

Walker Stewardship

Forest Service Supplemental Specifications

Table of Contents

Table of Contents 2

Preface..... 5

101 - Terms, Format, and Definitions..... 6

 101.01 Meaning of Terms..... 6

 101.03 Abbreviations..... 6

 101.04 Definitions..... 6

102 - Bid, Award, and Execution of Contract 9

 102 Bid, Award, and Execution of Contract..... 9

103 - Scope of Work..... 10

 Deletions 10

104 - Control of Work..... 11

 Deletions 11

 104.06 Use of Roads by Contractor 11

105 - Control of Material 12

 105.02 Material Sources. 12

 105.02(a) Government-provided sources..... 12

 105.05 Use of Material Found in the Work. 12

106 - Acceptance of Work 13

 106.07 Delete 13

107 - Legal Relations and Responsibility to the Public..... 14

 107.05 Responsibility for Damage Claims. 14

 107.06 Contractor’s Responsibility for Work..... 14

 107.09 Legal Relationship of the Parties. 14

 107.10 Environmental Protection. 14

108 - Prosecution and Progress..... 16

 108 Delete. 16

109 - Measurement and Payment..... 17

 109 Deletions 17

 109.02 Measurement Terms and Definitions..... 17

WALKER STEWARDSHIP FSSS

152 - Construction Survey and Staking 18

 152.02 General..... 18

 Table 152-1 Tolerances for reestablishing P-line, traverse, and elevations. 21

 Table 152-2 Cross section and slope stake tolerances..... 22

155 - Schedules for Construction Contracts 23

 155 Delete..... 23

185 - Low Volume Road Design 24

201 - Clearing and Grubbing 30

 201.02 Material:..... 30

 201.01 Description..... 30

 201.04 Clearing. (c) 30

 201.04 Clearing..... 31

 201.06 Disposal..... 31

203 - Removal of Structures and Obstructions 32

 203.01 Description..... 32

 203.04 Removing Material. 32

 203.05 Disposing of Material. 32

204 - Excavation and Embankment 34

209 - Structure Excavation and Backfill..... 46

 209.10 Backfill..... 46

 209.11 Compacting 46

 Table 209-1 Sampling and Testing Requirements..... 47

230 - Roadside Brushing..... 48

303 - Road Reconditioning 50

322 - Minor Aggregate Courses..... 54

602 - Culverts and Drains 61

 602.03 General..... 61

625 - Turf Establishment 62

 625.03 General..... 62

 625.05 Watering..... 62

 625.07 Seeding. (a) Dry method..... 62

WALKER STEWARDSHIP FSSS

625.07 Seeding. (b) Hydraulic method 62
Table 625-1. Fertilizer Application Rate. 62
650 - Road Closure Devices 63
703 - Aggregate..... 65
703.05 Subbase, Base, Surface Course, and Screened Aggregate..... 65
718 - Traffic Signing and Marking Material..... 70
718.05 Aluminum Panels..... 70

Preface

Preface_wo_03_15_2004_m

Delete all but the first paragraph and add the following:

The Forest Service, US Department of Agriculture has adopted FP-03 for construction of National Forest System Roads.

101 - Terms, Format, and Definitions

101.00_nat_us_07_25_2005

101.01_nat_us_01_22_2009

101.01 Meaning of Terms

Delete all references to the TAR (Transportation Acquisition Regulations) in the specifications.

101.03_nat_us_06_16_2006

101.03 Abbreviations.

Add the following to (a) Acronyms:

AFPA	American Forest and Paper Association
MSHA	Mine Safety and Health Administration
NIST	National Institute of Standards and Technology
NESC	National Electrical Safety Code
WCLIB	West Coast Lumber Inspection Bureau

.

Add the following to (b) SI symbols:

mp	Milepost
ppm	Part Per Million

101.04_nat_us_03_29_2007

101.04 Definitions.

Delete the following definitions and substitute the following:

Bid Schedule--The Schedule of Items.

Bridge--No definition.

Contractor--The individual or legal entity contracting with the Government for performance of prescribed work. In a timber sale contract, the contractor is the “purchaser”.

Culvert--No definition.

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Right-of-Way--A general term denoting (1) the privilege to pass over land in some particular line (including easement, lease, permit, or license to occupy, use, or traverse public or private lands), or (2) Real property necessary for the project, including roadway, buffer areas, access, and drainage areas.

Add the following:

Adjustment in Contract Price--“Equitable adjustment,” as used in the Federal Acquisition Regulations, or “construction cost adjustment,” as used in the Timber Sale Contract, as applicable.

Change--“Change” means “change order” as used in the Federal Acquisition Regulations, or “design change” as used in the Timber Sale Contract.

Design Quantity--“Design quantity” is a Forest Service method of measurement from the FS-96 *Forest Service Specifications for the Construction of Roads and Bridges*. Under these FP specifications this term is replaced by the term “Contract Quantities”.

Forest Service--The United States of America, acting through the Forest Service, U.S. Department of Agriculture.

Neat Line--A line defining the proposed or specified limits of an excavation or structure.

Pioneer Road--Temporary construction access built along the route of the project.

Purchaser--The individual, partnership, joint venture, or corporation contracting with the Government under the terms of a Timber Sale Contract and acting independently or through agents, employees, or subcontractors.

Protected Streamcourse--A drainage shown on the plans or timber sale area map that requires designated mitigation measures.

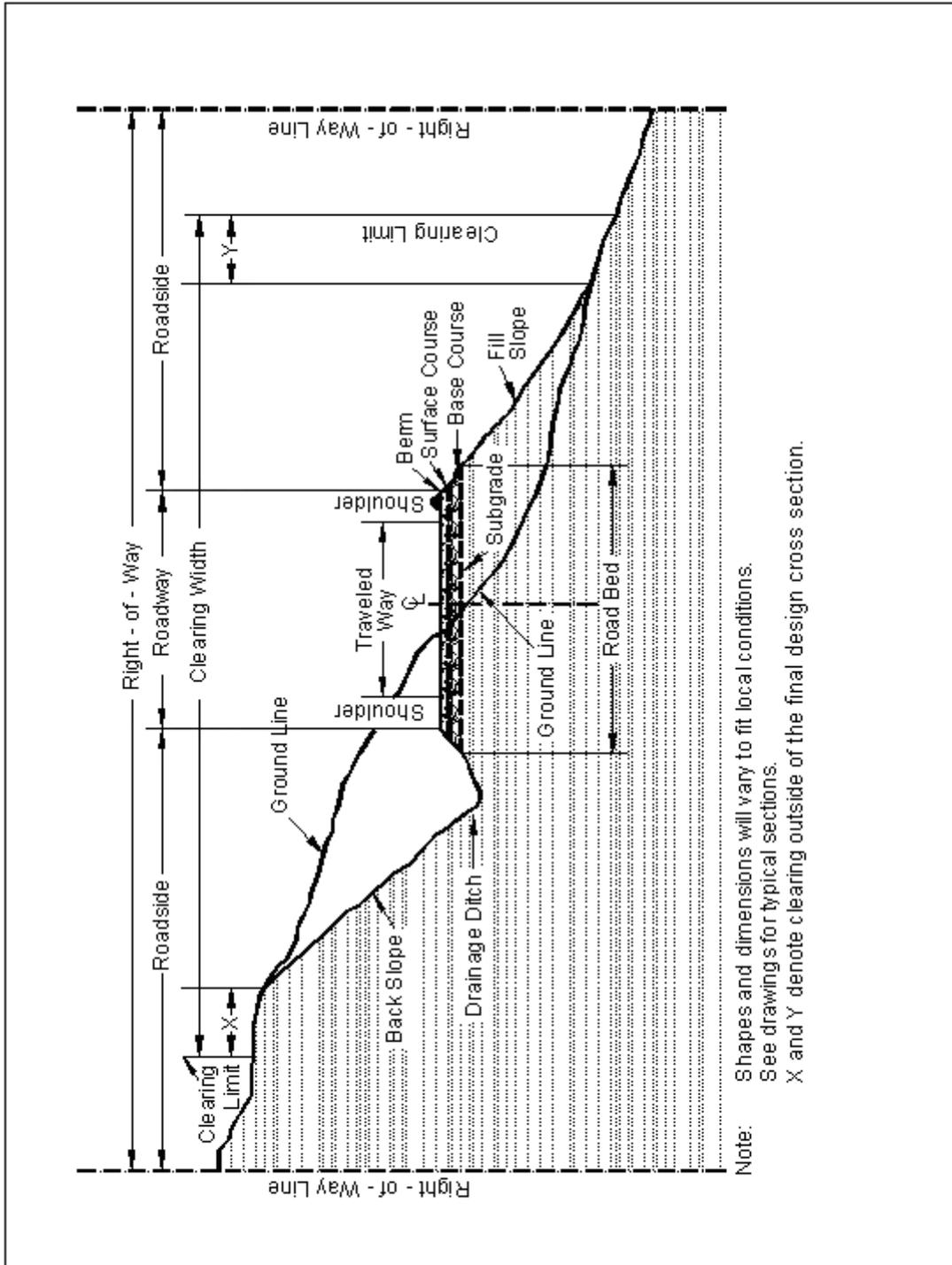
Road Order--An order affecting and controlling traffic on roads under Forest Service jurisdiction. Road Orders are issued by a designated Forest Officer under the authorities of 36 CFR, part 260.

Schedule of Items--A schedule in the contract that contains a listing and description of construction items, quantities, units of measure, unit price, and amount.

Utilization Standards--The minimum size and percent soundness of trees described in the specifications to determine merchantable timber.

Add Figure 101-1—Illustration of road structure terms:

Figure 101-1—Illustration of road structure terms.



102 - Bid, Award, and Execution of Contract

102.00_nat_us_02_16_2005

102 Bid, Award, and Execution of Contract

Delete Section 102 in its entirety.

103 - Scope of Work

103.00_nat_us_02_16_2005

Deletions

Delete all but subsection 103.01 Intent of Contract.

104 - Control of Work

104.00_nat_us_06_16_2006

Deletions

Delete Sections 104.01, 104.02, and 104.04.

104.06_nat_us_02_17_2005

Add the following subsection:

104.06 Use of Roads by Contractor

The Contractor is authorized to use roads under the jurisdiction of the Forest Service for all activities necessary to complete this contract, subject to the limitations and authorizations designated in the Road Order(s) or described in the contract, when such use will not damage the roads or national forest resources, and when traffic can be accommodated safely.

105 - Control of Material

105.02_nat_us_01_18_2007

105.02 Material Sources.

105.02(a) Government-provided sources.

Add the following:

Comply with the requirements of 30 CFR 56, subparts B and H. Use all suitable material for aggregate regardless of size unless otherwise designated. When required, re-establish vegetation in disturbed areas according to section 625.

105.05_nat_us_05_12_2004

105.05 Use of Material Found in the Work.

Delete 105.05 (a) and (b) and the last sentence of the second paragraph and substitute the following:

Materials produced or processed from Government lands in excess of the quantities required for performance of this contract are the property of the Government. The Government is not obligated to make reimbursement for the cost of producing these materials.

106 - Acceptance of Work

106.07_nat_us_05_11_2004

106.07 Delete

Delete subsection 106.07.

107 - Legal Relations and Responsibility to the Public

107.05_nat_us_05_11_2004

107.05 Responsibility for Damage Claims.

Delete the entire subsection.

107.06_nat_us_06_16_2006

107.06 Contractor's Responsibility for Work.

Delete the following from the first paragraph.

“except as provided in Subsection 106.07”.

107.09_nat_us_06_16_2006

107.09 Legal Relationship of the Parties.

Delete the entire subsection.

107.10_nat_us_06_16_2006

107.10 Environmental Protection.

Add the following:

Design and locate equipment repair shops, stationary refueling sites, or other facilities to minimize the potential and impacts of hazardous material spills on Government land.

Before beginning any work, submit a Hazardous Spill Plan. List actions to be taken in the event of a spill. Incorporate preventive measures to be taken, such as the location of mobile refueling facilities, storage and handling of hazardous materials, and similar information. Immediately notify the CO of all hazardous material spills. Provide a written narrative report form no later than 24 hours after the initial report and include the following:

- Description of the item spilled (including identity, quantity, manifest number, and other identifying information).
- Whether amount spilled is EPA or state reportable, and if so whether it was reported, and to whom.
- Exact time and location of spill including a description of the area involved.
- Containment procedures.
- Summary of any communications the Contractor had with news media, Federal, state and local regulatory agencies and officials, or Forest Service officials.
- Description of clean-up procedures employed or to be employed at the site including final disposition and disposal location of spill residue.

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When available provide copies of all spill related clean up and closure documentation and correspondence from regulatory agencies.

The Contractor is solely responsible for all spills or leaks that occur during the performance of this contract. Clean up spills or leaks to the satisfaction of the CO and in a manner that complies with Federal, state, and local laws and regulations.

108 - Prosecution and Progress

108.00_nat_us_02_16_2005

108 Delete.

Delete Section 108 in its entirety.

109 - Measurement and Payment

109.00_nat_us_02_17_2005

109 Deletions

Delete the following entire subsections:

109.06 Pricing of Adjustments.

109.07 Eliminated Work.

109.08 Progress Payments.

109.09 Final Payment.

109.02_nat_us_06_16_2006

109.02 Measurement Terms and Definitions.

(b) Contract quantity.

Add the following:

Contract quantities will be adjusted only when there are errors in the original design of 15% or more.

Change the following:

“(b) Cubic yard” to “(c) Cubic yard”.

Add the following definition:

(p) Thousand Board Feet (Mbf). 1,000 board feet based on nominal widths, thickness, and extreme usable length of each piece of lumber or timber actually incorporated in the job. For glued laminated timber, 1,000 board feet based on actual width, thickness, and length of each piece actually incorporated in the job.

152 - Construction Survey and Staking

152.00_nat_us_08_05_2005

Description

152.01(c) Material.

Add the following:

Use required stake dimensions and materials. Pre-paint the top 2 inches of all stakes and lath, or mark them with plastic flagging. Use designated colors for paint or flagging. Mark all stakes with a stake pencil that leaves a legible imprint, or with waterproof ink.

Do not use aerosol spray paints.

Use moisture-resistant paper for survey notes. Keep notes in books with covers that will protect the contents and retain the pages in numerical sequence.

Construction Requirements

152.02 General.

Delete the first two sentences.

Add the following:

When indicated on the plans, a preliminary survey line has been established on the ground. The project location line is established by offsets from this preliminary line.

Delete second sentence in second paragraph and replace with the following:

Reestablish missing reference, control lines, or stakes as necessary to control subsequent construction staking operations

152.03 Survey and Staking Requirements.

(b) Roadway cross-sections.

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Replace the first two sentences with the following:

Take roadway cross-sections normal to centerline. When the centerline curve radius is less than or equal to 200 feet, take cross-sections at a maximum centerline spacing of 25 feet. When the centerline curve radius is greater than 200 feet take cross-sections at a maximum centerline spacing of 80 feet.

c) Slope Stakes & References:

Replace section with the following:

Slope stakes and references. When required, locate slope stakes on designated portions of the road. Locate the slope stake catch points and use them to establish clearing limits and slope stake references.

Mark slope stakes with the station, the amount of cut or fill, the horizontal distance to centerline, and the slope ratios.

Place slope reference stakes at least 10 feet outside the clearing limit and mark with the offset distance to the slope stake. Place sight stakes when required.

Prior to clearing and grubbing operations, move the slope stake outside the clearing limit to the slope reference stake. After clearing and grubbing and before excavation, reset the slope stakes in their original position.

Use the designated method to establish the slope stake catchpoint.

- **Method I**—Computed Method. Use the template information shown in the plans or other Government-provided data to calculate the actual location of the catchpoint. The slope stake “catchpoint distance” provided may be used as a trial location to initiate slope staking. Recatch slope stakes on any section that does not match the staking report within the tolerances established in Table 152-2.
- **Method II**—Catchpoint Measurement Method. Determine the location of slope stake catchpoints by measuring the catchpoint distances shown in the plans or other Government-provided data.

(d) Clearing and grubbing limits.

Add the following:

Establish clearing limits on each side of the location line by measuring the required horizontal or slope distances shown in the stake notes. Mark the clearing limits with flagging or tags on trees to be left standing, or on lath. Make markings intervisible, and no more than 90 feet apart.

After establishing clearing limits, move the location line stake outside the clearing limits for station identification purposes, and mark it with horizontal distance to location line

(e) Centerline reestablishment.

Replace with the following:

Reestablish centerline from instrument control points. The maximum spacing between centerline points is 25 feet when the centerline curve radius is less than or equal to 200 feet. When the centerline curve radius is greater than 200 feet, the maximum distance between centerline points is 80 feet.

(g) Culverts.

Replace subsection with the following:

Set culvert reference stakes at all culvert locations. Set a culvert reference stake on the centerline of the culvert 10 feet from each end or beyond the clearing limit, whichever is greater. Record the following on culvert reference stakes:

- (1) Diameter, actual field measured length, and type of culvert.
- (2) The vertical and horizontal distance from the reference stake to the invert at the ends of the culvert.
- (3) Station of actual point where culvert intersects centerline.

When required, stake headwall for culverts by setting a hub with a guard stake on each side of the culvert on line with the face of the headwall. Perform this work after clearing is completed.

152.03 (l) Miscellaneous Survey and Staking.

Add the following:

- (11) Cattleguards
- (12) Drain Dips
- (13) Erosion Control Measures

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Replace Table 152-1 with the following two tables:

Table 152-1 Tolerances for reestablishing P-line, traverse, and elevations.

Precision Class	Minimum Position Closure	Angular Accuracy (±)	L-Line Tangent Control Points^a (±)	Vertical Closure^b (±)
A (Bridges)	1/10,000	2 sets, direct/reverse 10 second rejection limit	N/A	0.02 ft or 0.02ft/1000ft ^c
B	1/5,000	2 sets, direct/reverse 20 second rejection limit	0.1 ft	0.02 ft or 0.02ft/1000ft ^c
C	1/1,000	1 set, direct/reverse 1 minute rejection limit	0.2 ft	0.5ft/1000ft ^c
D	1/300	Foresight and backsight; 15 minute rejection limit ^c	0.4 ft	1.0ft/1000ft ^c
E	1/100	Foresight and backsight; 30 minute rejection limit ^c	0.8 ft	1.0ft/1000ft ^c

a. Accuracy of offset measurement.

b. Determine vertical closures at intervals not to exceed 2000 ft as measured along centerline.

c. Use greater value.

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Table 152-2 Cross section and slope stake tolerances.

Item	Tolerances				
	A	B	C	D	E
Allowable deviation of cross-section line projection from a true perpendicular to tangents, a true bisector of angle points, or a true radius of curves	(±)2°	(±)3°	(±)3°	(±)5°	(±)5°
Take cross-sections topography measurements so that variations in ground from a straight line connecting the cross-section points will not exceed	0.5 ft	1.0 ft	2.0 ft	2.0 ft	3.0 ft
Horizontal and vertical accuracy for cross-sections, in feet or percentage of horizontal distance measured from traverse line, whichever is greater.	0.1 ft or 0.4%	0.15 ft or 0.6%	0.2 ft or 1.0%	0.2 ft or 1.0%	0.3 ft or 1.0%
Horizontal and vertical accuracy for slope stake, slope stake references, and clearing limits. In feet or percentage of horizontal distance measured from centerline or reference stake, whichever is greater.					
Slope reference stakes and slope stakes.	0.1 ft or 0.4%	0.15 ft or 0.6%	0.2 ft or 1.0%	0.2 ft or 1.0%	0.3 ft or 1.0%
Clearing limits	1.0 ft	1.0 ft	1.0 ft	1.5 ft	2.5 ft

155 - Schedules for Construction Contracts

155.00_nat_us_05_11_2004

155 Delete.

Delete Section 155 in its entirety.

185 - Low Volume Road Design

185.00_nat_us_02_24_2005

Description

185.01 This work consists of the design of roads using non-geometric design methods. The design objective is to minimize quantities of excavation and embankment while conforming to the design standards and guidelines. The work includes furnishing all labor, transportation, materials, equipment, and other incidentals necessary to complete the design in accordance with these specifications and acceptable engineering practice.

Material

185.02 Government Furnished Information. The Contractor will be furnished access to the following information:

- (a) Design Criteria, elements, and standards
- (b) Survey notes
- (c) Applicable portions of Forest Service Manuals and Handbooks
- (d) Standard Specifications For Construction Of Roads And Bridges On Federal Highway Projects FP-03 and associated Forest Service Supplemental Specifications
- (e) Environmental documentation for the road construction.
- (f) Geotechnical investigation reports
- (g) Sample plans, specifications and drawings.

(h) Applicable standard drawings and detail sheets

Design Requirements

185.03 General. Except for work performed under the requirements of a timber sale contract by the timber purchaser's employees, accomplish the design under the direction of a registered professional engineer. Furnish a design conforming to the design standards and criteria. Accomplish the objectives set forth in the appropriate environmental document. Keep all notes, stakes, design computations, specifications, and drawings in a neat and orderly manner.

185.04 Design Program: Use the _____ computer program for all design. Use the same method of design computations for all portions of each road designed under this Section.

185.05 Field Review and Classification Notes. Before beginning the design, the Contractor visit the site and review the road location(s) to become familiar with the topography, drainage, and environmental conditions. Prepare classification notes for the road to provide information on clearing, grubbing, soils, rock, drainage, geotechnical investigation needs, potential disposal sites, and other necessary information.

Soils and rock will be classified in accordance with the following:

<u>Material Type</u>	<u>Classification</u>
Organic Material	Unsuitable
Soil and Loose Rock	Common

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Rock which can be moved Rippable (without blasting)

Rock that requires blasting Solid Rock

Boulders Boulders (list size range)

185.06 Design Criteria. The design criteria are those requirements such as management area direction, road management objectives, safety requirements, and traffic characteristics that govern selection of design elements and design standards. This information will be provided to the Contractor as background material that led to development of specific design elements and standards.

185.07 Design Elements and Standards. The Government will provide specific road design elements and standards for this project. See Forest Service Handbook FSH 7709.56 - Road Preconstruction Handbook, Chapter 4, to determine how to apply these elements and standards to the design process.

Basic road width will be specified in the design standards. Apply additional road width for turnouts, curve widening, and fill slough widening as shown in the design standards and/or derived from use of the furnished tables, to the basic width shown in the design standards to obtain total road width.

185.08 Specifications. Prepare the design and completed engineering drawings to be compatible with Standard Specifications For Construction Of Roads And Bridges On Federal Highway Projects FP-03 and associated Forest Service Supplemental Specifications.

In instances where the standard specifications are inadequate, prepare additional supplemental specifications to accomplish the intent of the design. Use the format and grammatical standards described in Subsection 101.01 of *Standard Specifications For Construction Of Roads And Bridges On Federal Highway Projects FP-03*. Obtain approval by the CO for all supplemental specifications.

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185.09 Design Products. Furnish the following products:

(a) Engineering Drawings. Drawings shall meet the requirements of subsection 104.03 unless otherwise designated. In addition to paper copies, furnish 1 engineering drawings in electronic format for the specified computer program. Format drawings on 11 inch by 17 inch sheets, or as directed by the CO. Furnish drawings that conform to content and format of samples provided by the CO.

Assemble the sheets in the following order:

1. Title Sheet
2. Vicinity Map
3. Estimate of Quantities
4. Typical Sections
5. General Notes (incorporate notes provided by the CO)
6. Drainage Listing
7. Drainage Construction Details
8. Riprap Details
9. Typical Construction Staking Details
10. Plan and Profile Drawings
11. Pit Development Plan

Use a vertical scale of 1 inch equals 10 feet, and horizontal scale of 1 inch equals 100 feet on plan and profile drawings. On details, use scales appropriate to the area and the elevation change. Show the centerline alignment with stationing, natural ground profile with stations and elevation, centerline grade with station and elevation, north arrow, scale, road name and number, sheet number, turnouts, location of rolling dips, culvert location and dimensions, excavation and embankment and clearing quantities, and balance points if applicable.

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- (b) Specifications. Furnish an electronic copy in an approved format of the Specification list showing FP-03 and FS Supplemental Specifications.
- (c) Staking Notes. Furnish one paper copy and one electronic copy in an approved format of construction staking notes. Include centerline grade elevation, centerline ground elevation, centerline cut or fill, template data left and right, slope ratios, offset from preliminary line to location line, preliminary line ground elevation, and information for trial catch points.
- (d) Computations. Furnish calculations including quantities of clearing, excavation, compaction factors, haul, culvert lengths and diameters, aggregate base and surfacing, and seeding. Include subtotaled quantities by classification and the grand totals shown by material. Compute excavation quantities by the average end area method. Compute seeding by slope areas of cut and fill slopes. Compute aggregate base or surfacing by final in-place quantities using appropriate compaction factors. Compute clearing quantities as the horizontal area between clearing limits.

185.10 Preliminary Review. Upon completion of a preliminary design drawings, submit the design drawings and specifications to the CO. Allow 30 days per submission for review. The CO may request additional specific drawings for unique situations in order to clarify layout, construction details, or methodology. If drawings must be resubmitted, the time for review starts over. The CO will provide comments and changes that are necessary for the design.

185.11 Formal Review. Submit modified drawings and specifications to the CO. Allow 30 days per submission for review. The CO may request additional specific drawings for unique situations in order to clarify layout, construction details, or methodology. If drawings must be resubmitted, the time for review starts over.

Submit final engineering drawings, specifications, construction staking notes, and working documents used for design including plots, cross sections, notes and similar information. Return Government furnished data, references, and property. Affix a State authorized seal by a registered professional engineer and sign all field books, staking notes, drawings, and working documents in accordance with applicable State laws; and attest in writing to the satisfactory

WALKER STEWARDSHIP FSSS

completion of the project. Upon acceptance, all documents become the property of the Government

185.12 Acceptance. Road Design will be evaluated under Subsections 106.02 and 106.04.

Measurement

185.13 Measure the Section 185 items listed in the bid schedule according to Subsection 109.02 and 109.04.

Payment

185.14 The accepted quantities will be paid at the contract price per unit of measurement for the Section 185 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

201 - Clearing and Grubbing

201.00_nat_us_08_05_2009

201.02 Material:

Delete Tree wound dressing material reference.

201.03 General.

Delete the last sentence.

201.04 Clearing.

Delete the last sentence of (d).

201.01_nat_us_02_18_2005

201.01 Description

Replace with the following

This work consists of clearing and grubbing within clearing limits and other designated areas.

201.04_nat_us_02_22_2005

201.04 Clearing. (c)

Delete paragraph (c) and replace with the following:

(c) In areas outside the excavation, embankment, and slope rounding limits, cut stumps to within 12 inches or one-third of the stump diameter of the ground, whichever is higher, measured on the side adjacent to the highest ground. For timber sales, stump heights will meet the requirements of the Timber Sale contract.

201.04 Clearing.

Delete subsection (d) and replace with the following:

WALKER STEWARDSHIP FSSS

(d) Do not cut vegetation less than 3 feet tall and less than 3 inches in diameter, that is within the clearing limits but beyond the roadway and not in a decking area, and that does not interfere with sight distance along the road.

Add the following:

(e) Trim branches of remaining trees or shrubs to give a clear height of 14 feet above the roadbed unless otherwise indicated. Trim tree limbs as near flush with the trunk as practicable.

(f) Remove brush from log decks. Deck logs so that logs are piled parallel to one another; can be removed by standard log loading equipment; will not damage standing trees; will not interfere with drainage, and will not roll. Keep logs in log decks free of brush and soil.

201.04_nat_us_02_18_2005

201.04 Clearing.

Add the following:

When marked in advance, remove dead trees over 6 inches in diameter measured at 12 inches above the ground that lean toward the road and are tall enough to reach the roadbed.

201.06_nat_us_02_18_2005

201.06 Disposal.

Delete the first sentence of this subsection and substitute the following:

Dispose of merchantable timber designated for removal according to the provisions of the timber sale contract.

203 - Removal of Structures and Obstructions

203.01_nat_us_02_25_2005

203.01 Description.

Delete and replace with the following:

This work consists of disposing of construction slash and debris, salvaging, removing, and disposing of buildings, fences, structures, pavements, culverts, utilities, curbs, sidewalks, and other obstructions.

203.04_nat_us_02_18_2005

203.04 Removing Material.

Replace the fourth and fifth paragraphs with the following:

Where part of an existing culvert is removed, remove the entire culvert upstream from the removal. The remaining downstream culvert may be left in place if no portion of the culvert is within 12 inches of the subgrade, embankment slope, or new culvert or structure; and the culvert ends are sealed with concrete.

Remove structures and obstructions in the roadbed to 12 inches below subgrade elevation.

Remove structures and obstructions outside the roadbed to 12 inches below finished ground or to the natural stream bottom.

203.05_nat_us_02_18_2005

203.05 Disposing of Material.

Add the following:

(e) Windrowing Construction Slash. Place construction slash outside the roadway in neat, compacted windrows approximately parallel to and along the toeline of embankment slopes. Do not permit the top of the windrows to extend above subgrade. Use construction equipment to matt down all material in a windrow to form a compact and uniform pile. Construct breaks of at least 15 feet at least every 200 feet in a windrow. Do not place windrows against trees. Obtain approval for pioneer roads. 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.

(f) Scattering. Scatter construction slash outside the clearing limits without damaging trees. Limb all logs. Place logs and stumps away from trees, positioned so they will not roll, and are not on top of one another. Limb and scatter other construction slash to reduce slash concentrations.

(g) Chipping or Grinding. Use an approved chipping machine to grind slash and stumps greater than 3 inches in diameter and longer than 3 feet. Deposit chips or ground woody material on embankment slopes or outside the roadway to a loose depth less than 6 inches. Minor amounts of

WALKER STEWARDSHIP FSSS

chips or ground woody material may be permitted within the roadway if they are thoroughly mixed with soil and do not form a layer.

(h) Debris Mat. Use tree limbs, tops, cull logs, split stumps, wood chunks, and other debris to form a mat upon which construction equipment is operated. Place stumps upside down and blend stumps into the mat.

(i) Decking Firewood Material. Remove brush from decks. Limb and deck logs that do not meet Utilization Standards according to Subsection 201.04 as directed by the CO. Cut logs to lengths less than 30 feet. Ensure that logs stacks are stable and free of brush and soil.

(j) Removal to designated locations. Remove construction slash to designated locations.

(k) Piling. Pile construction slash in designated areas. Place and construct piles so that if the piles are burned, the burning will not damage remaining trees. Keep piles free of dirt from stumps. Cut unmerchantable logs into lengths of less than 20 feet.

(l) Placing Slash on Embankment Slopes. Place construction slash on completed embankment slopes to reduce soil erosion. Place construction slash as flat as practicable on the completed slope. Do not place slash closer than 2 feet below subgrade. Priority for use of available slash is for: (1) through fills; (2) insides of curves; and (3) ditch relief outlets.

(m) Hydrological Sensitive Placement. Where required use this method in combination with other designated methods to dispose of material to reduce erosion and to aid in re-vegetation:

1. Place windrow segments on contours, wrap in type I geotextile.
2. Place logs as log erosion barriers on contours. Place logs so that 80% of their length is on the ground surface.
3. Scatter slash on bare or disturbed areas within or outside the clearing limits as directed.
4. Scatter chips or ground woody material on bare or disturbed areas within or outside the clearing limits as directed.

Place stumps in swales or on sites to form planting pockets. Place windrow segments on contours, wrap in type I geotextile.

203.08_nat_us_02_24_2005

203.08 Payment

Add the following:

Disposal of construction slash will be compensated under the designated pay item in Section 201.

204 - Excavation and Embankment

204.00_nat_us_03_26_2009

Replace Section 204 in its entirety with the following:

Description

204.01 This work consists of excavating material and constructing embankments. This includes furnishing, hauling, stockpiling, placing, disposing, sloping, shaping, compacting, and finishing earthen and rocky material.

204.02 Definitions.

(a) Excavation. Excavation consists of the following:

(1) Roadway excavation. All material excavated from within the right-of-way or easement areas, except subexcavation covered in (2) below and structure excavation covered in Sections 208 and 209. Roadway excavation includes all material encountered regardless of its nature or characteristics.

(2) Subexcavation. Material excavated from below subgrade elevation in cut sections or from below the original groundline in embankment sections. Subexcavation does not include the work required by Subsections 204.05, 204.06(b), and 204.06(c).

(3) Borrow excavation. Material used for embankment construction that is obtained from outside the roadway prism. Borrow excavation includes unclassified borrow, select borrow, and select topping.

(b) Embankment construction. Embankment construction consists of placing and compacting roadway or borrow excavation. This work includes:

- (1)** Preparing foundation for embankment;
- (2)** Constructing roadway embankments;
- (3)** Benching for side-hill embankments;
- (4)** Constructing dikes, ramps, mounds, and berms; and
- (5)** Backfilling subexcavated areas, holes, pits, and other depressions.

(c) Conserved topsoil. Excavated material conserved from the roadway excavation and embankment foundation areas that is suitable for growth of grass, cover crops, or native vegetation.

(d) Waste. Excess and unsuitable roadway excavation and subexcavation that cannot be used.

Material

204.03 Conform to the following Subsections:

Backfill material	704.03
Select borrow	704.07
Select topping	704.08
Topping	704.05
Unclassified borrow	704.06
Water	725.01

Construction Requirements

204.04 Preparation for Roadway Excavation and Embankment Construction. Clear the area of vegetation and obstructions according to Sections 201 and 203.

204.05 Reserved.

204.06 Roadway Excavation. Excavate as follows:

(a) General. Do not disturb material and vegetation outside the construction limits. Incorporate only suitable material into embankments. Replace any shortage of suitable material caused by premature disposal of roadway excavation. Dispose of unsuitable or excess excavation material according to Subsection 204.14.

At the end of each day's operations, shape to drain and compact the work area to a uniform cross-section. Eliminate all ruts and low spots that could hold water.

Retrieve material deposited outside of the clearing limits as directed by the CO. Place unsuitable material in designated areas.

(b) Rock cuts. Blast rock according to Section 205. Excavate rock cuts to 6 inches below subgrade within the roadbed limits. Backfill to subgrade with topping or with other suitable material. Compact the material according to Subsection 204.11

(c) Earth cuts. Scarify earth cuts to 6 inches below subgrade within the roadbed limits. Compact the scarified material according to Subsection 204.11.

(d) Pioneer Roads. Road pioneering, slash disposal, and grubbing of stumps may proceed concurrently with excavation. Conduct excavation and placement operations so material to be treated under Section 201 will not be incorporated into the roadway unless specified in the slash treatment method. Maintain drainage during pioneering operations.

Remove snow and ice in advance of the work and deposit beyond the roadway limits in a manner that will not waste material or generate sediment. Do not incorporate snow and ice into embankments. Place snow or ice in a manner to prevent resource damage.

204.07 Subexcavation. Excavate material to the limits designated by the CO. Take cross-sections according to Section 152. Prevent unsuitable material from becoming mixed with the backfill. Dispose of unsuitable material according to Subsection 204.14. Backfill the subexcavation with topping, or other suitable material. Compact the material according to Subsection 204.11.

204.08 Borrow Excavation. Use all suitable roadway excavation in embankment construction. Do not use borrow excavation when it results in excess roadway excavation. Deduct excess borrow excavation from the appropriate borrow excavation quantity.

Obtain borrow source acceptance according to Subsection 105.02. Develop and restore borrow sources according to Subsection 105.03. Do not excavate beyond the established limits. When applicable, shape the borrow source to permit accurate measurements when excavation is complete.

204.09 Preparing Foundation for Embankment Construction. Prepare foundation for embankment construction as follows:

(a) **Embankment less than 4 feet high over natural ground.** When designated, remove topsoil and break up the ground surface to a minimum depth of 6 inches by plowing or scarifying. Compact the ground surface according to Subsection 204.11.

(b) **Embankments over an existing asphalt, concrete, or gravel road surface.** Scarify gravel roads to a minimum depth of 6 inches. Scarify or pulverize asphalt and concrete roads to 6 inches below the pavement. Reduce all particles to a maximum size of 6 inches and produce a uniform material. Compact the surface according to Subsection 204.11.

(c) **Embankment across ground not capable of supporting equipment.** Dump successive loads of embankment material in a uniformly distributed layer to construct the lower portion of the embankment. Limit the layer thickness to the minimum depth necessary to support the equipment.

(d) **Embankment on an existing slope steeper than 1V:3H.** Cut horizontal benches in the existing slope to a sufficient width to accommodate placement and compaction operations and equipment. Bench the slope as the embankment is placed and compacted in layers. Begin each bench at the intersection of the original ground and the vertical cut of the previous bench.

204.10 Embankment Construction. Incorporate only suitable roadway excavation material into the embankment. When the supply of suitable roadway excavation is exhausted, furnish unclassified borrow to complete the embankment. Obtain written approval before beginning construction of embankments over 6 feet high at subgrade centerline. Construct embankments as follows:

(a) **General.** At the end of each day's operations, shape to drain and compact the embankment surface to a uniform cross-section. Eliminate all ruts and low spots that could hold water.

WALKER STEWARDSHIP FSSS

During all stages of construction, route and distribute hauling and leveling equipment over the width and length of each layer of material.

Compact embankment side slopes flatter than 1V:1.75H with a tamping type roller or by walking with a dozer. For slopes 1V:1.75H or steeper, compact the slopes as construction of the embankment progresses.

Where placing embankment on one side of abutments, wing walls, piers, or culvert headwalls, compact the material using methods that prevent excessive pressure against the structure.

Where placing embankment material on both sides of a concrete wall or box structure, conduct operations so compacted embankment material is at the same elevation on both sides of the structure.

Where structural pilings are placed in embankment locations, limit the maximum particle size to 4 inches.

(b) Embankment within the roadway prism. Place embankment material in horizontal layers not exceeding 12 inches in compacted thickness. Incorporate oversize boulders or rock fragments into the 12-inch layers by reducing them in size or placing them individually as required by (c) below. Compact each layer according to Subsection 204.11 before placing the next layer.

Material composed predominately of boulders or rock fragments too large for 12-inch layers may be placed in layers up to 24 inches thick. Incorporate oversize boulders or rock fragments into the 24-inch layer by reducing them in size or placing them individually according to (c) below. Place sufficient earth and smaller rocks to fill the voids. Compact each layer according to Subsection 204.11 before placing the next layer.

(c) Individual rock fragments and boulders. Place individual rock fragments and boulders greater than 24 inches in diameter as follows:

- (1) Reduce rock to less than 48 inches in the largest dimension.
- (2) Distribute rock within the embankment to prevent nesting.
- (3) Place layers of embankment material around each rock to a depth not greater than that permitted by (b) above. Fill all the voids between rocks.
- (4) Compact each layer according to Subsection 204.11 before placing the next layer.

(d) Embankment outside of roadway prism. Where placing embankment outside the staked roadway prism, place material in horizontal layers not exceeding 24 inches in compacted thickness. Compact each layer according to Subsection 204.11.

204.11 Compaction. Compact the embankment using one of the following methods as specified:

(a) Compaction A. Use AASHTO T 27 to determine the amount of material retained on a Number 4 sieve. If there is more than 80 percent retained on the No. 4 sieve use procedure (1).

WALKER STEWARDSHIP FSSS

If there is 50 to 80 percent retained on the No. 4 sieve use procedure (2). If there is less than 50 percent retained on the No. 4 sieve use procedure (3).

(1) Adjust the moisture content to a level suitable for compaction. Fill the interstices around rock with earth or other fine material as practical. Use compression-type rollers at speeds less than 6 feet per second and vibratory rollers at speeds less than 3 feet per second. Compact each layer of material full width with one of the following and until there is no visible evidence of further consolidation.

(a) Four roller passes of a vibratory roller having a minimum dynamic force of 40,000 pounds impact per vibration and a minimum frequency of 1000 vibrations per minute.

(b) Eight roller passes of a 20-ton compression-type roller.

(c) Eight roller passes of a vibratory roller having a minimum dynamic force of 30,000 pounds impact per vibration and a minimum frequency of 1000 vibrations per minute.

Increase the compactive effort for layers deeper than 12 inches as follows:

- For each additional 6 inches or fraction thereof, increase the number of roller passes in (a) above by four passes.
- For each additional 6 inches or fraction thereof, increase the number of roller passes in (b) and (c) above, by eight passes.

(2) Use AASHTO T 99 to determine the optimum moisture content of the portion of the material passing a No. 4 sieve. Multiply this number by the percentage of material passing a No. 4 sieve, and add 2 percent to determine the optimum moisture content of the material. Adjust the moisture content of material classified A-1 through A-5 to a moisture content suitable for compaction. Adjust the moisture content of material classified A-6 and A-7 to within 2 percent of the optimum moisture content.

Use compression-type rollers at speeds less than 6 feet per second and vibratory rollers at speeds less than 3 feet per second. Compact each layer of material full width according to (1) above.

(3) Classify the material according to AASHTO M 145. For material classified A-1 or A-2-4, determine the maximum density according to AASHTO T 180, method D. For other material classifications, determine the optimum moisture content and maximum density according to AASHTO T 99, method C.

Adjust the moisture content of material classified A-1 through A-5 to a moisture content suitable for compaction. Adjust the moisture content of material classified A-6 and A-7 to within 2 percent of the optimum moisture content.

Use compression-type or vibratory rollers. Compact each layer of material full width to at least 95 percent of the maximum density. Determine the in-place density and moisture content according to AASHTO T 310 or other approved test procedures. When required, use AASHTO T 224 to correct for coarse particles.

(b) Compaction B. Place material by end dumping to the minimum depth needed for operation of spreading equipment. Adjust the moisture content of the material to obtain a mass that will not visibly deflect under the load of the hauling and spreading equipment. Operate compaction equipment over the full width of each layer until there is no visible evidence of further consolidation or, if when a sheepsfoot roller is used, the roller “walks out” of the layer. Make at least three complete passes.

(c) Compaction C. Place material by end dumping to the minimum depth needed for operation of spreading equipment. Level and smooth each embankment layer before placing the next layers. Operate hauling and spreading equipment uniformly over the full width of each layer. Construct a solid embankment with adequate compaction 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.

204.12 Ditches. Slope, grade, and shape ditches. Remove all projecting roots, stumps, rock, or similar matter. Maintain all ditches in an open condition and free from leaves, sticks, and other debris.

Form furrow ditches by plowing or using other acceptable methods to produce a continuous furrow. Place all excavated material on the downhill side so the bottom of the ditch is approximately 18 inches below the crest of the loose material. Clean the ditch using a hand shovel, ditcher, or other suitable method. Shape to provide drainage without overflow.

204.13 Sloping, Shaping, and Finishing. Complete slopes, ditches, culverts, riprap, and other underground minor structures before placing aggregate courses. Slope, shape, and finish as follows:

(a) Sloping. Leave all earth slopes with uniform roughened surfaces, except as described in (b) below, with no noticeable break as viewed from the road. Except in solid rock, round tops and bottoms of all slopes including the slopes of drainage ditches. Round material overlaying solid rock to the extent practical. Scale all rock slopes. Slope rounding is not required on tolerance class D though M roads.

If a slide or slipout occurs on a cut or embankment slope, remove or replace the material, and repair or restore all damage to the work. Bench or key the slope to stabilize the slide. Reshape the cut or embankment slope to an acceptable condition.

(b) Stepped slopes. Where required by the contract, construct steps on slopes of $1\frac{1}{3}V:1H$ to $1V:2H$. Construct the steps approximately 18 inches high. Blend the steps into natural ground at the end of the cut. If the slope contains nonrippable rock outcrops, blend steps into the rock. Remove loose material found in transitional area. Except for removing large rocks that may fall, scaling stepped slopes is not required.

(c) Shaping. Shape the subgrade to a smooth surface and to the cross-section required. Shape slopes to gradually transition into slope adjustments without noticeable breaks. At the ends of

WALKER STEWARDSHIP FSSS

cuts and at intersections of cuts and embankments, adjust slopes in the horizontal and vertical planes to blend into each other or into the natural ground.

(d) Finishing. Finish the roadbed to be smooth and uniform, and shaped to conform to the typical sections. Remove unsuitable material from the roadbed and replace it with suitable material. Finish roadbeds to the tolerance class shown in table 204-2. Ensure that the subgrade is visibly moist during shaping and dressing. Scarify to 6 inches below the bottom of low sections, holes, cracks, or depressions and bring back to grade with suitable material. Maintain proper ditch drainage.

For surfaced roads, remove all material larger than 6 inches from the top 6 inches of the roadbed.

For unsurfaced roads, use one of the following methods to finish the roadbed:

- (1) **Method A.** Remove all material larger than 6 inches from the top 6 inches of the roadbed and replace with suitable material.
- (2) **Method B.** Use a vibratory grid roller or approved equal with a minimum weight of 10 tons. Roll at least 5 full-width passes or until there is no visible evidence of further consolidation.
- (3) **Method C.** For roads designated as Construction Tolerance Class K, L, or M, finish the roadbed by spreading the excavation. Eliminate rock berms.

204.14 Disposal of Unsuitable or Excess Material. Dispose of unsuitable or excess material at designated sites or legally off of the project.

When there is a pay item for waste, shape and compact the waste material in its final location. Do not mix clearing or other material not subject to payment with the waste material.

204.15 Acceptance. See Table 204-1 for sampling and testing requirements.

Material for embankment and conserved topsoil will be evaluated under Subsections 106.02 and 106.04.

Excavation and embankment construction will be evaluated under Subsections 106.02 and 106.04.

Clearing and removal of obstructions will be evaluated under Sections 201 and 203.

Measurement

204.16 Measure the Section 204 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

(a) Roadway excavation. Measure roadway excavation in its original position as follows:

- (1) Include the following volumes in roadway excavation:

WALKER STEWARDSHIP FSSS

- (a) Roadway prism excavation;
 - (b) Rock material excavated and removed from below subgrade in cut sections;
 - (c) Unsuitable material below subgrade and unsuitable material beneath embankment areas when a pay item for subexcavation is not shown in the bid schedule;
 - (d) Ditches, except furrow ditches measured under a separate bid item;
 - (e) Topsoil;
 - (f) Borrow material used in the work when a pay item for borrow is not shown in the bid schedule;
 - (g) Loose scattered rocks removed and placed as required within the roadway;
 - (h) Conserved material taken from stockpiles and used in Section 204 work; and
 - (i) Slide and slipout material not attributable to the Contractor's method of operation.
- (2) Do not include the following in roadway excavation:
- (a) Overburden and other spoil material from borrow sources;
 - (b) Overbreakage from the backslope in rock excavation;
 - (c) Water or other liquid material;
 - (d) Material used for purposes other than required;
 - (e) Roadbed material scarified in place and not removed;
 - (f) Material excavated when stepping cut slopes;
 - (g) Material excavated when rounding cut slopes;
 - (h) Preparing foundations for embankment construction;
 - (i) Material excavated when benching for embankments;
 - (j) Slide or slipout material attributable to the Contractor's method of operation;
 - (k) Conserved material taken from stockpiles constructed at the option of the Contractor; and
 - (l) Material excavated outside the established slope limits.
- (3) When both roadway excavation and embankment construction pay items are shown in the bid schedule, measure the following as roadway excavation only:
- (a) Unsuitable material below subgrade in cuts and unsuitable material beneath embankment areas when a pay item for subexcavation is not shown in the bid schedule;
 - (b) Slide and slipout material not attributable to the Contractor's method of operations; and
 - (c) Drainage ditches, channel changes, and diversion ditches.
- (b) Unclassified borrow, select borrow, and select topping.** When measuring by the cubic yard measure in its original position. If borrow excavation is measured by the cubic yard in place, take initial cross-sections of the ground surface after stripping overburden. Upon completion of excavation and after the borrow source waste material is returned to the source, retake cross-sections before replacing the overburden.
Do not measure borrow excavation used in place of excess roadway excavation.
- (c) Embankment construction.** Measure embankment construction in its final position. Do not make deductions from the embankment construction quantity for the volume of minor structures.

WALKER STEWARDSHIP FSSS

(1) Include the following volumes in embankment construction:

- (a) Roadway embankments;
- (b) Material used to backfill subexcavated areas, holes, pits, and other depressions;
- (c) Material used to restore obliterated roadbeds to original contours; and
- (d) Material used for dikes, ramps, mounds, and berms.

(2) Do not include the following in embankment construction:

- (a) Preparing foundations for embankment construction;
- (b) Adjustments for subsidence or settlement of the embankment or of the foundation on which the embankment is placed; and
- (c) Material used to round fill slopes.

(d) Rounding cut slopes. Measure rounding cut slopes horizontally along the centerline of the roadway if a pay item for slope rounding is included in the bid schedule. If a pay item for slope rounding is not included in the bid schedule slope rounding will be considered subsidiary to excavation.

(e) Waste. Measure waste by the cubic yard in its final position. Take initial cross-sections of the ground surface after stripping over burden. Upon completion of the waste placement, retake cross-sections before replacing overburden.

(f) Slope scaling. Measure slope scaling by the cubic yard in the hauling vehicle.

Payment

204.17 The accepted quantities will be paid at the contract price per unit of measurement for the Section 204 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

WALKER STEWARDSHIP FSSS

Table 204-1
Sampling and Testing Requirements

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Topping (704.05) & unclassified borrow (704.06)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type	Processed material before incorporating in work	Yes, when requested	Before using in work
		Moisture-density	—	AASHTO T 180, method D ⁽¹⁾ or T 99, method C ⁽¹⁾	1 per soil type but not less than 1 per	“	“	“
		Compaction	—	AASHTO T 310 or other approved procedures	1 per 6000 yd ² but not less than 1 per layer	In-place	—	Before placing next layer
Select borrow (704.07 & Select topping (704.08)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type but not less than 1 for each day of production	Processed material before incorporating	Yes, when requested	Before using in work
		Gradation	—	AASHTO T 27	“	“	“	“
		Liquid limit	—	AASHTO T 89	“	“	“	“
		Moisture-density	—	AASHTO T 180, method D ⁽¹⁾ or T 99, method C ⁽¹⁾	1 per soil type but not less than 1 per	“	“	“
Compaction	—	AASHTO T 310 or other approved procedures	1 per 6000 yd ² but not less than 1 per layer	In-place	—	Before placing next layer		

(1) Minimum of 5 points per proctor

WALKER STEWARDSHIP FSSS

Table 204-1 (continued)
Sampling and Testing Requirements

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Earth embankment (204.11, Compaction A)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type	Source of Material	Yes, when requested	Before using in work
		Moisture-density	—	AASHTO T 180, method D ⁽¹⁾ or T 99, method C ⁽¹⁾	1 per soil type but not less than 1 per 13,000 yd ³	“	“	“
		Compaction	—	AASHTO T 310 or other approved procedures	1 per 3500 yd ² but not less than 1 per layer	In-place	—	Before placing next layer
Top of subgrade (204.11 Compaction A)	Measured and tested for conformance (106.04)	Compaction	—	AASHTO T 310 or other approved procedures	1 per 2500 yd ²	In-place	—	Before placing next layer

(1) Minimum of 5 points per proctor.

WALKER STEWARDSHIP FSSS

Table 204-2
Construction Tolerances

	Tolerance Class ^(a)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Roadbed width (ft)	+0.5	+0.5	+1.0	+1.0	+1.0	+1.0	+1.5	+1.0	+2.0	+2.0	+2.0	+2.0	+2.0
Subgrade elevation (ft)	±0.1	±0.2	±0.2	±0.5	±0.5	±1.0	±1.0	±1.5	±2.0	±3.0	±2.0	±3.0	(c)
Centerline alignment (ft)	±0.2	±0.2	±0.5	±0.5	±1.0	±1.0	±1.5	±1.5	±2.0	±3.0	±3.0	±5.0	(c)
Slopes, excavation, and embankment (% slope ^(b))	±3	±5	±5	±5	±5	±5	±10	±10	±10	±10	±20	±20	±20

(a) Maximum allowable deviation from construction stakes and drawings.

(b) Maximum allowable deviation from staked slope measured from slope stakes or hinge points.

(c) Unless otherwise shown the centerline alignment and subgrade elevation, as built, have no horizontal curves with a radius of less than 80 feet, and no vertical curves with a curve length of less than 80 feet when the algebraic difference in the grade change is less than 10 percent, or a curve length of less than 100 feet when the algebraic difference of the grade change is greater than or equal to 10 percent. The centerline grade is not to exceed 20 percent in 100 feet of length.

209 - Structure Excavation and Backfill

209.10_nat_us_10_23_2007

209.10 Backfill.

(a) General.

Add the following:

Replace any pipe that is distorted by more than 5 percent of nominal dimensions, or that is ruptured or broken.

Do not place or backfill pipe that meets any of the following conditions until the excavation and foundation have been approved in writing by the CO:

- Embankment height greater than 6 feet at subgrade centerline.
- Installation in a protected streamcourse.
- Round pipe with a diameter of 48 inches or greater.
- Pipe arches with a span of 50 inches or greater.
- Any box culvert of structure other than pipe culverts.

(b) Pipe culverts.

(1) Pipe culverts with compacted backfill.

Add the following:

Excavate an area on each side of the pipe as needed to effectively achieve compaction requirements. Backfill without damaging or displacing the pipe. Complete backfilling of the trench with suitable material.

209.11_nat_us_02_24_2005

209.11 Compacting.

Delete the subsection and add the following:

Compact backfill using designated compaction method A, B, or C:

Method A. Ensure that backfill density exceeds the density of the surrounding embankment.

Method B. Adjust the moisture content of the backfill material to a moisture content suitable for compaction. Compact each layer using appropriate compaction equipment until visual displacement ceases. For compaction under sections 252, 254, 255, 257, 258 and 262 compact with a vibratory steel wheeled roller with a mass of at least 8 tons.

WALKER STEWARDSHIP FSSS

Method C. Determine optimum moisture content and maximum density according to AASHTO T 99 method C. Adjust the moisture content of the backfill material to a moisture content suitable for compaction. Compact material placed in all layers to at least 95 percent of the maximum density. Determine the in place density and moisture content according to AASHTO T 310 or other approved test procedures.

Table 209-1 Sampling and Testing Requirements

Add the following:

(2) Compaction methods (A) and (B) do not require AASHTO T-99 or T-310 test methods for foundation fill.

230 - Roadside Brushing

230.00_01_us_10_11_2006

Description

230.01 Work. This work consists of removing all vegetative material including limbs, residual slash, live roadside brush, and small trees within the brushing limits designated on the plans. Brushing areas include turnouts.

Construction

230.02 Brushing. Cut all brush and small trees (6 inches diameter, or less, at the point of cut) inside the brushing limits and outside the roadbed no higher than 4 inches above ground level (6 inches for machine brushing). If rocks or other obstructions are encountered, cut no higher than 6 inches above the obstruction. Limb live trees with a diameter larger than 6 inches to provide a clear height of __ feet above the road surface.

Cut all brush and trees located on the roadbed as nearly flush to the road surface as possible so stumps will not become a hazard to vehicle tires.

230.03 Windfalls. Limb windfalls lying within or across the brushing limits, cut off at the top of the existing cut slope or __ feet from the shoulder on the fill slope. Dispose of windfall material as slash.

230.04 Road Junctions. Do not deposit brushing debris on the roadway of adjoining roads.

230.05 Slash Treatment. Scatter slash outside the brushing limits without damaging residual trees. Slash is defined as any material that has a length greater than 36 inches or a diameter greater than __ inches at any point. Do not deposit material in streams, streambeds, culvert inlets or outlets, drainage ways, or cattle guards.

WALKER STEWARDSHIP FSSS

230.06 Acceptance. Roadside brushing will be evaluated under Subsection 106.02.

Measurement

230.07 Method. Measure the Section 230 items listed in the bid schedule according to Subsection 109.02 and the following.

Linear measurements will be horizontal along the road centerline.

Quantities will be the number of miles (or stations) and fractions thereof along the road centerline.

Payment

230.08. The accepted quantities will be paid at the contract price per unit of measurement for the section 230 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 109.05.

303 - Road Reconditioning

303.00_01_us_10_11_2006

Delete Section 303 in its entirety and replace with the following.

Description

303.01 This work consists of reconditioning ditches, shoulders, roadbeds, parking areas, turnouts, approach road intersections, cattleguards, asphalt surfaces and aggregate surfaces. Construct outslopes, clean and maintain all roadbed drainage structures when shown on the plans.

Material

303.02 Conform to the following Subsection:

Water 725.01

Construction Requirements

303.03 Ditch Reconditioning. Remove all slide material, sediment, vegetation, and other debris from the existing ditches and culvert inlets and outlets. Reshape ditches and culvert inlets and outlets to achieve positive drainage and a uniform ditch width, depth, and grade. Dispose of waste as shown on the plans.

303.04 Shoulder Reconditioning. Repair soft and unstable areas according to Subsection 204.07. Remove all slide material, vegetation, and other debris from existing shoulders including shoulders of parking areas, turnouts, and other widened areas. Dispose of waste as shown on the plans.

303.05 Roadbed Reconditioning Repair soft and unstable areas according to Subsection 204.07. Remove all organic, deleterious material larger than 6 inches from the top 6 inches of

WALKER STEWARDSHIP FSSS

subgrade. Dispose of waste as shown on the plans. Scarify, rip and shape the traveled way and shoulders at locations and to the depth and width designated on the plans. Remove surface irregularities and shape to provide a uniform surface.

Dispose of rock larger than 4 inches brought to the surface during scarification in areas designated on the plans.

For portions of roads not requiring scarification, the roadbed may contain rocks larger than 4 inches provided they do not extend above the finished roadbed surface. Reduce in place or remove rock extending above the finished roadbed surface. Dispose of removed rock in areas designated on the plans.

Compact using the following method as specified:

(a) Compaction A. Operate equipment over the full width.

(b) Compaction B. Operate rollers over the full width of each layer until visual displacement ceases, but not fewer than three complete passes. Use rollers that meet the following requirements:

(1) Steel wheeled rollers, other than vibratory, capable of exerting a force of not less than 250 pounds per inch of width of the compression roll or rolls.

(2) Vibratory steel wheeled rollers equipped with amplitude and frequency controls with a minimum weight of 6 tons, specifically designed to compact the material on which it is used.

(3) Pneumatic-tired rollers with smooth tread tires of equal size that will provide a uniform compacting pressure for the full width of the roller and capable of exerting a ground pressure of at least 80 psi.

303.06 Aggregate Surface Reconditioning. Repair soft and unstable areas to the full depth of the aggregate surface and according to Subsection 204.07. Scarify to the depth of the aggregate surface or to a depth of 8 inches, whichever is less, and remove surface irregularities. Reshape, finish, and compact the entire aggregate surface according to Section 308.

303.07 Roadway Reconditioning. Perform all the applicable work described in Subsections 303.03 through 303.06.

Maintain the existing cross slope or crown unless otherwise shown on the plans. Establish a blading pattern that will retain the surfacing on the roadbed and provide a through mixing of the materials within the completed surface width.

Blade and shape the subgrade for both surfaced and unsurfaced roads when moisture content is suitable for compaction.

303.08 Pulverizing. Scarify the surface to the designated depth and width. Pulverize all material to a size one and one half times the maximum sized aggregate or to 1½ inches, whichever is greater. Mix, spread, compact, and finish the material according to Section 301.

303.09 Acceptance. See Table 303-1 for sampling and testing requirements. Road reconditioning work will be evaluated under Subsections 106.02 and 106.04.

Measurement

303.10 Measure the Section 303 items listed in the Schedule of Items according to Subsection 109.02 and the following as applicable.

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Measure ditch reconditioning and shoulder reconditioning by the mile, by the station or foot horizontally along the centerline of the roadway for each side of the roadway.

Measure roadbed reconditioning, aggregate surface reconditioning, roadway reconditioning, and pulverizing by the mile, by the station, or by the square yard.

Payment

303.11 The accepted quantities will be paid at the contract price per unit of measurement for the Section 303 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

322 - Minor Aggregate Courses

322.00_nat_us_10_14_2011

Description

322.01 This work consists of constructing one or more courses of aggregate on a prepared surface. Work includes producing aggregate by grid rolling, screening, or crushing methods, or placing pit-run or Government-furnished aggregate.

Surface aggregate grading is designated as shown in Table 703-3.

Subbase and base aggregate grading is designated as shown in Table 703-2.

Screened aggregate grading is designated as shown in Table 703-16.

Material

322.02 Conform to the following Subsections:

Aggregate	703.05
Water	725.01

Construction Requirements

322.03 General. Prepare the surface on which the aggregate course is placed according to Section 204 or 303 as applicable.

Request approval of the roadbed in writing before placing aggregate.

Develop, haul, and apply water in accordance to Section 170.

Submit target values within the gradation ranges shown in Table 703-2 or 703-3 for the required grading. After reviewing the proposed target values the CO will determine the final values for the gradation and notify the Contractor in writing.

No quality requirements or gradation other than maximum size will be required for pit run and grid-rolled material. For grid rolling, use all suitable material that can be reduced to maximum size.

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After processing on the road, remove all oversize material from the road and dispose of it as directed by the CO.

If the aggregate is produced and stockpiled before placement, handle and stockpiled according to Section 320. Establish stockpile sites at approved locations.

322.04 Mixing and Spreading. Mix the aggregate and adjust the moisture content to obtain a uniform mixture with a moisture content suitable for the specified compaction method. Spread and shape the mixture on the prepared surface in a uniform layer with no segregation of size, and to a loose depth that will provide the required compacted thickness.

Do not place in layers exceeding 6 inches in compacted thickness for aggregate base and surface courses or twice the maximum particle size for screened aggregate. When more than one layer is necessary, compact each layer according to Subsection 322.05 before placing the next layer. Route hauling and leveling equipment uniformly over the full width.

When placing aggregate over geotextile, place aggregate in a single lift to the full depth specified.

322.05 Compacting. Compact each layer full width. Roll from the sides to the center, parallel to the centerline of the road. Along curbs, headers, walls, and all places not accessible to the roller, compact the material with approved tampers or compactors.

Compact the aggregate using one of the following methods as specified:

Compaction A. Operating spreading and hauling equipment over the full width of the travelway.

Compaction B. Operate rollers and compact as specified in Subsection 204.11(a)(1).

Compaction C. Moisten or dry the aggregate to a uniform moisture content between 5 and 7 percent based on total dry weight of the mixture. Operate rollers and compact as specified in Subsection 204.11(a)(1).

Compaction D. Compact to a density of at least 95 percent of the maximum density, as determined by AASHTO T 99, method C or D.

Compaction E. Removed.

Compaction F. Compact to a density of at least 95 per-cent of the maximum density, as determined by AASHTO T 180, method C or D.

Compaction G. Removed.

For all compaction methods, blade the surface of each layer during the compaction operations to remove irregularities and produce a smooth, even surface. When a density requirement is specified, determine the in place density and moisture content according to AASHTO T 310 or other approved test procedures.

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322.06 Construction Tolerance. If grade finishing stakes are required, finish the surface to within ± 0.10 feet from staked line and grade elevation.

If grade finishing stakes are not required, shape the surface to the required template and check the surface with a 10-foot straightedge. Defective areas are surface deviations in excess of 1/2 inch in 10 feet between any two contacts of the straightedge with the surface.

Correct all defective areas by loosening the material, adding or removing material, reshaping, and compacting.

Ensure that the compacted thickness is not consistently above or below the specified thickness. The maximum variation from the compacted specified thickness is 1/2 inch.

Ensure that the compacted width is not consistently above the specified width. The maximum variation from the specified width will not exceed +12 inches at any point.

322.07 Maintenance. Maintain the aggregate course to the correct line, grade, and cross-section by blading, watering, rolling, or any combination thereof until placement of the next course. Correct all defects according to Subsection 322.06.

322.08 Acceptance. See Table 322-1 or Table 322-2 as applicable, for sampling and testing requirements.

Aggregate gradation and surface course plasticity index will be evaluated under Subsection 106.04. If the aggregate is obtained from a Government stockpile then the above characteristics will be evaluated under Subsection 106.02. Other aggregate quality properties will be evaluated under Subsections 106.02 and 106.04. Placement of aggregate courses will be evaluated under Subsections 106.02 and 106.04.

The allowable upper and lower aggregate gradation limits are the Target Value plus or minus the allowable deviations shown in Tables 703-2 and 703-3.

The allowable upper and lower Plasticity index limits for surface courses are stated in 703.05(b).

Preparation of the surface on which the aggregate course is placed will be evaluated under Section 204 or 303 as applicable.

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Measurement

322.09 Measure the Section 322 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Measure square yard width horizontally to include the top of aggregate width including designed widening. Measure the square yard length horizontally along the centerline of the roadway.

If the measurement for aggregate is by cubic yard using contract quantities then measure aggregate by the cubic yard in-place once compacted, otherwise measurement for aggregate by the cubic yard is measured by the cubic yard in the hauling vehicle.

Measure thickness perpendicular to the grade of the travelway.

Measure width perpendicular to the centerline.

Payment

322.10 The accepted quantities will be paid at the contract price per unit of measurement for the Section 322 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

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**Table 322-1
Sampling and Testing Requirements**

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Aggregate source quality 703.05	Measured and tested for conformance (106.04 & 105)	LA abrasion (coarse)	—	AASHTO T 96	1 per type & source of material	Source of material	Yes, when requested	Before using in work
		Sodium sulfate soundness loss (coarse & fine)	—	AASHTO T 104	“	“	“	“
		Durability index (coarse & fine)	—	AASHTO T 210	“	“	“	“
		Fractured faces	—	ASTM D 5821	“	“	“	“
Subbase, Base, and Surface courses	Measured and tested for conformance (106.04)	Sample	—	AASHTO T 2	2 per day	From windrow or roadbed after processing or from approved crusher sampling device	Yes	48 hours

Table 322-1 (continued)
Sampling and Testing Requirements

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time	
Subbase, Base, and Surface	Measured and tested for conformance (10.6.04)	Moisture-density Method D	—	AASHTO T 99 ⁽¹⁾	1 per type and source of material	Source of material	Yes, when requested	Before using in work	
		Moisture-density Method F	—	AASHTO T 180 ⁽¹⁾	“	“	“	“	
			—		“	“	“	“	“
			—		“	“	“	“	“
		In-place density & moisture content	—	AASHTO T 310 or other approved procedures	3 per day	In-place	—	Before placing next layer	

**Table 322-2
Sampling and Testing Requirements**

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Screened Aggregate	Measured and tested for conformance (106.04)	Sample	—	AASHTO T 2	2 per day	From windrow or roadbed after processing or from approved crusher sampling device	Yes	48 hours

602 - Culverts and Drains

602.03_nat_us_09_06_2005

602.03 General.

Add the following:

Ensure that the final installed alignment of all pipe allows no reverse grades, and does not permit horizontal and vertical alignments to vary from a straight line drawn from center of inlet to center of outlet by more than 2 percent of pipe center length or 1.0 feet, whichever is less.

602.03_06_us_03_17_2010

602.03 General

Add the following:

Clean and paint damaged coating caused by welding, field cutting, or handling in accordance with AASHTO M 36M and ASTM A 849.

625 - Turf Establishment

625.03_nat_us_02_25_2005

625.03 General.

Delete the first subsection and add the following:

Apply turf establishment to finished slopes and ditches between _____ and _____. Do not seed during windy weather or when the ground is excessively wet, frozen, snow covered, extremely dry, cloddy, hard pan, or is otherwise untillable.

625.05_nat_us_03_30_2005

625.05 Watering.

Delete the entire subsection

625.07_nat_us_02_25_2005

625.07 Seeding. (a) Dry method.

Remove the last sentence “Lightly compact the seedbed within 24 hours after seeding.”

625.07 Seeding. (b) Hydraulic method.

Add the following:

Apply fertilizer conforming to Subsection 713.03 at the rates shown in Table 625-1. Fertilize areas inaccessible to hydro-type equipment by hand.

Table 625-1. Fertilizer Application Rate.

Type	Quantity per Slurry Unit
::	__lbs
::	__lbs

Apply the seed mixture at the rate of _____ kilograms of live seed per _____ (hectare/slurry unit). Include a tracer material consisting of either wood fiber mulch or grass cellulose fiber mulch to provide visible evidence of uniform application. Add the tracer to the slurry at a rate of _____ (400 pound per acre or 100 pound per slurry unit). Seed areas inaccessible to hydro-type equipment by hand.

650 - Road Closure Devices

650.00_nat_us_06_28_2007

Description

650.01 Work. Furnish and install, or install only, road closure devices using fabricated gates and accessories, combination post and rail barriers, concrete barriers, earth mound barriers, and other devices.

Materials

650.02 Requirements. Furnish materials to be used in fabricating gates and barriers. Ensure that all hardware is galvanized in accordance with AASHTO M 232 and meets the requirements of ASTM A 307. Furnish plain or cut washers that are American Standard Washers.

Furnish timber posts, rails, and lumber that meet the requirements of AASHTO M 168. Provide timber of the species and type, and rate of preservative treatment.

Furnish concrete that meets the requirements of Subsection 601.03, method B or C.

Construct earth mound barriers from excavated material adjacent to the barrier location, or from other designated locations.

Construction

650.03 Performance. Place road closure devices at designated locations. Construct all devices to the required dimensions. In assembling gates, perform required welding in accordance with the best modern practice and the applicable requirements of AWS D1.1.

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After assembly, clean non-galvanized steel pipe gates and paint them with one coat of zinc-rich primer and two coats of exterior enamel of the required type and color.

Set all posts vertically and embed them to the required depth. Place concrete for embedment against undisturbed earth within an excavation sized to achieve the embedment dimensions. Compact the backfill in 6 inch layers to finished grade.

Furnish and install all signs and/or reflective warning markers accessory to the road closure device.

650.04 Acceptance. Construction of road closure devices will be evaluated under Subsections 106.02 and 106.04.

Measurement

650.05 Measure the items listed in the bid schedule according to Subsection 109.02.

Payment

650.06 The accepted quantities, measured as provided in Subsection 109.02 and above, will be paid at the contract price per unit of measurement for the Section 650 pay item listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

703 - Aggregate

703.05_nat_us_08_14_2009

Delete 703.05 and replace with the following:

703.05 Subbase, Base, Surface Course, and Screened Aggregate.

(a) Subbase or base aggregate. Furnish hard, durable particles or fragments of crushed stone, crushed slag, or crushed gravel conforming the following:

(1) Gradation	Table 703-2
(2) Liquid limit, AASHTO T 89	25 max.
(3) Plastic limit, AASHTO T 90	Nonplastic
(4) Los Angeles abrasion, AASHTO T 96	40% max.
(5) Sodium sulfate soundness loss (5 cycles), AASHTO T 104	12% max.
(6) Durability index (coarse), AASHTO T 210	35 min.
(7) Durability index (fine), AASHTO T 210	35 min.
(8) Fractured faces, ASTM D 5821	50% min.
(9) Free from organic matter and lumps or balls of clay	

Do not use material that breaks up when alternately frozen and thawed or wetted and dried.

Obtain the aggregate gradation by crushing, screening, and blending processes as necessary. Fine aggregate, material passing the No. 4 sieve, shall consist of natural or crushed sand and fine mineral particles.

(b) Surface course aggregate. Furnish hard, durable particles or fragments of crushed stone, crushed slag, or crushed gravel conforming the following:

(1) Gradation	Table 703-3
(2) Liquid limit, AASHTO T 89	35 max.
(3) Plastic Index, AASHTO T 90	
a) If the percent passing the No. 200 sieve is less than 12%	2 to 9
b) If the percent passing the No. 200 sieve is greater than 12%	Less than 2
(4) Los Angeles abrasion, AASHTO T 96	40% max.
(5) Sodium sulfate soundness loss (5 cycles), AASHTO T 104	12% max.
(6) Durability index (coarse), AASHTO T 210	35 min.
(7) Durability index (fine), AASHTO T 210	35 min.
(8) Fractured faces, ASTM D 5821	75% min.
(9) Free from organic matter and lumps or balls of clay	

Do not use material that breaks up when alternately frozen and thawed or wetted and dried.

Do not furnish material that contains asbestos fibers.

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Obtain the aggregate gradation by crushing, screening, and blending processes as necessary. Fine aggregate, material passing the No. 4 sieve, shall consist of natural or crushed sand and fine mineral particles.

(c) **Screened aggregate** – Furnish hard, durable particles or fragments of stone, slag, or gravel conforming the following:

(1) Gradation	Table 703-16
(2) Plastic Index, AASHTO T 90	Less than 9
(3) Los Angeles abrasion, AASHTO T 96	55% max.
(4) Free from organic matter and lumps or balls of clay.	

Do not use material that breaks up when alternately frozen and thawed or wetted and dried.

Obtain the aggregate gradation by crushing, screening, and blending processes as necessary.

Delete Table 703-2 and replace with the following:

**Table 703-2
Target Value Ranges for Subbase and Base Gradation
Percent by Mass Passing Designated Sieve (AASHTO T 27 and T 11)**

Sieve Size	Grading Designation				
	A (Subbase)	B (Subbase)	C (Base)	D (Base)	E (Base)
2½ inch	100				
2 inch	97 – 100	100	100		
1½ inch		97 – 100			
1 inch	65 – 79 (6)		80 – 100 (6)	100	
¾ inch			64 – 94 (6)	86 – 100 (6)	100
½ inch	45 – 59 (7)				
⅜ inch			40 – 69 (6)	51 – 82 (6)	62 – 90 (6)
No. 4	28 – 42 (6)	40 – 60 (8)	31 – 54 (6)	36 – 64 (6)	36 – 74 (6)
No. 40	9 – 17 (4)			12 – 26 (4)	12 – 26 (4)
No. 200	4.0 – 8.0 (3)	4.0 – 12.0 (4)	4.0 – 7.0 (3)	4.0 – 7.0 (3)	4.0 – 7.0 (3)

() The value in the parentheses is the allowable deviation (±) from the target values..

Delete Table 703-3 and replace with the following:

**Table 703-3
Target Value Ranges for Surface Gradation**

Sieve Size	Percent by Mass Passing Designated Sieve (AASHTO T 27 and T 11)										
	Grading Designation										
	F	G	H	S	T	U					
1 1/2 inch	100			100							
1 inch	97-100	100		72 - 92 (6)	100						100
3/4 inch	76-89 (6)	97 - 100	97 - 100								
1/2 inch					71 - 91 (6)						
3/8 inch	56-68 (6)	70 - 80 (6)	80 - 92 (6)	51 - 71 (6)							71 - 90 (6)
No. 4	43-53 (7)	51 - 63 (7)	58 - 70 (7)	36 - 53 (7)	43 - 60 (7)						50 - 68 (7)
No. 8				26 - 40 (6)	30 - 46 (6)						34 - 51 (6)
No. 16	23-32 (6)	28 - 39 (6)	28 - 40 (6)								
No. 40	15-23 (5)	19 - 27 (5)	16 - 26 (5)	14 - 25 (5)	16 - 28 (5)						19 - 30 (5)
No. 200	10.0-16.0 (4)	10.0 - 16.0 (4)	9.0 - 14.0 (4)	8.0 - 15.0 (4)	8.0 - 15.0 (4)						8.0 - 15.0 (4)

() The value in the parentheses is the allowable deviation (±) from the target values. If the plasticity index (PI) is greater than 0, the TV range for the No. 200 sieve size is 8-12 (4).

Add Table 703-16:

Table 703-16

Gradation Requirements for Screened Aggregate

Sieve Size	Percent by Mass Passing Designated Sieve (AASHTO T 27 and T 11)						
	Grading Designation						
	L	M	N	O	P	Q	R
6 inch	100	100					
4 inch			100	100			
3 inch					100	100	
2 inch							100
No. 4		15-45		15-45		15-45	

718 - Traffic Signing and Marking Material

718.05_nat_us_08_05_2009

718.05 Aluminum Panels

Delete the third paragraph and replace with the following:

Clean, degrease and properly prepare the panels according to methods recommended by the sheeting manufacturer. Conversion coatings will conform to ASTM B-921 or ASTM B-449.