APPENDIX E
TRANSPORTATION MAINTENANCE GUIDELINES
Ironwood Forest National Monument
Travel Management Plan

Maintenance guidelines for Monument Roads and Primitive Roads are established to achieve consistency in the way that Monument routes are maintained, and to ensure that only minimal maintenance work is accomplished for the access purposes that the different routes serve as identified in the land use allocations made in the IFNM RMP and the route designations established concurrently.

Monument transportation routes provide access for administrative purposes that require access by different types of vehicles depending on the management activities (i.e. special projects, resource surveys, monitoring, law enforcement and emergencies) including sport utility vehicles, off highway vehicles, 4WD trucks, service trucks, wild land fire engines, and transports for construction and maintenance equipment. Monument access routes also provide access for the use, maintenance and operation of existing facilities and improvements under current land use authorizations (i.e. utilities, transportation, communication sites, range improvements, wildlife waters) that need access by different types of vehicles for normal inspection, maintenance, and emergency repairs. The Monument routes also provide access to not-federal land inholdings, including residential areas and ranch headquarters which need access by passenger car and livestock trailer trucks. The routes also provide access for outdoor recreational use by the general public who visit the Monument by variety of motor vehicle types, including passenger car, pick up truck, motor home and various off highway vehicles. The different types of vehicles using Monument routes have differing physical characteristics and performance capabilities, which were considered in developing maintenance guidelines for Monument roads, primitive roads and trails.

Monument Primitive Roads will be maintained according to the guidelines described in this Appendix until standards for BLM Primitive Roads are established, as indicated in current Bureau travel management guidance[1], road maintenance guidance[2], and trail maintenance guidance[3].

Maintenance according to these guidelines will ensure that reasonably reliable access by the type of vehicle identified in the TMP for roads and primitive roads is available. Routes maintained according to the different types of routes will be available for public use by vehicles that have similar geometric requirements based on the access vehicles' characteristics, performance and capabilities of the driver/operator. Maintenance standards and guidelines for administrative routes by public would allow physical access by medium class vehicles, but would be subject to the use restrictions and limitations described in the TMP.

[1] BLM Handbook, H-8342 Travel and Transportation Handbook, Bureau of Land Management, (page 116).
[2] BLM Manual 9113 - Roads.
[3] BLM Manual 9114 - Trails.

1. Transportation Assets:

The Monument transportation assets to be maintained under this program include Roads, Primitive Roads, and Trails, according to BLM-wide definitions[4]. These definitions are constrained by the language of the Proclamation prohibiting "all motorized and mechanized vehicle use off road", and to meet local Monument access needs, as noted below.

a. **Road:** Linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use.

b. **Primitive Road:** A linear route managed for 4WD or high-clearance vehicles. Primitive Roads do not normally meet any BLM road design standards. Two types of Primitive Roads are defined to accommodate access needs in the Monument, as described in section 3 below.

c. **Trail:** Linear route managed for human-powered, stock, or off-highway vehicle forms of recreation or for historic or heritage values. Trails are not generally managed for use by 4WD or high-clearance vehicles. Trails in the Monument are limited to non-motorized human- or livestock-powered travel.

2. Maintenance Intensities:

BLM Route Maintenance Intensities provide guidance for appropriate "standards of care" to recognized routes within the BLM. Recognized routes by definition include Roads, Primitive Roads, and Trails carried as Assets within the Bureau of Land Management Facility Asset Management System (FAMS).

Maintenance Intensities provide consistent objectives and standards for the care and maintenance of BLM routes according to identified management objectives. Maintenance Intensities are consistent with land-use planning management objectives (for example, natural, cultural, recreational setting, and visual quality). Maintenance Intensities provide operational guidance to field personnel on the appropriate intensity, frequency, and type of maintenance activities that should be undertaken to keep the route in acceptable condition and provide guidance for the minimum standards of care for the annual maintenance of a route.

Maintenance Intensities do not describe route geometry, types of route, types of use, or other physical or managerial characteristics of the route. Those items are addressed as other descriptive attributes to a route. Maintenance Intensities provide a range of objectives and standards, from "identification for removal" through "frequent and intensive maintenance".

The definitions for BLM Transportation maintenance intensities are:

a. **Level 0 Maintenance Description:** Existing routes that will no longer be maintained or declared as routes. Routes identified as Level 0 are identified for removal from the transportation System entirely.

[4] Roads and Trails Terminology Technical Note 422,November 2006, U.S. Department of the Interior, Bureau of Land Management, Washington D.C. 20240

Maintenance Objectives: No planned annual maintenance. Meet identified environmental needs. No preventive maintenance or planned annual maintenance activities.

Maintenance Funds: No annual maintenance funds allocated.

b. **Level 1 Maintenance Description:** Routes where minimal (low-intensity) maintenance is required to protect adjacent lands and resource values. These roads may be impassable for extended periods of time.

Maintenance Objectives: Low (Minimal) maintenance intensity. Emphasis is given to maintaining drainage and runoff patterns as needed to protect adjacent lands. Grading, brushing, or slide removal is not performed unless route bed drainage is being adversely affected, causing erosion. Meet identified resource management objectives. Perform maintenance as necessary to protect adjacent lands and resource values. No preventive maintenance. Planned maintenance activities will be limited to environmental and resource protection. Route surface and other physical features are not maintained for regular traffic.

Maintenance Funds: Maintenance funds provided to address environmental and resource protection requirements. No maintenance funds provided to perform preventive maintenance.

c. Level 2 RESERVED FOR POSSIBLE FUTURE USE

d. **Level 3 Maintenance Description:** Routes requiring moderate maintenance because of low-volume use (e.g., seasonally or year-round for commercial, recreational, or administrative access). Maintenance Intensities may not provide year-round access, but are intended to generally provide resources appropriate for keeping the route in use for the majority of the year.

Maintenance Objectives: Medium (Moderate) maintenance intensity. Drainage structures will be maintained as needed. Surface maintenance will be conducted to provide a reasonable level of riding comfort at prudent speeds for the route conditions and intended use. Brushing will be conducted as needed to improve sight distance when appropriate for management uses. Landslides adversely affecting drainage will receive high priority for removal; otherwise, they will be removed on a scheduled basis to meet identified environmental needs. Generally, they will be maintained for year-round traffic, including the annual maintenance necessary to protect adjacent lands and resource values. Preventive maintenance will be performed as required to generally keep the route in acceptable condition. Planned maintenance activities should include environmental and resource protection efforts, and annual maintenance of the route surface. Route surface and other physical features are maintained for regular traffic.

Maintenance Funds: Maintenance funds provided to preserve the route in the present condition, perform planned preventive maintenance activities on a scheduled basis, and address environmental and resource protection requirements.

e. Level 4 RESERVED FOR POSSIBLE FUTURE USE

f. **Level 5 Maintenance Description:** Routes for high (Maximum) maintenance because of year-round needs, high-volume traffic, or significant use. Also may include routes identified through management objectives as requiring high intensities of maintenance or to be maintained open year-round.

Maintenance Objectives: High (Maximum) maintenance intensity. The entire route will be maintained at least annually. Problems will be repaired as discovered. These routes may be closed or have limited access because of weather conditions but are generally intended for year-round use. Meet identified environmental needs. Generally maintained for year-round traffic. Perform annual maintenance necessary to protect adjacent lands and resource values. Perform preventive maintenance as required to generally keep the route in acceptable condition. Planned maintenance activities should include environmental and resource protection efforts, annual route surface. Route surface and other physical features are maintained for regular traffic.

Maintenance Funds: Maintenance funds provided to preserve the route in the present condition, perform planned preventive maintenance activities on a scheduled basis, and address environmental and resource protection requirements.

The maintenance guidelines for Monument routes identify the key geometric elements and typical dimensions required accommodate the type of access and vehicles the routes are intended to serve. These guidelines will be applied on maintenance projects for existing routes, and on any reconstruction or new construction. The environmental impact analysis of the Monument transportation maintenance program is based on the changes and modifications to existing route conditions required to maintain them in proper condition (vegetation clearance trimming, removal of plant growth in travel way, re-grading and reconstructing the road bed, etc.).

3. Primitive Road Maintenance Guidelines

The designated road and primitive road network in the Monument is in poor condition and the travel way, drainage, and vegetation clearance need to be maintained so the routes continue to provide the access purpose they serve. The roads and primitive roads have important administrative access needs that need to be accommodated, and they also have characteristics that are important for the recreational experience of Monument visitors in the different Recreation Management Zones established for the Monument. The existing roads and primitive roads were developed over time for mining, utilities and range improvement, and current condition vary greatly and affect the route's use-ability (grade steepness, roughness, travel-way width, horizontal and vertical alignment, side and overhead vegetation clearance).

Monument access vehicles identified in the (passenger cars, light trucks, stock 4WD high clearance vehicles, routes requiring use of all-terrain vehicles only, or to other OHVs with extremely capable equipment and driving skill.

The maintenance guidelines identify the desired physical condition of the different transportation assets, the type of access accommodated, and the ROW needs associated with the different types of motorized routes.

A. Typical Road Maintenance:

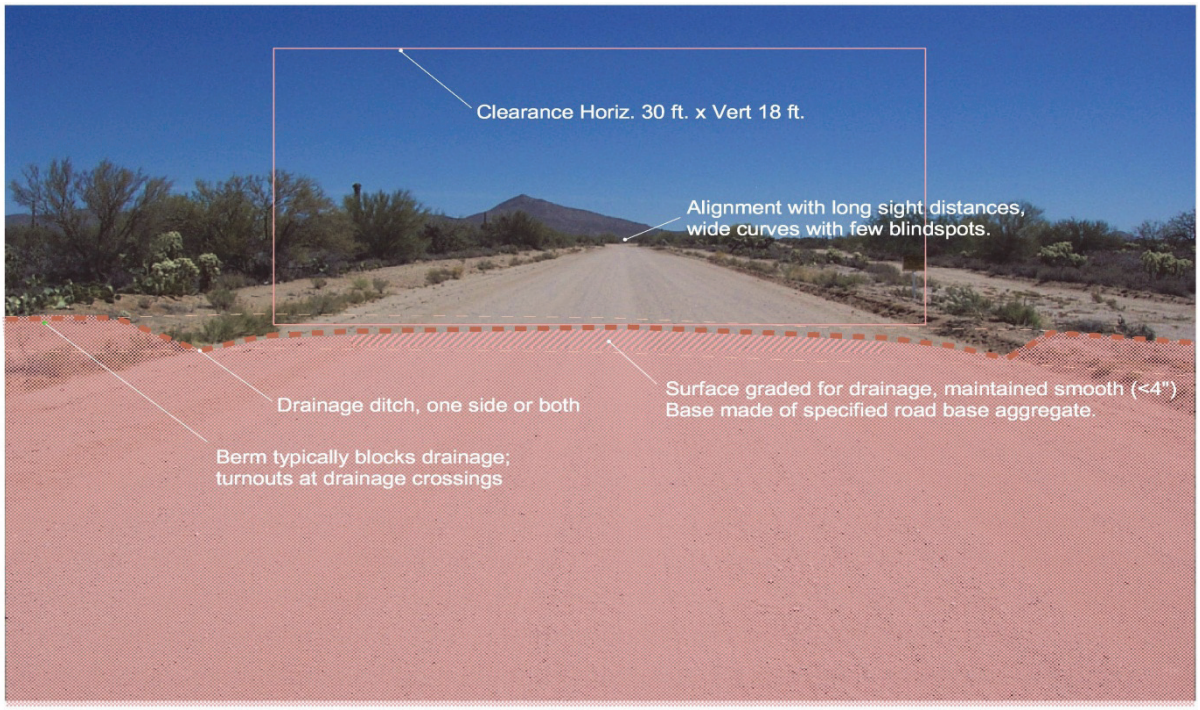

Figure E-1. **Typical Road:** Two lane roads used for general access to the Monument from the local public highways, used by all types of vehicles including wild land fire and emergency vehicles, passenger car and minibus. These roads maybe under a right of way to the local county, and are subject to county road standards. Roads across Monument lands may be improved to standards for low volume rural roads in accordance with BLM engineering handbook H-9113, and AASHTO standards for low volume roads[5] to minimize impacts on Monument objects.

a. Functional class: 'Collector', 'Local' or 'Resource'.

b. Maintenance intensity: Level 5.

c. Traffic type: All vehicle types (passenger car, motor home, trailer towing vehicles, heavy trucks and equipment.

d. Traffic volume: Low volume, under 250 vehicles per day, varies seasonally with peak use in fall, winter and spring. Engineering analysis required with daily traffic levels of 150 to 250 vehicles.

e. Speed: 35 miles per hour or higher.

f. Cut and Fill Banks: Graded 3:1, or at angle of repose depending on soil conditions. Allow natural revegetation outside ditch.

g. Travel way width: 24 feet overall, two lanes (plus 1:3 ditch one or both sides).

h. Curves and alignment: Curvilinear alignment will be designed to promote low speeds. Typically open and broad horizontal curves, with gently rolling vertical curves; large radius over 200 feet, per engineering analysis.

[5] Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT $\leq$ 400), American Association of State Highway and Transportation Officials, 2001.

i. Driving surface: Asphalt or aggregate pavement, depending on engineering analysis. Roads in soils prone to fugitive dust will be surfaced with aggregate to minimize impacts on air quality.

j. Grades: Flat to gentle grades, 12% max.

k. Drainage: Crowned or outsloped depending on site conditions. Ditched on one or both sides, with lead off ditches as needed. Stabilized low water crossings with improved approaches; culverts or other drainage structures may be used at natural drainage crossings to achieve objectives.

l. Vegetation clearance: Side clearance 4 feet from edge of roadway, 16 to 20 feet overhead clearance.

m. Construction/maintenance equipment: Access by standard road maintenance equipment (motor grader, water truck, backhoe and 12-20 yard dump truck).

B. Typical Primitive Road Type A:

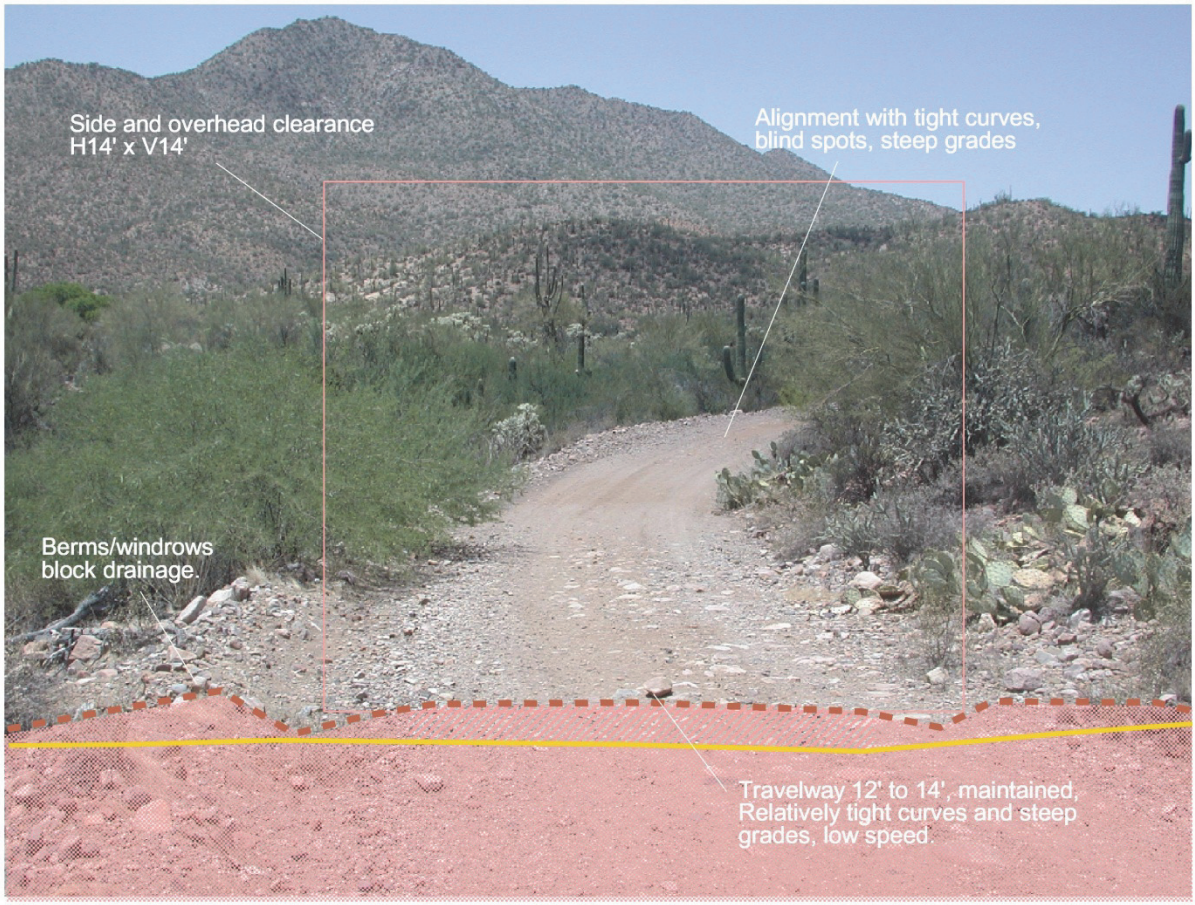

Figure E-2. **Typical 'Type A' Primitive Road:** Narrow single lane, low volume, low speed primitive road used by Type 6 wild land fire engine, utility line truck and other vehicles for administrative purposes and public use. Some of these roads are designated for administrative vehicles only (service roads for utility rights of way including natural gas transmission pipeline, electric powerlines and high voltage transmission lines), and are open to public use by non-motorized travel only. These routes are not intended to accommodate passenger car access or mini-bus, though may be temporarily useable by these vehicles for a period after maintenance work.

a. Functional class: ‘Local’ or ‘Resource’.

b. Maintenance intensity: Level 3.

c. Traffic type: Administrative and emergency access by Type 6 wild land fire engine. Predominantly high clearance 2WD or 4WD vehicles, and OHVs (all-terrain vehicle, utility vehicle, motorcycle).

d. Traffic volume varies depending on time of year, type of route and location. ADT 50 to 150 vehicles during peak times (fall-winter-spring weekends, holidays, and events).

e. Speed: 15 miles per hour.

f. Cut and Fill Banks: At angle of repose depending on soil conditions. Allow natural revegetation.

g. Travel way width: 14 feet with turnouts or spot widening.

h. Curves and alignment: Short radius (<25 ft.) horizontal curves common, with rolling vertical curves.

i. Driving surface: Natural soil, unpaved surface (bedrock, consolidated stone/cobble, gravel). Roads on soils prone to fugitive dust will be capped with aggregate to minimize air quality impacts

j. Grades: Gentle to moderate grades depending on topography (max. 12%).

1. Drainage: Open or confined by berms, waterbars and turnout ditches at intervals depending on natural drainage patterns and soil type. Low water crossings typically, with culverts in spots.

k. Vegetation clearance: Minimal side clearance (12 to 14 feet horizontal, 16 feet overhead).

l. Construction/maintenance equipment: These roads typically have a narrow travel way and restricted operating clearance. Road maintenance requiring earthwork will be performed using small construction equipment to minimize collateral disturbance to adjacent soils and vegetation. Dozer with 6-way blade less than 11 ft. width will be used (Caterpillar D3C, D3G, D4G, D4H, or equivalent, Sweco tractor)

Maintenance on roads limited to administrative vehicles will only be performed when the authorized utility infrastructure requires maintenance work and access by line trucks and other vehicles, and will be subject to case by case notifications and approval by BLM.

C. Typical Primitive Road Type B:

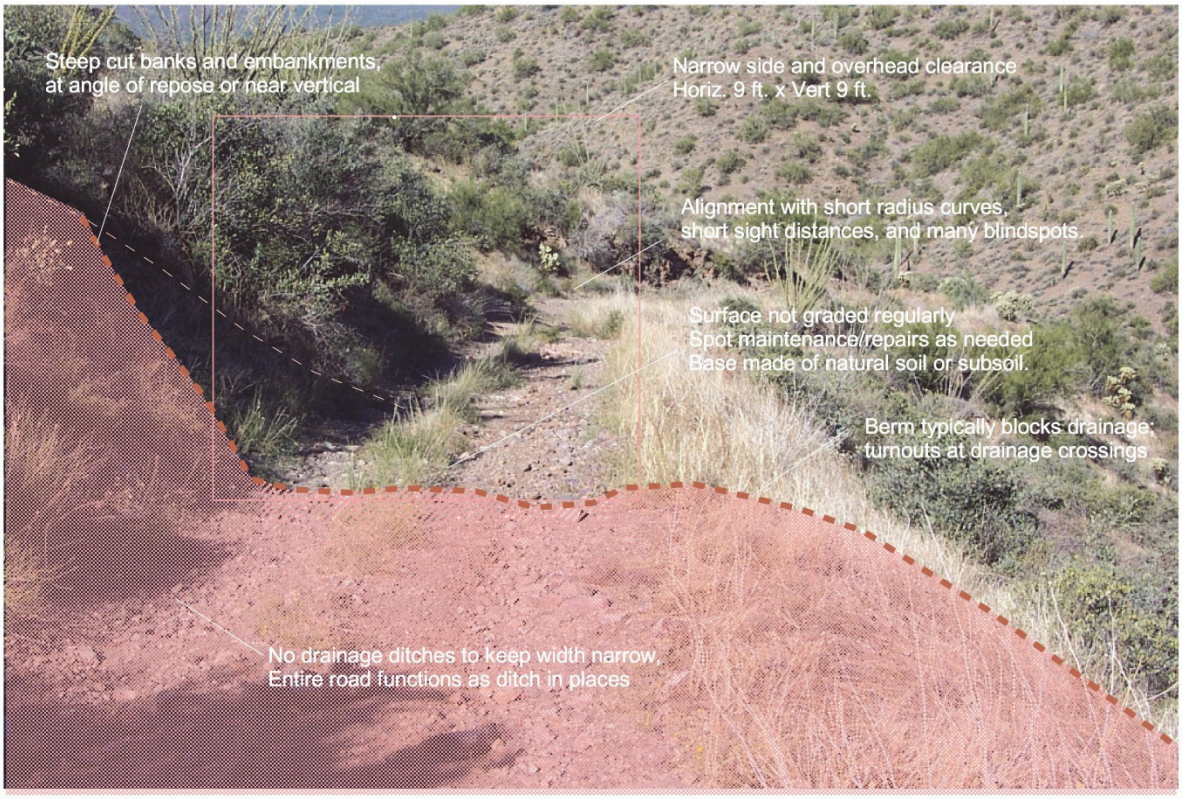

Figure E-3. **Typical 'Type B' Primitive Road:** Very narrow, low volume, low speed single lane road used by 4WD and OHV's for general administrative and recreational access. Not intended to accommodate 2WD, passenger car, or minibus. Land use activities will be constrained by narrow, rough primitive road conditions. These routes may be improved to meet temporary access needs on a case by case basis, subject to project specific plans and clearances.

a. Functional class: 'Resource'.

b. Maintenance intensity: Level 1.

c. Traffic Type: Administrative and public use by predominantly high clearance 4WD vehicles, and OHVs (all-terrain vehicle, utility vehicle, motorcycle), and mixed non-motorized mechanized public travel (mountain bike, equestrian, hiking).

d. Traffic volume: Very low and seasonal; ADT 50 or less vehicles, with use occurring during peak times (hunting season opening days, fall-winter-spring weekends, holidays, and special events).

e. Speed: Very low speed, 5 to 15 miles per hour.

f. Cut and Fill Banks: At stable angle of repose depending on soil conditions. Preserve natural vegetation growth if not interfering with travel-way.

g. Travel way width: 10 feet with inter-visible passing turnouts, or spot widening.

h. Curves and alignment: Tight and numerous horizontal and vertical curves common; curve radius <25 feet.

i. Driving surface: Natural soil, unpaved, rough surface (bedrock, consolidated stone/cobble, gravel); roads on soils prone to fugitive dust will be capped with aggregate to minimize air quality impacts.

j. Grades: moderate to very steep grades depending on topography (12% to 18%).

2. Drainage: Roadbed typically out-sloped at 6% for unobstructed cross drainage. Road sections obstructed by berms will be drained be clearing the berm, installing water bars and lead-off ditches at intervals depending on grade, natural drainage patterns and soil type. Low water crossings typically, with culverts in spots.

   Sections of road entrenched by erosion (with the road grade down cut and below the prevailing ground surface, and under-cut natural drainage crossings) will be reconstructed to raise the road grade for proper drainage.

k. Vegetation clearance: Minimal side clearance (10 feet, may encroach roadway to 8 feet). Overhead clearance 9 feet. Vegetation regrowth in travel way allowed.

l. Construction/maintenance equipment: These roads typically have a very narrow travel way with limited operating clearance. Road maintenance requiring earthwork will be performed using the smallest conventional construction equipment available to minimize collateral disturbance to adjacent soils and vegetation. A dozer with 6-way blade less than 8 ft. width will be used (Komatsu D21A-8 or D21A-6, Caterpillar D4G or D4B, or equivalent, Sweco tractor).

D. Typical Trail:

Figure E-4. **Typical Trail, Non-Motorized, Non-Mechanized travel:** Narrow, low volume, single track trail used by hikers and equestrian riders for administrative and recreational access in primarily a wildland setting. These

trails are not intended to accommodate mountain bicycles, which are required to stay on designated roads and administrative roads by the Monument proclamation. Existing routes identified for closure will generally remain open to public use for non-motorized mechanized travel. Those routes will be allowed to reclaim naturally, and may be maintained to trail standards to accommodate passage by equestrians and hikers.

a. Functional class: 'Resource'.

b. Maintenance intensity: Level 1.

c. Traffic Type: Administrative and public use by non-motorized non-mechanized (equestrian, hiking).

d. Traffic volume: Very low and seasonal.

e. Speed: Very low, 2 to 4 miles per hour.

f. Cut and Fill Banks: At stable angle of repose depending on soil conditions. Preserve natural vegetation growth if not interfering with travel-way.

g. Travel way width: 24" to 30".

h. Curves and alignment: Following natural contours, tight and numerous horizontal and vertical curves common; curve radius 6 to8 feet.

i. Driving surface: Natural soil, unpaved, rough surface (bedrock, consolidated stone/cobble, gravel); roads on soils prone to fugitive dust will be capped with aggregate to minimize air quality impacts.

j. Grades: Gentle to moderate with few steep grades if required by topographic conditions (max. 12% to 16%).

k. Drainage: Trail bench typically out-sloped at 6% for unobstructed cross drainage. Trail sections that become ditched over time, or obstructed by berms will be drained be re-grading the outslope, clearing or breaching the berm, rolling the grade, installing water bars and lead-off ditches at intervals depending on grade, natural drainage patterns and soil type. Low water crossings typically.

l. Vegetation clearance: Minimal side clearance (5 to 6 feet). Overhead clearance 9 feet. Low-growing vegetation will be allowed to encroach the clear zone.

m. Construction/maintenance equipment: Trails typically have a very narrow travel way with a limited operating platform and clearance. Trail maintenance will be done with hand tools and equipment. Maintenance work requiring excavation or earthwork will be performed using power tools (gas or electric jack hammer). A mini-excavator may be used for trail work requiring relatively extensive excavation for efficiency or effectiveness of the effort (Takeuchi TB108, Kubota K008-3 or equivalent).

E. Typical Overland Route:

Figure E-5. **Typical Overland Access Route:** Narrow, very low volume, two track vehicle access route used for authorized administrative purposes for maintenance, operation, repair or replacement of existing facilities or improvements, or special projects that require vehicle access to transport tools, materials or supplies that can-not be transported by non-motorized means. These routes include existing routes previously constructed, but are not intended to accommodate regular on-going vehicle traffic. These routes will be allowed to reclaim naturally after each use, and restoration treatments may be applied if disturbance is likely to attract more use, or have a persistent impacts.

a. Functional class: 'Resource'. These routes provide access to project sites or existing improvements or facilities that require very infrequent vehicle access.

b. Maintenance intensity: Level 0. Travel way allowed to revegetate naturally

c. Traffic Type: Administrative vehicles, depending on specific needs (truck, service vehicle, heavy equipment, fire engine, equestrian, hiking).

d. Traffic volume: Very infrequent, one vehicle crew trip a year or less.

e. Speed: Very low, 0 to 1 miles per hour; walking speed.

f. Cut and Fill Banks: If the overland route uses an originally constructed roadbed, existing cut and fill slopes will be left 'as-is'. Preserve natural vegetation growth if not interfering with travel-way. Apply treatments to stabilize slope or bank erosion damaging resources or interfering with reclamation.

g. Travel way width: 10’ to 12’, depending on the type of vehicle used.

h. Curves and alignment: Following natural contours and openings in vegetation, no set curve or alignment, other than maneuvering the vehicle through tight and numerous horizontal and vertical curves, with aid of spotter common.

i. Driving surface: Natural soil ground surface, variable (bedrock, consolidated stone/cobble, gravel, sand, silt); routes on soils prone to damage from compaction, rutting or mud will not be used when moist or wet.

j. Grades: Gentle to moderate, avoiding steep grades as required by topographic conditions (max. 12%).

k. Drainage: Natural surface runoff cross drainage, unobstructed, not intercepted. Use of route will avoid creating ruts that form ditches over time and intercept runoff. Existing ditches or ruts that are intercepting surface runoff will be mitigated with drainage control work using hand methods.

l. Vegetation clearance: Minimal trimming for adequate side clearance and overhead clearance to allow passage by the vehicle at the time of use. Minimal trimming of low growing vegetation to accommodate vehicle driving over plants, without creating a fire hazard. Selective removal and transplanting of succulent and cacti regrowth in the travel-way.

m. Construction/maintenance equipment: No construction or maintenance work will be performed. Only hand tools may be used to remove obstructions, or trim vegetation to gain passage, with minimum impact.