

**Forest Service Handbook
National Headquarters - Washington Office
Washington, DC**

**Forest Service Handbook 7709.57 – Road Construction Handbook
Chapter 3 - Compliance with Drawings and Specifications**

Amendment: 7709.57-1992-1

Effective date: September 4, 1992

Duration: This amendment is effective until superseded or removed.

Superseded Directive: Entire Handbook issued September 1986; Title Page; 0--1 thru 7.3

Approved by: F. Dale Robertson, Chief

Date approved:

Responsible Staff:

Explanation of changes: Following is an explanation of the changes throughout the directive by section.

This amendment is a reissuance of FSH 7709.57 to conform the format and structure of the Handbook to the requirements of electronic directive issuance.

This amendment makes no substantive changes to the text. The only changes made are those necessary to meet new format requirements or to correct spelling, punctuation, or unit names.

This Handbook is now available electronically in the National Information Center in the same format as the paper copy. Henceforth, amendments to this Handbook will be issued to Forest Service units electronically on a document basis.

Contents

3.1 - General	3
3.2 - Construction Staking	3
3.3 - Clearing and Grubbing	4
3.4 - Excavation and Embankment	4
3.5 - Drainage	6
3.6 - Aggregate Base and Surface	7
3.7 - Erosion Control	8
3.8 - Structures and Other Features	9

3.1 - General

1. Conduct onsite inspections to ensure compliance with the contract drawings and specifications according to the following:

- a. Be completely familiar with the drawings, specifications, and contract provisions for each project.
- b. Be specific about what you are checking, and continuously refer to the contract specifications and drawings. Do not rely on memory.
- c. Be aware of critical or priority work that should be closely monitored during construction.
- d. Arrange for necessary equipment, materials, and support crews in advance and ask for additional help when you need it.
- e. Establish good relations and maintain good communications with the contractor and designated representative.
- f. Document your actions, observations, significant conversations, and the like.

2. Refer to FSH 7109.17, Engineering Certification Handbook for job performance requirements for commonly used specifications. Public works contracts may require the contractor to perform quality control and quantity measurement (Specifications 160 and 161). Review the requirements of each contract to determine the responsibilities of the contractor, and obtain assistance from technical specialists when necessary.

3.2 - Construction Staking

Prior to staking, the Engineer must ensure that the stakeout notes accurately represent the design and must resolve discrepancies. Monitor the following:

1. Clarity of stake markings.
2. Placement of:
 - a. Slope stakes.
 - b. Clearing limits.
 - c. Reference stakes.
 - d. Culvert, drainage structure, cattleguard, and other miscellaneous stakes.
3. Accuracy and completeness of notekeeping.

Check on-the-ground staking against the contract design to verify quantity and balance points when appropriate.

3.3 - Clearing and Grubbing

1. Review with the contractor the general work to be done and any special details such as trees to be saved, stakes and survey control points to be preserved, and location of cultural resources and all known utilities that could be damaged during clearing operations. Discuss with the contractor the general clearing procedure and disposal of materials. Pay particular attention to right-of-way timber on purchaser election public works contracts. Disposal methods are identified in the Schedule of Items and described in the specifications.

2. During clearing and grubbing operations, monitor:

- a. Placement of debris in accordance with specifications.
- b. Felling operations to ensure proper warnings are used.
- c. Removal of identified hazard trees.
- d. Actions taken to prevent damage to existing structures, utilities, residual trees, and cultural resources.
- e. Timber utilization and decking standards. Obtain assistance from Timber Management Staff if difficult or unusual circumstances develop.
- f. Pioneer road operations to avoid future problems such as oversteepening or undercutting slopes.
- g. The adequacy of clearing operations for later construction of catch basins and turnouts.
- h. Stump heights.
- i. Burning operations to ensure they conform to fire protection and suppression requirements, and are coordinated with district fire management plans.

3.4 - Excavation and Embankment

Monitor the initial excavation to ensure the contractor clearly understands the stakes, slope and subgrade tolerances, and embankment requirements and that soil moisture-density relationships have been determined if applicable. During excavation and placement of embankments, monitor:

1. Contractor's staking or references to control the excavation and placement of embankments.
2. Operations that affect:
 - a. Direction of material movement.
 - b. Turnouts.
 - c. Balance points.
 - d. Catch basins.
 - e. Curve widening, superelevation, crown, etc.
 - f. Other special features.
3. Safety precautions and warnings during blasting or other hazardous work.
4. Earthwork operations to:
 - a. Provide timely changes in grade, alignment, or slopes to balance quantities.
 - b. Ensure optimum use of excavated materials.
 - c. Keep overruns in excavation quantities to a minimum.
 - d. Identify unsuitable or unstable soils and groundwater not provided for in the road design.
 - e. Prevent damage to resources, roads, or facilities.
 - f. Ensure timely consultation with appropriate specialists or other design personnel if construction problems develop.
5. Embankment foundations for unstable materials and other unsatisfactory conditions.
6. Suitability of excavated material and moisture-density relationships.
7. Temporary drainage during wet weather and prior to seasonal shutdowns.
8. Confinement of operations within the clearing limits and excavated material within the roadway.

9. Treatment of oversize material.
10. Construction of catch basins, ditches, and drainage excavation.

3.5 - Drainage

1. Field check the as-staked culvert list before the contractor orders materials.
Ensure that:

- a. Culvert size appears adequate for apparent stream flow.
 - b. Culvert locations fit the ground.
 - c. Inlet/outlet conditions and grade are adequate.
 - d. Proper energy dissipation measures are taken.
2. Obtain required materials certifications prior to installation.
3. During drainage installation, monitor:
- a. Materials and procedures for the first few structures so that the contractor's installation crew knows exactly what is required.
 - b. Implementation of the erosion control plan.
 - c. Foundation, bedding, and camber requirements.
 - d. Pipe location, alignment, and grade. Make adjustments when conditions differ from the design.
 - e. Installations that require foundation approval prior to placing backfill.
 - f. The source of backfill material prior to backfilling.
 - g. Circumferential laps, lock-seams, gauge, and coupling bands prior to backfilling.
 - h. Equal backfill placement and compaction on both sides of the culvert to avoid deforming or lifting the structure.
 - i. Spelter repair of culverts damaged or field cut during installation.
 - j. Downdrain connections and anchors.

- k. Headwalls, end treatments, and energy dissipators.
- l. Dewatering if required.

4. Review the surface drainage design, including cross slope, dikes, berms, overside drains, and slope protection. Adjust to as-built conditions as necessary.

3.6 - Aggregate Base and Surface

1. Designated Sources. Designated materials sources are shown on the drawings. Before work starts, review the material sources, investigation reports, and development plans with the contractor.

2. During the development of a material source, monitor:

- a. Clearing, grubbing, and debris disposal.
- b. Placement of topsoil or overburden.
- c. Access, plant site, and stockpile site locations and construction.
- d. Drilling and loading pattern.
- e. Blasting precautions and safety.
- f. Sizes of material produced from blasting.
- g. Sideslopes, drainage, and site rehabilitation.

3. Contractor-Furnished Sources. The contractor must furnish test results and a certificate of compliance to ensure that the contractor-furnished materials source is capable of producing the specified product.

4. When the contractor chooses to furnish a materials source in place of the designated source, ensure that the weight and volume relationships of the material do not result in a financial disadvantage to the Government and that the alternate site is agreed to by the appropriate line officer (if necessary) and that resource impacts are considered.

5. Production. The contractor is responsible for gradation testing. During the production of aggregates, monitor:

- a. Contractor's sampling, testing, testing equipment, and procedures. Perform check tests as necessary.
- b. Records of inspections and tests.

- c. Procedures used in measuring materials:
 - (1) Weighing and scale operations if applicable.
 - (2) Moisture deductions if required by Special Project Specifications.
 - d. Stockpiling operations to ensure minimum segregation, loss, or contamination of material.
 - e. Use of all suitable material from designated sources.
 - f. General operations for compliance to the material source development plan and to assure protection of natural resources.
6. Placement. During the placement of aggregates, monitor:
- a. Completion and approval of the roadbed before aggregate is placed.
 - b. Plan locations where changes in aggregate widths and depths are shown on the drawings.
 - c. Appropriateness of design quantities.
 - d. Adverse effects of hauling equipment on the subgrade.
 - e. Widths and depths of compacted aggregate.
 - f. Compaction over the full roadbed width.
 - g. Gradation of the in-place and compacted aggregate.
 - h. Overruns or underruns.

3.7 - Erosion Control

1. Erosion control and watershed protection are major requirements during construction of transportation facilities. Make sure the soil is held in place within the construction limits to prevent sedimentation of water courses.

2. To ensure erosion and sedimentation are controlled, monitor:
- a. Contract restrictions such as maximum size of disturbed areas prior to treatment.
 - b. Contractor's compliance with the erosion control plan.

- c. Seasonal or temporary erosion control measures.
 - d. Timeframes for achieving permanent stabilization.
 - e. Weather forecasts.
3. Anticipate and prepare for adverse weather.

3.8 - Structures and Other Features

Drawings and specifications often include specialized structures or features such as retaining walls, bridges, underdrains, concrete fords, and asphalt pavements. Review the specialized Handbooks dealing with these topics.

Seek the assistance of specialists at the first indication of a problem or changes with regard to structures or other features. Construction problems can be corrected much more easily and less expensively if identified early.