel anchors, ATFs, cables, and fabric panel segments, as described under Chapter 2.0.

4.21.5.2 Exhibition

Visitor traffic, traffic management activities, and traffic control devices may be more concentrated at five sites (compared to eight under alterative 1a); however, this is not anticipated to significantly alter the presence and/or magnitude of visual resource impacts on the work of art. The June/July exhibition period under Alternative 2 (compared to August under Alternative 1a) is also not anticipated to significantly alter the presence and/or magnitude of visual resource impacts.

4.21.5.3 Demobilization

Fewer panel locations would reduce the extent and intensity of impacts during demobilization and restoration, as described above.

4.21.6 Alternative 3

Alternative 3 would eliminate selected panels from each panel location throughout the corridor, resulting in 4.1 miles of panels at eight sites (compared to 5.9 miles at eight sites under Alternative 1a). All other elements of Alternative 3, including installation and removal time frame and techniques, and exhibition period details (viewing areas, traffic management, and transportation) would be the same as described for Alternative 1a. As a result, the impact of installation, exhibition, and demobilization activities for Alternative 1d would be similar to those described for Alternative 1a, except as noted below.

During installation, exhibition, and demobilization, the extent and intensity of fabric panels would be selectively reduced at each of the eight sites. Fewer panel displays within each panel location would reduce the intensity and extent of impacts; however, installation, exhibition, and demobilization activities would still occur at all eight panel locations. A select number of Alternative 1a panel displays would not be visible or have partial visibility from some KOPs under Alternative 3, as shown in Table 4-65. However, traffic management, delays and congestion, and a high volume of rafts would still occur at each panel location. As a result, VRM Class II objectives would not be met in the short-term during the installation process, exhibition period, or immediately following during demobilization. VRM Class II objectives would be met in the long-term following demobilization and restoration.

4.21.7 Alternative 4

Alternative 4 would include a total of 1.4 miles of panels at four sites in the project corridor (compared to 5.9 miles at 8 sites under Alternative 1a). As a result, no localized impacts would occur at the Spike Buck, Three Rocks, Maytag, and Texas Creek panel locations. There would not be any physical changes within the Arkansas Canyonlands ACEC. Under Alternative 4, 0.3 miles of panels, or 10% of the panels proposed under Alternative 1a, would be constructed at Parkdale (compared to 2.5 miles over 3.0 miles of river under Alternative 1a). Impacts at Vallie Bridge, Tunnel, and County Line panel locations would be the same as Alternative 1a.

4.21.7.1 Installation

Fewer panel locations in the Project Area would reduce the extent and intensity of impacts from installing and demobilizing anchor points, ATFs, and cables within the Project Area.

Installation would occur over a 14-month period (compared to 28 months under Alternative 1a). Due to the reduced panel configuration, visual effects from construction workforce, equipment, and highway closures would be reduced.

It is anticipated that this reduction would result in much lower visitation levels during all phases of Alternative 4, including installation. Since visitor traffic, traffic management activities, and traffic control devices would be concentrated in a much smaller area, the geographic scope of impacts to visual resources under Alternative 4 would be correspondingly smaller compared to Alternative 1a. This would help lessen the potential impact of traffic, traffic management activities, and/or traffic control devices under Alternative 4. While the duration of the installation phase would be shorter under Alternative 4,

(1 year) compared to Alternative 1a (2 years), the majority of visitor use would still occur during the week before the exhibition phase of the project. However, and similar to Alternative 1a, potential visual resource impacts from traffic and event management are not anticipated to be significant.

Under Alternative 4, the Texas Creek Limited Rest Stop would not be used as a staging area and would be reduced to a minor visitor station, resulting in less intense and less visible site disturbance. The Parkdale Viewing Center would be eliminated.

4.21.7.2 Exhibition

Fewer panel displays at Parkdale, and elimination of Spike Buck, Three Rocks, Maytag, and Texas Creek panel locations would reduce the intensity and extent of impacts. At Parkdale, only one panel display would be visible or partially visible from KOPs. Impacts at Vallie Bridge, Tunnel, and County Line panel locations would be the same as Alternative 1a.

The reduction in panels is expected to result in a decrease in visitation to the project corridor, and would change viewing patterns and key visitation areas relative to those described under the other alternatives. However, it is not anticipated to significantly alter the presence and/or magnitude of visual resource impacts resulting from traffic, traffic management activities, and/or traffic control devices under this alternative (though it would likely shift some location-specific impacts).

4.21.7.3 Demobilization

VRM Class II objectives would be met at Spike Buck, Three Rocks, Maytag, and Texas Creek locations, but not at the remaining four panel locations. Within view of the panel locations, VRM Class II objectives would not be met in the short-term during the installation phase, exhibition period, or immediately following during demobilization. VRM Class II objectives would be met in the long-term following demobilization and restoration.

4.22 WILD AND SCENIC RIVERS

4.22.1 No Action Alternative

There would be no change to the eligibility, classification level, or suitability of Arkansas River Segments #3 and #4 as a result of the No Action Alternative. This alternative would have no effect on future WSRA reviews or recommendations for designation.

4.22.2 Alternative 1a

4.22.2.1 Installation

a. Free-flowing Characteristics

The installation of Alternative 1a would not result in any impoundments, diversions, straightening, riprapping, or other modification of the waterway. Therefore, there would be no effect on the free-flowing characteristics of Arkansas River Segments #3 and #4 as a result of Alternative 1a.

b. Outstandingly Remarkable Values

Recreational opportunities and experiences may be affected in the short-term as a result of project installation activities. Ultimately, although some minor, short-term impacts to Outstandingly Remarkable Values are expected (recreational and historical values), these values are not expected to be affected in the long-term (see also Section 4.20 Recreation Resources).

Factors beyond the scope of this project limit the potential classification level of these segments to "recreational river area." The installation of Alternative 1a would have no effect on land ownership patterns or road and rail access to the river. The installation of cable anchors would result in both short-term and permanent belowground shoreline development on both segments. If the river corridor and shoreline were otherwise largely primitive or undeveloped, this action could prevent future classification of these segments as "scenic." However, given that current complex land ownership patterns and continuous road and rail access to these segments would remain unchanged as a result of this action, there would be no effect to the classification level for future WSR designation under Alternative 1a.

c. Suitability

The installation of Alternative 1a would have no effect on these segments' suitability for designation. Alternative 1a would not affect the characteristics that make the area a worthy addition to the NWSRS. As previously described, Alternative 1a would have no bearing on the status of land ownership in the area. Alternative 1a would not affect the segments' compatibility with existing and reasonably foreseeable potential uses of the land and related waters. It is assumed that federal, public, state, tribal, local, or other interests in designation or nondesignation of the river, including cost-sharing, would remain unchanged as a result of Alternative 1a. Alternative 1a would have no bearing on the ability of the BLM to manage and/or protect the segments. Lastly, although historical or existing rights are beyond the scope of this project, none of the Alternative 1a activities would injure these rights.

d. Designation

The primary reasons for abandoning a designation recommendation, federal reserve water rights on native flows and prior existing rights, are beyond the scope of this project and would remain unchanged under Alternative 1a. Therefore, with no potential to affect the free-flowing characteristics of the river, short-term effects only on recreational resources (ORVs), limited or negligible effects on historic resources, no effect on potential classification level, and no effect on suitability criteria, Alternative 1a would have no effect on future reviews of the Arkansas River for NWSRS inclusion.

4.22.2.2 Exhibition

The effects of the exhibition period would be similar to those described for the installation period.

4.22.2.3 Removal

The effects of the removal period would be similar to those described for the installation period.

4.22.3 Alternative 1c

For all project phases, the effects of Alternative 1c would be similar to those described for Alternative 1a.

4.22.4 Alternative 1d

For all project phases, the effects of Alternative 1d would be similar to those described for Alternative 1a.

4.22.5 Alternative 2

Given that there would be no panels located in Arkansas River Segment #3 (Salida to Vallie Bridge), there is no potential for effects to free-flowing characteristics, ORVs, suitability, or designation considerations for this segment under Alternative 2.

For all project phases, the effects of Alternative 2 on Arkansas River Segment #4 would be similar to those described for Alternative 1a.

4.22.6 Alternative 3

The effects of Alternative 3 would be similar to those described for Alternative 1a.

4.22.7 Alternative 4

Given that there would be very limited panel installation along Arkansas River Segment #4 (approximately 0.25 miles), there is little or no potential for effect to free-flowing characteristics, ORVs, suitability, or designation considerations for this segment under Alternative 4. The Alternative 4 panel locations on Arkansas River Segment #4 occur in an existing disturbed area of the corridor; existing disturbances in this area include active aggregate hauling, a bridge, and private recreation developments.

For all project phases, the effects of Alternative 4 on Arkansas River Segment #3 would be similar to those described for Alternative 1a.

4.23 WILDERNESS AND SPECIAL MANAGEMENT AREAS

4.23.1 No Action Alternative

The No Action Alternative would not result in any ground disturbance, increased visitation, or other modifications or impacts to wilderness characteristics in the Analysis Area, including the McIntyre Hills WSA. Therefore, this alternative would have no effect on eligibility for future wilderness designation.

Similarly, this alternative would have no effect on the outstandingly remarkable values of the Arkansas Canyonlands ACEC.

4.23.2 Alternative 1a

4.23.2.1 Installation

a. Wilderness

The McIntyre Hills WSA boundary is roughly adjacent to the south side of US 50 in the eastern half of the Analysis Area. All Alternative 1a ground disturbing activities would be located on the north side of US 50, outside of the WSA boundary. Therefore, there would be no direct effects to lands within the WSA and

there would be no potential to impair the WSA's suitability for future designation per the BLM's "nonimpairment standard" (FLMPA, Section 603(c)).

Although WSA access is highly constrained by the surrounding patchwork of private lands, limited road and trail access, and rugged terrain, the WSA may experience some increased visitation during the installation period as a function of increased interest in the project area, in general. Overall, however, the increase in visitation to the WSA is anticipated to be negligible. Therefore, this additional WSA visitation would have no effect on opportunities for solitude and unconfined, primitive recreational experiences or other wilderness characteristics.

The WSA also follows a specific set of management objectives, as set forth by the 1996 Royal Gorge Field Office RMP for Sub-Region 1. Management objectives proposed activities in WSAs must (1) be temporary, (2) not cause any substantially noticeable impact following reclamation, and (3) not impair the suitability of the WSA for wilderness designation (BLM 1993). Alternative 1a conforms to these parameters and would not conflict with management objectives for the WSA.

b. Special Management Areas

As stated in Chapter 3.0, the ACEC is managed to protect, enhance, and interpret scenic, historic, and archaeological values, including habitat for the endangered Brandegi Wild buckwheat, Bighorn sheep, peregrine falcons, and other raptors. While there would be no physical change in the land use found within the ACEC, the installation phase of the proposed project would result in impacts to cultural, recreational, and biological resources, and therefore impacts to the land management objectives set forth for the area. A detailed discussion of those impacts can be found in Sections 4.1, 4.20, 4.21 and 4.25.

The Arkansas Canyonlands ACEC would be directly affected by ground disturbing activities, the installation and presence of aboveground elements, and increased human activity for the duration of the installation period. Specific effects, such as potential disturbances to bighorn sheep, scenic values, or other defining ACEC characteristics, are described in detail in other resource impact analyses located throughout this chapter.

Overall, each of these defining ACEC values would be affected in the short-term. The degree of impact varies by resource. For example, as stated in Section 4.21, scenic values or visual resources would be affected in the short-term by major modifications to the characteristic landscape. However, following the demobilization and restoration efforts, no long-term visual effects are anticipated.

4.23.2.2 Exhibition

a. Wilderness

All Alternative 1a exhibition period activities would be located on the north side of US 50, outside of the WSA boundary. As previously described, under normal conditions, access to the WSA is highly constrained by ownership patterns, limited road and trail access, and rugged terrain. During the exhibition period, access to the WSA would be increasingly constrained by restrictions on pedestrian use and parking along US 50. These restrictions would constrain, but not prohibit, access to the WSA from the north during the exhibition period.

The WSA may experience some increased visitation during the exhibition period as a function of increased interest in the project area, in general. Overall, however, the increase in visitation to the WSA is

anticipated to be minor and temporary. This additional WSA visitation would have minor, short-term effects on opportunities for solitude during the exhibition period. The increased visitation would have no effect on unconfined, primitive recreational experiences or other wilderness characteristics.

b. Special Management Areas

The Arkansas Canyonlands ACEC would be directly affected during the viewing period. Specific effects, such as potential disturbances to bighorn sheep, scenic values, or other defining ACEC characteristics, are described in detail in other resource impact analyses located throughout this chapter. Each of these defining ACEC values would be affected in the short-term by the influx of visitors and traffic; the intensity of short-term impacts to the ACEC's defining characteristics varies by resource value. Long-term effects would generally be limited to wildlife resources, as described in Section 4.1.

4.23.2.3 Removal

a. Wilderness

All Alternative 1a removal activities would be located on the north side of US 50, outside of the WSA boundary. Therefore, there would be no direct effects to lands within the WSA and there would be no potential to impair the WSA's suitability for future designation per the BLM's "nonimpairment standard" (FLMPA, Section 603(c)).

Similar to the Alternative 1a installation period, the WSA may experience some increased visitation during the installation period as a function of increased interest in the project area, in general. Overall, however, the increase in visitation to the WSA is anticipated to be negligible. Therefore, this additional WSA visitation would have no effect on opportunities for solitude and unconfined, primitive recreational experiences or other wilderness characteristics.

b. Special Management Areas

The Arkansas Canyonlands ACEC would be directly affected during the removal period. Specific effects, such as potential disturbances to bighorn sheep, scenic values, or other defining ACEC characteristics, would be similar to those described for the installation period. Although scenic values would be affected by removal activities, there would be no long-term effects to scenery within the ACEC.

4.23.3 Alternative 1c

For wilderness and special management areas and for all project phases, the effects of Alternative 1c would be similar to those described for Alternative 1a. The modification of boat rations and extended viewing period would have no bearing on the potential for impacts to the ACEC's defining characteristics.

4.23.4 Alternative 1d

For wilderness and special management areas and for all project phases, the effects of Alternative 1d would be similar to those described for Alternative 1a. The modification of boat rations and the later viewing period would have no bearing on the potential for impacts to the ACEC's defining characteristics.

4.23.5 Alternative 2

The reduction in panel configuration occurs outside of the ACEC boundaries. For wilderness and special management areas and for all project phases, the effects of Alternative 2 would be the same as those described for Alternative 1a.

4.23.6 Alternative 3

For wilderness and special management areas and for all project phases, the effects of Alternative 3 would be similar to those described for Alternative 1a. Modifications to the Artists' proposed panel locations have been incorporated to allow for enhanced bighorn sheep access to watering areas. Therefore, overall, this alternative would have slightly less impact on bighorn sheep populations, a defining characteristic of the ACEC, as described in Section 4.1.

4.23.7 Alternative 4

a. Wilderness

Under Alternative 4, the majority of panel viewing opportunities occur west of Texas Creek and are not adjacent to the McIntyre Hills WSA. It is anticipated that, unlike Alternative 1a, visitation to the WSA would not experience any measurable increase during the exhibition period. Therefore, there would be no effects on opportunities for solitude during the exhibition period. The increased visitation would have no effect on unconfined, primitive recreational experiences or other wilderness characteristics.

b. Special Management Areas

Under Alternative 4, all event activities would occur outside of the ACEC boundary; therefore, there would be no direct effects to ACEC resources or defining characteristics. The potential for long-term impacts to the ACEC as a result of the project are extremely remote and limited to indirect impacts such as increased recreational use and human presence in the ACEC by OTR visitors traveling through the corridor.
The wildlife resources for which the ACEC was originally designated (i.e., bighorn sheep, peregrine falcons, fisheries) are not confined to the ACEC. These resources may experience effects or be affected by activities occurring outside of the ACEC boundary; however, no direct effects to habitat, watering areas, breeding grounds, or refugia areas would occur within the ACEC boundary.

4.24 SOUND RESOURCES AND NOISE

Noise Measurements

Background noise levels and those from drilling operations associated with proposed anchor installation for the temporary work of art were measured during anchor testing on June 24, 2006. The test was located in the Parkdale Area along the Arkansas River. (J.F. Sato 2007)

Noise Measurement Specimens and Locations

There were five primary measurement groups, which included KLEMM KR802 drilling vertically into the ground, Bobcat TEI drilling vertically into the ground, Bobcat TEI drilling horizontally into a boulder;

background levels without drill noise along US50, riverbank with calm waters, and riverbank with rapids; and gravel pit noise.

Background measurements were made to represent three typical scenarios near the river. The first background measurement was along US 50 about 25 feet from the edge of pavement. Traffic during these measurements equated to about 360 vehicles per hour of which about 5% were heavy trucks. The second background measurement was taken near the riverbank with calm running waters and included some influence from vehicles along US 50. The third background measurement was again near the riverbank, but with rapidly flowing water over rocks.

Gravel pit noise measurements were made at two locations (south and east) at or near the property line. It is unknown what equipment was operating at the time of these measurements. Typically, a gravel pit would include one or two loaders along with various conveyor belts, a rock crusher, haul trucks, and possibly large generators and fans.

Noise Measurement Results

A comparison of the overall noise level of a vertical drilling operation between the KLEMM KR802 and TEI indicates that there is very little difference between the types of drills proposed to be used to install anchors. The TEI drill is louder in the lower frequencies (100-500 Hz) and the KLEMM drill is louder in the higher frequencies (500-2000 Hz). The KLEMM drill has higher noise levels at frequencies in the range of ordinary speech.

A comparison of the noise levels when using the TEI drill to drill vertically into the ground and drill horizontally into a boulder indicates that the horizontal drilling operation is typically 5-10 dB(A) louder than the vertical drilling.

The noise study indicates that the typical background noise levels along the river are much lower than that from drilling; however, US 50 traffic noise is comparable to drilling noise of 75-85 dB(A). Drilling would be easily heard by people passing near the drill operation along the highway with levels 10-20 dB(A) louder than the measured background levels. Overall, the drill noise would be very audible along the river within about 300 feet of the drilling operation, and would be regarded as loud by rafters and fishermen on the river. Noise levels measured at 1,100 feet downwind of the drilling operation were slightly audible, but the drill noise levels were 0-10 dB(A) lower than the background levels. (J.F. Sato 2007).

Gravel pit noise levels were measured at the property line, which were around 47-48 dB(A) on the south and west sides. It is unknown if the pit was in full operation, though some activity was audible. This particular pit has large berms, 10 to 20 feet tall, around the pit, which helped reduce the noise levels.

Table 4-65 provides the noise limits set by Colorado State law for various zones:

Table 4-65. Noise Limits set by Colorado Revised Statute 25-12-103

Zone	Daytime 7:00 am to 7:00 pm	Nighttime 7:00 pm to 7:00 am
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

Source: http://www.michie.com/colorado/lpext.dll?f=templates&fn=main-h.htm&cp
Accessed 12/28/2009.

4.24.1 No Action Alternative

4.24.1.1 Installation

Under the No Action Alternative, no temporary work of art for public viewing would be installed and no associated impacts are anticipated. Existing noise sources would continue to occur.

4.24.2 Alternative 1a

There would be localized and temporary noise impacts during the three phases of activity: installation, viewing, and removal.

4.24.2.1 Installation

Heavy equipment, including flatbed trucks, flatbed rail cars, drill rigs, and a crane, would be used to install anchors, cables, and fabric panels.

Installation activities would have localized noise impacts on residents and recreation users near and within OTR areas. Because of the proximity of the Parkdale Area to Parkdale Siding, this small enclave would be most affected by installation activities. The other OTR areas are in areas significantly outside community areas. A map layer for residential buildings (rural housing footprints) was obtained from BLM. These building footprints were mapped for areas within 1,500 feet of the panel areas to account for the estimated audible construction noise within 1,000 feet of the noise source. Four residential footprints are located within 1,500 feet of the panels northwest of the Vallie Bridge Area along the southern river valley.

Other residential footprints are shown east of the Vallie Bridge Area within a northern river terrace area at a distance greater than 1,500 feet from the panels. Two residential footprints are located within 1,500 feet of the fabric panels east of the Parkdale Area along the southern river valley. Other residential footprints are shown farther south of these footprints at a distance greater than 1,500 feet from the fabric panels. Since the train track would be used for installation activities, there would be some noise from the small train engine that would be used to transport project materials and equipment. Train noise is expected to be intermittent and temporary, and would not affect any specific area for a prolonged period.

The training and CSA near Texas Creek would be the hub of activity during all phases. As such, this area would be affected by additional traffic, people, and equipment noise from activities associated with OTR. These activities would generate noise levels above the background and may be objectionable to area residents or recreational users near Texas Creek, but would likely be less than the noise from drilling and other construction noise.

Colorado law specifies that noise levels in industrial areas are limited to 80 dB(A) during the hours 7:00 am to next 7:00 pm, and 75 dB(A) during the hours 7:00 pm to the next 7:00 am. The law provides for construction projects to exceed maximum permissible noise levels specified for industrial zones ***for the period within which construction is to be completed pursuant to any applicable construction permit issued by proper authority or, if no time limitation is imposed, for a reasonable period of time for completion of project.*** (CRS 25-12-103)

4.24.2.2 Exhibition

The exhibition would take place over a 2-week period. This period would involve a temporary increase in traffic. Decreased speeds are generally associated with decreased highway noise. Because of the increased traffic as well as vehicles slowing to view the work of art, it is expected that traffic speeds would generally be decreased and as a result, highway noise would also be lower than normally occurs in the corridor. If semi-truck traffic were to divert to alternate routes during the viewing period, there would be a decrease in highway noise from trucks. Because viewing requires natural lighting, sight-seeing traffic would be concentrated in daylight hours.

Studies have shown that changes in noise levels of 3 dB(A) or less are not normally detectable by the average human ear. An increase of 5 dB(A) is generally readily noticeable by most people, and a 10 dB(A) increase is usually felt to be “twice as loud” as before. During the viewing period, traffic is expected to temporarily increase (during the 2-week viewing period) by 120% during the weekday and by 155% during the weekend. Applying the FHA traffic noise model in a screening mode (look-up tables), it is estimated that increasing traffic from 600 vehicles per hour to 1,800 vehicles per hour (peak viewing hour) would change the noise level A-weighted Hourly Equivalent Sound Level at 100 feet from the highway centerline from 61.2-64.4 dB(A), an increase of 3.2 dB(A). This increase would be just above the detectable change by the average human, but would be well below a level readily noticeable by most people.

4.24.2.3 Demobilization

Heavy equipment, including flatbed trucks, a flatbed rail car, and support vehicles, would be used to remove the panels immediately following the viewing period. Cables would be removed soon after panel removal using flatbed trucks, a rail vehicle, winches, line guns, and rafts or boats. Within 2-3 months of the end of the viewing period, the anchors would be removed using flatbed trucks, a flatbed rail car, and three drill rigs. Project removal activities would have localized noise impacts on residences, enclaves, and communities near and within project segments. Because of the proximity of the Parkdale Area to Parkdale Siding, this small enclave would be most affected by removal activities. The other Project Areas are in areas significantly outside community areas. Train noise is expected to be intermittent and temporary, and would not affect any specific area for a prolonged period.

4.24.3 Alternative 1c

4.24.3.1 Installation

Impacts would be about the same as Alternative 1a.

4.24.3.2 Exhibition

Assuming that the total number of visitors would increase but would visit over a longer period of time, noise impacts from traffic could potentially be less than under Alternative 1a.

4.24.3.3 Demobilization

Noise impacts from demobilization would be about the same as Alternative 1a.

4.24.4 Alternative 1d

4.24.4.1 Installation

Impacts would be about the same as Alternative 1a.

4.24.4.2 Exhibition

Impacts would be less than or about the same as Alternative 1a, assuming that there would be fewer visitors over the same period of time.

4.24.4.3 Demobilization

Noise impacts would be the same as Alternative 1a.

4.24.5 Alternative 2

4.24.5.1 Installation

Impacts during installation would be less than Alternative 1a. Alternative 2 would require less construction and would reduce related noise impacts during installation.

4.24.5.2 Exhibition

Viewing impacts would potentially be about the same as or slightly higher under this alternative, assuming that there would be more visitors.

4.24.5.3 Demobilization

Noise impacts under Alternative 2 would be less than impacts under Alternative 1a.

4.24.6 Alternative 3

4.24.6.1 Installation

Impacts during installation would be less than Alternative 1a. Alternative 3 would require less construction and would reduce related noise impacts during installation.

4.24.6.2 Exhibition

Viewing impacts would be less under this alternative, assuming that there would be about 20,000 fewer visitors.

4.24.6.3 Demobilization

Noise impacts under Alternative 3 would be less than impacts under Alternative 1a.

4.24.7 Alternative 4

4.24.7.1 Installation

Alternative 4 would require less construction than Alternative 1a, and would reduce total construction related noise impacts.

4.24.7.2 Exhibition

Impacts would be less under this alternative since there would be about 200,000 fewer visitors.

4.24.7.3 Demobilization

Noise impacts under Alternative 4 would be less than impacts under Alternative 1a.

4.25 CULTURAL, HISTORIC, AND PALEONTOLOGICAL RESOURCES AND NATIVE AMERICAN CULTURAL CONCERNS

In this section, the term "historic property" is used to designate prehistoric or historic era cultural resources that are considered eligible for inclusion on the NRHP. Cultural resources that need data in order to facilitate an NRHP eligibility determination receive the same protection as eligible sites and are considered to be historic properties.

Because Native American consultation has not yet been completed, tribal concerns have not yet been identified. However, BLM will work with tribal representatives to identify impacts and mitigation measures that address impacts, pursuant to NHPA and other relevant historic preservation laws and regulations, along with the American Indian Religious Freedom Act and Executive Order 13007 (entitled "Indian Sacred Sites").

4.25.1 No Action Alternative

No cultural resources will be impacted in the No Action Alternative.

4.25.2 Alternative 1a

4.25.2.1 Installation

As with all of the alternatives described below, there are 17 historic properties within or intersecting the APE that would be directly or indirectly impacted by general use during the installation phase. Of the 17 historic properties, 4 would be directly impacted and 10 would be indirectly impacted by anchor drilling. In this context, indirect impact refers to the potential for disturbance of sites that are visible and in proximity to installation activities.

Disturbance areas associated with anchor drilling and ATF installation would directly impact 5 historic properties and indirectly impact 10 historic properties. Six historic properties would be directly impacted and 10 would be indirectly impacted by access routes to anchor and ATF locations. One historic property within a visitor information center would be indirectly impacted during construction. Contributing portions of one historic property would need to be avoided so there are no adverse impacts from staging area/visitor information center construction and use. Twelve segments of historic highway and 12

segments of historic railroad are NRHP-eligible and would be used during construction, but no adverse impacts are anticipated.

4.25.2.2 Exhibition

During the exhibition phase, 10 historic properties within or partially within the APE would be indirectly impacted by general use. Twelve segments each of a historic highway and a railroad are NRHP-eligible and would be used during the exhibition phase; however, no adverse impacts are anticipated. One historic property within a visitor information center would be indirectly impacted during this phase of the project. Avoidance of contributing portions of one historic property is necessary to ensure that there are no adverse impacts from staging area/visitor information center use.

4.25.2.3 Demobilization

Activities during demobilization are effectively a reversal of the installation and would result in the same impacts to historic properties described above for the installation phase.

4.25.3 Alternative 1c

All of the impacts to cultural resources during the installation, exhibition, and demobilization phases of the project described under Alternative 1a apply to Alternative 1c.

4.25.4 Alternative 1d

The impacts to cultural resources during all phases of the project are the same as Alternative 1a in Alternative 1d.

4.25.5 Alternative 2

4.25.5.1 Installation

As with Alternatives 1a through 1c, 17 historic properties would be directly or indirectly impacted by general use during the installation period. Anchor drilling and access routes to anchor points would directly impact one historic property and indirectly impact 10 historic properties. Disturbance areas associated with anchor drilling and ATF installation would cause direct impacts to 2 historic properties and indirect impacts to 10. One historic property within a visitor information center would be indirectly impacted during construction, and contributing portions of one historic property will need to be avoided so that no adverse impacts occur from staging area/visitor information center construction and use. Twelve segments of historic highway and 9 segments of the historic railroad are NRHP-eligible and slated for use during construction, although no adverse impacts are anticipated.

4.25.5.2 Exhibition

Impacts to historic properties during the exhibition phase are the same for all proposed alternatives. See the description of impacts under Alternative 1a.

4.25.5.3 Demobilization

Activities during demobilization are effectively a reversal of the installation, and would result in the same impacts to historic properties described above for the installation phase.

4.25.6 Alternative 3

4.25.6.1 Installation

Identical to the other alternatives, 17 historic properties within or intersecting the APE would be directly or indirectly impacted by general use during the installation phase. Two historic properties would be directly impacted and 10 indirectly impacted by anchor drilling, while 3 historic properties would experience direct impacts and 10 historic properties would experience indirect impacts related to disturbance areas associated with anchor drilling and ATF installation. Access routes to anchor and ATF locations would directly impact 4 historic properties and indirectly impact 10 historic properties. As with the alternatives described above, one historic property within a visitor information center would be indirectly impacted during construction, and contributing portions of one historic property will have to be avoided so that no adverse impacts occur from construction and use of a staging area/visitor information center. Exactly like Alternatives 1a, 1b, and 1c, 12 segments each of historic highway and railroad that are NRHP-eligible would be used during construction; however, no adverse impacts are anticipated.

4.25.6.2 Exhibition

Impacts to historic properties during the exhibition phase are the same for all proposed alternatives. See the description of impacts under Alternative 1a.

4.25.6.3 Demobilization

Activities during demobilization are effectively a reversal of the installation, and would result in the same impacts to historic properties described above for the installation phase.

4.25.7 Alternative 4

4.25.7.1 Installation

With Alternative 4, 17 historic properties would be directly or indirectly impacted by general use during the installation phase. Three historic properties would be directly impacted and 10 would be indirectly impacted by anchor drilling. Anchor drilling and ATF installation would cause direct impacts to 4 historic properties and indirect impacts to 10. Six historic properties would be directly impacted and 10 would be indirectly impacted by access routes to anchor and ATF locations. Contributing portions of one historic property must be avoided so that no adverse impacts occur from staging area/visitor information center construction and use. Twelve segments of historic highway and 12 segments of historic railroad that are NRHP-eligible would be used, but no adverse impacts are anticipated.

4.25.7.2 Exhibition

Impacts to historic properties during the exhibition phase are the same for all proposed alternatives. See the description of impacts under Alternative 1a.

4.25.7.3 Demobilization

Activities during demobilization are effectively a reversal of the installation and would result in the same impacts to historic properties described above for the installation phase.

4.25.8 Paleontological Resources

Paleontological resources defined for this impact analysis mean any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth.

4.25.8.1 No Action Alternative

None of the proposed activities would occur under the No Action Alternative. Therefore, adverse impacts to paleontological resources would occur as the result of ongoing geological processes and disturbance through unauthorized collecting to accessible outcrops. The discovery of potential fossil resources through the implementation of the proposed project would not occur.

4.25.8.2 Alternatives 1a-1d

Potentially at risk fossil resources may be present at the County Line, Tunnel, Vallie Bridge, eastern portions of the Parkdale section, Parkdale Viewing Center, and the Fremont Road Information Center. Fossil resources would not be expected to occur at the Texas Creek, Maytag, Three Rocks, and Spike Buck sections, and the Texas Creek Staging Area and Limited Rest Stop.

a. Installation

Potential impacts to fossil localities during installation would be both direct and indirect. Direct impacts to or destruction of fossils would occur from installation activities conducted on formation with high potential for important scientific fossil resources. Indirect impacts during installation would involve damage or loss of fossil resources due to the unauthorized collection of scientifically important fossils by construction workers or the public due to increased access to fossil localities along the ROW. Adverse impacts to important fossil resources would be long-term and significant since fossils removed or destroyed would be lost to science. Adverse significant impacts to paleontological resources can be reduced to a negligible level through mitigation of ground disturbing activities. It is possible that the proposed project would have the beneficial impact that ground disturbance activities might result in the discovery of important fossil resources.

b. Exhibition

No direct impacts to fossil resources are expected during the exhibition period. Short-term, indirect effects may occur because of increased access.

c. Demobilization

Removal of project elements would not have direct impacts to fossil resources. Short-term, indirect effects may occur because of increased access.

4.25.8.3 Alternative 2

Potential fossil resources in Alternative 2 would be at the Parkdale section, the Parkdale Viewing Center, and Fremont Road Information Center. The potential impacts at these locations would be the same as described for Alternatives 1a-1d.

4.25.8.4 Alternative 3

Potential fossil resources in Alternative 3 would be at the Tunnel and Parkdale sections, the Parkdale Viewing Center, and Fremont Road Information Center. The potential impacts at these locations would be the same as described for Alternatives 1a-1d.

4.25.8.5 Alternative 4

Potential fossil resources at risk in Alternative 4 would be at the County Line, Tunnel and Parkdale sections, and Fremont Road Information Center. The potential impacts at these locations would be the same as described for Alternatives 1a-1d.

4.26 CUMULATIVE EFFECTS

BIOLOGICAL RESOURCES

4.26.1 Terrestrial Wildlife and Habitat

For most terrestrial species, all action alternatives are expected to result in minor to moderate short-term effects. There are no readily identifiable or reasonably foreseeable actions that would result in major cumulative effects resulting from the project. Cumulative effects, if any, would be minor for most species.

Bighorn sheep are a possible exception to this conclusion. Although herds in the Project Area have reached a stable population over the past 5-10 years (George, et al. 2009), lamb survival rates are below desired levels in several herd components within the Arkansas River Canyon due to disease (CDOW comment, 2010). This trend, when combined with the significant impacts of most project alternatives, may result in significant cumulative effects on bighorn sheep mortality and population levels within the Arkansas River Canyon.

4.26.2 Avian Wildlife and Habitat

For most avian species, all action alternatives are expected to result in moderate short-term effects. There are no readily identifiable or reasonably foreseeable actions that would result in major cumulative effects resulting from the project. Cumulative effects, if any, would be minor for most species.

4.26.3 Aquatic Wildlife and Habitat

With implementation of project design features and BLM BMPs, all action alternatives would result in minor impacts on aquatic species and their habitat from surface disturbance, noise, human presence, and fuel spill risks. Therefore, these alternatives would not be expected to contribute incremental effects to other past, present, and reasonably foreseeable actions within the Arkansas River corridor between Cañon City and Salida.

Potential damage or removal of riparian vegetation for all of the action alternatives could result in long-term impacts on overhanging cover for fish. However, it should be clarified that this type of cover in the form of riparian vegetation is generally limited, except for the Parkdale, Three Rocks, and County Line areas. This impact could combine with other cumulative actions along this portion of the Arkansas River that have or could reduce riparian vegetation cover. These actions would include wildfire, human activity

along accessible portions of the river from fishing or hiking, and natural conditions such as drought or animal foraging.

The potential effect of runoff from the panels during a major precipitation event could alter aquatic habitat at some of the panel sites. The affected areas would vary depending on the location of panels under Alternatives 1a-1d, 2, 3, and 4. There is a higher risk associated with those alternatives involving larger panel lengths under Alternatives 1a-1d and 2. If this type of impact occurred from one of the action alternatives, it could combine with other cumulative actions that could possibly alter aquatic habitat. These actions include other natural precipitation events or instream activities related to future permitting efforts for new or modified structures near the river.

4.26.4 Wetlands, Floodplains, and Riparian Habitat

The proposed project would likely only have a minor temporary impact to wetlands, floodplains, and riparian habitat. The restoration and implementation of project design features would return both wetland and riparian communities to pre-project conditions in the near-term. The cumulative effects study area for wetlands, floodplains, and riparian habitat would extend from Salida to Cañon City. Cumulative effects to the floodplain are likely to result from future development and infrastructure improvements that may encroach on the floodplain cross-section along the Arkansas River. Although no specific development plans are cited, increased population and popularity of the area are likely to increase demand for roads and development. However, upstream detention to slow runoff would likely mitigate these effects.

Rivers with managed flows, where water can be released throughout the year or releases can be extended or shortened depending upon water demand, change the natural conditions during the reproductive phase of these water dependent species. Controlled flows affect the composition, reproductive success, and survival of some of the riparian vegetation along the river. Riparian species that normally have the greatest successful germination and survival during higher flood years, and less chance of scour during consecutive years before establishing, may have more limited success when flows fluctuate less often from controlled flows. Naturally occurring flood/scour regimes are moderated to be less severe and water is controlled so releases minimize flooding, accommodate downstream irrigation needs, and maintain river recreation. Regulated flows prevent years of extreme high water that would germinate woody riparian species higher up the banks, and reduce the chance that it would be scoured out the following year. Effects of managed river flows might not be immediately evident through the narrow rocky gorge of the Project Area, but downstream effects may include changes to riparian plant community composition, structure, and successional stage (Johnson 1999).

With implementation of the restoration and other project design features, the proposed project is not likely to significantly add to the cumulative effect from past, present, and reasonably foreseeable actions.

4.26.5 Vegetation and Plant Communities

The installation, exhibition, and demobilization of the project are expected to have a temporary impact to vegetation. Once restoration efforts are completed, no long-term impacts to vegetation are expected. Cumulative impacts to vegetation by past, present, and reasonably foreseeable projects and uses result from surface disturbance associated with mining, fire, grazing, agriculture, roads, management practices, recreation, development, climate change, and weed invasion within the Analysis Area.

Climate change is producing trends of more frequent and severe droughts and higher average temperatures in North America, as well as changes in the timing of growth stages (i.e., phenological changes), especially the earlier onset of spring events, migration, and lengthening of the growing season (IPCC 2007). Drought and other stressors can stress trees and lead to outbreaks or severe infestations by beetles and other pathogens that can cause forestwide mortality of tree species (Reed 2010).

The native piñon juniper community, which is the dominant community in the area, is highly adapted to periodic fires, mostly resulting from lightening strikes. Historic fire suppression has changed fuel loads, fire frequency, size, and severity. Higher use by people is likely to increase the opportunity for fire ignition sources, and increased development would likely result in more strict guidelines in fire suppression when structures and lives are threatened. Other fuels treatment and fire management methods and policies would likely be adapted to accommodate these changing considerations.

Areas with higher use often end in compacted soils that limit water infiltration, seed germination, and root development, often limiting the development of plants and stunting growth. In addition, compacted soils create more direct runoff, which can create erosion both sheeting and concentrated flows that deplete topsoil and subsoil for plants. In addition, soil disturbance can adversely affect biological soil crust consisting of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria (Belnap, et al. 2001). Once disturbed, biological soil crusts can take years or decades to recover, exposing the soil below to surficial erosion. Soil disturbance and compaction can occur as a result from vehicles, pedestrians, grazing, development, etc.

Continued development in the area would reduce the amount of native vegetation in the area through physical removal and the construction of roads and structures. Some of this development may increase water demands from both surface and ground water sources. Ground water withdrawals can result in lowered ground water tables and change plant communities as a result, such as wet meadows could become upland.

Grazing also affects vegetation. Grazing removes biomass, as well as stimulates growth. In addition, grazing affects the structure of the plant community by significantly increasing composition of shrubs and forbs, and a lower composition of grasses and cacti in piñon juniper woodland compared to nongrazed areas (Harris, et al. 2003). Grazing can have beneficial effects to vegetation depending upon specific grazing practices and seasonal rotations.

Anthropogenic activities can help import and spread invasive and noxious weeds. Nonnative weed species can outcompete some of the native species for resources such as water, nutrients, and space, and over time can change the composition of native plant communities. In addition, weeds can also change the fire regime, such has been the case for cheatgrass throughout the west. In addition, species such as tamarisk can lower the water table and increase soil salinity (Berry 1970 and Sala, et al. 1996). Although weed management has been successful in controlling many of the infestations in the area, it is difficult to predict what new threats and plant adaptations would be faced in the future and global travel and the importation of exotic species continues.

With the implementation of the restoration and other project design features, the proposed project is not likely to significantly add to the cumulative effect from past, present, and reasonably foreseeable actions.

4.26.6 Noxious Weeds and Invasive Species

With the implementation of a weed management plan and diligent restoration, the proposed project is not expected to have any long-term adverse effect from invasive and noxious weeds. As described in the vegetation section, past, present and reasonably future anthropogenic activities still provide an avenue for the introduction and spread of weeds. Species such as knapweed, common mullein, cheatgrass, tamarisk, and others are still found throughout the area. Weeds still pose a threat to the ecological integrity of the area. However, the weed management efforts in the Project Area have reduced and eradicated a number of weeds previously documented. With the weed management and restoration, the proposed project is not likely to significantly add to the cumulative effects for noxious and invasive species.

4.26.7 Range Resources

The cumulative effects study area for range resources includes approximately 653,000 acres in the Royal Gorge Planning Area for BLM administered land (BLM 1995). BLM authorizes a maximum of 30,000 AUMs for livestock grazing, with an average of 28,000 AUM annually. Cumulatively, the number of AUMs on BLM managed land is not anticipated to change from a land use or management perspective. However, fluctuating livestock markets conditions and operations may dictate otherwise. The number of AUMs on public land would not change. However, data on grazing on adjacent private land is not readily available. As pressure for development on private land increases, more range resources converted to other uses.

The Artists' Proposed Action combined with other past, present and reasonably foreseeable projects would not significantly decrease the amount of range resources on public land. The proposed project would temporarily affect range resources with activity, dust, and minor temporary loss of forage, but no long-term impacts are expected following restoration.

4.26.8 Threatened, Endangered, and Sensitive Species

Federally-listed species that may occur within the project area include the Mexican spotted owl (threatened), greenback cutthroat trout (threatened), and Gunnison's prairie dog (candidate). The action alternatives would have negligible, if any, effects on these species. There are no readily identifiable or reasonably foreseeable actions that would result in cumulative effects resulting from the project. Therefore, cumulative effects, if any, would be negligible.

A variety of other sensitive species also occurs within proximity of the project. There are no readily identifiable or reasonably foreseeable actions that would elevate these effects or result in major cumulative effects.

For all other special status species, the action alternatives would have negligible, if any, effects. Further, there are no readily identifiable or reasonably foreseeable actions that would result in cumulative effects resulting from the project. Therefore, cumulative effects on these species would also be negligible, if any.

In addition to federally-listed species, several state-listed threatened and endangered species occur within the Project Area, including the southern redbelly dace, bald eagle, and northern river otter. No effects on the redbelly dace are anticipated from the project, and therefore no cumulative effects can be identified.

For the bald eagle, activities occurring during the installation phase of the project would likely affect this species, limiting access to roost trees and feeding areas. However, these effects would be short-term and

no cumulative effects are anticipated. With respect to the northern river otter, impacts would occur during all project phases but would remain short-term. No additional activities or trends can be identified in the short-term that would result in cumulative effects on the northern river otter.

A wide range of species of BLM and state concern also occur within the project area. Several of these species would be impacted by the project, but all impacts are expected to remain short-term. No additional activities or trends can be identified in the short-term that would result in cumulative effects on these species.

PHYSICAL RESOURCES

4.26.9 Atmosphere, Air Resources, and Air Quality

The cumulative effects study area (CESA) consists of the area within 10 km of the project.

Principal facility sources of particulate pollutants in Fremont County and Chaffee County within about 10 km of the proposed project, and the reported amounts emitted in 2002, are indicated in Table 4-66.

Table 4-66. Principal Source Facility Particulate Pollutant Emissions in the Vicinity of the Proposed Project (2002 data)

Pollutant (tpy) PM_{10}	$PM_{2.5}$	Facility	County	Industry SIC/Description
86.9	55.1	Cotter Corp	Fremont	1094 Uranium Ores
79.3	43.9	Tezak Heavy Equipment	Fremont	1429 Crushed and Broken Stone
44.8	24.9	Rocky Mountain Asphalt, Coyote Ridge	Fremont	1442 Construction Sand and Gravel
35.1	19.5	Front Range Aggregate, Parkdale Quarry	Fremont	1442 Construction Sand and Gravel
57.4	9.06	Colorado Lime (CALCO)	Chaffee	1422 Crushed and Broken Limestone
16.1	5.38	Hard Rock and Ready Mix – Main Plant	Chaffee	3273-Ready Mixed Concrete
15.4	3.44	Hard Rock and Ready Mix – Hwy 291 Pit	Chaffee	1442 Construction Sand and Gravel

Source USEPA AirData website http://www.epa.gov/air/data/ accessed 12/21/2009.

All air quality impacts from the proposed project would add cumulatively to these and other stationary and mobile sources in the CESA. Nevertheless, emissions from the proposed project would be temporary and would not materially contribute to violations of NAAQS in the viewing area and the CESA.

4.26.9.1 Residual Effects

No residual impacts to air quality from the proposed project would occur since reclamation and re-vegetation would stabilize exposed soil and control fugitive dust emissions. As vegetation becomes established, particulate levels should return to what is considered normal for this environment. Once the disturbance ceases, air quality would revert to its original state.

4.26.10 Water Resources

The cumulative effects study area consists of the length of the Arkansas River Canyon between Salida and Cañon City, Colorado. This study area receives inflows from municipalities, mining-related activities, and trans-basin diversions. Below the study area, outflows are used downstream for additional municipal, industrial, and agricultural activities. Within the canyon itself, present uses primarily involve small domestic water supplies, agriculture, fish and wildlife habitat, and recreation. Runoff conditions, managed flow regimes, and water quality all currently reflect these activities. All of these beneficial uses have existed historically and are ongoing, forming the baseline condition for the project and any other past, present, and reasonably foreseeable projects.

Within the cumulative study area, these existing beneficial uses and related projects or programs are likely to continue at more-or-less present levels. The proposed project or action alternatives would temporarily increase the demands on water supplies and wastewater treatment facilities. This would be a short-term impact, within the more gradual increases in demand from growth in population and recreation. Similarly, if water quality impacts occurred from the project, they would be short-term, localized additions to the effects from ongoing activities in the area.

With implementation of standard practices and other project design features, the proposed project or its action alternatives are not anticipated to create significant cumulative impacts to water resources. Any cumulative impacts that did occur would be short-term, minor and localized. Such effects would cease when project demobilization and restoration were completed.

4.26.10.1 Residual Effects

No residual impacts to water resources from the proposed project or its action alternatives are anticipated. Upon completion of project demobilization and restoration, water uses and quality would return to their pre-existing conditions.

4.26.11 Soil Resources

Data that quantifies cumulative effects to the soil resource is not readily available. Information on soil resource disturbances was taken from aerial photo interpretation, soil survey information, and previous EISs in the area.

Cumulative impacts to the soil resource result from surface disturbance related to mining, fire, grazing, farming, roads, railroad maintenance, recreation, industrial development, roads, municipalities, and other natural and anthropogenic activities within the Analysis Area.

High severity wildfires result in increased water repellent (hydrophobicity) soil, which limits infiltration, combustion, and increased mobility of some soil nutrients; mortality of some soil organisms; combustion of surface soil organic matter; and loss of effective ground cover, which leaves the soil susceptible to erosion and could contribute to noxious weed spread (Korb, et al. 2004). Fire severity typically increases as plant biomass increases. High severity fires would be expected to contribute to cumulative impacts to soils in the study area.

Where public and private lands are grazed, an increase in compaction could occur, which may result in accelerated runoff and erosion and a reduction in soil quality. Riparian and wetland soils may receive the greatest impact, where diligent best management practices are not implemented.

With implementation of standard and other project design features, the proposed project, when added to past, present, and reasonably foreseeable future actions, is not expected to result in significant cumulative impact to soil resources.

4.26.12 Geologic Substrate and Terrain

Cumulative impacts to geologic resources result from surface disturbance related to mining, developments (including the railroad and roads), and weather-related conditions in the Analysis Area. With implementation of project design features, the proposed project, when added to past, present, and reasonably foreseeable future actions, would not be expected to contribute to cumulative impacts to geologic resources in the Project Area.

OTHER RESOURCES

4.26.13 Environmental Justice/Protection of Children

Neither the installation and demobilization nor the exhibition of the OTR artwork would have any disproportionate impacts on minority populations or on low income populations. Therefore, no cumulative effects would be experienced by these groups as a result of any of the OTR project alternatives in combination with other local or regional events or projects.

During the installation and demobilization periods, no disproportionate environmental health or safety risks would affect children. Therefore, no cumulative effects would be experienced by children as a result of any of the OTR project alternatives during these periods. During the exhibition period, when traffic volumes are higher than normal, children would experience disproportionate safety risks related to additional vehicles traveling on US 50 and other roads in the region. OTR visitation during the exhibition period could coincide with other local and regional events, increasing traffic to a greater extent, and therefore increasing the cumulative traffic related risks to children.

4.26.14 Socioeconomics and Social Impacts

Installation and demobilization activities and visitation could overlap with other local and regional events, such as FIBArk, a popular boating event that occurs in June, or other arts and cultural events that occur throughout the year. In combination with those events, OTR visitation during the installation and demobilization periods would add to the cumulative socioeconomic effects in the region. If overlapping visitation occurs, cumulative effects would include increased pressure on accommodations and services to meet visitor demands; increased traffic and congestion on local roads; increased visitor spending and additional revenue to local businesses; and increased sales and use tax revenue to local jurisdictions and the State of Colorado. However, OTR visitation during installation and demobilization would generally be light, except for several weeks immediately prior to and following the exhibition period, which would minimize the cumulative effects of the project if overlapping events were to occur.

The Chaffee County and Fremont County fairs generally take place in late July or early August, which would overlap with the OTR exhibition period under all alternatives except Alternative 1d, when the exhibition period would occur in September. However, although not an individual event, increased regional visitation may occur during September due to changing foliage color, which could be considered an overlapping event for Alternative 1d, depending on the weather. Cumulative effects from the project would include increased pressure on accommodations and services to meet visitor demands; increased traffic and congestion on local roads; increased visitor spending and additional revenue to local businesses; and increased sales and use tax revenue to local jurisdictions and the State of Colorado.

Several city and county planning departments, chambers of commerce, and visitor bureau's in the region were contacted to determine if any special tourism related events, developments, or projects are planned for 2013, other than the usual annual events. As of mid-2010, these agencies were unaware of any events or projects currently scheduled for any part of the year 2013, indicating that it is still early for scheduling 2013 events. However, it is likely that tourism related events or conferences may schedule dates that coincide with the OTR exhibition period as an added attraction, which would amplify the cumulative effects. It is also likely that construction or development projects would schedule dates outside of the exhibition period to avoid the traffic and other issues associated with large numbers of OTR visitors.

4.26.15 Public Health

The project may have wide-ranging effects in the neighboring cities and communities that are outside of the project boundary. The analysis would take into account resources that are drawn away from neighboring jurisdictions as well as the potential impacts of large numbers of visitors traveling through adjacent cities and towns. Additional recreational activities and annual events may take place near the Project Area, which could add additional responsibilities to already stretched local and state resources.

Cumulative effects are similar for the adjacent cities and towns as for the Project Area, namely, an influx of project visitors during a time when summer visitation is already high and resources are already thin. Providing emergency services for normal events may be hampered due to a lack of resources, as local agencies share staff and equipment to meet project needs.

Local jurisdictions outside the Project Area may be called upon to assist in augmenting emergency services within the project corridor. Many of the local agencies have mutual aid agreements in place to offer assistance when the capabilities of agencies are stretched. In some circumstances, these mutual aid agreements exclude special events. However, some of these agreements may be enacted during the project. Adjacent jurisdictions outside the corridor would lend personnel and equipment during a time when the summer tourist season is in full swing. The agencies would be faced with the prospect of lending resources while simultaneously fulfilling obligations within their own jurisdiction. These agencies may also be coming to terms with budget cuts and inadequate staffing, furthering the potential impact to public health and safety.

Cumulative effects would vary by alternative. Alternatives 1a and 1d would be similar in nature due to the relative consistency in visitor numbers with each alternative. The greatest impact would be associated with Alternative 1c. The longer 3-week viewing period would draw resources away from neighboring agencies for a longer duration. This results in local communities bearing the impacts of not only increased visitation, but also fewer resources to accommodate the longer duration increase in visitation. Cumulative effects would wind down for Alternatives 2 through 4, as the scope of each alternative becomes less. Alternative 2 may coincide with the FIBArk Festival. This event occurs in mid-June and consists of multiple

water events, including rafting 25.7 miles between Salida and Cotopaxi. Thousands of visitors attend the festival. Visitors to this event would add to congestion in neighboring towns, most notably Salida, and increase the responsibilities of stretched local resources.

4.26.16 Transportation and Traffic

There are no past, present, or reasonably foreseeable projects that would add to this project's traffic and transportation effects as described previously in Chapter 5.0. The effects presented in 2013 would be the overall effects in 2013.

4.26.17 Hazardous Materials

All impacts that are reasonably foreseeable associated with the presence and/or use of hazardous materials within the Project Area were found to be short-term and negligible for all alternatives. Accordingly, no cumulative impacts associated with such materials have been identified.

4.26.18 Waste (Nonhazardous)

All impacts that are reasonably foreseeable associated with the generation of nonhazardous waste during the installation, exhibition, and demobilization phases of the Project Area were found to be short-term and negligible for all alternatives. Accordingly, no cumulative impacts associated with such materials have been identified.

4.26.19 Realty Authorizations and Land Use

None of the action alternatives are expected to result in any long-term impacts on land use. All planned land uses associated with the project are temporary, and it is expected that current uses on private and public lands would revert to their pre-project status once the project was completed. As such, the project would not directly contribute incremental effects to other past, present, and reasonably foreseeable actions within the Arkansas River corridor between Cañon City and Salida or within the surrounding area.

Although increased visitation and publicity are expected as a result of the action alternatives, this area of Colorado is already well-known and heavily visited by tourists and others traveling through the area. Increased exposure of the area might result in a minor increase in future visitation, but this increment would be minor and not sufficient to induce any increase in businesses or other activities associated with tourism. Therefore, no land use effects from increased visitation would be expected.

4.26.20 Recreation Resources

All alternatives could contribute to cumulative effects on recreation resources in the Project Area and region. Installation or exhibition activities that occur in June could overlap with the four-day FIBArk river event, which would temporarily amplify the impacts of the project on recreation. Project visitation and installation activity would add to the already high levels of human presence and river use that occur during this event. In particular, impacts to boating and angling would increase as a result of project activities occurring during FIBArk.

Project activities and visitation could coincide with other local and regional events. The cumulative effects of the project with these activities would be comparable to those described for FIBArk. Increased numbers of visitors and traffic levels would impact visitation at these events.

4.26.21 Visual/Aesthetic Resources

The No Action Alternative would not result in any cumulative effects.

Past actions that have impacted visual resources in the Bighorn Sheep Canyon and greater Arkansas River include freight and passenger railroad and support facilities, river flow changes from water development, a state highway, local road networks, and residential and commercial development. As a result, the Arkansas River configuration, riverbanks, water levels, and vegetation have been substantially degraded by past actions. Due to the temporary nature of the installment, the incremental and temporary contribution of action alternatives when combined with past modifications of the visual setting is not anticipated to result in long-term cumulative effects.

4.26.22 Wild and Scenic Rivers

All potential project impacts during the installation, exhibition, and demobilization phases of the Project Area were found to be short-term and negligible or minor for all alternatives. Accordingly, limited or no cumulative impacts associated with Wild and Scenic River eligibility or designation have been identified.

4.26.23 Wilderness and Special Management Areas

Direct and indirect negligible to minor effects to wilderness values would be limited to the short-term; therefore, it is unlikely that they would intersect with other past, present, or reasonably foreseeable activities such that cumulative effects to wilderness values would result. (No direct or indirect long-term effects to wilderness values are anticipated; therefore, there is no potential for long-term cumulative effects to this resource.)

The Arkansas Canyonlands ACEC and the resource values for which it was designated would be directly affected by ground disturbing activities, the installation and presence of aboveground elements, and increased human activity for the duration of the period between installation and demobilization. Following the removal of structures and restoration of disturbed sites, these effects are expected to diminish and become unnoticeable within 5 years. It is possible, however, that some effects would persist, including visual change associated with anchor drilling into rock and reduced viability of the bighorn sheep population. No other landscape altering projects or activities can be identified that would result in cumulative effects on visual resources. As discussed under terrestrial wildlife, ongoing trends, such as diminished lamb survival rates, could interact with the anticipated effects of the project and result in cumulative effects on bighorn sheep mortality and population levels within the ACEC. This would result in a major cumulative effect on the ACEC.

4.26.24 Sounds Resources and Noise

Noise impacts associated with all phases of the proposed project would be temporary and highly localized, only noticeable (exceeding 3-5 dBA) within about 1,000 feet of the source. Therefore, cumulative noise impacts would not be anticipated.

4.26.25 Cultural, Historic, and Native American Cultural Concerns

Mitigation and monitoring plans that will be developed after the Section 106 consultation have been completed will be designed to negate any cumulative impacts to cultural resources. All of the direct and indirect impacts to cultural resources will be dealt with prior to and during the lifetime of the project.

4.26.26 Paleontological Resources

Cumulative impacts to paleontological resources would result from surface disturbance related to mining, developments (including the railroad and roads), and natural erosion processes in the Analysis Area. With the implementation of standard practices, the proposed project, when added to past, present, and reasonably foreseeable future actions, would not be expected to contribute to cumulative impacts to paleontological resources in the Project Area.

4.27 UNAVOIDABLE ADVERSE EFFECTS

NEPA requires that this analysis identify those alternative actions that would result in unavoidable adverse effects. Unavoidable adverse effects are those environmental consequences of an action that cannot be avoided, either because modifying the action would change the nature of the project or effective mitigation through project design is not feasible.

- Activities and effects within each of the three project phases have the potential to disperse terrestrial and avian wildlife from primary habitat requirements such as water, cover, breeding/production habitat, and forage within the Project Area.
- Collision, trampling, or compaction from installation/removal equipment and exhibition period visitation would have the potential to cause direct mortality to small mammals, reptiles, and amphibians or destruction of habitats, such as burrows or ground cavities.
- During much of the overall project period, bare cables would present a higher risk of avian collisions.
- The construction phase of the project would also result in increased human presence along the river and noise from equipment. Construction could result in moderate noise levels in the river environment and cause avoidance responses or physiological effects on fish populations.
- Travel time delays on US 50 during the exhibition period. Predicted delays are not major, but unforeseen events could result in major travel disruptions.
- Emergency response vehicles would be delayed to various degrees along the US 50 corridor during the exhibition due to traffic congestion or accidents.
- Increased potential for uncontrolled releases of hazardous materials during all phases of the project.
- Project activities along the Arkansas River that impact access and the recreation experience for traditional recreation activities, most notably boating and angling, could displace users to other recreation sites in the region or state, outside the Project Area. This displacement would result in a loss of revenue to AHRA from traditional visitation, as well as diminished recreation opportunities overall.

- Temporary, long-term, and residual effects of the project from construction and deconstruction and compliance with VRM Class II long-term objectives. Restoration of native habitats, specifically riparian and wetland habitats, may extend beyond 5 years.
- The Arkansas Canyonlands ACEC and the values for which it was designated would be directly affected by ground disturbing activities, the installation and presence of aboveground elements, and increased human activity for the duration of the installation period.
- Because of the options for mitigation of impacts to cultural resources that are available, there are no unavoidable adverse impacts to historic properties in any of the proposed alternatives.

4.28 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS OF RESOURCES

NEPA requires a discussion of irreversible or irretrievable commitment of resources that would result from implementing the alternatives.

Irreversible commitments are those that cannot be reversed, such as species extinction, mining ore, or logging old growth forest, which would take hundreds of years to recover. Such decisions are considered irreversible when their implementation would affect a resource such that its useful renewal could occur only over a period of time longer than the useful life of the project, at exorbitant expense, or because they would cause the resource to be destroyed or removed. Irreversible commitments of resources on federal lands are typically attributed to major infrastructure construction projects, such as the use of federal lands for the original construction of dams, reservoirs, or associated conveyance features.

The permanent extraction of bedrock and, to some degree, soils for the installation of anchors along the river corridor represents an irreversible commitment of resources. However, the amount of soil and rock permanently displaced is of an insignificant quantity at the landscape or Field Office level, except in the case of removal or otherwise preventing recovery of high value mineral resources (e.g., gold that may be present on mining claims). The permanent removal of these materials is not anticipated to foreclose any future activities on these lands including, but not limited to, mineral or land use leases, assuming that claimants' mineral rights are protected by upfront coordination as defined in the mitigation measures in Chapter 5.0.

Irretrievable commitments of resources result in the loss of production or use of resources as a result of a decision where the resource commitments represent a moratorium on other site-specific uses or opportunities for the useful life of the associated project. For example, if a paved highway is constructed through a forest, the timber productivity of the cleared ROW is lost for as long as the highway remains. The construction of the highway represents an irretrievable loss in exchange for the benefits of the highway.

With the implementation of mitigation measures, there should be no irretrievable or irreversible impacts to cultural resources. The mitigation will be designed to either avoid contributing elements of cultural resources or exhaust the research potential of those resources.

No irretrievable commitments of resources have been identified as a result of any of the OTR project action alternatives.

4.29 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires that the description of impacts should identify how short-term uses of the environment would affect long-term productivity of resources (or, actions that would result in trade-offs between short-term uses and long-term productivity). **Short-term** is defined as the 1-5 year period from installation through complete restoration. **Long-term** productivity refers to the period after the Project is completed and mitigation measures have been implemented.

The installation, exhibition, and demobilization of the OTR project in the short-term (less than 5 years) would adversely affect the bighorn sheep herds on the north side of the river such that long-term viability of the herd may be jeopardized. Displacement, additional stressors during critical or important seasons, and other habitat modifications over the project duration (short-term) could contribute to long-term diminishment of herd viability.

As with other elements of the impacts to and management of cultural resources, if the avoidance, mitigation, and monitoring procedures are followed, there will be no long-term adverse impacts to historic properties.