Appendix 3-2

USFS Road Requirements

SECTION 201-CLEARING AND GRU

DESCRIPTION

201.01. This work shall consist of clearing, grubbing, trimming, removing, and disposing of or treatment of timber, construction slash, and debris. This work shall also include preservation of vegetation and objects DESIGNATED to remain from injury or defacement.

CONSTRUCTION REQUIREMENTS

201.02 CLEARING AND GRUBBING. All debris, trees, stumps, roots, and other protruding obstructions within the clearing limits, not DESIGNATED to remain, shall be cleared, grubbed, removed, and disposed of, except the following:

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(a) Undisturbed stumps outside the roadway or in embankment areas, provided they do not extend more than 12 inches above the original ground nor closer than 2 feet to the finished subgrade or 1 foot to any slope surface and do not interfere with the placement or compaction of embankments.

(b) Stable trees up to 6 inches in diameter within the clearing limits but beyond the roadway and uncut vegetation less than 3 feet in height and less than 3 inches in diameter that do not interfere with visibility.

(c) Grubbing of pits, channel changes, rock sections, and ditches below the depth of the proposed excavation.

All roots over 3 inches in diameter within the roadbed area shall be grubbed to a minimum depth of 6 inches below subgrade. Roots protruding from the excavated slope shall be cut flush with the excavated slope surface.

Trees shall be felled into the area being cleared when ground conditions, tree lean, and shape of clearing permit. Controlled felling shall be used that will ensure the direction of fall when necessary to prevent damage to property, structures, trees DESIGNATED to remain, or traffic.

Snags and trees outside the clearing limits that are DESIGNATED for individual removal shall be cut off not more than 12 inches above the ground and treated in accordance with Subsections 201.03 and 201.05.

Branches on remaining trees or shrubs shall be trimmed to give a clear height of 20 feet above the roadbed. Tree limbs shall be trimmed as near flush with the trunk as practicable.

201.03 DISPOSAL OF MERCHANTABLE TIMBER (TIMBER MEETING UTILIZATION STANDARDS). Timber meeting utilization standards shall be disposed of in accordance with the *Special Project Specifications*.

201.04 PIONEER ROADS. The construction of pioneer roads shall be confined to inside the roadway unless otherwise approved by the Engineer.

201.05 SLASH TREATMENT. Treatment of construction slash shall be accomplished by one or more of the following methods as SHOWN ON THE DRAWINGS and in the SCHEDULE OF ITEMS:

(1)	Windrowing Construction Slash	(5)	Burying
(2)	Windrowing of Large Material	(6)	Chipping
(3)	Windrowing and Covering	(7)	Piling and Burning
(4)	Scattering	(8)	Decking Unmerchantable Material

Pieces of wood less than 3 inches in diameter and 3 feet in length may be scattered within the clearing limits.

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(a) *All Methods.* No material shall be deposited in lakes, meadows, streams, or streambeds. Construction slash that interferes with drainage structures shall be removed immediately.

Trees adjacent to the clearing limits scorched or damaged beyond recovery, shall be felled and disposed of in accordance with Subsection 201.03 or treated as construction slash.

(b) *Specific Methods.*

(1) Windrowing Construction Slash. Areas used to windrow construction slash shall be cleared to accommodate the windrow. Construction slash shall be placed outside the roadway in neat, compacted windrows laid approximately parallel with and along the toe-line of embankment slopes. The top of windrows shall not extend above the subgrade. All material in the windrow shall be matted down with construction equipment to form a compact and uniform pile. Windrows shall have 16-foot minimum length breaks at least every 200 feet. Windrows shall not be placed against trees. A pioneer road may be constructed to provide an area for placement of windrows provided the excavated material is kept within the clearing limits and does not adversely affect the road construction.

(2) Windrowing of Large Material. Construction slash 10 inches or more in diameter at the small end and 6 feet or more in length shall be windrowed as in (1) above. Smaller material shall be treated by one or more of the other included options for slash treatment.

(3) Windrowing and Covering. Construction slash shall be placed and compacted as in (1) above and shall be covered with at least 6 inches of rock and soil to form a smooth and uniform windrow.

(4) Scattering. Construction slash shall be scattered outside the clearing limits without damaging trees. All logs shall be limbed. Logs and stumps shall be placed away from trees, positioned so they will not roll, and not be placed on top of one another. Other construction slash shall be limbed and scattered to reduce slash concentrations.

(5) Burying. Construction slash shall be buried at the locations SHOWN ON THE DRAWINGS and DESIGNATED on the ground. Construction slash

shall be matted down in layers and covered with at least 2 feet of rock and soil. The final surface shall be smooth and sloped to drain.

(6) Chipping. Construction slash up to at least 4 inches in diameter shall be processed through a chipping machine. Chips shall be deposited on embankment slopes or outside the roadway to a loose depth not exceeding 6 inches. Minor amounts of chips may be permitted within the roadway if they are thoroughly mixed with soil and do not form a layer.

(7) Piling and Burning. Construction slash shall be in areas SHOWN ON THE DRAWINGS and DESIGNATED on the ground. Piles shall be constructed so that burning does not damage standing trees. If burning is incomplete, the slash remaining shall be repiled and burned until pieces are reduced to less than 3 inches in diameter and 3 feet in length. These pieces shall then be scattered.

(8) Decking Unmerchantable Material. Logs not meeting utilization standards that are 6 inches or more in diameter shall be bucked into lengths not to exceed 32 feet and piled at the locations SHOWN ON THE DRAWINGS.

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SECTION 203-EXCAVATION AND EMBANKMENT

DESCRIPTION

203.01. This work shall consist of excavation and shaping roadway, borrow excavation, drainage excavation, removal of slide material, excavation of unsuitable material, embankment construction, and disposal of all excavated material necessary for the completion of construction including roadway ditches, channel changes, furrows, slope rounding, benches, berms, dips, approaches, and subsidiary work.

203.02 EXCAVATION. Excavation shall consist of the excavation and disposal of all excavated material, regardless of its nature, that is not included under other pay items listed in the SCHEDULE OF ITEMS.

203.03 BORROW EXCAVATION. Borrow excavation shall consist of the excavation and utilization of material from sources SHOWN ON THE DRAWINGS or described in the *Special Project Specifications*. Additional sources of borrow excavation shall be approved in advance by the Engineer. Development of sources shall be in accordance with Section 611. 203 .06

CONSTRUCTION REQUIREMENTS

203.04 CLEARING AND GRUBBING. Clearing and grubbing shall be accomplished in accordance with Section 201 before work under Section 203 begins, except the grubbing of stumps, which may proceed concurrently with excavation, and the burning of slash, which may be delayed until weather permits. Excavation and placement operations shall be conducted so material to be treated under Section 201 will not be incorporated in the roadway.

203.05 PIONEERING. Pioneering operations for the top of excavation slopes, toe of embankments, or pioneer road construction shall prevent undercutting of the final excavation slope, depositing of materials outside of the roadway limits, and any restriction of drainage.

203.06 UTILIZATION OF EXCAVATED MATERIALS. All suitable, excavated material shall be used in the construction of embankments, subgrades, shoulders, slopes, bedding, and backfill for structures and for other purposes as SHOWN ON THE DRAWINGS.

(a) *Excess Excavation*. Designed excess excavation shall be disposed of as SHOWN ON THE DRAWINGS.

(b) *Rock for Slope Protection*. Excavated rock suitable for protection of embankments may be conserved and used in lieu of a DESIGNATED materials source.

(c) *Conserving Material*. Material encountered in the excavation, suitable for cushion, road finishing, or other purposes, may be conserved and utilized instead of materials from DESIGNATED sources. Excessively wet material that is otherwise suitable for embankment shall be field drained and dried before placement.

(d) *Excavation of Unsuitable Material.* Unsuitable material shall be excavated. Disposal will be as SHOWN ON THE DRAWINGS. Excavated areas shall be backfilled with suitable material when necessary to complete the work. Frozen material shall not be placed in embankments. Rocks that are too large to be incorporated into the embankment shall be broken for incorporation, maneuvered to the face of the embankment, and embedded so that they will not roll or obstruct the use and maintenance of the roadbed, or moved to approved locations.

(e) *Conservation of Topsoil.* When SHOWN ON THE DRAWINGS, suitable topsoil shall be removed, transported, and deposited in the DESIGNATED stockpile areas.

(f) *Abandoned Structures and Obstructions.* Abandoned structures and obstructions shall be treated in accordance with Section 202.

203.07 DRAINAGE EXCAVATION. Drainage excavation shall include construction of side ditches, minor channel changes, inlet and outlet ditches, furrow ditches, ditches constructed along the road but beyond the roadway limits, and other minor earth drainage structures as SHOWN ON THE DRAWINGS. Excavated material shall be utilized in accordance with Subsection 203.06.

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203.08 FINISHING ROADBED. Rock requiring blasting, rippable rock, and boulders shall be excavated to a minimum depth of 6 inches below subgrade unless otherwise SHOWN ON THE DRAWINGS, and replaced with suitable cushion material obtained from within the roadway or from sources SHOWN ON THE DRAWINGS. Undrained pockets in a rock surface, within the limits of the roadbed, shall be excavated to properly drain or be filled with approved impermeable material.

For roads receiving base or surface course, rocks larger than 4 inches that do not protrude above the subgrade more than one-third of the depth of the base or surface course, or 3 inches, whichever is less, may be left in place.

For unsurfaced roads, unless otherwise SHOWN ON THE DRAWINGS, the top 4 inches below the finished roadbed surface shall consist of cushion material containing rocks less than 4 inches in greatest dimension that are developed by scarification, rolling, or importing suitable material obtained from sources SHOWN ON THE DRAWINGS.

The subgrade shall be shaped, dressed, and compacted when required. Low sections, holes, or depressions shall be brought to grade with suitable material.

203.09 SNOW REMOVAL. Snow or ice shall not be incorporated in the embankment. Snow shall be removed in advance of the work and deposited beyond the roadway limits in a manner that will not cause resource damage nor waste material.

203.10 FINISHING SLOPES. Finished slopes shall conform reasonably to the lines STAKED ON THE GROUND or SHOWN ON THE DRAWINGS. The finished slope shall be left in a roughened condition to facilitate the establishment of vegetative growth. The finish associated with template and stringline or handraking methods will not be permitted. Loose rock, debris, and other material larger than 6 inches in diameter shall be removed from the slope.

The tops of excavations, excluding areas of solid rock, shall be blended with the adjacent terrain by rounding where SHOWN ON THE DRAWINGS. Decomposed rock that may be cut without blasting or ripping shall be rounded. Earth overlying rock shall be rounded above the rock.

All rock excavations that require blasting shall be formed with controlled blasting techniques unless otherwise SHOWN ON THE DRAWINGS. Controlled blasting is defined as the controlled usage of explosives and blasting accessories in appropriately alined and spaced drill holes for the purpose of producing a free surface or shear plane in the rock excavation slopes and of minimizing landscape damage, adjacent ground vibration, and overbreak. Presplitting is not intended unless SHOWN ON THE DRAWINGS.

The Contractor shall drill, blast, and excavate short test sections (not to yield in excess of 1,000 cubic yards) to determine the controlled blasting method, hole spacing, and charge best suited to the material encountered.

203.11 OVERBUILDING AND LANDSCAPE AND STREAM PROTECTION. Excavated or embankment material shall be confined within the roadway limits to avoid overbuilding and to protect the landscape and streams. 203 .15

203.12 SUBGRADE TREATMENTS. Subgrade treatment shall consist of soil modification by admixing aggregates, placing filter cloth, fiber mat, wood corduroy, rock blanket, or other similar materials over areas of unsuitable embankment foundation material that are SHOWN ON THE DRAWINGS. The construction and material requirements for the type of subgrade treatment will be specified in the *Special Project Specifications* or SHOWN ON THE DRAWINGS.

203.13 EARTH BERMS. Permanent earth berms shall be constructed along the shoulder of the traveled way at locations SHOWN ON THE DRAWINGS. Material used in the construction of berms shall be well graded with no rocks having a diameter greater than one-fourth of the height of the berm.

Acceptable material for the berm may be windrowed as the roadbed is constructed. When the local material is not acceptable, material shall be imported from approved sources. Material used for berm construction shall contain no frozen material, roots, sod, or other deleterious material. Material shall not be wasted over the embankment slope.

Compaction shall be accomplished by operating the spreading equipment over the full section of the berm.

203.14 WATER. Water development, hauling, and application shall be in accordance with Section 207.

203.15 EMBANKMENT PLACING METHODS.

(a) *All Methods*. When an embankment is to be placed across swampy ground and removal of unsuitable material or subgrade treatment is not required, the lower part of the embankment shall be constructed in a single layer to the minimum depth necessary to support construction equipment.

(b) *Specific Methods*. All embankments shall be placed by one or more of the following methods as SHOWN ON THE DRAWINGS and listed in the SCHEDULE OF ITEMS:

Method 1. Side Casting and End Dumping. Embankment may be placed by side casting and end dumping. Where material containing a large amount of rock is used to construct embankments, a solid embankment shall be provided by working smaller rocks and fines in with the larger rocks and fines to fill the voids.

Method 2. Layer Placement. Surfaces steeper than a ratio of 3 to 1, upon which embankment is to be placed, shall be roughened or stepped when SHOWN ON THE DRAWINGS to provide permanent bonding of new and old materials.

Embankment shall be layer placed, except over rock surfaces, in which case material may be placed by end dumping to the minimum depth needed for operation of spreading equipment. Each embankment layer shall be leveled and smoothed before placement of subsequent layers. Hauling and spreading equipment shall be operated uniformly over the full width of each layer.

Suitable material shall be placed in layers no more than 12 inches
203 thick, except when the material contains rock more than 9 inches in diameter,
.15 in which case layers may be of sufficient thickness to accommodate the material involved. No layer shall exceed 24 inches before compaction.

Placing individual rocks or boulders greater than 24 inches will be permitted provided the embankment will accommodate them. Such rocks and boulders shall be at least 6 inches below subgrade. They shall be carefully distributed and the voids filled with finer material to form a dense and compacted mass.

Where material containing large amounts of rock is used to construct embankments, the layers may be of sufficient thickness to accommodate the material involved. A solid embankment with adequate compaction shall be constructed by working smaller rock and fines in with the larger rocks to fill the voids and by operating hauling and spreading equipment uniformly over the full width of each layer as the embankment is constructed.

Method 3. Controlled Compaction. Embankments shall be placed as specified in Method 2, except earth embankments shall be placed in horizontal layers not exceeding 8 inches (loose measure) and compacted. Material shall be at a moisture content suitable for attaining the required compaction. Embankments and the top 1 foot of excavation sections shall be compacted to at least 95 percent of the maximum density as determined by AASHTO T 99, Method C or D.

The density of the embankment material will be determined during the progress of the work in accordance with AASHTO T 191, T 205, and T 217; or T 238, and T 239. Corrections for coarse particles will be made in accordance with AASHTO T 224.

Density requirements will not apply to portions of rock embankments that cannot be tested in accordance with approved methods. When this condition exists, compaction shall be provided by working smaller rocks and fines in with the larger rocks to fill the voids and by operating equipment over the embankment materials.

Method 4. Controlled Compaction Using Density Control Strips. The embankment placement requirements for Method (3) shall apply for this method except that compaction shall be performed in accordance with Section

212. Where portions of rock embankment are constructed that cannot be tested in accordance with approved methods, each layer shall be rolled full width with the same number of passes as the adjacent embankment containing material represented by a control strip.

Method 5. Special Project Controlled Compaction. Embankments shall be placed and compacted to at least 90 percent of the maximum density determined by AASHTO T 180, Method C or D, except that compaction of not less than 95 percent of AASHTO T 180, Method C or D, shall be obtained for a minimum depth of 1 foot below subgrade for the width of the roadbed in both excavation and embankment sections.

The density will be determined during the work in accordance with AASHTO T 191, T 205, and T 217; or T 238 and T 239. Adjustment for course particles will be made in accordance with note 8 of AASHTO T 180, Method C.

203.16 CONSTRUCTION TOLERANCES. The tolerance class shall be as SHOWN ON THE DRAWINGS. Roadway ditches shall be constructed to flow in the direction of design with the gradient no flatter than one-half of 1 percent. 203.17

Item	Tolerance Class[a]					
	A	B	C	D	E	F
Roadbed Width (Feet)	+0.5	+1	+1	+1	+1	+2
Subgrade Elevation (Feet)	±0.1	±0.2	±0.5	±1	±2	±3
Centerline Alinement (Feet)	0.2	0.5	1	1	2	3
Slopes, Excavation and Embankment (Percent)	±3	±5	±5	±5	±10	±10

[a]Maximum allowable deviation from construction stakes and drawings.

Deviations shall be uniform in the direction of change for a distance of 200 feet or more along the project centerline.