

Request for Proposals

BEAR CREEK NATIONAL RECREATION TRAIL RECONSTRUCTION

**GRAND MESA, UNCOMPAHGRE AND GUNNISON NATIONAL
FORESTS**

Background and Statement of Work: The U.S. Forest Service and National Forest Foundation (NFF) are working together to implement projects associated with the Great American Outdoors Act (GAOA). A variety of trail maintenance and reconstruction projects proposed by the Grand Mesa, Uncompahgre and Gunnison (GMUG) National Forests have been prioritized through the U.S. Department of Agriculture's list of deferred maintenance projects for GAOA funding. The NFF is seeking partners to implement reconstruction of the Bear Creek National Recreation Trail on the Ouray Ranger District.

Bear Creek National Recreation Trail is a popular hiking destination in the GMUG National Forests. The trail is known for its steep ascent, narrow exposure, panoramic views, and access to the historic Grizzly Bear and Yellow Jacket mines. This trail experiences high visitation during the summer months. Bear Creek National Recreation Trail is pedestrian only.

Information Requested

If interested in submitting a bid for this project, please provide a proposal for the above statement of work by providing:

- technical approach
- work experience
- cost
- capacity for this project
- experience in similar projects

Specific requirements are detailed below.

I. PROJECT OVERVIEW AND REQUIREMENTS

General Specifications

- (a) Description of Work – This Request for Proposals is for restoration services related to the reconstruction of Bear Creek National Recreation Trail. This project prioritizes the protection of natural resources, mitigation of safety hazards, and keeping trail users on the trail. The project focuses on constructing new retaining walls, maintaining and

restoring failed retaining walls, installing or hardening shallow stream ford and gully crossings, replacing the railings on pedestrian timber trail bridge, and constructing drainage features such as water bars. The complete Logbook of Items is located in Appendix A.

(b) Specifications - Project work shall be accomplished in accordance with the following:

- a. All work will be consistent with Appendix B: Specifications.
- b. All work will be consistent with Appendix C: Drawings and Maps.

(c) Project Location – The project is located on the Ouray Ranger District, Uncompahgre National Forest, approximately 2 miles south of Ouray, Colorado in Ouray County. To reach the trailhead, from Ouray, travel south on Highway 550 for two miles. Trailhead parking is a pullout on the east side of the highway immediately south of the tunnel. Trailhead is located at 8,440 feet elevation. Latitude: N38.003, Longitude: W-107.662.

(d) Work Schedule – The Contractor may propose one or two years (field seasons) to complete this Scope of Services. The project location is generally free of snow from June through October. The trail may be closed to the public Monday-Friday, and must be safely secured and remain open to the public on weekends (Saturdays-Sundays), and for the following organized events:

1. Hardrock 100 Endurance Run: July 11-14, 2024
2. Any additional events will be communicated to contractor with advance notice

Other Project Requirements and Specifications

(e) Utilities – In many locations there will be no or limited sanitation, water, electrical or housing services available. The Contractor shall make its own arrangements for temporary facilities if needed. Spike camping is possible. All camping on National Forest Lands are subject to Forest Service camping regulations. Camps must be kept clean and orderly, be bear safe, and sanitary. Camps are subject to periodic inspection.

(f) Safety – The Contractor must perform all work in a safe and conscientious manner. Contractor shall follow all OSHA standards for worker safety and shall provide necessary protection and equipment throughout the duration of the project.

(g) Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements
The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the NFF Representative. Any equipment being brought into National Forest System lands needs to be thoroughly cleaned in order to prevent the spread of invasive species.

Insurance Requirements

Upon selection of the winning bid, the Contractor agrees that it has and shall maintain the following insurance coverage indicated below. The effective date of all coverage shall precede the start of any work.

- a. State minimum workers' compensation insurance coverage for its employees, if any.
- b. Broad form general liability, property damage, and automotive liability insurance in the minimum amount of \$1,000,000 for bodily injury, death, or damage to property of any person and \$2,000,000 for bodily injury, death, or damage to property of more than one person. The Contractor shall name NFF an Additional Named Insured and provide NFF with a certificate of insurance evidencing such coverages, prior to the initiation of the Scope of Services.
- c. Contractor shall provide professional errors and omissions liability insurance if its Scope of Services includes professional services. Professional services for purposes of this section include, but are not limited to performing: architecture, engineering, landscape architecture, land surveying or planning, geological investigation, interior design/space planning, preparation and signing or stamping of drawings, maps, surveys or construction specifications, consulting, or design and development of computer software, programs or websites by the Contractor or by subcontractors on behalf of the Contractor. The minimum coverage limits required are \$1,000,000 for each claim and \$1,000,000 annual aggregate.

Prohibited Telecommunications Services and Equipment

The Contractor is responsible for compliance with the prohibition on certain telecommunications and video surveillance services or equipment identified in 2 CFR 200.216.

Payment/Performance Security

Contractor shall post cash, a letter of credit, bond, or other financial security that is easily convertible into cash in a form acceptable to the NFF, in its sole determination, to assure completion of the work required under any subsequent agreement and payment of all amounts lawfully due to all persons supplying or furnishing to the Contractor or Contractor's subcontractors with labor, laborers, materials, rental machinery, tools or equipment used or to perform the work. Contractor may incorporate required associated costs into mobilization costs or other approved expenses.

- a. Work that is classified as construction in accordance with the Miller Act or Little Miller Act or if required per conditions of the funding source, payment and performance bonding will be required in the full amount of any Agreement. For the purposes of this Request for Proposal, construction is defined as "any contract greater than \$100,000 for the construction, alteration, or repair of any public building or public work where the federal government is the owner", or
- b. If Contractor is not self-performing at least 85% of the total contract value or if the cost of materials is in excess of the larger of \$100,000 or 50% of the contract total, payment and performance bonding will be required in the full amount of the agreement, or
- c. If the value of the agreement is in excess of \$250,000, Contractor will be required to post financial security in a form acceptable to the NFF in the amount of 5% of the total agreement value up to \$250,000 in total financial security.

American Made Products. The work associated with this RFP is subject to Build America, Buy America Act. P.L. 117-58, Secs 70911-70917, and as such, domestic content procurement preference requires all iron and steel, manufactured products and construction materials used within the scope of this Agreement, be produced in the United States.

Federal Exclusion Verification

The selected Contractor will be required to affirm that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

Federal Flowdown Provisions

Flowdown Requirements: Any Agreement associated with this RFP may be subject to flowdown requirements under associated federal or state funding agreements, which are included and made part of by this reference.

II. REQUIRED COMPONENTS

Technical Proposal

Please provide a detailed technical approach to the work.

The Contractor must identify what they can supply in terms of materials, labor, equipment, supplies, supervision, quality control, safety and rigging, and incidentals required to complete the work specified in Appendices A – C.

Contractor Qualifications

- I. Past Experience – Please provide a brief explanation of previous work experience with land management agencies.
- II. References – Please provide three professional references that can speak to past performance.

Pricing Schedule

Contractor shall price work according to the schedule below. Prevailing wages are required per conditions of funding sources.

All work items will be awarded at the discretion of the NFF, as budgetary obligations allow.

Quantities in the below pricing schedule are approximate and may fluctuate depending on field conditions. For any changes in quantities that may result in costs exceeding the total contract amount, the Contractor must provide the NFF Representative with a written proposal. The Contractor must receive written approval and a Notice to Proceed before beginning work on additional proposed quantities.

BASE BID

Phase I - High Priority	Quantity	Unit of Measure	Unit Cost	Extended Cost
a. Mobilization	1	Lump Sum		
b. Install or Reconstruct Timber Retaining Wall	195	Square Ft		
c. Install Rock or Treated Rock Retaining Wall	1776	Square Feet		
d. Re-establish original route; Install Retaining Wall (1,200 Sq. Ft.)	1	Lump Sum		
e. Install Shallow Stream Ford and Gully Xing; Rock Retainer	1	Each		
e. Repair Trail Bridge	1	Each		
PHASE I SUBTOTAL				
Phase II	Quantity	Unit of Measure	Unit Cost	Extended Cost
a. Mobilization	1	Lump Sum		
b. Install or Reconstruct Timber Retaining Wall	90	Square Ft		
c. Install Rock or Treated Rock Retaining Wall	215	Square Ft		
d. Trail restoration; Minor reroute	50	Linear Ft		
e. Split Boulder	1	Each		
f. Install Shallow Stream Ford and Gully Xing, Log Retainer	2	Each		
g. Install Shallow Stream Ford and Gully Xing, Rock Retainer	4	Each		
PHASE II SUBTOTAL				
BASE BID TOTAL				

OPTIONAL BID

Add Alternates	Quantity	Unit of Measure	Unit Cost	Extended Cost
a. Install Rock Water Bar	9	Each		
b. Install or Reconstruct Timber Retaining Wall	600	Square Feet		
c. Install Rock or Treated Rock Retaining Wall	60	Square Feet		
d. Remove or Cover Culvert; Re-establish Fill; Install Retaining Wall (80 Sq Ft)	1	Lump Sum		
e. Install Shallow Stream Ford and Gully Xing, Rock Retainer	4	Each		
f. Basic Trail Restoration	200	Linear Ft		
OPTIONAL TOTAL				

GRAND TOTAL				
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III. SUBMISSION, EVALUATION, AND CONTACTS

Contractor Selection Process

This is a request for proposals only and bids furnished are not offers from the National Forest Foundation. This request does not commit the National Forest Foundation to pay any costs incurred in the preparation or submission of the proposal or to contract for supplies or services.

The NFF will use the Evaluation Factors below to review each submitted bid. Based on the outcomes of that selection process, the NFF will notify successful and unsuccessful bidders by March 31, 2024 and will prepare a separate contract document.

Evaluation Factors and Relative Importance

The following criteria will be used in the evaluation of submitted proposals, ordered from highest weighting (level 3) to lowest weighting (level 1).

Level 3 Criteria

- Price / cost
- Equipment and contractor capability
- Timing of when contractor can begin and/or finish the project
- Past performance, references, and USFS feedback

Level 2 Criteria

- Technical proposal / proposed approach to project
- Overall strategic benefits to meeting NFF goals and grant needs, requirements, and timelines

Level 1 Criteria

- Benefits to the local community
- Relationship to local community

Point of Contact

Please submit any questions about the project in writing to the Point of Contact.

Kaily Raley
National Forest Foundation, GMUG Recreation Coordinator
kraley@nationalforests.org

Responses will be shared with known interested parties by email or otherwise posted at <https://www.nationalforests.org/rfp>.

Site Visits

Due to the timing of this RFP during the winter season, a virtual showcase will be scheduled on March 7, 2024, from 10:00am – 11:30am MT.

To RSVP and receive a meeting link for the virtual showcase, please email kraley@nationalforests.org.

Bid Submission

Submit bids via email to kraley@nationalforests.org by March 22, 2024.

Equal Opportunity Provider

In accordance with Federal law and U.S. Department of Agriculture policy, the National Forest Foundation is prohibited from discriminating on the basis of race, color, national origin, sex, age, religion, political beliefs, or disability.




APPENDIX A.





I. Logbook of Items





Mile Post	Item	Comments	Est. Qty	Unit	Phase
0.000	Bear Creek NRT Trailhead	No Work			
0.112	Switchback	No Work			
0.221	Switchback	No Work			
0.313	Shallow Stream Crossing and Rock Retainer	No Work			
0.360	Switchback	No Work			
0.399	Shallow Stream Crossing and Rock Retainer	No Work			
0.442	Switchback	No Work			
0.485	Install Shallow Stream Ford and Gully Xing, Rock Retainer		1	Each	OPT
0.566	Switchback	No Work			
0.643	Rock Retaining Wall	No Work			
0.703	Reconstruct Rock Retaining Wall		45	Sq Ft	2
0.756	Switchback	No Work			
0.794	Reconstruct Timber Retaining Wall	Above and Below Tread	350	Sq Ft	OPT
0.822	Switchback	No Work			
0.924	Switchback	No Work			
0.968	Switchback	No Work			
1.016	Switchback	No Work			
1.068	Switchback	No Work			
1.193	Install Rock Retaining Wall; Re-establish original route		1200	Sq Ft	1
1.197	Install Rock Retaining Wall		40	Sq Ft	1
1.211	Install Rock Retaining Wall		200	Sq Ft	1
1.250	Install Rock Retaining Wall		30	Sq Ft	OPT
1.273	Reconstruct Timber or Rock Retaining Wall		90	Sq Ft	OPT
1.353	Install Rock Retaining Wall	Also Low Water Stream Ford	90	Sq Ft	2
1.375	Reconstruct Rock Retaining Wall		90	Sq Ft	1
1.385	Install Shallow Stream Ford and Gully Xing, Rock Retainer		1	Each	2
1.431	Install Timber or Rock Retaining Wall		160	Sq Ft	OPT
1.482	Split Boulder	Split large boulder to widen passage	1	Each	2
1.490	Install Shallow Stream Ford and Gully Xing, Rock Retainer		1	Each	1
1.522	Trail Restoration	Excavate Grade approx. 4 ft segment; Lower grade	4	Linear Ft	OPT
1.644	Low Water Stream Crossing	No Work			
1.701	Install Shallow Stream Ford and Gully Xing, Log Retainer		1	Each	2
1.730	Stream Crossing	No Work			
1.760	Install Shallow Stream Ford and Gully Xing, Rock or Log Retainer		1	Each	2
1.856	Install Shallow Stream Ford and Gully Xing, Log Retainer		1	Each	2
1.805	Install Rock or Timber Retaining Wall	High exposure location	45	Sq Ft	1
1.905	Repair 4x13 Bridge	Replace Hand Railing; Items needed: (6) 4x4x5' treated lumber, (4) 3x8x6' treated lumber, (24) 0.5X8 inch hot dipped galvanized carriage head bolts & nuts w/ washers	1	Each	1
1.957	Low Water Stream Crossing	No Work			





1.970	Install Rock Retaining Wall		36	Sq Ft	1
1.984	Stream Crossing	No Work			
2.018	Install Rock Retaining Wall		120	Sq Ft	1
2.101	Install Rock Retaining Wall	Replace Aspen; Shave rebar	30	Sq Ft	2
2.247	Stream Crossing	No Work			
2.281	Install Rock Retaining Wall		50	Sq Ft	2
2.352	Grizzly Bear Mine – Gated adit	No Work			
2.377	Trail Restoration; Minor Reroute	Reroute trail approx. 5 feet upslope	50	Linear Ft	2
2.422	Low Water Stream Crossing	No Work			
2.614	Grizzly Bear Mine - vent	No Work			
2.635	Install Shallow Stream Ford and Gully Xing, Rock Retainer		1	Each	OPT
2.652	Install Rock Retaining Wall		50	Sq Ft	1
2.662	Install Rock Retaining Wall		30	Sq Ft	OPT
2.746	Switchback	No Work			
2.755	Switchback	No Work			
2.808	Install Rock Retaining Wall	Active slide area	1200	Sq Ft	1
2.843	Remove or cover culvert; Re-establish fill; Install Retaining Wall		80	Sq Ft	OPT
2.955	Stream Crossing	No Work			
2.963	Switchback	No Work			
3.109	Trail Restoration	Sides pulled in; 24 inch tread re-established	190	Linear Ft	OPT
3.211	Install Rock Waterbar		1	Each	OPT
3.226	Install Rock Waterbar		1	Each	OPT
3.353	Install Shallow Stream Ford and Gully Xing, Rock Retainer		1	Each	OPT
3.366	Install Rock Waterbar		1	Each	OPT
3.401	Install Rock Retaining Wall	Below Tread	40	Sq Ft	1
3.498	Switchback	No Work			
3.552	Switchback	No Work			
3.623	Install Rock Waterbar		1	Each	OPT
3.693	Low Water Stream Crossing	No Work			
3.722	Switchback	No Work			
3.729	Switchback	No Work			
3.766	Switchback	No Work			
3.784	Switchback	No Work			
3.838	Low Water Stream Crossing	No Work			
3.876	Install Rock Waterbar		1	Each	OPT
3.899	Install Rock Waterbar		1	Each	OPT
4.009	Install Rock Waterbar		1	Each	OPT
4.028	Install Timber Retaining Wall		40	Sq Ft	2
4.108	Install Timber Retaining Wall		150	Sq Ft	1
4.157	Install Rock Waterbar		1	Each	OPT
4.194	Install Timber or Rock Retaining Wall	Below tread	50	Sq Ft	2
4.244	Install Shallow Stream Ford and Gully Xing, Rock Retainer		1	Each	2
4.269	Install Shallow Stream Ford and Gully Xing, Rock Retainer		1	Each	2
4.274	Install Rock Waterbar	Mitigate trenching	1	Each	OPT
4.290	Yellow Jacket Mine - Trailhead	No Work			





II. Work Station Photos





Mile Post	Item	Photos	Phase
0.000	Bear Creek NRT Trailhead		
0.485	Install Shallow Stream Ford and Gully Xing, Rock Retainer		OPT
0.703	Reconstruct Rock Retaining Wall		2
0.794	Reconstruct Timber Retaining Wall		OPT





1.193	Install Rock Retaining Wall; Re-establish original route		1
1.197	Install Rock Retaining Wall		1
1.211	Install Rock Retaining Wall		1
1.250	Install Rock Retaining Wall		OPT





1.273	Reconstruct Timber or Rock Retaining Wall		OPT
1.353	Install Rock Retaining Wall		2
1.375	Reconstruct Rock Retaining Wall		1
1.385	Install Shallow Stream Ford and Gully Xing, Rock Retainer		2





1.431	Install Timber or Rock Retaining Wall		OPT
1.482	Split Boulder		2
1.490	Install Shallow Stream Ford and Gully Xing, Rock Retainer		1
1.522	Trail Restoration		OPT





1.701	Install Shallow Stream Ford and Gully Xing, Log Retainer		2
1.760	Install Shallow Stream Ford and Gully Xing, Rock or Log Retainer		2
1.856	Install Shallow Stream Ford and Gully Xing, Log Retainer		2
1.805	Install Rock or Timber Retaining Wall		1





1.905	Repair 4x13 Bridge		1
1.970	Install Rock Retaining Wall		1
2.018	Install Rock Retaining Wall		1
2.101	Install Rock Retaining Wall		2





2.281	Install Rock Retaining Wall		2
2.377	Trail Restoration; Minor Reroute		2
2.635	Install Shallow Stream Ford and Gully Xing, Rock Retainer		OPT
2.652	Install Rock Retaining Wall		1

2.662	Install Rock Retaining Wall		OPT
2.808	Install Rock Retaining Wall		1
2.843	Remove or cover culvert; Re-establish fill; Install Retaining Wall		OPT
3.109	Trail Restoration		OPT

3.211	Install Rock Waterbar		OPT
3.226	Install Rock Waterbar		OPT
3.353	Install Shallow Stream Ford and Gully Xing, Rock Retainer		OPT
3.366	Install Rock Waterbar		OPT

3.401	Install Rock Retaining Wall		1
3.623	Install Rock Waterbar		OPT
3.876	Install Rock Waterbar		OPT
3.899	Install Rock Waterbar		OPT

4.009	Install Rock Waterbar		OPT
4.028	Install Timber Retaining Wall		2
4.108	Install Timber Retaining Wall		1
4.157	Install Rock Waterbar		OPT

4.194	Install Timber or Rock Retaining Wall		2
4.244	Install Shallow Stream Ford and Gully Xing, Rock Retainer		2
4.269	Install Shallow Stream Ford and Gully Xing, Rock Retainer		2
4.274	Install Rock Waterbar		OPT
4.290	Yellow Jacket Mine - Trailhead	No Work	

Bear Creek National Recreation Trail

Specifications (Based on Forest Service Standard Specifications – 2002)

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DIVISION 100 - General Specifications

Section 101 - Abbreviations, Acronyms, & Terms

101.01 Terms, Organizations, & Standards

These specifications are generally written in the imperative mood. In sentences using the imperative mood, the subject, “the Contractor,” is implied. Also implied in this language is “shall,” “shall be,” or similar words and phrases. In material specifications, the subject may also be the supplier, fabricator, or manufacturer supplying material, products, or equipment for use on the project.

Wherever “directed,” “required,” “prescribed,” or similar words are used, the “direction,” “requirement,” or “order” of the Contracting Officer (CO) is intended. Similarly, wherever “approved,” “acceptable,” “suitable,” “satisfactory,” or similar words are used, they mean “approved by,” “acceptable to,” or “satisfactory to” the CO.

The word “will” generally pertains to decisions or actions of the CO.

Whenever in these specifications, or in other contract documents, the following terms (or pronouns in place of them) are used, the intent and meaning shall be interpreted as follows: reference to a specific standard, test, testing method, or specification shall mean the latest published edition or amendment that is in effect at the solicitation issue date for Public Works Contracts or the sale advertisement date for Timber Sale Contracts.

These specifications are divided into the following divisions:

- Division 100 consists of general specifications for which no direct payment is made. These requirements are applicable to all contracts.
- Division 150 consists of engineering requirements that are applicable to some contracts. Work under this division is paid for directly when there is a PAY ITEM IN THE SCHEDULE OF ITEMS. When there is no PAY ITEM IN THE SCHEDULE OF ITEMS, no direct payment is made.
- Divisions 200–600 consist of construction contract requirements for specific items of work. Work under these divisions is paid for directly or indirectly according to Section 106 and the section for ordering the work when there is a PAY ITEM IN THE SCHEDULE OF ITEMS.
- Division 700 contains the material requirements for Divisions 200–600. No direct payment is made under Division 700. Payment for material is included as part of the work required in Divisions 200–600.

(a) Acronyms. The following acronyms are used in these specifications:

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials

ACI	American Concrete Institute
ADA	Americans With Disabilities Act
AGC	Associated General Contractors of America
AI	Asphalt Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standards Committee
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ARTBA	American Road and Transportation Builders Association
ASTM	American Society for Testing and Material
ATCC	American Type Culture Collection
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association
CFR	Code of Federal Regulations
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard issued by U.S. Department of Commerce
DEMA	Diesel Engine Manufacturers Association
DOT	U.S. Department of Transportation
FAR	Federal Acquisition Regulation
FHWA	Federal Highway Administration
FLH	Federal Lands Highway (Federal Highway Administration)
FSS	Federal Specifications and Standards
GSA	General Services Administration
ISSA	International Slurry Surfacing Association
MIL	Military Specification(s)
MSHA	Mine Safety and Health Administration
MUTCD	Manual on Uniform Traffic Control Devices
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	(Fire)--National Fire Protection Association
NFPA	(Forest)--National Forest Products Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard issued by the U.S. Department of Commerce
PTI	Post-Tensioning Institute
RIS	Redwood Inspection Service

SAE	Society of Automotive Engineers
SF	Standard Form
SI	International System of Units
SSPC	Steel Structures Painting Council
UL	Underwriter's Laboratories, Inc.
USASI	United States of America Standards Institute
WCLIB	West Coast Lumber Inspection Bureau
WWPA	Western Wood Products Association
WWPI	Western Wood Preservation Institute

(b) System of International Units (SI) Symbols. The following SI symbols are used in these specifications:

A	-	ampere	electric current
cd	-	candela	luminous intensity
°C	-	degree Celsius ($K - 273.15$)	temperature
d	-	day	time
g	-	gram	mass
h	-	hour	time
ha	-	hectare	area
Hz	-	hertz (s^{-1})	frequency
J	-	joule ($N \bullet m$)	energy
K	-	kelvin	temperature
L	-	liter	volume
lx	-	lux	illuminance
m	-	meter	length
m ²	-	square meter	area
m ³	-	cubic meter	volume
min	-	minute	time
N	-	newton ($kg \bullet m / s^2$)	force
Pa	-	pascal (N/m^2)	pressure
s	-	second	time
t	-	ton	mass
V	-	volt (W/A)	electric potential
W	-	watt (J/s)	power
Ω	-	ohm (V/A)	electric resistance
°	-	degree	plane angle
'	-	minute	plane angle
"	-	second	plane angle

(c) SI Prefix Symbols. The following SI prefix symbols are used in these specifications:

E	-	exa	10 ¹⁸
P	-	peta	10 ¹⁵
T	-	tera	10 ¹²

G	-	giga	10^9
M	-	mega	10^6
k	-	kilo	10^3
c	-	centi	10^{-2}
m	-	milli	10^{-3}
μ	-	micro	10^{-6}
n	-	nano	10^{-9}
p	-	pico	10^{-12}
f	-	femto	10^{-15}
a	-	atto	10^{-18}

(d) English slope notation (horizontal : vertical). Express the slope as the ratio of a number of units horizontal to one unit vertical.

101.02 Abbreviations

ABS	Acrylonitrile-butadiene-styrene
ACA	Ammoniacal copper arsenate
ACZA	Ammoniacal copper zinc arsenate
Agg	Aggregate
Al	Aluminum
AOS	Apparent opening size
AQ	Actual quantities
AQL	Acceptable Quality Level
ASP	Asphalt
B.C.C.S.P. or B.C.C.S. PIPE	Bituminous Coated Corrugated Steel Pipe
BMP	Best Management Practice
B.W.	Barbed Wire
CAPWAP	Case pile wave analysis program
CCA	Chromated copper arsenate
CMP	Corrugated metal pipe
CMPA	Corrugated metal pipe arch
CO	Contracting Officer
CPF	Composite pay factor
CSP	Corrugated steel pipe
CSPA	Corrugated steel pipe arch
CEMT	Cement
CEMT-T	Cement Treated
CLEAR & GRUB	Clearing & Grubbing
CMPCT	Compaction
CONC	Concrete
CTB	Cement-treated base
C.Y.	Cubic Yard
C.Y. Mi.	Cubic Yard Mile
DAR	Durability Absorption Ratio

Dia	Diameter
DQ	Designed quantities
DTI	Direct tension indicator
Dwgs	Drawings
EA	Each
EMLSFD	Emulsified
E&P CONTROL	Erosion and Pollution Control
FABR	Fabricated
FOUND	Foundation
FM	Fineness modulus
FURN	Furnished
GAL	Gallon
GFM	Government-furnished materials
Gr	Grade
h or hr	Hour
H	Height
ha	Hectare
HDO	High-density overlay
HDPE	High-density polyethylene
H. STRENGTH	High Strength
Hor	Horizontal
HR	Hour
HSLA	High-strength low-alloy
kg	Kilogram
kL	Kiloliter
kL km	Kiloliter kilometer
km	Kilometer
L	Length
L	Liter
L.F.	Linear Foot
LIQ	Liquid
LD	Loading
LSL	Lower specification limit
L.S.	Lump Sum
m	Meter
m ²	Square meter
m ³	Cubic meter
m ³ km	Cubic meter kilometer
Matl	Material
max.	Maximum
Mbf	Thousand board feet
M	Method
Mi	Mile
min.	Minimum
Misc	Miscellaneous
mm	Millimeter

mph	Miles per hour
N/C	Numerically controlled
MFBM	One Thousand Feet Board Measure
M.GALS.	One Thousand Gallons
M.GALS.MI	One Thousand Gallons Mile
M.S.F.	One Thousand Square Feet
PG	Performance-graded
PI	Plasticity index
ppm	Parts per million
lbs	Pounds
lbf	Pounds force
PS	Product Standard (issued by the U.S. Department of Commerce)
PVC	Polyvinylchloride
REFLECT.	Reflectorized
SEC	Section
S.F.	Square Foot
S.Y.	Square Yard
STA	Station
STA. YD.	Station Yard
SQ	Staked quantities
S.	Strand
STRUCT	Structural
S. Steel	Structural Steel
STMP	Stump
t	Ton (1,000 kg)
t km	Ton kilometer
T	Temperature
T.M.	Ton Mile
T&L	Tops and limbs
TFE	Tetraflouroethylene
Th	Thickness
TV	Target value
UOT	Utilization of Timber
USL	Upper specification limit
Vert	Vertical
VMA	Voids in Mineral Aggregate
VOC	Volatile organic compound
WH	White
W	Width
W/	With
W/O	Without
WW	Woven wire
WWF	Welded wire fabric
YE	Yellow

Section 102 - Definitions

Wherever the following terms, or pronouns in place of them, are used in these specifications or in other contract documents, the intent and meaning are as follows:

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.

Arch. A culvert section, usually formed of bolted structural plates, that is an arc of a circle (usually one-half or less); that is, a bottomless culvert.

Base Course. The layer or layers of specified or selected material of designed thickness placed on a subbase or subgrade to support a surface course. (See Figure 102-1.)

Bearings. The portion of a beam, girder, or truss that transmits the bridge superstructure load to the substructure.

Berm. Curb or dike constructed to control trailway runoff water. (See Figure 102-1.)

Best Management Practice. A series of water quality protection practices and procedures approved or certified by the State water quality agency under the provisions of sections 319 and 402 of the Clean Water Act, as amended.

Bridge. A structure, including supports, erected over a depression or an obstruction, such as water, a trail, a trail, or a railway, and having a floor for carrying traffic or other moving loads.

Bridge Length. The overall length measured along the centerline of trail to the back of abutment backwalls, if present; otherwise, end to end of the bridge floor, but in no case less than the total clear opening of the structure.

Bridge Traveled Way Width. The clear width measured at right angles to the longitudinal centerline of the bridge between the bottom of curbs or, if curbs are not used, between the inner faces of parapet or railing.

Certificate of Compliance. A signed statement by a person with legal authority to bind a company or supplier to its product. The certificate states that the material or assemblies furnished fully comply with the requirements of the contract.

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

Clearing Limits. The limits of clearing as designated on the ground or on the drawings. (See Figure 102-1.)

Cofferdam. A cofferdam is an enclosed single or double wall braced structure with walls sheeted with timber, concrete, or steel, and extending well below the bottom of excavation, when practical. Earthen or rockfill dikes, dams, or embankments are not considered cribs or cofferdams for this purpose.

Conduit. A natural or artificial channel for carrying fluids, such as water pipe, canal, or aqueduct.

Construction Slash. All vegetative material not meeting Utilization Standards, such as tops and limbs, timber, brush, and grubbed stumps associated with construction or reconstruction of a facility.

Contracting Officer (CO). The person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the CO acting within the limits of their authority as delegated by the CO. Authorized representatives include the Forest Service Representative, Engineering Representative, Contracting Officer's Representative, and Inspector.

Contractor. The individual, partnership, joint venture, or corporation undertaking the execution of the work under the terms of the contract and acting directly or through agents, employees, or subcontractors. As used in specifications and drawings for specified trails (Timber Sale Contracts), "Contractor" is "purchaser."

Controlled Felling. Directing the placement of trees in felling by using wedges, jacks, cable tension, or distribution of holding wood, or any combinations of these, to ensure that trees are dropped into previously cleared areas, or clear of any objects that are to remain.

Culvert. A conduit or passageway under a trail, trail, or other obstruction. A culvert differs from a bridge in that it is usually constructed entirely below the elevation of the traveled way.

Curve Widening. Additional width added to curves to allow for vehicle offtracking.

Cushion Material. Native or imported material generally placed over rocky sections of unsurfaced trails to provide a usable and maintainable traveled way.

Defect. A failure to meet a requirement with respect to a single quality characteristic.

Drawings. The documents, including plan and profile sheets, plans, cross sections, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials showing details for construction of a facility.

Embankment. A structure of soil, aggregate, or rock material placed on the prepared ground surface and constructed to subgrade.

Equipment. All machinery and equipment, together with the necessary supplies for upkeep and maintenance, as well as tools and apparatus necessary for the proper construction and acceptable completion of the work.

Excess Excavation. Material from the trailway in excess of that needed for construction of designed trailways.

Falsework. Any temporary construction work used to support the permanent structure until it becomes self-supporting. Falsework includes steel or timber beams, girders, columns, piles, foundations, and any proprietary equipment including modular shoring frames, post shores, and adjustable horizontal shoring.

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

Government Land. National Forest System lands, and other lands controlled or administered by the Forest Service or other Federal agencies.

Inspector. The Government-authorized representative designated in writing by the Contracting Officer, Contracting Officer's Representative, or Engineering Representative responsible for detailed inspection.

Invert. The lowest point of the internal cross section of culvert or pipe arch.

Job-Mix Formula. The percentage of each material in a mixture intended for a particular use.

Laboratory. A testing laboratory of the Government, or any other testing laboratory approved by the Contracting Officer.

Live Stream. A defined streambed with flowing water.

Lot. An isolated quantity of material from a single source; a measured amount of construction assumed to be produced by the same process.

Materials. Any substance specified for use in the construction of the project and its appurtenances.

Maximum Density. The highest density that can be obtained for a specific material using the stated test procedure.

Measurement. Determining and expressing the quantities of work or materials.

Multibeam Girder. A precast, prestressed concrete member where the concrete deck is precast as an integral part of the member.

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

Nominal Dimensions or Weights. The numerical values shown on the drawings or in the specifications as measurements of material to be used in the construction.

Nominal Maximum Particle Size. The largest sieve size listed in the applicable specification upon which any material is permitted to be retained.

Overbreak. Material beyond the neat line of an excavation that is removed in the process of excavation, usually by blasting.

Pass. A pass shall consist of one complete coverage of the surface.

Pavement Structure. Subbase, base, or surface course, or combination thereof, placed on a subgrade to support the traffic load and distribute it to the trailbed.

Pioneer Trail. Temporary construction access built along the route of the project.

Pipe. A culvert that is circular (round) in cross section.

Pipe Arch. A pipe that has been factory-deformed from a circular shape such that the width (or span) is larger than the vertical dimension (or rise).

Profile Grade. The trace of a vertical plane, as shown on the drawings, intersecting the top surface at the centerline of the proposed facility construction.

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.

Random Sampling. A sample of material chosen such that each increment of a population of material has an equal probability of being selected.

Reasonably Close Conformity. Compliance with reasonable and customary manufacturing and construction tolerances, performing all work and furnishing all materials in “reasonably close conformity” with lines, grades, cross sections, dimensions, and material requirements shown on the drawings, indicated in the specifications, or designated on the ground.

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) land, appurtenances thereto, or interest therein, usually in a strip, acquired for public or private passageway. (See Figure 102-1.)

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

Trail Template. The shape and cross-sectional dimensions of the railway to be constructed, as defined by the construction staking notes and the characteristics of the typical sections.

Trailbed. The graded portion of a trail between the intersection of subgrade and side slopes, excluding that portion of the ditch below subgrade. (See Figure 102-1.)

Trailside. A general term denoting the area adjoining the outer edge of the railway. (See Figure 102-1.)

Trailway. The portion of the trail within the limits of excavation and embankment, including slope rounding. (See Figure 102-1.)

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

Second Samples. A sample taken when the initial sample indicates that the material is defective.

Shoulder. The portion of the railway contiguous to the traveled way for accommodation of stopped vehicles, emergency use, and lateral support of pavement structure. (See Figure 102-1.)

Sidewalk. The portion of the railway constructed primarily for pedestrian use.

Special Project Specifications. The specifications that detail the conditions and requirements specific to the individual project, including additions and revisions to Standard Specifications.

Specifications. A description of the technical requirements for a material, product, or service that includes criteria for determining whether these requirements are met.

Spring Line. The point of contact between arch and footing.

Standard Specifications. Specifications approved for general application and repetitive use.

Station. (1) A measure of distance used for highways and railroads equal to 100 feet.
(2) A precise location along a survey line.

Subbase. The layers of specified or selected material of designed thickness placed on a subgrade to support a base course.

Subgrade Treatment. Modification of trailbed material by stabilization.

Subgrade. The prepared surface, including widening for curves, turnouts, and other areas upon which a subbase, base, or surface course is constructed. For trails without base course or surface course, that portion of trailbed prepared as the finished wearing surface. (See Figure 102-1.)

Substructure (Bridge). All of that part of the structure below the bearings of simple and continuous spans, skewbacks of arches, and tops of footings of rigid frames, together with the backwalls, wingwalls, and wing protection railings.

Superstructure (Bridge). The entire structure, except the substructure.

Surface Course. The top layer of a pavement structure, sometimes called the wearing course, usually designed to resist skidding, traffic abrasion, and the disintegrating effects of climate. (See Figure 102-1.)

Tackifier. Binder for vegetative mulch.

Target Value. Values that are established according to contract, and from which allowable variations are measured.

Timber Sale Contract. A written contract for the removal of national forest timber.

Tops and Limbs. All woody material including bushes, vines, and portions of trees smaller than the dimensions for timber shown in Subsection 201.03.

Traveled Way. The portion of the trailway for the movement of vehicles, exclusive of shoulders and auxiliary lanes. (See Figure 102-1.)

Turnout. A short auxiliary lane on a one-lane trail provided for the passage of meeting vehicles.

Unit of Measurement. The unit and fractions of units DESIGNATED IN THE SCHEDULE OF ITEMS.

Unsuitable Material. The material excavated during trailway construction that is not usable in embankment and must be disposed of, or that can be used only in certain locations or for limited purposes.

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

Section 103 - Intent of Contract

The intent of the contract is to provide for the complete construction of the project described in the contract. Unless otherwise provided, furnish all labor, materials, equipment, tools, transportation, and supplies, and perform all work required to complete the project in reasonably close conformity with drawings and specifications, and in accordance with provisions of the contract.

Section 104 - Maintenance for Traffic

104.01 Trails To Be Constructed

Unless otherwise SHOWN ON THE DRAWINGS or described in the SPECIAL PROJECT SPECIFICATIONS, keep existing trails open to all traffic during trail improvement work, and maintain them in a condition that will adequately accommodate traffic. Perform no work that interferes or conflicts with traffic or existing access to the trailway surface until a plan for the satisfactory handling of traffic has been approved. Specific requirements for temporary closures, detours, part-width construction, and access to adjacent or intersecting facilities will be SHOWN ON THE DRAWINGS or described in the SPECIAL PROJECT SPECIFICATIONS. Post construction signs and traffic control devices in conformance with the "Manual on Uniform Traffic Control Devices" (MUTCD). Do not proceed with work on the project until all required signs are in place and approved.

Before shutting down any operations, take all necessary precautions to prevent damage to the project, such as temporary detours, approaches, crossings, or intersections; and provide for normal drainage and minimization of erosion. Leave all travelways in a condition suitable for traffic.

The Government may permit use of portions of the project during periods when operations have shut down. All maintenance attributable to permitted use during periods of work suspension will be provided by the Government, except for maintenance needed through the fault or negligence of the Contractor. The Contractor shall be responsible for any maintenance not attributable to use, or that is necessary during suspensions through the fault or negligence of the Contractor.

When SHOWN ON THE DRAWINGS or described in the SPECIAL PROJECT SPECIFICATIONS, trail segments may be closed to all traffic during the period(s) when construction is in progress. If any of the listed trails are to be closed during construction operations, give at least 14 days advance notice.

Unless otherwise provided, when construction activity is in progress and total closure has not been provided for herein, delays may not exceed *30 minutes*, in order to reasonably accommodate traffic.

104.02 Use of Trails by Contractor

The Contractor is authorized to use trails under the jurisdiction of the Forest Service for all activities necessary to complete this contract, subject to the limitations and authorizations SHOWN ON THE DRAWINGS, designated in the Trail Order, or described in the SPECIAL PROJECT SPECIFICATIONS, when such use will not damage the trails or national forest resources, and when traffic can be accommodated safely.

Section 105 - Control of Materials

105.01 Handling Materials

Transport and handle all materials to preserve their quality and fitness for the work. Stockpile, load, and transport aggregates in a manner that will preserve specified gradation and avoid contamination. Do not intermingle stockpiles of aggregate with different gradations. Stockpile crushed or screened aggregate in accordance with Section 305.

105.05 Rights in & Use of Materials Found or Produced on the Work

- (a) With the written approval of the CO, suitable stone, gravel, sand, or other material found in the excavation can be used on the project. Payment will be made both for the excavation of such materials at the corresponding contract unit price and for the pay items for which the excavated material is used. Replace, without additional compensation, sufficient suitable materials to complete the portion of the work that was originally contemplated to be constructed with such material.
- (b) 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.

105.06 Material Sources

(a) Designated Sources. Sources of local materials designated in the SPECIAL PROJECT SPECIFICATIONS or SHOWN ON THE DRAWINGS are guaranteed by the Government for the quality and quantity of material in the source. Determine the equipment and work required to produce the specified product. Submit test results and a Certificate of Compliance that states that the gradation of the aggregate meets the contract requirements.

Utilize all suitable material in the source. The designation of a source includes the Contractor's right to use areas SHOWN ON THE DRAWINGS for the purposes designated (that is, plant sites, stockpiles, and haul trails). Unless otherwise indicated or approved, no additional operating area shall be allowed. In this case, operate only in the confines of the area(s) designated.

The weight/volume relationship used for determining designed quantities (DQ) of material in designated sources subject to weight measurement is SHOWN ON THE DRAWINGS.

Should the designated source contain insufficient suitable material due to causes beyond the Contractor's control, the Government will provide another source, with an adjustment in contract price, in accordance with applicable contract provisions.

Designated sources will be available for the Contractor's use during the periods SHOWN ON THE DRAWINGS. Use at any other time will require an agreement with the party scheduled for that period, with the CO's approval.

(b) Contractor-Furnished Sources. When the material sources are not designated as provided above, or when designated sources are not used, furnish material that produces an end product equivalent in performance to that originally designated. An adjustment in contract price shall be made where the weight/volume relationship differences between designated source material and Contractor-furnished source material result in a financial disadvantage to the Government. When SHOWN ON THE DRAWINGS, complete any pit development specified for a designated source, even when material is not obtained from the source.

Test for quality in conformance with applicable requirements, to establish the equivalency of the end product. Furnish test results and a Certificate of Compliance.

Section 106 - Measurement & Payment

106.01 Measurement & Payment

Compensation provided for in the contract is full payment for performing all contract work in a complete and acceptable manner. All risk, loss, damage, or expense arising out of the nature or prosecution of the work is included in the compensation provided by the contract.

Work required by the contract will not be paid for directly unless a PAY ITEM for the work is DESIGNATED IN THE SCHEDULE OF ITEMS.

Work referenced for measurement under another section will not be paid for directly unless a PAY ITEM for the work is DESIGNATED IN THE SCHEDULE OF ITEMS for the referenced section.

Work not paid for directly is considered to be included under the other contract PAY ITEMS.

Unless otherwise shown, work measured and paid for under one PAY ITEM will not be paid for under any other PAY ITEM.

The quantity to be paid for is the quantity DESIGNATED IN THE SCHEDULE OF ITEMS. No payment will be made for work performed in excess of that staked, ordered, or otherwise authorized.

When more than one class, size, or thickness is specified in the SCHEDULE OF ITEMS for any PAY ITEM, suffixes will be added to the item number to differentiate between the items.

106.02 Determination of Quantities

The following measurements and calculations are used to determine contract quantities.

For individual construction items, longitudinal and lateral measurements for area computations shall be made horizontally or corrected to horizontal measurement unless otherwise specified. Measurements for seeding, mulching, geotextiles, netting, erosion control blankets, and sodding shall be along slope lines.

The average end area method shall be used to compute volumes of excavation or embankment. However, if in the judgment of the CO the average end area method is impractical, measurement shall be made by volume in hauling vehicles, or by other three-dimensional methods.

Structures shall be measured according to neat lines SHOWN ON THE DRAWINGS, or as altered by the CO in writing to fit field conditions.

For items that have linear measurements, such as pipe culverts, fencing, guardrails, and underdrains, measurements shall be made parallel to the base or foundation upon which the

structures are placed. Pipe and pipe arch culverts shall be measured along center of invert, and arches shall be measured at spring line.

For aggregates weighed for payment, the tonnage weight shall not be adjusted for moisture content, unless otherwise provided in SPECIAL PROJECT SPECIFICATIONS.

For standard manufactured items (such as fence, wire, plates, rolled shapes, and pipe conduits) identified by gauge, weight, section dimensions, and so forth, such identifications shall be considered the nominal weights or dimensions. Unless controlled by tolerances in cited specifications, manufacturer's tolerances shall be accepted.

106.03 Units of Measurement

Payment will be by units defined and determined according to measure. Unless otherwise specified, the meanings of the following terms are as follows:

(a) Cubic Yard in Place (yd³). Measure solid volumes by the average end area method as follows:

- (1) Measure cross-sections of the original ground and use with design or staked templates, or take other comparable measurements to determine the end areas. Do not measure work outside of the established lines or slopes.
- (2) If any portion of the work is acceptable, but is not completed to the established lines and slopes, remeasure cross sections or comparable measurements of that portion of the work. Deduct any quantity outside the designated or staked limits. Use these measurements to calculate new end areas.
- (3) Compute the quantity using the average end areas multiplied by the horizontal distance along a centerline or reference line between the end areas. Deduct any quantity outside the designed or staked limits.

Where it is impractical to measure material by the average end area method, other methods involving three-dimensional measurements may be used.

Measure liquid volumes in accordance with Subsection 106.03(h).

(b) Cubic Yard in the Hauling Vehicle. Measure the cubic yard volume in the hauling vehicle using three-dimensional measurements at the point of delivery. Use vehicles bearing a legible identification mark with the body shaped so the actual contents may be readily and accurately determined. Before use, mutually agree in writing upon the volume of material to be hauled by each vehicle. Vehicles carrying less than the agreed volume may be rejected or accepted at the reduced volume.

Level selected loads. If leveling reveals that the vehicle was hauling less than the approved volume, reduce the quantity of all material received since the last leveled load by the same ratio

as the ratio of the current leveled load volume to the agreed volume. Payment will not be made for material in excess of the agreed volume.

Material measured in the hauling vehicle may be weighed and converted to cubic yards for payment purposes if the conversion factors are mutually agreed to in writing.

Compute measurement-using measurements of material in the hauling vehicles at the point of delivery. Load vehicles to at least their water-level capacity. Leveling of the loads may be required when vehicles arrive at the delivery point.

(c) Each. One entire unit, which may consist of one or more parts. The quantity is the actual number of units completed and accepted.

(d) Acre (ac). **43,560 ft².** Make longitudinal and transverse measurements for area computations horizontally. Do not make deductions from the area computation for individual exclusions having an area of 500 ft² or less.

(e) Hour (h). Measurement will be for the actual number of hours ordered and performed by the Contractor.

(f) Pound (lb). If sacked or packaged material is furnished, the net weight as packed by the manufacturer may be used.

(g) Mile (mi). **5,280 feet.** Measure horizontal along the centerline of each trailway, approach trail, or ramp.

(h) Gallon (gal). The quantity may be measured by any of the following methods:

- (1) Measured volume container.
- (2) Metered volume. Use an approved metering system.
- (3) Commercially packaged volumes.

(i) Lump Sum. Do not measure directly. The bid amount is complete payment for all work described in the contract and necessary to complete the work for that item.

(j) Foot (ft). Measure from end to end, parallel to the base or foundation being measured, or horizontal.

(k) Station. 100 feet measured horizontally.

(l) Square Yard (yd²). Measure on a plane parallel to the surface being measured or horizontal.

Where measurement is horizontal, make no deductions from the area computation for individual exclusions having an area of 10 ft² or less.

For pavement structure courses, measure the width horizontally to include the top design width and allowable curve widening. Do not include side slopes. Measure the length horizontally along the centerline of each trailway, approach trail, or ramp.

(m) 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.

(n) Ton (T). 2,000 pounds.

No adjustment in contract unit price will be made for variations in quantity due to differences in the specific gravity or moisture content.

Use net certified scale weights, or weights based on certified volumes.

106.04 Methods of Measurement

One of the following methods of measurement for determining final payment is DESIGNATED IN THE SCHEDULE OF ITEMS for each PAY ITEM:

(a) Designed Quantities (DQ). These quantities denote the final number of units to be paid for under the terms of the contract. They are based upon the original design data available prior to advertising the project. Original design data include the preliminary survey information, design assumptions, calculations, drawings, and the presentation in the contract. Changes in the number of units DESIGNATED IN THE SCHEDULE OF ITEMS may be authorized under any of the following conditions:

- (1) Changes in the work authorized by the CO.
- (2) A determination by the CO that errors exist in the original design that cause a PAY ITEM quantity to change by 15 percent or more.
- (3) A written request submitted to the CO showing evidence of errors in the original design that cause the quantity of a PAY ITEM to change by 15 percent or more. The evidence must be verifiable and consist of calculations, drawings, or other data that show how the designed quantity is in error.

(b) Staked Quantities (SQ). These quantities are determined from staked measurements prior to construction.

(c) Actual Quantities (AQ). These quantities are determined from measurements of completed work.

(d) Vehicle Quantities (VQ). These quantities are measured or weighed in hauling vehicles.

(e) **Lump Sum Quantities (LSQ).** These quantities denote one complete unit of work as required by or described in the contract, including necessary materials, equipment, and labor to complete the job.

106.06 Earthwork Tolerances

Where tolerances are shown in the contract, they are intended to define “reasonably close conformity.” Make adjustments of horizontal or vertical alignment within the tolerances specified in this contract, or shifts of balance points up to 100 feet, as necessary to produce the designed railway section and to balance earthwork. Such adjustments will not be considered “changes.”

DIVISION 150 - Engineering

Section 160 - Quality Control & Quantity Measurement

Description

160.01 Work. Provide quality control in conformance with the Inspection of Construction provisions of this contract to ensure compliance with the drawings, specifications, and provisions of the contract. Measure the quantities of completed work in conformance with the provisions of the applicable specification. Provide all personnel, equipment, tests, and reports necessary to meet the requirements of this specification.

Construction

160.02 Quality Control & Quantity Measurement System. Provide and maintain a quality control system that will ensure that all services, supplies, and construction required under this contract conform to the contract requirements. Perform, or cause to be performed, the sampling, inspection, and testing required to substantiate that all supplies, services, and construction conform to the contract requirements.

In addition, perform, or cause to be performed, all measurement of quantities of materials incorporated into the work or work processes that are to be measured under the provisions of the contract.

(a) Quality Control Plan. Submit in writing the following:

- (1) Authorities and responsibilities of inspection and testing personnel.
- (2) Experience and qualifications of inspection and testing personnel to be assigned and name and location of any (for hire) testing facility to be used.

(b) Approval of Quality Control Plan. Before beginning work, submit proposed quality control plan for all items requiring quality control to the CO for review. Within 5 days of receipt of the plan, the CO will determine whether the plan adequately covers quality control requirements. Do not perform construction work before receiving written approval of the proposed plan. Submit to the CO in writing any proposed changes in the approved quality control plan. Do not put proposed changes into effect until approved in writing by the CO.

160.03 Sampling, Testing, Inspection, & Measurement of Quantities. Provide and maintain appropriate measuring and testing devices, equipment, and supplies to accomplish the required measurement, testing, and inspection in a timely manner. Make all tests, measurements, and certifications as required by the drawings and specifications. Take samples and perform inspections and tests as necessary to achieve the quality of construction required by the contract, and make required measurements of work performed onsite or offsite under this contract. Sampling and testing frequency for specific items will be SHOWN ON THE DRAWINGS, in the Standard Specifications, or in a SPECIAL PROJECT SPECIFICATION.

Where random sample or random measurement is specified, provide a stratified statistically random sample. Determine random numbers in accordance with ASTM D 3665, Sections 5.1 through 5.7, or use a computer-generated random number program approved by the CO. Ensure that the sampling is stratified to eliminate the possibility that sample points are “clustered.” Perform stratification by dividing the total quantity for the applicable bid item by the sample frequency. This process divides the total project quantity of one lot into sublots. Use the random number to obtain a random sampling point within each subplot. A lot may be terminated and a new lot started when approved by the CO. After a lot is terminated, do not combine it with any other lot. If material within a subplot fails to meet specification requirement, the CO may allow the subplot materials to be reworked and resampling to be performed at new randomly selected locations.

The CO may reject any quantity of material that appears to be defective based on visual inspection or test results. Do not use such rejected material in the work. Results of tests run on this rejected material will not be included in results of lot acceptance tests.

160.04 Records of Inspection, Tests, & Measurement. Meet the following requirements for inspection and tests, and as-built drawings:

(a) Inspection and Tests. Maintain current records of all inspections and tests performed. The following format, or one with the following information, will be acceptable to the Government:

Trail No.			Contract No.			
Pay Item No.	Test	Date	Station	Standard	Results	Test By (Initials)

Certify in writing that all inspections and tests were performed in accordance with specifications.

(b) As-Built Drawings. Maintain a set of the contract drawings depicting as-built conditions. Maintain these drawings in current condition, and make them available for review. Indicate all variations from contract drawings in red on the drawings. Upon completion of the contract work, submit as-built drawings to the CO.

160.05 Certifications & Measurements. Meet the following requirements for offsite-produced materials and quantity measurements:

(a) Offsite-Produced Materials. Furnish certificates executed by the manufacturer, supplier, or vendor, stipulating that all materials produced offsite that are incorporated into the work meet the applicable requirements SHOWN ON THE DRAWINGS or stated in the specifications. Certify all incidental purchases needed to remedy minor shortages of material.

(b) Quantity Measurements. Make all measurements for computation of quantities for all work items, except those specified for payment by designed quantity or lump sum. Compute the quantities for periodic progress payments; the CO will compute the quantities for the final

payment based on measurements taken. All Contractor measurements are subject to verification. Submit all field notes, calculation sheets, and other data used to determine quantities, and certify in writing as to the accuracy of the measurements and computations submitted.

The following format, or one containing the following information, will be acceptable to the Government:

Trail No.	Contract No.		Quantity or Measurement	Measured By (Initials)
Pay Item No.	Date	Station		

Measurement

160.06 Method. Do not make separate measurements for this section.

Payment

160.07 Basis. The accepted quantities will be paid for at the contract unit price for each PAY ITEM DESIGNATED IN THE SCHEDULE OF ITEMS. Otherwise, quality control and quantity measurement will be incidental to other specified work.

Payment will be prorated based on the percentage of work accomplished on the related PAY ITEM that meets specifications.

Section 161 - Certification for Quality & Quantity

Description

161.01 Work. Provide certification that the quality and quantity of construction conforms to the drawings, specifications, and requirements of the contract.

Construction

161.02 Certifications & Measurements. Meet the following requirements for offsite-produced materials and quantity measurements:

(a) Offsite-Produced Materials. Furnish certificates executed by the manufacturer, supplier, or vendor, stipulating that all materials produced offsite that are incorporated into the work meet the applicable requirements SHOWN ON THE DRAWINGS or stated in the specifications. Make each certificate apply to a single commodity or invoice. Certify all incidental purchases needed to remedy minor shortages of material.

(b) Quantity Measurements. Make all measurements for computation of quantities for all work items, except those specified for payment by designed quantity or lump sum. Compute the quantities for periodic progress payments; the CO will compute the quantities for the final payment based on measurements taken. All Contractor measurements are subject to verification. Submit all field notes, calculation sheets, and other data used to determine quantities, and certify in writing as to the accuracy of the measurements and computations submitted.

The following format, or one containing the following information, will be acceptable to the Government:

Trail No.	Contract No.		Quantity or Measurement	Measured By (Initials)
Pay Item No.	Date	Station		

161.03 Records. Meet the following requirements for as-built drawings:

As-Built Drawings. Maintain a set of the contract drawings depicting as-built conditions. Maintain these drawings in current condition, and make them available for review. Indicate all variations from contract drawings in red on the drawings. Upon completion of the contract work, submit as-built drawings to the CO.

Measurement

161.04 Method. Make no separate measurements for this item.

Payment

161.05 Basis. Payment will be considered incidental to other pay items in this contract.

DIVISION 200 - Earthwork

Section 201 - Clearing & Grubbing

Description

201.01 Work. Clear and grub; treat timber, construction slash, and debris; and preserve vegetation and objects designated to remain free from injury or defacement.

Construction

201.02 Clearing & Grubbing. Clear and grub in accordance with the following:

(a) Exceptions. Within the clearing limits, clear and treat trees, debris, stumps, roots, and other protruding vegetative material not designated to remain, except the following:

- (1) Undisturbed stumps outside the trailway or in embankment areas, provided they do not extend more than 12 inches above the original ground (measured from the uphill side); they are no closer than 2 feet to the finished subgrade or 12 inches to any slope surface, or as otherwise SHOWN ON THE DRAWINGS; and they do not interfere with the placement or compaction of embankments.
- (2) Material in channel changes, rock sections, and ditches that is below the depth of the proposed excavation.
- (3) Uncut vegetation less than 3 feet in height and less than 3 inches in diameter, that is within the clearing limits but beyond the trailway and not in a decking area, and that does not interfere with sight distance along the trail.

(b) Performance. Grub all roots over 3 inches in diameter within the trailbed area to a minimum depth of 6 inches below subgrade. Cut flush with the excavated trail surface all roots over 3 inches in diameter that protrude from the excavated slope.

Clear slash treatment areas and treat debris in accordance with Subsections 201.02(a) and 201.05.

Clear decking areas and treat debris in accordance with Subsection 201.05.

Unless shown otherwise in the SPECIAL PROJECT SPECIFICATIONS, fell trees into the area being cleared when ground conditions, tree lean, and shape of clearing permit.

Use controlled felling to ensure the direction of fall to prevent damage to property, structures, trees designated to remain, and traffic.

Dead trees over 6 inches in diameter measured 12 inches above the ground that lean toward the trail and are sufficiently tall to reach the trailbed are designated for cutting. Fell hazard trees or unstable live trees that are tall enough to reach the trailbed, when marked, before felling timber in the immediate clearing vicinity. Maximum stump height is 12 inches or one-third of the stump

diameter, whichever is higher, measured on the side adjacent to the highest ground. Leave trees felled outside the clearing limits in place, and treat them no further unless otherwise SHOWN ON THE DRAWINGS.

Trim branches on remaining trees or shrubs to give a clear height of 16 feet above the trailbed, unless otherwise SHOWN ON THE DRAWINGS. Trim tree limbs as near flush with the trunk as practicable.

201.03 Utilization of Timber. Merchantable timber is timber that meets Utilization Standards in the SPECIAL PROJECT SPECIFICATIONS. Conform logging methods and utilization to the following:

(a) Felling & Bucking. Fell trees to minimize damage to merchantable timber and to remaining trees located outside of clearing limits. Fell trees with saws or shears unless shown otherwise in the SPECIAL PROJECT SPECIFICATIONS. Buck logs to permit removal of all minimum pieces set forth in the SPECIAL PROJECT SPECIFICATIONS.

(b) Utilization & Removal of Timber. Remove or treat trees that equal or exceed the diameters and minimum lengths listed in the SPECIAL PROJECT SPECIFICATIONS, and that contain one minimum piece, using one of the following methods, as DESIGNATED IN THE SCHEDULE OF ITEMS:

- (1) Dispose of merchantable timber designated for removal in accordance with the B(BT) provisions of the Timber Sale Contract.
- (2) Limb and deck logs that meet Utilization Standards at locations approved by the CO or SHOWN ON THE DRAWINGS. Deck logs such that logs are piled parallel one to the other; can reasonably be removed by standard log-loading equipment; will not damage standing trees; and will not roll. Log decks are to be free of brush and soil.
- (3) Remove from Government land merchantable timber designated for removal, without charge to the Government. This timber becomes the property of the Contractor, but may not be exported from the United States or used as substitution (as defined in 23 CFR 223.10) for timber from private lands exported by the Contractor or an affiliate, directly or indirectly.
- (4) Dispose of unmerchantable timber in accordance with Subsection 201.05 by the treatment methods SHOWN ON THE DRAWINGS and DESIGNATED IN THE SCHEDULE OF ITEMS.

201.04 Pioneer Trails. During pioneering operations, prevent undercutting of the final excavation slope. Avoid any restriction of drainages while pioneering the trail. Keep all materials within the railway limits unless otherwise SHOWN ON THE DRAWINGS.

201.05 Slash Treatment. Use or treat construction slash larger than 3 inches in diameter and 3 feet in length by one or more of the following methods, as DESIGNATED IN THE SCHEDULE OF ITEMS:

- (1) Windrowing construction slash.
- (2) Windrowing large material.
- (3) Windrowing and covering.
- (4) Scattering.
- (5) Burying.
- (6) Chipping or grinding.
- (7) Piling and burning.
- (8) Decking unmerchantable material.
- (9) Placement in cutting units.
- (10) Removal.
- (11) Piling.
- (12) Placing slash on embankment slopes.
- (13) Debris mat.

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

(a) All Methods. Construction slash placement will not be allowed in lakes, meadows, streams, or streambeds. Immediately remove construction slash that interferes with drainage structures.

Fell and dispose of trees that are scorched or damaged beyond recovery, and adjacent to the clearing limits, in accordance with Subsection 201.03; or treat these trees as construction slash.

(b) Specific Methods. When using one or more of the following slash treatment methods, meet requirements specified below:

(1) Windrowing Construction Slash. Windrow according to the following requirements unless otherwise specified in the SPECIAL PROJECT SPECIFICATIONS. Clear areas to accommodate the windrow slash. Place construction slash outside the trailway in neat, compacted windrows laid approximately parallel to and along the toe line of embankment slopes.

Do not permit the top of the windrows to extend above the top of subgrade. Use construction equipment to matt down all material in a windrow to form a compact and uniform pile. Construct breaks of at least 16 foot at least every 200 feet in a windrow. Do not place windrows against trees. A pioneer trail 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 trail construction.

(2) *Windrowing Large Material.* Windrow construction slash that is 10 inches or more in diameter at the small end, and 6 feet or more in length, as specified in Subsection 201.05(b)(1). Treat smaller material by one or more of the other included methods for slash treatment.

(3) *Windrowing & Covering.* Place and compact construction slash as specified in Subsection 201.05(b)(1), and cover with at least 6 inches of rock and soil to form a smooth and uniform windrow.

(4) *Scattering.* Scatter according to the following requirements unless otherwise specified in the SPECIAL PROJECT SPECIFICATIONS. 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.

(5) *Burying.* Bury construction slash at the locations SHOWN ON THE DRAW-INGS and designated on the ground. Mat construction slash down in layers, and cover it with at least 2 feet of rock and soil. Smooth and slope the final surface to drain.

(6) *Chipping or Grinding.* Process construction slash that is up to at least 4 inches in diameter and longer than 3 feet through a chipping machine or machine designed and operated to grind slash and stumps into pieces, such as a tub grinder. Deposit chips or ground woody material on embankment slopes or outside the trailway to a loose depth not exceeding 6 inches. Minor amounts of chips or ground woody material may be permitted within the trailway if they are thoroughly mixed with soil and do not form a layer.

(7) *Piling & Burning.* Deposit construction slash in areas SHOWN ON THE DRAWINGS and designated on the ground. Construct piles so that burning does not damage standing trees. If burning is incomplete, repile and burn the slash remaining until pieces are reduced to less than 3 inches in diameter and 3 feet in length. Scatter the remaining pieces.

(8) *Decking Unmerchantable Material.* Deck logs that do not meet Utilization Standards specified in Subsection 201.03, and other material that exceeds the diameter and length shown in the SPECIAL PROJECT SPECIFICATIONS in areas SHOWN ON THE DRAWINGS. Other locations may be approved by the CO.

Cut material into lengths not exceeding 32 feet, and remove all limbs. Decks are to be stable and free of brush and soil. Treat other material according to slash treatment methods SHOWN ON THE DRAWINGS and in the SCHEDULE OF ITEMS.

(9) *Placement in Cutting Units.* Place construction slash from within cutting units and the adjacent 200 feet with cutting unit logging slash. Place construction slash at least 50 feet inside the cutting unit boundary such that it will not inhibit logging of the unit and may be treated by the prescribed logging slash treatment method.

(10) *Removal.* Remove or haul construction slash to locations SHOWN ON THE DRAWINGS or designated on the ground.

(11) *Piling.* Pile construction slash in areas SHOWN ON THE DRAWINGS or designated on the ground. Place and construct piles so future burning will not damage remaining trees. Keep piles reasonably free of dirt from stumps. Cut unmerchantable logs into lengths of less than 20 feet prior to placement in the pile.

(12) *Placing Slash on Embankment Slopes.* Place construction slash on completed embankment slopes to reduce soil erosion where SHOWN ON THE DRAWINGS. Place construction slash as flat as practicable on the completed slope. Place slash from the toe of the embankment to a point at least 2 feet below subgrade elevation. Priority for use of available slash is for: (1) through fills; (2) insides of curves; and (3) ditch relief outlets.

(13) *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.

Measurement

201.06 Method. Clearing and Grubbing shall be considered incidental to other items of work.

Payment

201.07 Basis. Clearing and Grubbing shall be considered incidental to other items of work.

Section 203 - Excavation, Embankment, & Haul

Description

203.01 Work. Excavate material and construct embankments. Furnish, haul, stockpile, place, dispose of, slope, shape, compact, and/or finish earthen and rocky material.

203.02 Excavation. Excavation consists of the excavation and placement of all excavated material that is not included under other PAY ITEMS listed in the SCHEDULE OF ITEMS.

203.03 Borrow Excavation. Excavate and utilize material from sources SHOWN ON THE DRAWINGS or described in the SPECIAL PROJECT SPECIFICATIONS. Additional sources of borrow excavation will be subject to advance approval by the CO. Develop sources in accordance with Section 611.

Construction

203.04 Clearing & Grubbing. Clear and grub in accordance with Section 201 before work under Section 203 begins. Trail pioneering, slash disposal, and grubbing of stumps may proceed concurrently with excavation when approved by the CO. Conduct excavation and placement operations so material to be treated under Section 201 will not be incorporated in the trailway unless specifically included in the slash treatment method.

203.05 Pioneering. During pioneering operations, prevent undercutting of the final excavation slope. Avoid any restriction of drainages while pioneering the trail. Keep all materials within the trailway limits unless otherwise SHOWN ON THE DRAWINGS.

203.06 Utilization of Excavated Materials. Use all suitable excavated material in the construction of embankments, subgrades, shoulders, slopes, bedding, and backfill for structures and other purposes, as SHOWN ON THE DRAWINGS.

(a) Excess Excavation. Place excess excavation as SHOWN ON THE DRAWINGS.

(b) Rock for Slope Protection. Conserve and use suitable excavated rock for protecting embankments.

(c) Conserving Material. Excavated material suitable for cushion, trail finishing, or other purposes may be conserved and utilized instead of materials from designated sources. Field drain and dry excessively wet material that is otherwise suitable for embankment before placement.

(d) Excavation of Unsuitable Material & Backfill. Place unsuitable excavated material as SHOWN ON THE DRAWINGS. Backfill excavated areas with suitable material when necessary to complete the work. Do not place frozen material in embankments.

Break up rocks that are too large to be incorporated into the embankment or move them to locations approved by the CO. Broken pieces of rock may be placed on the face of the

embankment and embedded so they will not roll or obstruct the use and maintenance of the trailbed. Immediately remove any excavated material that inadvertently reaches a stream course.

(e) Conservation of Topsoil. When SHOWN ON THE DRAWINGS, remove, transport, and deposit suitable topsoil in the designated stockpile areas.

(f) Abandoned Structures & Obstructions. Treat abandoned structures and obstructions in accordance with Section 202.

203.07 Drainage Excavation. Construct side ditches, minor channel changes, inlet and outlet ditches, furrow ditches, ditches along the trail but beyond railway limits, and other minor earth drainage structures as SHOWN ON THE DRAWINGS. Utilize excavated material in accordance with Subsection 203.06.

203.08 Sloping, Shaping, & Finishing. Complete slopes and ditches before placing aggregate courses. Slope, shape, and finish as follows:

(a) Sloping. Leave all earth slopes with uniform roughened surfaces, except as described in Subsection 203.08(b), with no noticeable break as viewed from the trail. Except in solid rock, round the tops and bottoms of all slopes, including the slopes of drainage ditches, where SHOWN ON THE DRAWINGS. Round the material overlaying solid rock to the extent practical.

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 slope to stabilize the slide. Reshape the cut or embankment slope to an acceptable condition.

(b) Stepped Slopes. Where SHOWN ON THE DRAWINGS, construct steps on slopes of 1 ½:1 to 2:1. Construct the steps about 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 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. For trails receiving base or surface course, rocks may remain in place if they do not protrude above the subgrade more than one-third of the depth of the base or surface course, or 3 inches, whichever is less.

(d) Finishing. Finish the trail surface to be reasonably smooth, uniform, and shaped to conform to the typical sections as SHOWN ON THE DRAWINGS. Remove unsuitable material from the trailbed and replace it with suitable material. Finish trailbeds to the tolerance class shown in Table 203-1 or as SHOWN ON THE DRAWINGS.

Ensure that the subgrade for both surfaced and unsurfaced trails is visibly moist during shaping and dressing. Bring low sections, holes, cracks, or depressions to grade with suitable material. Compact the subgrade as required by the designated embankment placing method.

Finish the trailbed for unsurfaced trails using one of the following methods, as SHOWN ON THE DRAWINGS:

(1) *Method A.* Ensure that the top 4 inches below the finished trailbed contains rocks no larger than 4 inches. Remove oversize material, reduce to acceptable size, or cover by importing suitable material approved by the CO.

(2) *Method B.* Roll the trailbed to break down rocky material. Roll a minimum of five full-width passes, or until visual displacement ceases, with a vibratory grid roller or equivalent weighing a minimum of 10 Tons.

(3) *Method C.* Tractor finish work by spreading the excavation for trails SHOWN ON THE DRAWINGS as Construction Tolerance Class K, L, or M, as shown in Table 203-1. Eliminate rock berms that may form during embankment construction with a tractor finish.

203.09 Snow Removal. Remove snow and ice in advance of the work and deposit beyond the railway limits in a manner that will not waste material. Snow and ice will not be incorporated into the embankment or be placed to cause damage.

203.10 Finishing Slopes. Ensure that finished slopes conform reasonably to the lines STAKED ON THE GROUND or SHOWN ON THE DRAWINGS. Finish slopes in a roughened condition to facilitate the establishment of vegetative growth. The finish associated with template and stringline or hand-raking methods will not be required. Remove rock, debris, and other loose material that are more than 6 inches in diameter, unless otherwise SHOWN ON THE DRAWINGS.

In areas that require blasting, use blasting techniques in accordance with Section 220, as SHOWN ON THE DRAWINGS. Presplitting is not required, unless controlled backslope blasting is SHOWN ON THE DRAWINGS.

Perform test blasting in accordance with Subsection 220.06, unless directed otherwise by the CO.

203.11 Landscape & Stream Protection. Confine excavation, blasted material, and embankment material within the railway limits, unless otherwise approved by the CO, to avoid overbuilding and to protect the landscape and streams. Retrieve and incorporate into designated areas all material deposited outside of the clearing limits.

203.12 Subgrade Treatments. Subgrade treatment consists of soil modification by admixing aggregates or placing geotextiles, fiber mat, wood corduroy, rock blanket, or other similar materials over areas of unsuitable embankment foundation materials that are SHOWN ON THE DRAWINGS. The construction and material requirements for the type of subgrade treatment will

be specified in the SPECIAL PROJECT SPECIFICATIONS or SHOWN ON THE DRAWINGS.

Table 203- 1 - Construction tolerances.													
Item	Tolerance Class ^a												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Trailbed width (ft)	0.5	0.5	1	1	1	1	1	1.5	1	2	2	2	2
Subgrade Width (ft)	0.1	0.2	0.2	0.5	0.5	1	1	1.5	2	3	2	3	- ^c
Centerline alignment (ft)	0.2	0.2	0.5	0.5	1	1	1	1.5	2	3	3	5	- ^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 ON THE DRAWINGS, the centerline alignment and subgrade elevation, as built have no horizontal curves with a radius of less than 85 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.

203.13 Earth Berms. Construct permanent earth berms along the shoulder of traveled ways at locations SHOWN ON THE DRAWINGS. Use well-graded material that contains no rocks having a dimension greater than one-fourth the height of the berm in the construction. Acceptable material for the berm may be windrowed as the trailbed is constructed. When local material is not acceptable, import material from approved sources. Frozen material, roots, sod, or other deleterious material is unacceptable for berm construction. Do not waste materials over the embankment slope.

Accomplish compaction by operating the spreading equipment over the full section of the berm.

203.14 Water. Develop, haul, and apply water in accordance with Section 207.

203.15 Compaction Equipment. Use equipment capable of obtaining compaction requirements. The compacting units may be of any type, provided that they are capable of compacting each lift of material as specified, and that they meet the minimum requirements specified below. Heavier compacting units may be required to achieve the specified density of the embankment. Minimum requirements for rollers are as follows:

- (a) Sheepsfoot, tamping, or grid rollers shall be capable of exerting a force of 250 lbs/in of width of roller drum.

- (b) Steel-wheel rollers, other than the vibratory type, shall be capable of exerting a force of not less than 250 pounds/in of width of the compression roll or rolls.
- (c) Vibratory steel-wheel rollers shall have a minimum weight of 6 Tons. The compactor shall be equipped with amplitude and frequency controls, and specifically designed to compact the material on which it is used.
- (d) Pneumatic-tire rollers shall have 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 pounds/in².

203.16 Embankment Placement. Place embankment in accordance with the following requirements:

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

(b) Specific Methods. Place all embankments using one or more of the following methods, as SHOWN ON THE DRAWINGS and listed in the SCHEDULE OF ITEMS:

(1) Method 1—Side Casting & End Dumping. Embankment may be placed by side casting and end dumping. Build solid embankments by working smaller rocks and fines in with the larger rocks and fines to fill the voids.

(2) Method 2—Layer Placement. Roughen or step surfaces steeper than a ratio of 3 horizontal to 1 vertical (3:1) upon which embankment is to be placed, when SHOWN ON THE DRAWINGS, in order to provide permanent bonding of new and old materials.

Layer place embankment, except over rock surfaces. Over rock surfaces, material may be placed by end dumping to the minimum depth needed for operation of spreading equipment. Level and smooth each embankment layer before placement of subsequent layers. Operate hauling and spreading equipment uniformly over the full width of each layer.

Place suitable material in layers no more than 12 inches thick, except when the material contains rock more than 9 inches in diameter, in which case layers may be of sufficient thickness to accommodate the material involved. Ensure that no layer exceeds 2 feet before compaction.

Placing individual rocks or boulders greater than 2 feet in diameter will be permitted, provided that the embankment will accommodate them and that they are at least 6 inches below the subgrade. Carefully distribute rocks and fill the voids with finer material to form a dense and compacted mass.

Where material containing large amounts of rock is used to construct embankments, make layers of sufficient thickness to accommodate the material involved. 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.

Ensure that material is at a moisture content suitable to obtain a mass that will not visibly deflect under the load of the hauling and spreading equipment. Handle excessively wet material in accordance with Subsection 203.06(c).

(3) Method 3—Layer Placement (Roller Compaction). Place embankments as specified in method 2. Place in horizontal layers not exceeding 12 inches prior to compaction, except when the material contains rock more than 9 inches in diameter, in which case layers may be of sufficient thickness to accommodate the material involved. Obtain compaction using equipment listed in Subsection 203.15. Operate compaction equipment over the full width of each layer until visible deformation of the layer ceases or, in the case of the sheepsfoot roller, the roller “walks out” of the layer. Make at least three complete passes.

203.17 Construction Tolerances. Construct to the tolerance class as SHOWN ON THE DRAWINGS and in accordance with Table 203-1. Construct railway ditches to flow in the direction SHOWN ON THE DRAWINGS.

Ensure that deviations are uniform in the direction of change for a distance of 200 feet or more along the project centerline.

203.18 Haul. Haul is incidental to excavation and borrow excavation, unless listed as a separate PAY ITEM in the SCHEDULE OF ITEMS.

Measurement

203.19 Method. Excavation, Embankment and Haul shall be considered Incidental to other Items of Work

Payment

203.20 Basis. Excavation, Embankment and Haul shall be considered Incidental to other Items of Work

Section 206A - Structural Excavation for Minor Structures

Description

206A.01 Work. Excavate, backfill, and dispose of material for the construction of culverts and minor structures. Preserve channels; shore and brace; seal foundations; dewater; excavate; prepare foundations; bed; and backfill.

Materials

206A.02 Requirements. Ensure that material conforms to specifications in the following sections and subsections:

Backfill Material	704.03
Bedding	704.02
Foundation Fill	704.01
Minor Concrete Structures	602
Structural Concrete	552
Unclassified Borrow	704.06

Construction

206A.03 Preparation for Structural Excavation. Clear the area of vegetation and obstructions according to Sections 201 and 202.

206A.04 General. Consider the elevations of the bottoms of footings or foundations when SHOWN ON THE DRAWINGS to be approximate elevations. The CO may order, in writing, changes in the elevations of footings and foundations when necessary to secure a satisfactory foundation.

Excavate trenches or foundation pits to a width and length that allows room for work. Provide a firm foundation of uniform density throughout its length and width. Do not place footings until the depth of excavation and the foundation material have been approved in writing.

Where necessary to blast rock, blast according to Section 220.

Follow Occupational Safety and Health Administration (OSHA) safety regulations (29 CFR, part 1926, subpart P, Excavation), or OSHA-approved State Plan requirements for sloping the sides of excavations and for using shoring, bracing, and 88 other safety features. When sides of excavations are sloped for safety considerations, provide one copy of the design that demonstrates conformity with OSHA regulations. Submit working drawings and construction details when required by the SPECIAL PROJECT SPECIFICATIONS where support systems, shield systems, or other protective systems are used. Ensure that drawings demonstrate conformity with regulations.

Remove safety features when no longer necessary. Remove shoring and bracing to at least 12 inches below the surface of the finished ground.

Saw cut existing pavements or concrete structures that are adjacent to the area to be excavated and are designated to remain.

Conserve suitable material for structural backfill from excavated material. Do not deposit excavated material in or near a waterway. Do not stockpile excavated material closer than 3 feet from the edge of the excavation.

Place unsuitable or excess material according to Subsection 203.06. If approved, suitable material may be used in embankment construction.

Remove all water as necessary to perform work.

(a) Minor Structures. Clean all loose material from all rock or other foundation material and cut to a firm surface that is level, stepped, or serrated. Remove all loose and disintegrated rock and thin strata. When the footing is to rest on material other than rock, complete the excavation just before the footing is to be placed.

(b) Culverts. Construct the width of trenches in natural ground to permit satisfactory joining of the culvert sections and thorough tamping of the bedding material under and around the culvert. Excavate trenches to a minimum width equal to the culvert diameter plus 2 feet.

Construct trenches for culverts being placed in embankments to a width of one diameter, plus one diameter on each side.

Excavate unsuitable foundation material below the invert of the culvert to an approximate depth of 2 feet and a width of at least the culvert diameter plus 4 feet. Remove rock, hardpan, or other unyielding material below the foundation grade for a depth of at least 12 inches and a width of at least 2 feet greater than the outside width of the culvert.

Excavate to foundation grade without unduly disturbing the trench or foundation surface. Foundation grade is the elevation at the bottom of any bedding for the installation of the structure.

206A.05 Channel Preservation. Preserve channels according to Subsection 206.05, but excavate inside separations such as dikes or sandbags.

206A.06 Foundation Seal. Where necessary, construct foundation seal according to Subsection 206.07.

206A.07 Dewatering. Where necessary, dewater according to Subsection 206.08.

206A.08 Foundation Preparation. Excavate any unsuitable material present at foundation grade, and replace it with foundation fill. Place and compact the foundation fill material according to Subsection 206.09(d).

206.09 Foundation Preparation. Prepare footing foundations as follows:

(a) Footings Placed on Bedrock. Cut the bottom of the excavation to the specified elevations. Clean the foundation surface of loose or disintegrated material. Clean and grout all open seams and crevices that will remain beneath the footing.

(b) Footings Placed on an Excavated Surface Other Than Bedrock. Do not disturb the bottom of the foundation excavation. Remove material to foundation grade and compact the foundation immediately before concrete is placed. Treat material below the foundation grade that is disturbed as unstable material (see Subsection 206.09(d)).

(c) Footings Keyed Into Undisturbed Material. Excavate the foundation to the neat lines of the footing and compact the foundation. Where material does not stand vertically, fill all space between the neat lines of the footing and the remaining undisturbed material with concrete. If the top of the excavation is below the top of the footing, fill only to the top of the excavation; otherwise, fill to the top of the footing. Concrete placed against steel sheet piles in cofferdams is considered to be against undisturbed material.

(d) Unstable Material Below Footing Elevation. Excavate unstable material below foundation grade to the depth and lateral extent as approved, and replace it with foundation fill. Place foundation fill material in horizontal layers that, when compacted, do not exceed 6 inches in depth. Compact each layer according to Subsection 206.11.

Where footing must be keyed into undisturbed material, prepare foundation and construct footing according to Subsection 206.09(c). Notify the CO when each excavation is completed, and receive written approval of the excavation and the foundation material before placing footings.

206A.09 Utilization of Excavated Materials. Utilize all suitable excavated material as backfill or embankment. Do not place excavated material in live streams.

Dispose of all surplus material as SHOWN ON THE DRAWINGS. Do not deposit excavated material in a manner that will endanger the partly finished structure.

206A.10 Backfill & Embankments for Minor Structures. Backfill excavated areas around minor structures to the level of the original ground surface. Backfill with selected material placed in horizontal layers not over 6 inches (loose measure) in depth. Use compactible material free of frozen lumps, chunks of highly plastic clay, or other objectionable material. Do not use rocks larger than 3 inches in diameter within 12 inches of the structure. Compact each layer in accordance with Subsection 203.16(b), method 4.

206A.11 Bedding, Backfill, & Embankment for Pipe Culverts. Install bedding, backfill, and embankment for pipe culverts in accordance with Sections 603, 603A, and 603B, unless otherwise SHOWN ON THE DRAWINGS or described in the SPECIAL PROJECT SPECIFICATIONS.

Measurement

206A.12 Method. Minor Structure Excavation shall be considered incidental to other items of work.

Payment

206A.13 Basis. Minor Structure Excavation shall be considered incidental to other items of work.

Section 259 - Reinforced Soil Embankments

Description

259.01 Work. Construct reinforced soil embankments. Geogrid soil reinforcement material categories are designated as shown in Table 714-7.

Materials

259.02 Requirements. Ensure that material conforms to specifications in the following subsections:

Geogrids, Categories 1, 2, 3, 4, 5, or 6	714.03
Select Granular Backfill	704.10

Construction

259.03 General. Lay soil reinforcements at the proper elevation and alignment, as SHOWN ON THE DRAWINGS.

Orient soil reinforcements such that the maximum tensile strength available is in the direction of primary reinforcement, as SHOWN ON THE DRAWINGS.

Do not splice reinforcements in the primary direction. Geogrids may be overlapped three ribs (approximately 1 inch) in the direction transverse to the primary direction, and may be held together with hog rings or other approved devices.

Install soil reinforcements in accordance with manufacturer's recommendations for their intended purpose. Include a copy of those recommendations with project submittals.

Exercise care to prevent wrinkle development and/or slippage of reinforcement during fill placement and spreading. Prior to beginning work, submit a plan indicating how the stretching and staking will be accomplished.

Do not permit construction equipment to operate directly upon the reinforcement material. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the reinforced material. Keep turning of tracked vehicles to a minimum to prevent tracks from displacing the fill and damaging the material.

Ensure that the following tolerances apply to the elevations and dimension as SHOWN ON THE DRAWINGS: install the base of reinforcement material within ± 4 inches of that specified; and do not permit any layer to exceed 12 inches in thickness.

259.04 Field Adjustments. The final limits and configuration of the fills or reinforcement sections may vary, depending on the foundation materials encountered

during excavation. Ensure that final foundation limits are approved by the CO in writing before placing any backfill material.

At least 48 hours before beginning work, notify the CO to inspect the foundation.

259.05 Excavation. Dispose of unsuitable material as SHOWN ON THE DRAWINGS.

259.06 Performance. Maintain all construction stakes to control the work.

259.07 Backfilling. Provide select granular backfill material that meets requirements specified in Subsection 704.10, unless otherwise SHOWN ON THE DRAWINGS. Place and compact backfill in accordance with Subsection 203.16(b), method 4. Do not use sheepsfoot rollers to obtain compaction. On geogrid fills, place backfill so as to keep tension in the geogrid.

259.08 Slope Face Treatment. Treat the face of the reinforced slope for erosion control in accordance with Section 204 and as SHOWN ON THE DRAWINGS.

Measurement

259.09 Method. Use the method of measurement that is DESIGNATED IN THE SCHEDULE OF ITEMS.

Payment will be based on the contract unit price of reinforcing material placed and accepted. This will be exclusive of overlap and wastage.

Payment

259.10 Basis. The accepted quantities will be paid for at the contract unit price for each PAY ITEM DESIGNATED IN THE SCHEDULE OF ITEMS.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
259(01) Geogrid category <u>4</u>	Square Foot

DIVISION 600 - Incidental Construction

Section 601 - Mobilization

Description

601.01 Work. Move personnel, equipment, material, and incidentals to the project, and perform all activities necessary to accomplish work at the project site. Obtain permits, insurance, and bonds.

Measurement

601.02 Method. Measure mobilization by the lump sum.

Payment

601.03 Basis. The accepted quantity, measured as provided above, will be paid at the contract price per unit of measurement for the PAY ITEM listed below that is DESIGNATED IN THE SCHEDULE OF ITEMS.

The mobilization lump sum will be paid as follows:

- (a) If applicable, bond premiums will be reimbursed according to FAR clause 52.232-5, Payment Under Fixed-Price Construction Contracts, after receipt of evidence of payment.
- (b) Fifty percent of the lump sum, not to exceed 5 percent of the original contract amount, will be paid following completion of 5 percent of the original contract amount, not including mobilization.
- (c) Payment of the remaining portion of the lump sum, up to 10 percent of the original contract amount, will be paid following completion of 10 percent of the original contract amount, not including mobilization.
- (d) Any portion of the lump sum in excess of 10 percent of the original contract amount will be paid after final acceptance.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
601(01) Mobilization	Lump Sum

DIVISION 700 - Materials

Section 704 - Soil

704.01 Foundation Fill

Furnish granular material free of excess moisture, frozen lumps, roots, sod, and other deleterious material and conforming to the following:

- (a) Material passing 2 inch sieve100%
- (b) Soil classification, AASHTO M 145A-1-a
- (c) In wet environments, material passing No. 2006% max.

704.03 Backfill Material

Furnish granular material or fine compatible soil free of excess moisture, muck, frozen lumps, roots, sod, and other deleterious material. Remove all rock particles and hard earth clods larger than 3 inches in the longest dimension.

704.04 Structural Backfill

Furnish free-draining granular material free of excess moisture, muck, frozen lumps, roots, sod, and other deleterious material. Remove all rock particles and hard earth clods larger than 3 inches in the longest dimension. Ensure that material conforms to the following:

- (a) Material passing No. 200 sieve,
AASHTO T 27 and T 1115% max.
- (b) Liquid limit, AASHTO T 8930 max.

704.06 Unclassified Borrow

Furnish granular material free of excess moisture, muck, frozen lumps, roots, sod, and other deleterious material. Remove all rock fragments and boulders greater than 24 inches in the longest dimension. Ensure that material conforms to AASHTO M 145, Table 2, soil classification A-1, A-3, or A-2-4.

704.10 Select Granular Backfill

Furnish sound, durable granular material free from organic matter or other deleterious material (such as shale or other soft particles with poor durability). Ensure that material conforms to the specifications below.

(a) Quality Requirements. Furnish material that meets the following quality requirements:

- (1) GradationTable 704-4

- (2) Shear angle of internal friction, AASHTO T 236¹34° min.
- (3) Sodium sulfate soundness loss (five cycles),AASHTO T 104
15% max.
- (4) Los Angeles abrasion, AASHTO T 9650% max.
- (5) Liquid limit, AASHTO T 8930 max.

¹Compact samples for AASHTO T 236 to 95 percent of the maximum density determined in accordance with AASHTO T 99, method C or D, and corrected for oversized material as set forth in AASHTO T 99.

Table 704-4. - Select granular backfill gradation.	
Sieve Size (inch)	Percent by Weight Passing Designated Sieve (AASHTO T 27 and T 11)
4	100
3	75-100
No. 200	0-15

704.12 Crib Wall Backfill

Furnish material in accordance with Subsection 704.10, but conform to the following:

- (a) GradationTable 704-5
- (b) Unit weight3,200 lb/yd³ min.

Table 704-5. - Crib wall backfill gradation.	
Sieve Size (inch)	Percent by Weight Passing Designated Sieve (AASHTO T 27 and T 11)
3	100
No. 4	25-70
No. 50	5- 20
No. 200	0-5

Section 714 - Geotextile, Geocomposite Drain Material, & Geogrids

714.01 Geotextiles

Use long-chain synthetic polymers composed by weight of at least 95 percent polyolefins or polyesters to manufacture geotextile or the threads used to sew geotextiles. Form the geotextiles, including selvages, into a stable network such that the filaments or yarns retain their dimensional stability relative to each other.

(a) Physical Requirements. For the specified type, see the following tables:

- (1) Subsurface drainage, Type I (A–F)Table 714-1
- (2) Separation, Type II (A–C)Table 714-2
- (3) Stabilization, Type III (A–B)Table 714-3
- (4) Permanent erosion control, Type IV (A–F)Table 714-4
- (5) Temporary silt fence, Type V (A–C)Table 714-5
- (6) Paving fabric, Type VITable 714-6

All property values in these specifications, with the exception of apparent opening size (AOS), represent minimum average roll values in the weakest principal direction (i.e., ensure that average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the specified values). Values for AOS represent maximum average roll values.

Elevate and protect rolls with a waterproof cover if stored outdoors. When using a geotextile for a permanent installation, limit the geotextile exposure to ultraviolet radiation to less than 10 days.

(b) Evaluation Procedures. Furnish a product certification, including the name of the manufacturer, product name, and style number, chemical composition of the filaments or yarn, and other pertinent information to fully describe the geotextile.

When samples are required, remove a 3-foot-long full-width sample from beyond the first outer wrap of the roll. Label the sample with the lot and batch number, date of sampling, project number, item number, manufacturer name, and product name.

714.03 Geogrids

Furnish geogrids consisting of polymeric materials such as polypropylene, polyethylene, or polyester formed into a stable network of bars or straps fixed at their junctions such that the bars retain their relative position to each other. Ensure that the geogrid is treated to resist ultraviolet

degradation, and that it conforms to the physical strength requirements shown in Table 714-7 in accordance with ASTM D 4595.

Table 714-7. - Physical strength requirements for geogrids.		
Category	Minimum Strength at 5% Strain (lb/ft)	Minimum Ultimate Strength at Breakage (lb/ft)
1	620	890
2	890	1440
3	1165	1990
4	1920	4180
5	3630	6715
6	4800	8565

Furnish the CO with a certificate signed by a legally authorized official from the company that manufactured the geogrid. Ensure that the certificate attests that the geogrid meets the chemical, physical, material, and manufacturing requirements stated in the specification. When requested by the CO, furnish a sample of the geogrid from each lot for verification testing.

During shipment and storage, wrap the geogrid in a heavy-duty protective covering. Protect the geogrid from mud, soil, dust, debris, and sunlight prior to installation.

Ensure that the geogrid meets the minimum average roll values for the wide-width strip tensile strength tests performed in accordance with ASTM D 4595 for the category SHOWN ON THE DRAWINGS. Provide test results to the CO prior to incorporating the geogrid into the work.

Ensure that the aperture size for all geogrids is from 7/8 inch to 3 inches. Square and rectangular openings are permitted. Strengths shown in Table 714-7 are for both the machine and cross directions.

Section 716 - Material for Timber Structures

716.02 Hardware & Structural Steel

Furnish machine and carriage bolts that meet the requirements of ASTM A 307, drift pins and dowels that meet the requirements of ASTM A 575, and galvanized hardware that meets the requirements of AASHTO M 232.

Ensure that all structural steel shapes, rods, glued laminated deck panel dowels, and plates are structural steel that meets the requirements of AASHTO M 183. Ensure that galvanizing meets the requirements of AASHTO M 111.

Furnish bolts with square or hexagonal heads, nuts or dome-headed bolts as **SHOWN ON THE DRAWINGS**, and nails that are cut or round nails of standard form. Use cut, round, or boat spikes, as specified. Use washers that are malleable iron castings, and plain or cut washers that are American Standard Plain Washers.

Use ring or shear plate timber connectors conforming to AASHTO's "Standard Specifications for Highway Bridges," Division II, article 16.2.6, Timber Connectors.

716.03 Treated Structural Timber & Lumber

Furnish wood in accordance with Subsection 716.01. Treat the wood and mark each piece of treated timber in accordance with AASHTO M 133. Use the type of treatment and minimum net retention of preservative that are **SHOWN ON THE DRAWINGS**. Completely and accurately fabricate all treated timber before it is treated. Except for Southern Pine, incise all surfaces greater than 2 inches in width; including glued laminated members, before treatment. Treat glued laminated timbers in accordance with AWPA C28. Furnish inspection certification of treatment from an agency accredited by ALSC.

Use the assay method to determine retention of preservatives in all lumber and timbers.

Ensure that treatment meets the requirements in the current edition of the WWPI's "Best Management Practices for the Use of Treated Wood in Aquatic Environments."

UNITED STATES DEPARTMENT OF AGRICULTURE



FOREST SERVICE



Rocky Mountain Region

Grand Mesa, Uncompahgre and Gunnison National Forests

Ouray Ranger District

TRAIL CONSTRUCTION PLANS FOR

BEAR_CREEK_NRT

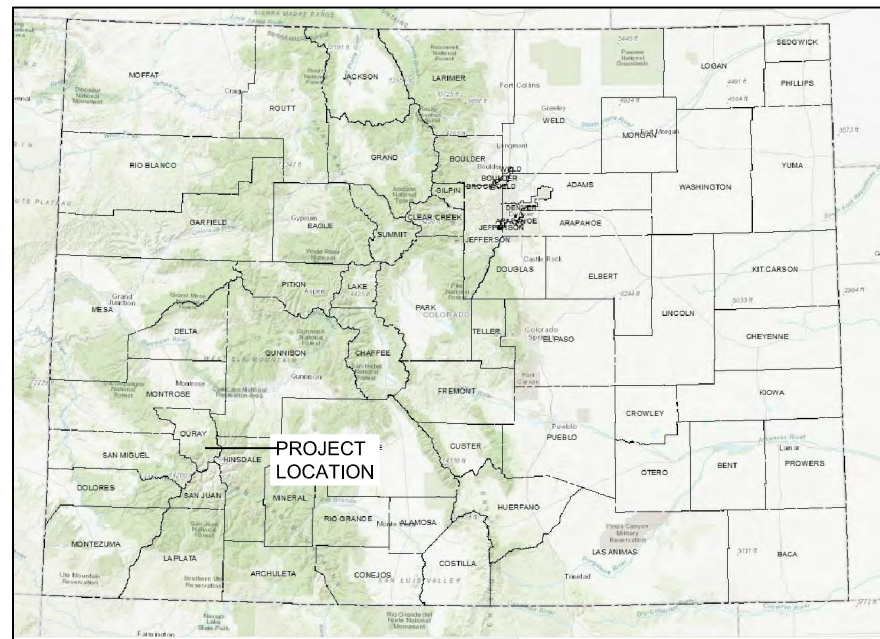
Appendix C

INDEX

SHEET

SHEET NO.

TITLE AND VICINITY MAP -----	1
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CROSS SECTION -----	6
TREATED TIMBER RETAINING WALL - ANCHORING -----	7
TREATED TIMBER RETAINING WALL - INSTALLATION -----	8



REVIEWED BY:

ENGINEERING 01 _____ DATE _____

ENGINEERING 02 _____ DATE _____

RECOMMENDED BY:

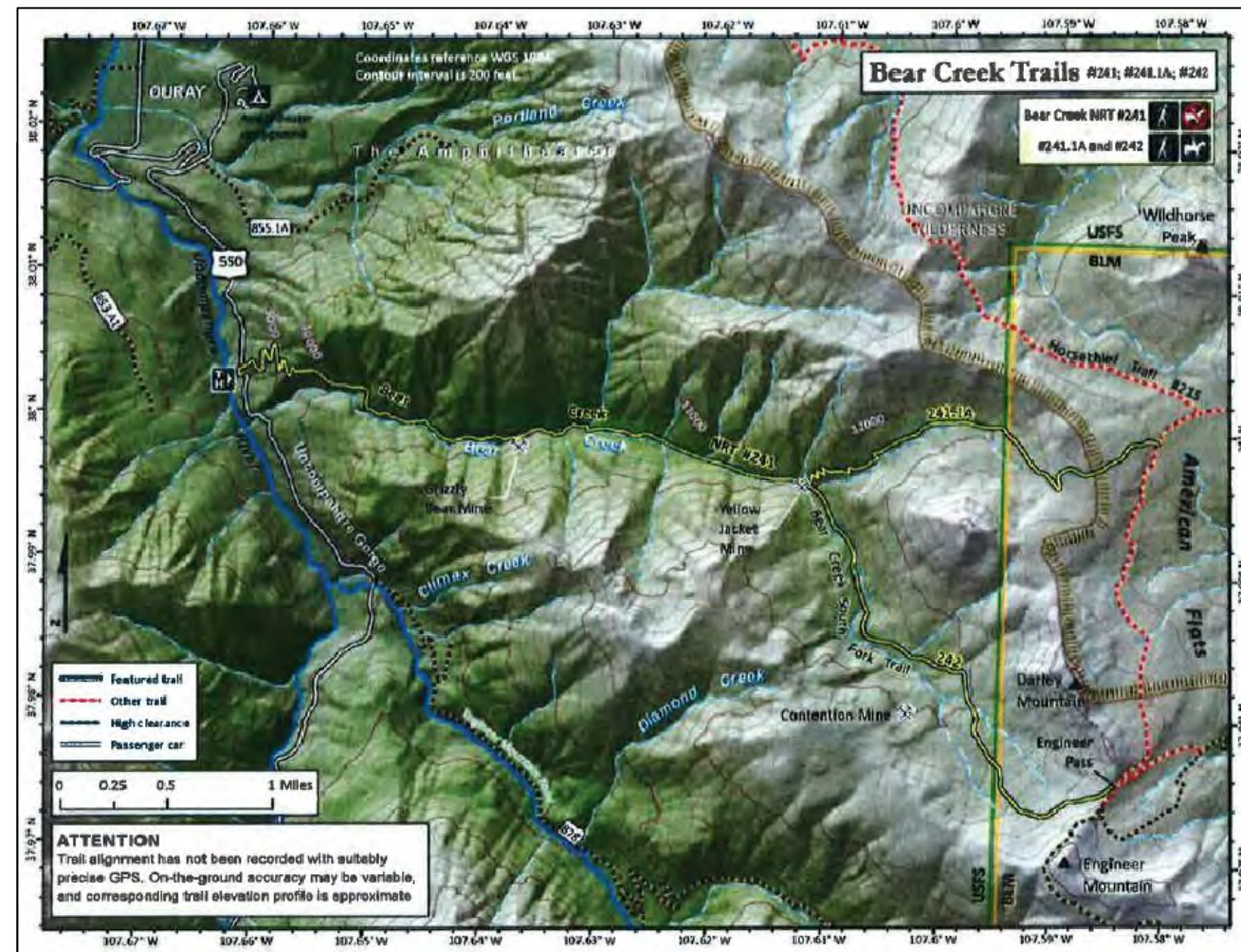
DISTRICT RANGER/PROGRAM MANAGER _____ DATE _____

FOREST/STATION ENGINEER _____ DATE _____

APPROVED BY:

FOREST SUPERVISOR/STATION DIRECTOR _____ DATE _____

REGIONAL/RESEARCH ENGINEER _____ DATE _____



PROJECT SITE

REVISIONS:

No.	△	DATE	INITIALS
No.	△	_____	_____
No.	△	_____	_____
No.	△	_____	_____

DESIGN:	DOUG MARAH	05/28/2019
DRAWN:	CHRIS PHELPS	05/28/2019
CHECKED:	DOUG MARAH	05/28/2019

PROJECT NAME	Bear Creek NRT
SECTION	900-GENERAL
TYPICAL ID	TTL

REVISION DATE	05/28/2019
NO SCALE	

DRAWING NO.	TITLE
SHEET	1 OF 8

CONSTRUCTED FORD - ROCK STRUCTURE

TYPICAL ID	FORD LENGTH	APPROACHES		RETAINERS*		FOUNDATION**				SURFACE COURSE			ROCK DAM		STEPPING ROCK MINIMUM SIZE (LBS)	COMMENTS	
		NEAR	FAR	TYPE	LENGTH	TYPE	DEPTH	LENGTH	GEOTEXTILE TYPE	TYPE	DEPTH	LENGTH	MINIMUM LENGTH	MINIMUM FACE ROCK SIZE (LBS)			
	X	X%	X%	R x X	X	F	X	X	GX	SX	X	X	X	X	X	X	
1	VARIES	10	10	ROCK	2FT.	1	12IN.	VARIES	3	5	6IN.	VARIES	AS EXIST	150	75		

N/A WHEN NOT REQUIRED

**FOR FOUNDATIONS SEE SECTION STD_918

GEOTEXTILE TYPE

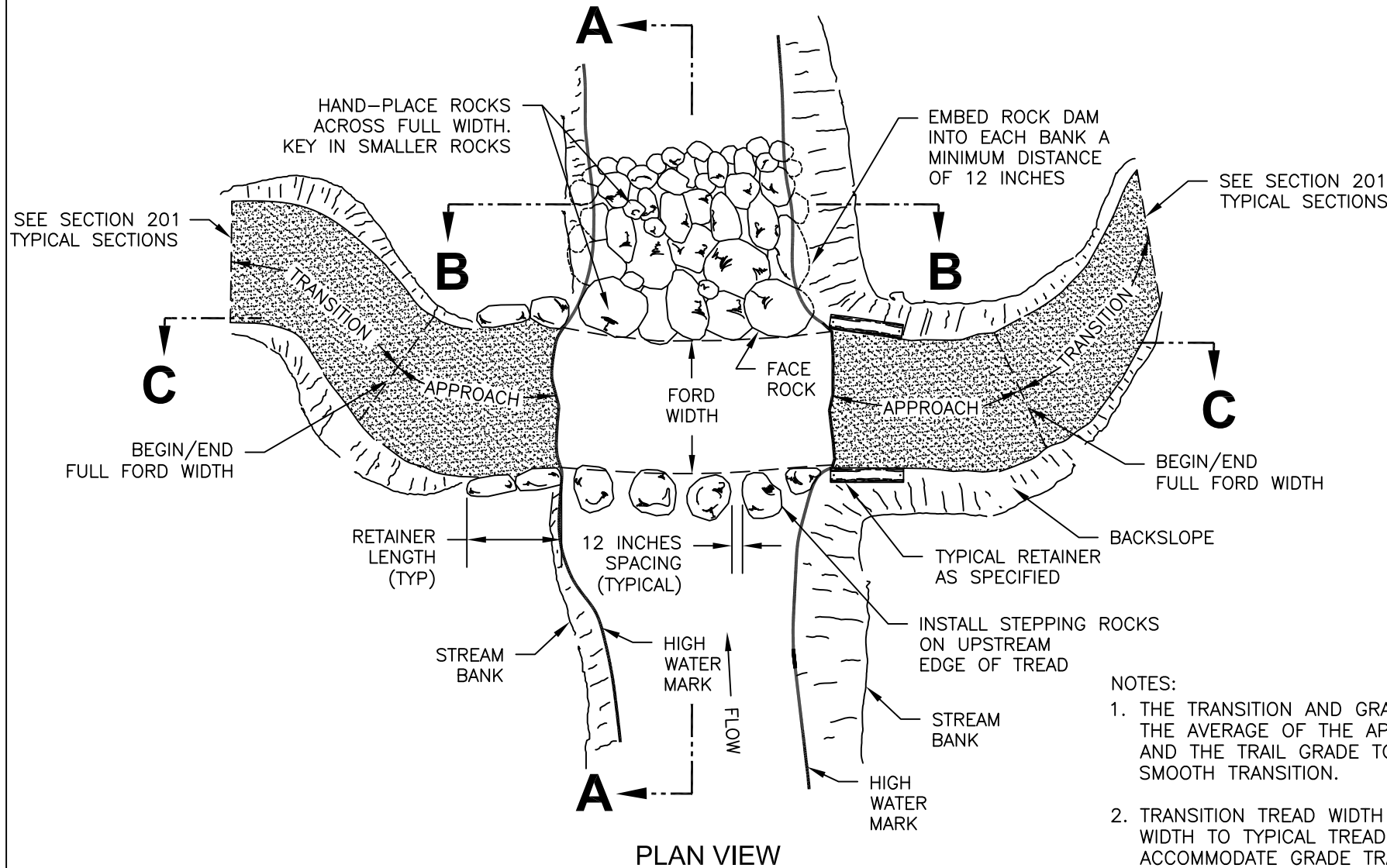
TYPE	MATERIAL	COMMENTS
G1	NON-WOVEN	X
G2	WOVEN	
G3	GEOGRID	714
G4	X	
G5	X	
G6	X	

FOUNDATION MATERIAL TYPE

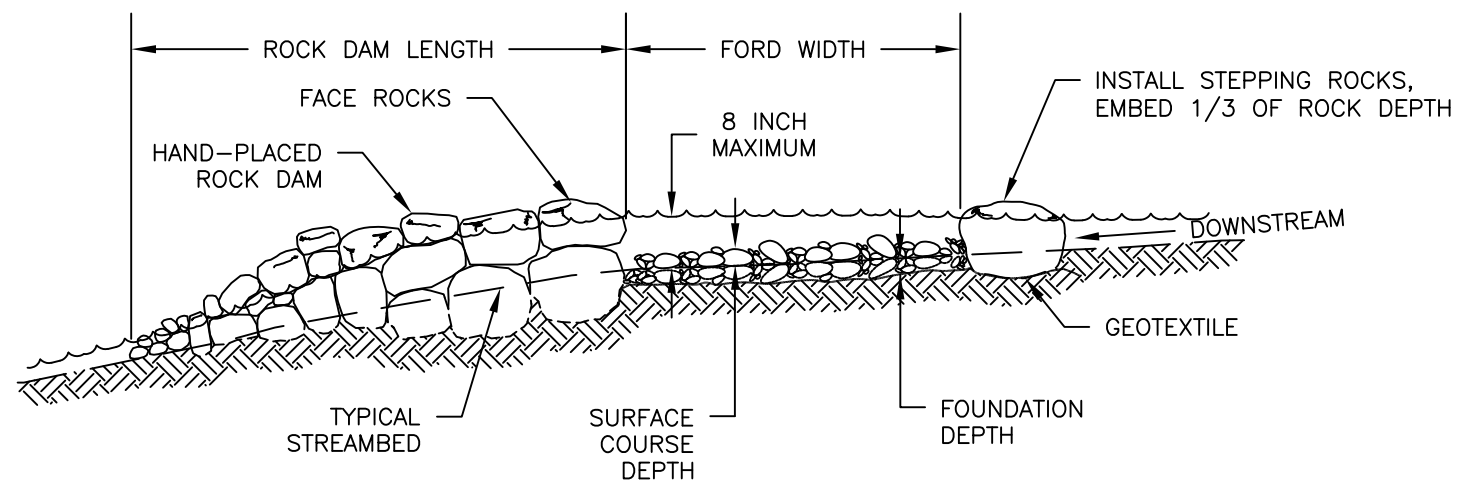
TYPE	MATERIAL	COMMENTS
F1	GRAVEL	SMALL ROCKS LESS THAN 3 INCHES
F2	PAVING BLOCK	
F3	GEOCELL	714
F4	X	

SURFACE COURSE MATERIAL TYPE

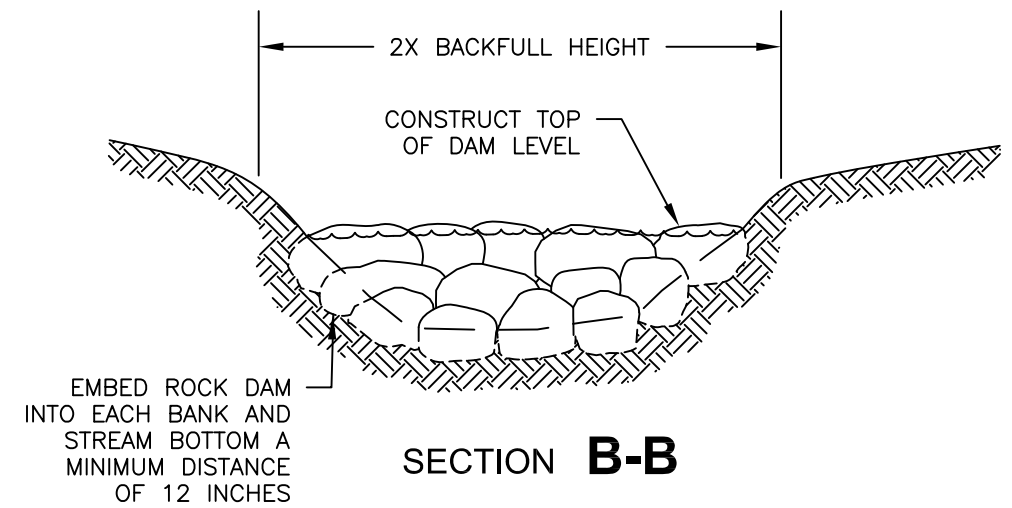
TYPE	MATERIAL	GRADATION	COMMENTS
S1	PITRUN	X	
S2	AGGREGATE	X	
S3	CLAY	X	
S4	WOODCHIPS	X	
S5	NATIVE	<3"	ONSITE



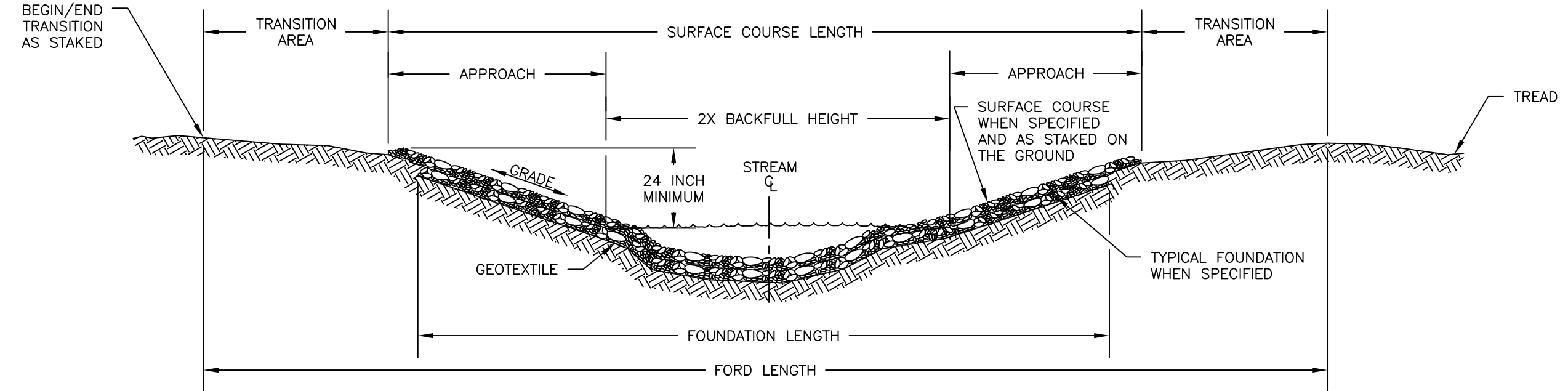
- NOTES:
1. THE TRANSITION AND GRADE SHALL BE THE AVERAGE OF THE APPROACH GRADE AND THE TRAIL GRADE TO CREATE A SMOOTH TRANSITION.
 2. TRANSITION TREAD WIDTH FROM FORD WIDTH TO TYPICAL TREAD WIDTH TO ACCOMMODATE GRADE TRANSITION.



SECTION **A-A**



SECTION **B-B**



SECTION **C-C**

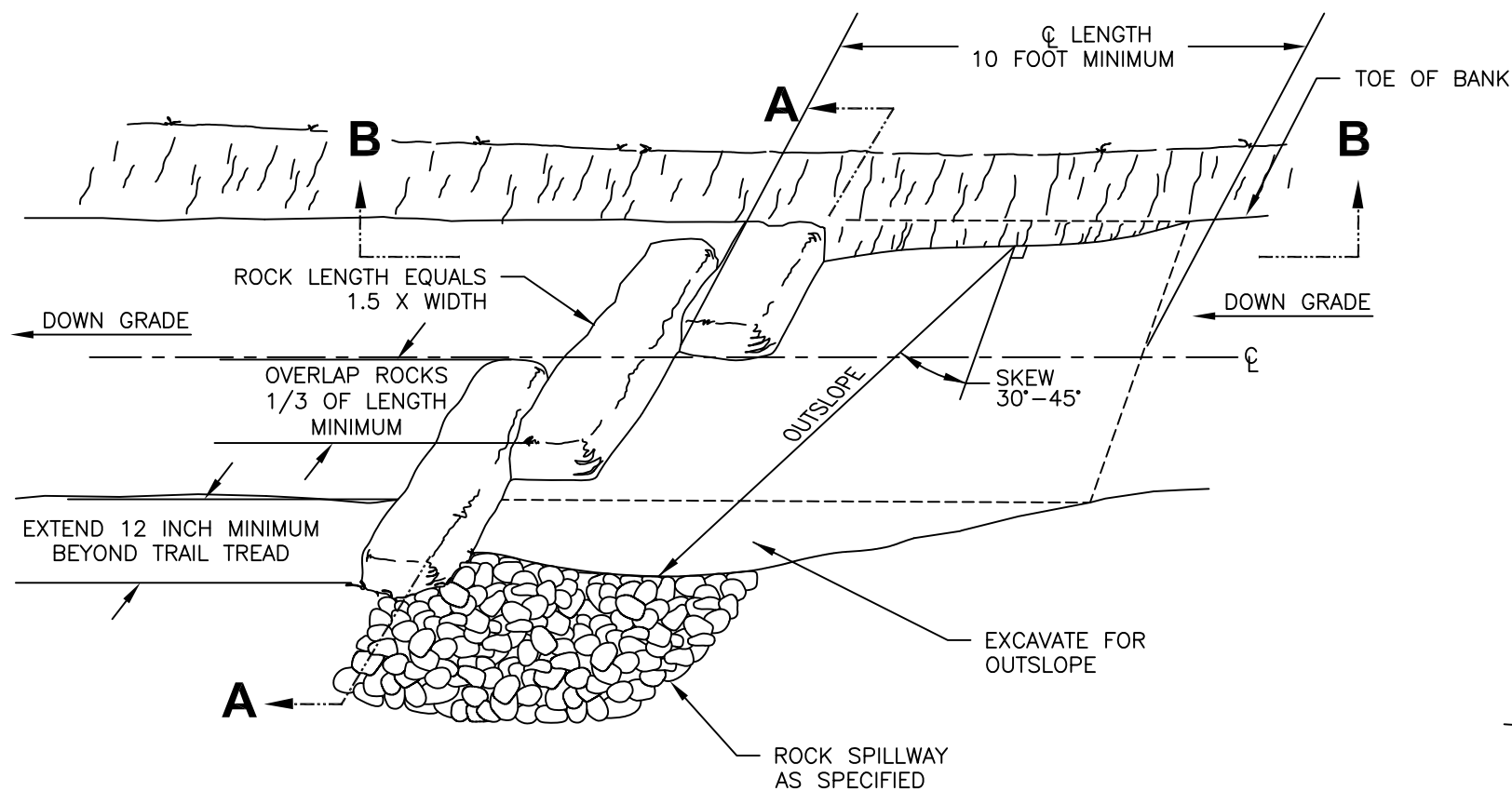
ROCK WATERBAR

SKEW

TRAIL GRADE	SKEW ANGLE
<5%	45° MAX
>5%	30° MIN

TYPICAL ID	MINIMUM ROCK SIZE (LBS)	OUTSLOPE	CL LENGTH	ROCK*** SPILLWAY	COMMENTS
	X	X	X	X	X
	150	5 %	6FT.	N/A	

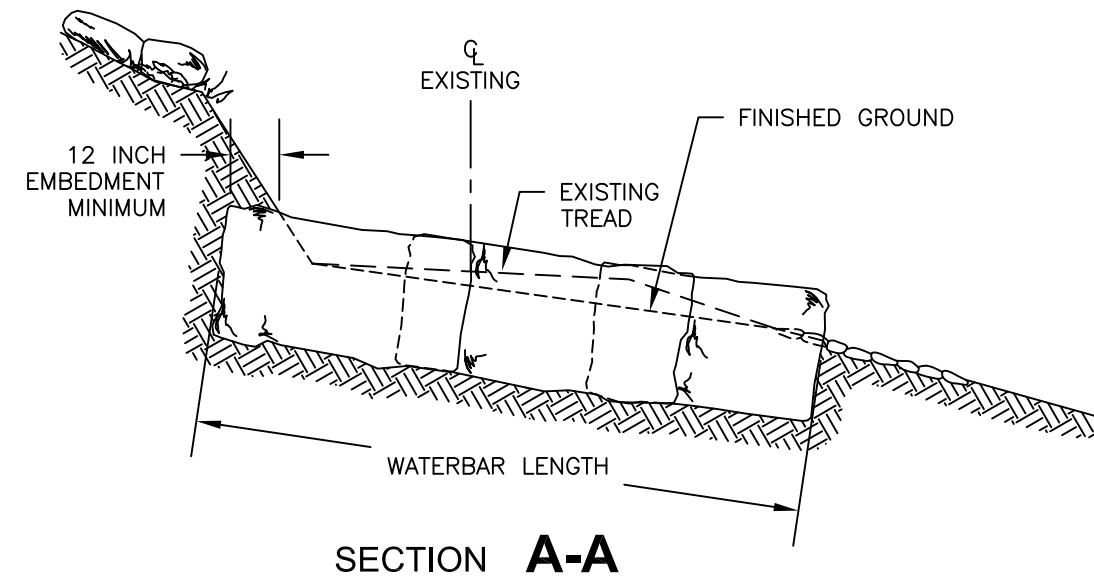
N/A WHEN NOT APPLICABLE



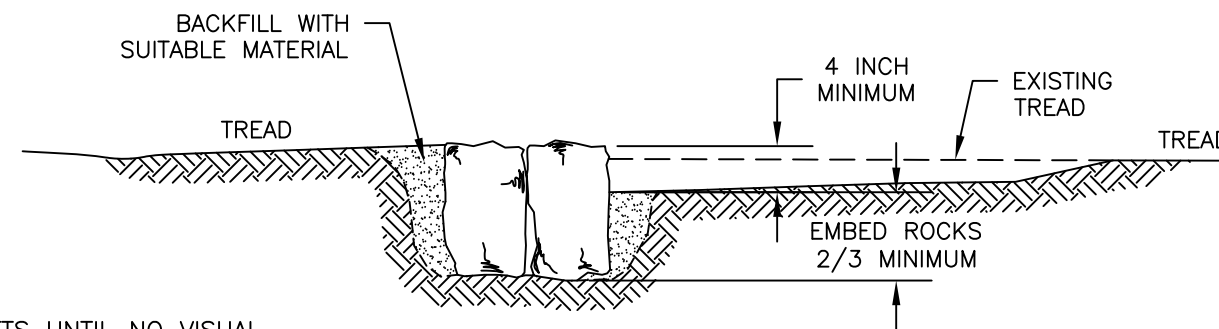
PERSPECTIVE VIEW

NOTE:

1. COMPACT BACKFILL IN 6 INCH LIFTS UNTIL NO VISUAL DISPLACEMENT.
2. ALL EXCAVATED SECTIONS FOR WATERBARS SHALL BE OUTSLOPED TO DAYLIGHT.

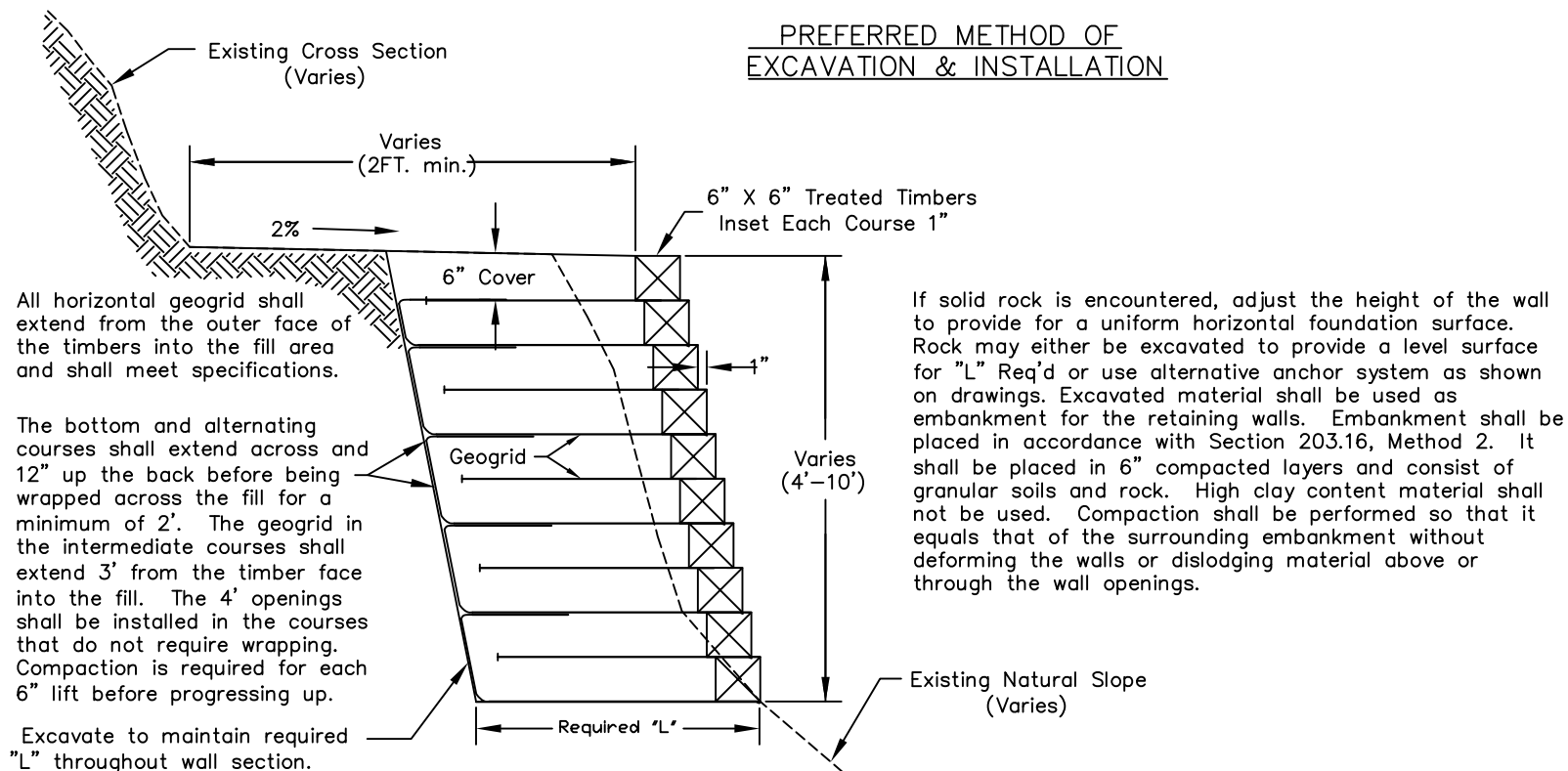


SECTION A-A



SECTION B-B

**PREFERRED METHOD OF
EXCAVATION & INSTALLATION**



All horizontal geogrid shall extend from the outer face of the timbers into the fill area and shall meet specifications.

The bottom and alternating courses shall extend across and 12" up the back before being wrapped across the fill for a minimum of 2'. The geogrid in the intermediate courses shall extend 3' from the timber face into the fill. The 4' openings shall be installed in the courses that do not require wrapping. Compaction is required for each 6" lift before progressing up.

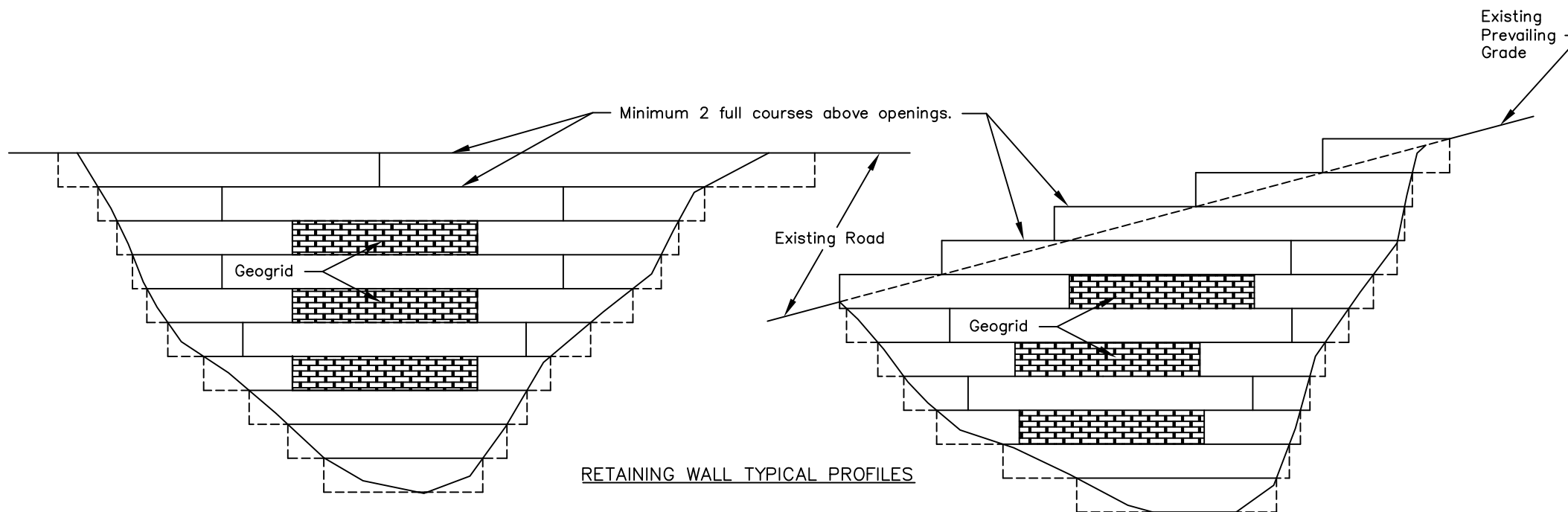
Excavate to maintain required "L" throughout wall section.

If solid rock is encountered, adjust the height of the wall to provide for a uniform horizontal foundation surface. Rock may either be excavated to provide a level surface for "L" Req'd or use alternative anchor system as shown on drawings. Excavated material shall be used as embankment for the retaining walls. Embankment shall be placed in accordance with Section 203.16, Method 2. It shall be placed in 6" compacted layers and consist of granular soils and rock. High clay content material shall not be used. Compaction shall be performed so that it equals that of the surrounding embankment without deforming the walls or dislodging material above or through the wall openings.

RETAINING WALL TYPICAL CROSS SECTION

NOTES:

1. Contractor shall be responsible for all traffic signing and control barricades in project area during construction.
2. Project staking shall be considered incidental to other items of work. Dimensions of length and height are approximate. Actual wall dimensions shall be staked before construction begins.
3. Any clearing and grubbing shall be considered incidental to items of work.
4. All treated timbers shall meet the requirements of Section 716.03. They shall be rated for continuous ground contact. Treatment type shall be approved in advance by the Engineer as shown drawings.
5. Ends of timbers cut to fit in the field shall be treated with a treatment recommended by the manufacturer and approved in advance by the Engineer.
6. Removal and disposal of existing retaining wall materials (timbers, pins, rails, etc.) shall be considered incidental to installation of the Reinforced Soil Embankment Retaining Walls. All materials shall be removed from National Forest Lands.
7. Slough material at the toe of the cut slope may be used in the embankment if it meets the utilization requirements for the fill.
8. Material used in embankment shall be free-draining granular soils & rock and shall be placed in accordance with Section 203.16, Method 2, Layer Placement. Flat and elongated rock may be used if it is 5" or less when placed horizontally.
9. Each lift shall be placed to provide a 6" compacted layer. Care shall be taken during spreading and compaction to ensure the geogrid over the openings remains intact, timbers are not displaced, and geogrid is not damaged. Compact to equal surrounding material.



RETAINING WALL TYPICAL PROFILES

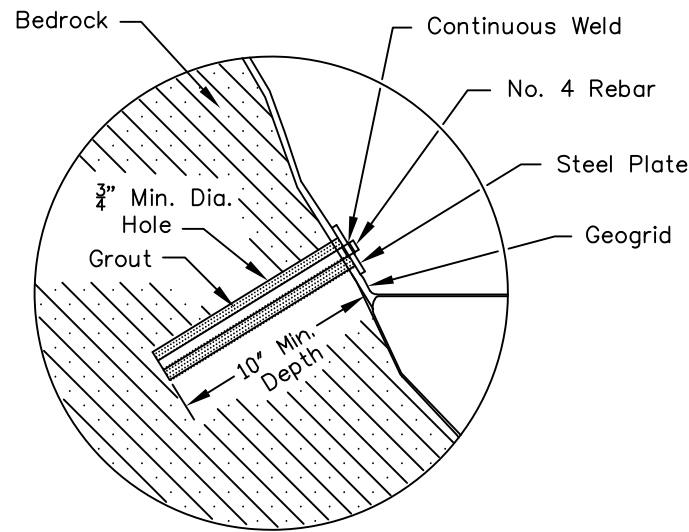
Erect walls with 4' openings on alternating courses where possible. Openings shall be covered inside the timber surface with geogrid flaps as shown on drawings.

Excavate a horizontal full bench foundation into stable undisturbed material. Stockpile excavated material for use in embankment. Oversized material (rock over 5" high laying flat) may be deposited outside the toe of the retaining wall if it will stabilize there.

K:\eng\proj\misc\lmogene\dwg\x_sec.

REQUIRED GEOGRID LENGTHS

WALL HEIGHT (Ft.)	REQUIRED GEOGRID LENGTH, "L" Req'd (Ft.)
10	7.25
9	6.50
8	5.75
7	5.25
6	4.50
5	4.00
4	3.50
3	3.00



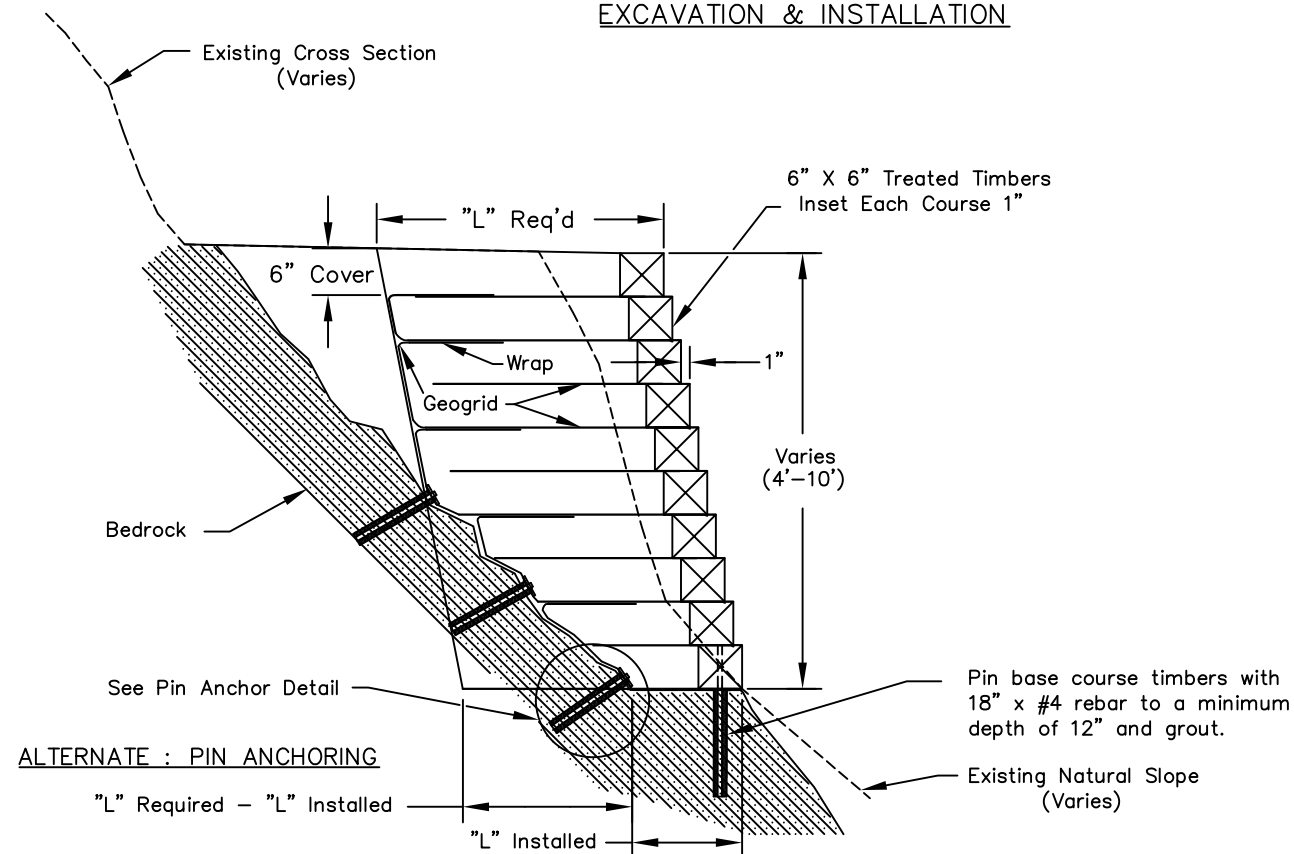
PIN ANCHOR DETAIL

Install Anchors with an Inclination of 15 to 30 degrees from Horizontal

NOTES:

1. Anchors shall be installed in areas where bedrock is encountered in a location such that the design geogrid length ("L" Req'd) cannot be installed.
2. Anchors shall be grouted using a non-shrink Five Star Instant Grout or approved equal.
3. Steel plate shall have the following minimum dimensions: Length = 12", Width = 2", and Thickness = 1/4". Plate shall be placed with the length horizontal across the slope.
4. Rebar pin shall be attached to the plate using a continuous weld, top surface only.

ALTERNATE METHOD OF EXCAVATION & INSTALLATION



Anchor Spacing for Geogrid Layers, 0, 1, 2, 3, and 4 Ft. Above Base of Wall	
"L" Req'd-"L" Inst (Ft.)	Maximum Anchor Spacing (Ft.)
1	10.0
2	6.7
3	4.4
4	3.3
5	2.7
6	2.2

Anchor Spacing for Geogrid Layers, 5, 6, 7, 8, and 9 Ft. Above Base of Wall	
"L" Req'd-"L" Inst (Ft.)	Maximum Anchor Spacing (Ft.)
1	10.0
2	10.0
3	7.0
4	5.2
5	4.2

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U.S. DEPARTMENT OF AGRICULTURE
 FOREST SERVICE

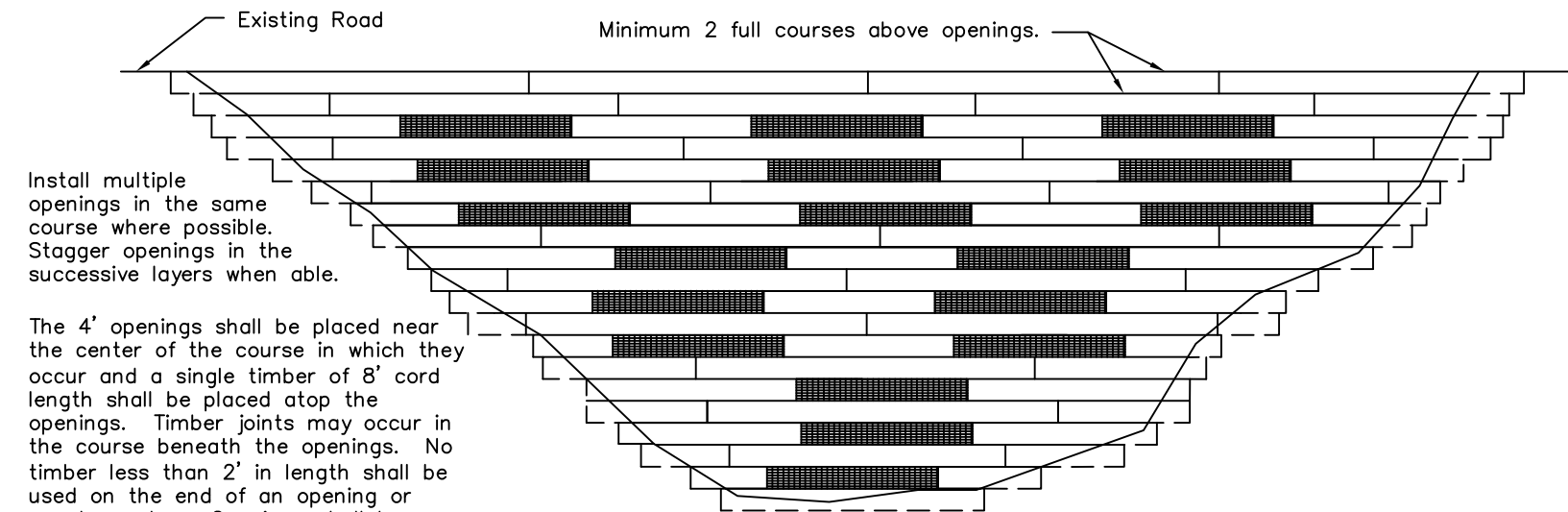
 R-2
 ROCKY MOUNTAIN REGION

Drawn PDM
 Design DTM
 Checked PM
 Reviewed TC

Forest
 Grand Mesa, Uncompahgre, &
 Gunnison National Forests

Project Name
 Treated Timber Retaining Wall
 Bear Creek NFT

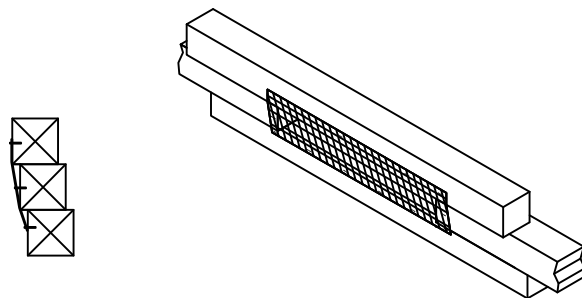
Sheet Title **Reqd. Geogrid Lengths
 And Alternate Anchoring Details**
 Scale NOT TO SCALE
 Sheet of 8 **7**



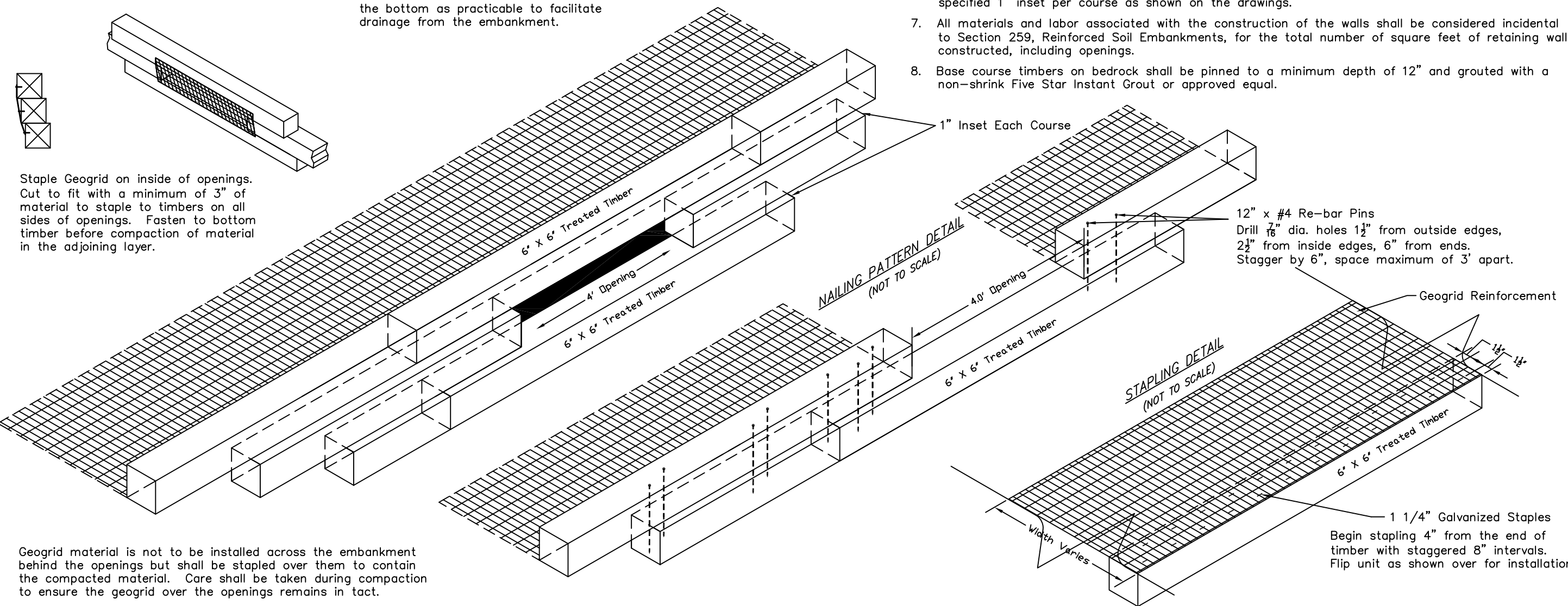
Install multiple openings in the same course where possible. Stagger openings in the successive layers when able.

The 4' openings shall be placed near the center of the course in which they occur and a single timber of 8' cord length shall be placed atop the openings. Timber joints may occur in the course beneath the openings. No timber less than 2' in length shall be used on the end of an opening or anywhere else. Openings shall be on alternating courses and shall have a 4' timber between them.

A 4' opening with minimum 2' timbers on the ends shall be installed as near the bottom as practicable to facilitate drainage from the embankment.



Staple Geogrid on inside of openings. Cut to fit with a minimum of 3" of material to staple to timbers on all sides of openings. Fasten to bottom timber before compaction of material in the adjoining layer.



Geogrid material is not to be installed across the embankment behind the openings but shall be stapled over them to contain the compacted material. Care shall be taken during compaction to ensure the geogrid over the openings remains in tact.

NOTES

1. The 6" x 6" timbers shall be uniform in size (tolerance on all dimensions $\pm 1/8"$) with ends trimmed square. Timber shall be #2 grade or better Ponderosa Pine & treated to meet the penetration and retention requirements of AWPA C2 for continuous soil contact applications. Treatment type shall be approved in advance by the Engineer. Manufacturer's certificate of compliance shall be required.
2. Biaxial Geogrid shall meet the requirements of Section 714.03, Category 1. Geogrid Materials shall be Tensor BX1200 available from CONTECH Engineered Solutions. 303-288-6052, or an approved equal. Geogrid for the base and alternating layers (full width layers) shall be installed with the machine direction parallel to the wall face (when deployed, the roll shall be perpendicular to the wall face). Geogrid in the intermediate layers can be installed with the machine direction either parallel or perpendicular to the wall face.
3. Wall details show construction of a wall on tangent for clarification. The actual walls shall be built along the alignment staked on the ground. Regardless of prevailing existing grade, each course shall be placed horizontally. Geogrid mats shall be cut on the down grade end to provide 6" minimum cover over the bottom mat and wrapped end.
5. Timbers shall be installed in 8' cord lengths where possible but may be cut in the field to fit. No length less than 2' shall be used. Cut ends shall be trimmed square and treated by an approved method.
6. Where a retaining wall is to be built along a radius, it is not required to cut timber ends to butt tight to the adjoining timbers. Timbers shall be adjusted in the field to obtain the specified 1" inset per course as shown on the drawings.
7. All materials and labor associated with the construction of the walls shall be considered incidental to Section 259, Reinforced Soil Embankments, for the total number of square feet of retaining wall constructed, including openings.
8. Base course timbers on bedrock shall be pinned to a minimum depth of 12" and grouted with a non-shrink Five Star Instant Grout or approved equal.

K:\eng\proj\misc\imogene\dwg\retain

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

R-2
 ROCKY MOUNTAIN REGION

Drawn PDM
 Design PDM
 Checked PDM
 Reviewed TC

Forest
**Grand Mesa, Uncompahgre, &
 Gunnison National Forests**

Project Name
**Treated Timber Retaining Wall
 Bear Creek NRT**

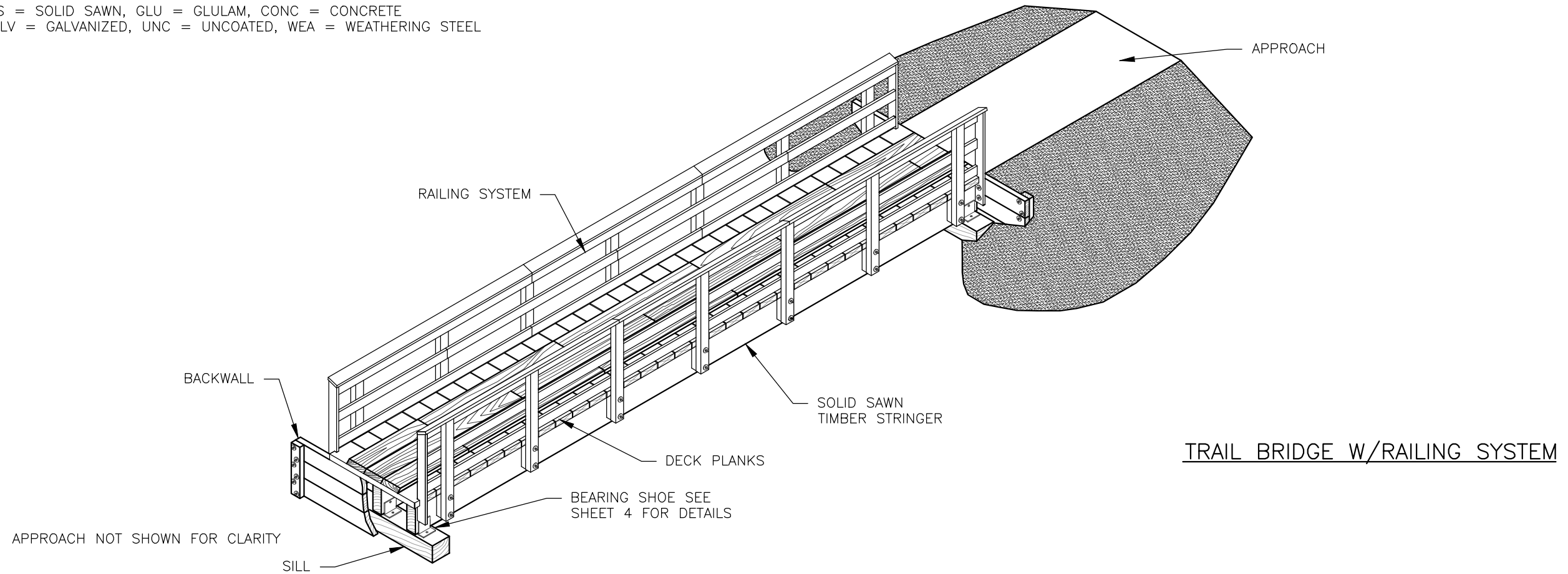
Sheet Title
Retaining Wall Installation
 Scale Not to Scale Sheet **8**
 of **8**

STRUCTURE NUMBER	TRAIL NO.	BRIDGE LOCATION	BRIDGE LENGTH OUT-TO-OUT	STRINGER SPAN C-C BRNG	BRIDGE CLEAR WIDTH	PEDESTRIAN LOAD	GROUND SNOW LOAD	STRINGERS				DECK			BACKWALL						
								SPECIES	NUMBER	MATERIAL SIZE	TREATMENT		SPECIES	SIZE	TREATMENT	TYPE	SPECIES	SIZE	WIDTH	HEIGHT	TREATMENT
											YES	NO									

NA = NOT APPLICABLE

STRUCTURE NUMBER	RAILING SYSTEM/CURB						RUNNING PLANK				SILL			APPROACHES					HARDWARE	COMMENTS			
	SPECIES	TYPE	HEIGHT	MATERIAL TYPE	TREATMENT		SPECIES	SIZE	WIDTH	TREATMENT		TYPE	SIZE	TREATMENT	LENGTH		WIDTH	MATERIAL TYPE	MATERIAL DEPTH		GEO- SYNTHETIC TYPE	COATINGS	
					YES	NO				YES	NO				NEAR	FAR							
X																							

ABUTMENT MATERIAL TYPE: SS = SOLID SAWN, GLU = GLULAM, CONC = CONCRETE
 HARDWARE COATING TYPE: GALV = GALVANIZED, UNC = UNCOATED, WEA = WEATHERING STEEL



TRAIL BRIDGE W/RAILING SYSTEM

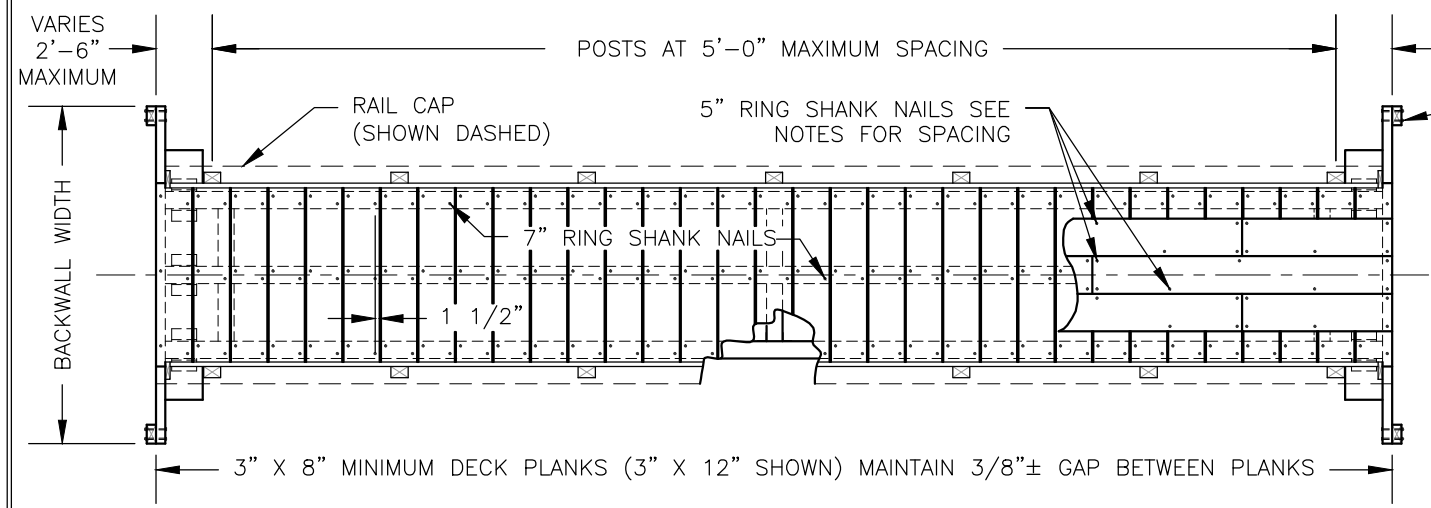
U.S. DEPARTMENT OF AGRICULTURE
 FOREST SERVICE
STANDARD TRAIL PLAN

PROJECT NAME & LOCATION

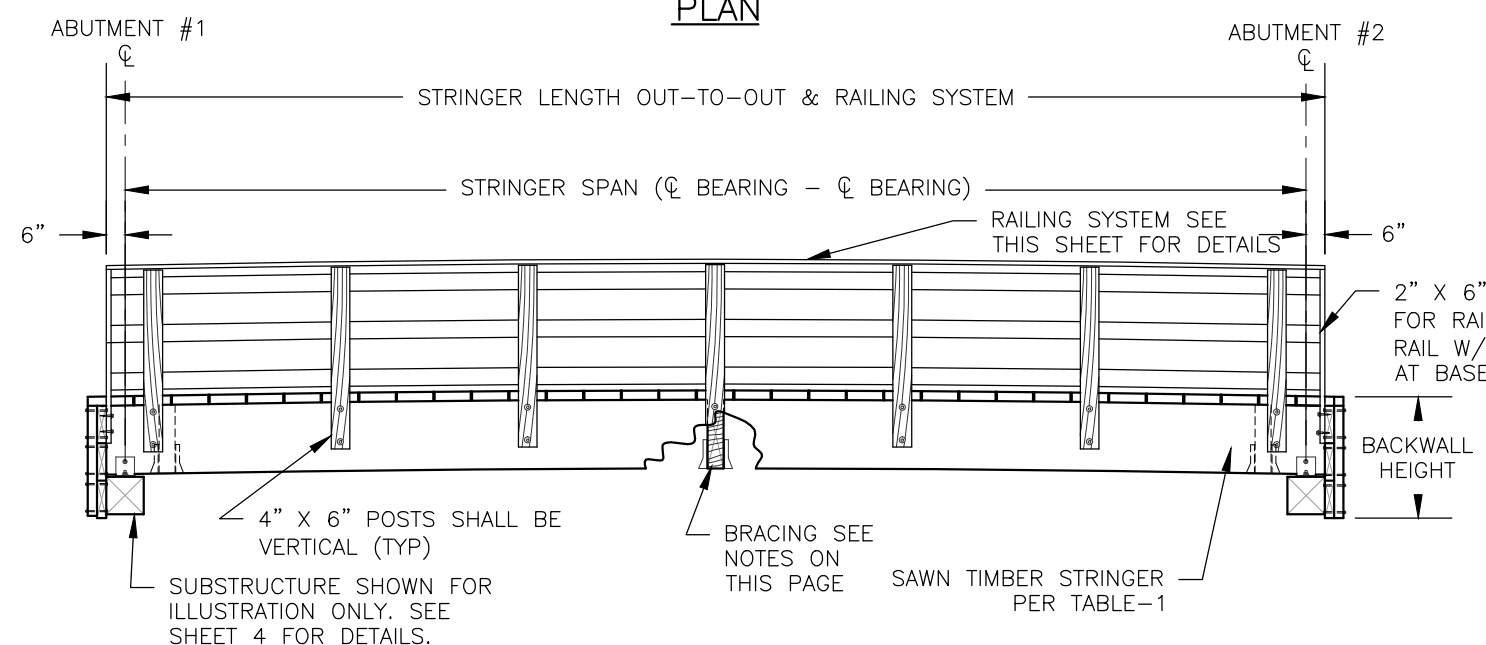
DRAWING NAME
SAWN TIMBER STRINGER TRAIL BRIDGE
 SECTION 962 - SAWN TIMBER TRAIL BRIDGE TYPICAL ID STS

REVISION DATE
NOT TO SCALE

DRAWING NO.
STD_962-10-01
 SHEET OF



PLAN

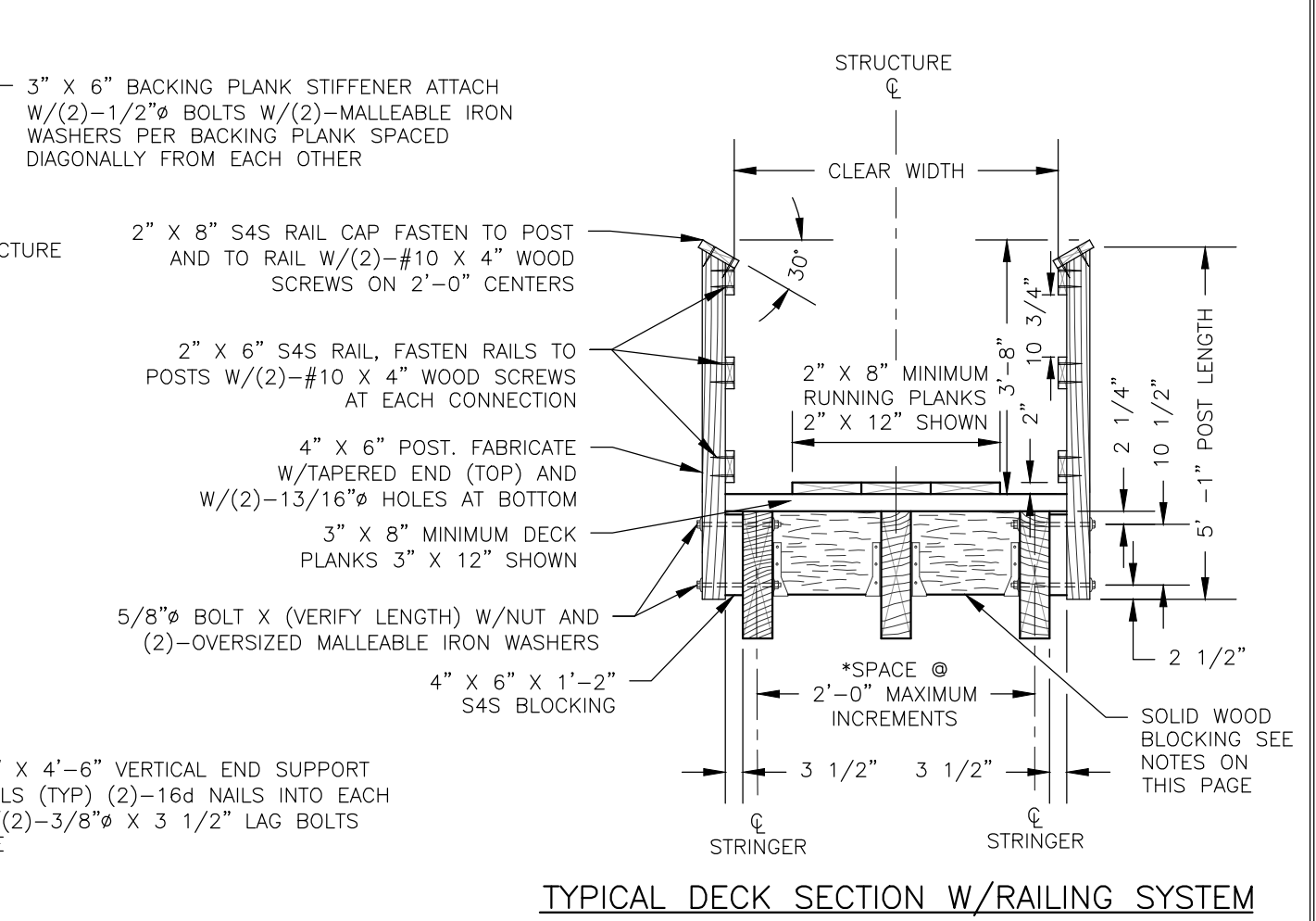


ELEVATION

NOTES:

GRADE SHOWN = 0.0%, RUNNING PLANKS NOT SHOWN FOR CLARITY

1. ALL DIMENSIONS IN TABLE-1 ARE NOMINAL (ROUGH SAWN). THE MINIMUM STRINGER DEPTH FOR BRIDGES WITH A PEDESTRIAN RAILING SYSTEM IS 15-INCHES. BRIDGES WITH STRINGER DEPTHS LESS THAN 15-INCHES SHALL HAVE CURBS ONLY. THE MINIMUM NUMBER OF STRINGERS IS THREE.
2. FASTEN DECK PLANKS TO STRINGERS WITH TWO ROWS 5/16-INCH DIAMETER X 7-INCH RING SHANK NAILS PER PLANK AT EACH STRINGER. ALTERNATE SIDES.
3. FASTEN RUNNING PLANKS TO DECK WITH 40d (5-INCH RING SHANK) NAILS AT 24-INCH SPACING. ALTERNATE SIDES WITH TWO AT EACH END.
4. PROVIDE A MINIMUM 1/2-INCH SPACE BETWEEN BLOCKING AND BACKWALL FOR AIR CIRCULATION.
5. SPLICE RAILS AT POSTS. RAILS SHALL BE CONTINUOUS FOR TWO POST SPACES. DO NOT LOCATE MORE THAN ONE RAIL SPLICE AT ANY ONE POST.
6. BRACING REQUIRED AT THE ENDS OF EACH MEMBER. THE BRACING SHALL BE THREE-QUARTERS TO FULL DEPTH AND PLACED WITHIN A DISTANCE OF THE DEPTH OF THE BEAM FROM THE CENTERLINE OF BEARING. BRACING REQUIRED AT MID-SPAN FOR SPANS OVER 20 FEET LONG.
7. WOOD BLOCKING SHALL BE BOLTED TO STRINGERS WITH STEEL ANGLES OR SUSPENDED IN STEEL HANGERS THAT ARE NAILED TO BLOCKS AND STRINGER SIDES



TYPICAL DECK SECTION W/RAILING SYSTEM

***TABLE-1: SOLID SAWN STRINGER SIZE REQUIREMENTS - LRFD**

**STRINGER SPAN (FEET)	TIMBER SPECIES - DOUGLAS FIR - LARCH				
	GRADE - NO.1				
	DESIGN LOADING IN POUNDS PER SQUARE FOOT				
	PEDESTRIAN LIVE LOAD		GROUND SNOW LOAD		
	***65	90	120	150	200
● 10	3" X 8"	3" X 10"	3" X 12"	4" X 10"	4" X 12"
● 15	4" X 10"	4" X 12"	4" X 14"	4" X 16"	6" X 12"
● 20	4" X 14"	6" X 12"	6" X 12"	6" X 14"	6" X 16"
▲ 25	6" X 14"	6" X 14"	6" X 16"	6" X 18"	6" X 20"
▲ 30	6" X 16"	6" X 18"	6" X 20"	6" X 20"	8" X 20"

- INSTALL BRACING WITHIN A DISTANCE OF THE DEPTH OF THE BEAM FROM THE CENTERLINE OF BEARING
- ▲ INSTALL BRACING WITHIN A DISTANCE OF THE DEPTH OF THE BEAM FROM THE CENTERLINE OF BEARING & MID-SPAN
- * STRINGER SIZE SHALL BE THE LARGER OF THE PEDESTRIAN OR GROUND SHOW LOAD SIZE REQUIRED FOR THE SITE CONDITIONS
- ** STRINGER LENGTH EQUAL TO STRINGER SPAN PLUS ONE FOOT
- *** REQUIRES REGIONAL BRIDGE ENGINEER APPROVAL



PROJECT NAME & LOCATION

DRAWING NAME
SAWN TIMBER STRINGER TRAIL BRIDGE

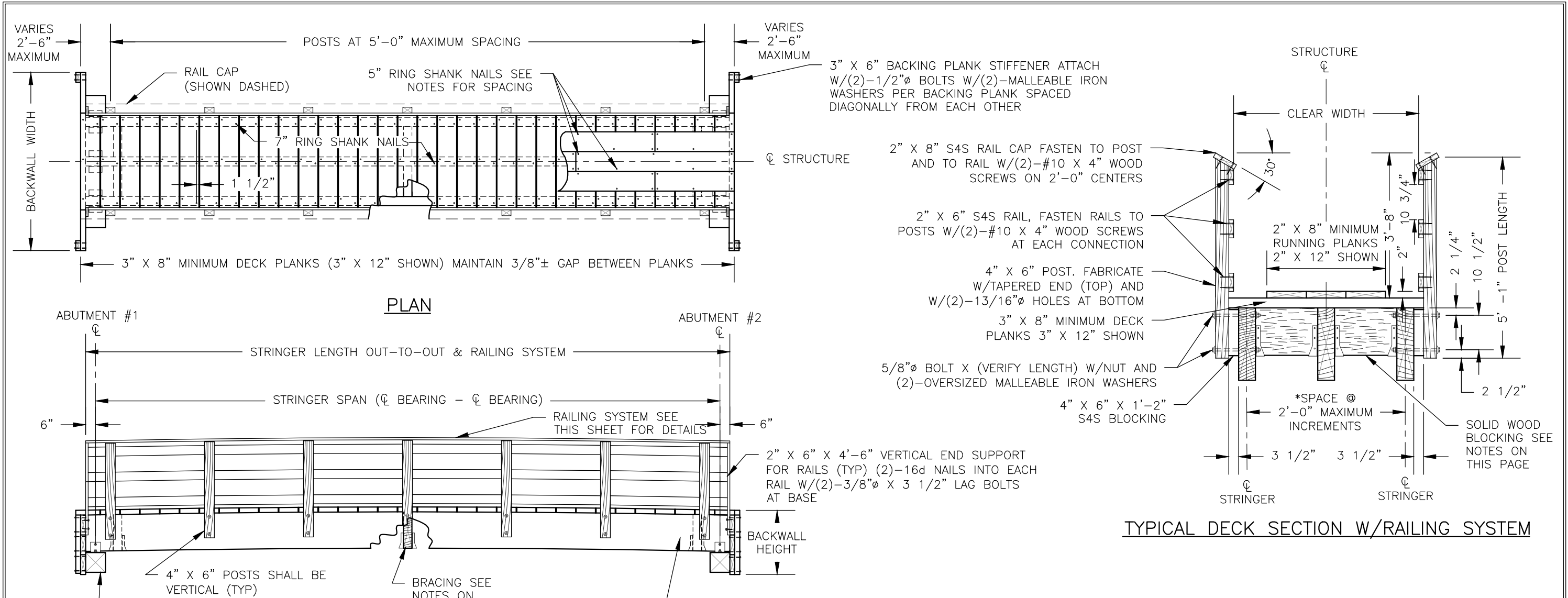
SECTION: **962 - SAWN TIMBER TRAIL BRIDGE** TYPICAL ID: **STS**

REVISION DATE

NOT TO SCALE

DRAWING NO.
STD_962-10-02a

SHEET OF



*TABLE-1: SOLID SAWN STRINGER SIZE REQUIREMENTS - LRFD

**STRINGER SPAN (FEET)	TIMBER SPECIES - SOUTHERN PINE GRADE - NO.1				
	DESIGN LOADING IN POUNDS PER SQUARE FOOT				
	PEDESTRIAN LIVE LOAD		GROUND SNOW LOAD		
	**65	90	120	150	200
● 10	3" X 8"	3" X 10"	3" X 10"	3" X 12"	4" X 12"
● 15	4" X 10"	4" X 12"	4" X 14"	4" X 16"	6" X 12"
● 20	4" X 14"	4" X 16"	6" X 12"	6" X 14"	6" X 16"
▲ 25	6" X 14"	6" X 16"	6" X 16"	6" X 16"	6" X 20"
▲ 30	6" X 16"	6" X 18"	6" X 18"	6" X 20"	8" X 20"

● INSTALL BRACING WITHIN A DISTANCE OF THE DEPTH OF THE BEAM FROM THE CENTERLINE OF BEARING
 ▲ INSTALL BRACING WITHIN A DISTANCE OF THE DEPTH OF THE BEAM FROM THE CENTERLINE OF BEARING & MID-SPAN
 * STRINGER SIZE SHALL BE THE LARGER OF THE PEDESTRIAN OR GROUND SHOW LOAD SIZE REQUIRED FOR THE SITE CONDITIONS
 ** STRINGER LENGTH EQUAL TO STRINGER SPAN PLUS ONE FOOT
 *** REQUIRES REGIONAL BRIDGE ENGINEER APPROVAL

NOTES:

GRADE SHOWN = 0.0%, RUNNING PLANKS NOT SHOWN FOR CLARITY

- ALL DIMENSIONS IN TABLE-1 ARE NOMINAL (ROUGH SAWN). THE MINIMUM STRINGER DEPTH FOR BRIDGES WITH A PEDESTRIAN RAILING SYSTEM IS 15-INCHES. BRIDGES WITH STRINGER DEPTHS LESS THAN 15-INCHES SHALL HAVE CURBS ONLY. THE MINIMUM NUMBER OF STRINGERS IS THREE.
- FASTEN DECK PLANKS TO STRINGERS WITH TWO ROWS 5/16-INCH DIAMETER X 7-INCH RING SHANK NAILS PER PLANK AT EACH STRINGER. ALTERNATE SIDES.
- FASTEN RUNNING PLANKS TO DECK WITH 40d (5-INCH RING SHANK) NAILS AT 24-INCH SPACING. ALTERNATE SIDES WITH TWO AT EACH END.
- PROVIDE A MINIMUM 1/2-INCH SPACE BETWEEN BLOCKING AND BACKWALL FOR AIR CIRCULATION.
- SPLICE RAILS AT POSTS. RAILS SHALL BE CONTINUOUS FOR TWO POST SPACES. DO NOT LOCATE MORE THAN ONE RAIL SPLICE AT ANY ONE POST.
- BRACING REQUIRED AT THE ENDS OF EACH MEMBER. THE BRACING SHALL BE THREE-QUARTERS TO FULL DEPTH AND PLACED WITHIN A DISTANCE OF THE DEPTH OF THE BEAM FROM THE CENTERLINE OF BEARING. BRACING REQUIRED AT MID-SPAN FOR SPANS OVER 20 FEET LONG.
- WOOD BLOCKING SHALL BE BOLTED TO STRINGERS WITH STEEL ANGLES OR SUSPENDED IN STEEL HANGERS THAT ARE NAILED TO BLOCKS AND STRINGER SIDES

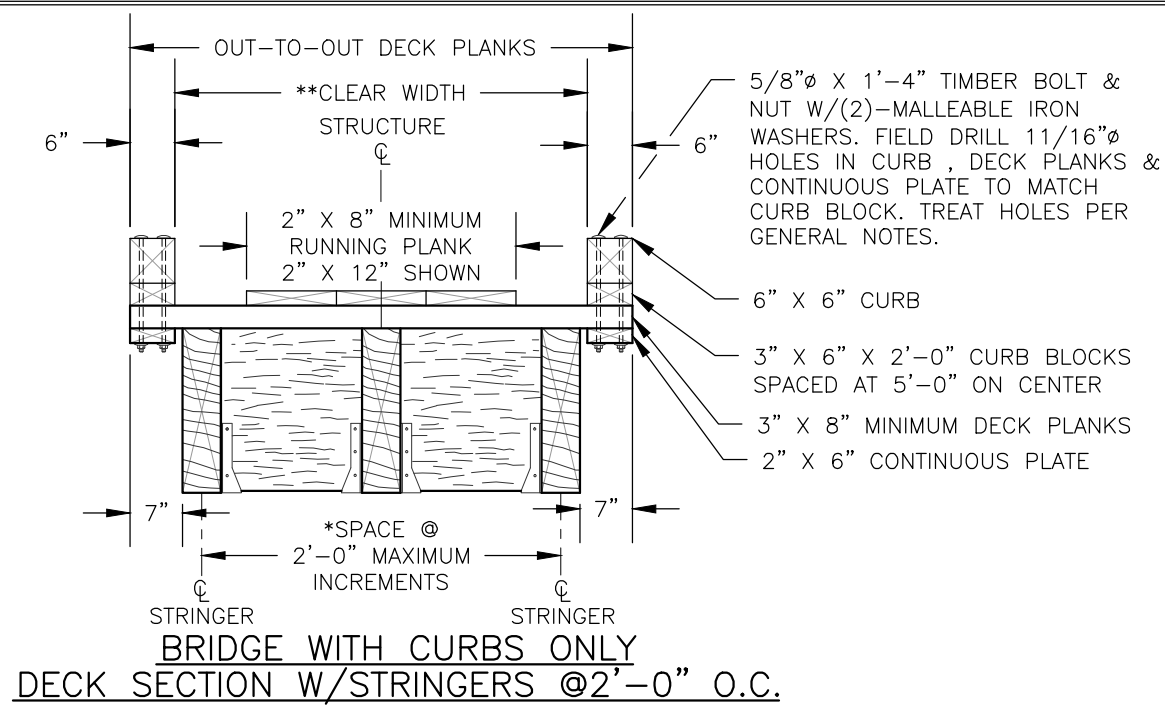


PROJECT NAME & LOCATION

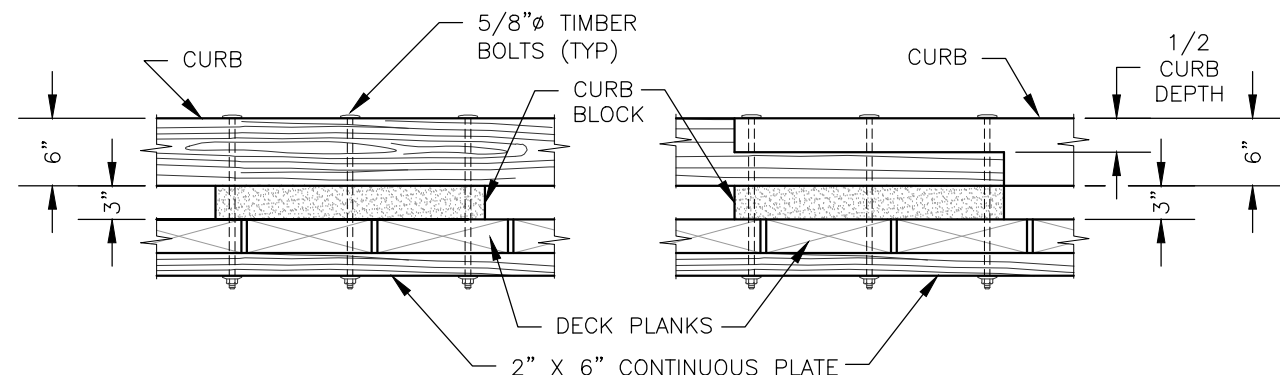
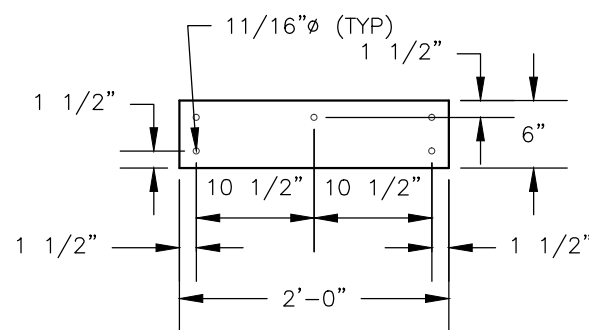
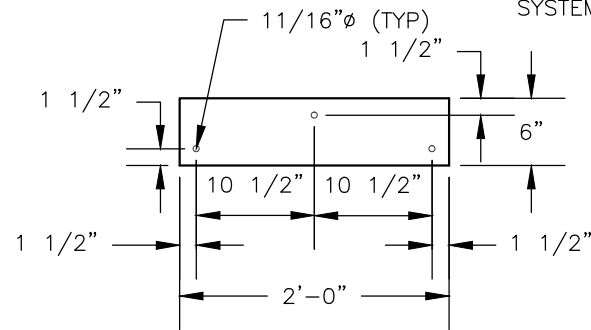
DRAWING NAME
SAWN TIMBER STRINGER TRAIL BRIDGE
 SECTION 962 - SAWN TIMBER TRAIL BRIDGE TYPICAL ID STS

REVISION DATE
NOT TO SCALE

DRAWING NO.
STD_962-10-02b
 SHEET OF



* MINIMUM NUMBER OF STRINGERS IS THREE
 ** INSIDE FACE TO INSIDE FACE OF RAILING SYSTEM



SOLID SAWN CURB CONNECTION DETAILS

GENERAL NOTES:

SPECIFICATIONS: MATERIALS AND CONSTRUCTION OF THIS STRUCTURE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS (FP-03) AND STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON FEDERAL PROJECTS,

TIMBER & LUMBER: SOLID SAWN TIMBER MEMBERS SHALL CONFORM TO THE REQUIREMENTS OF THE GRADING RULES AGENCY FOR THE SPECIES, TYPE, AND GRADE SPECIFIED BELOW.

DECK PLANKS, CURBS, SILLS, & BACKING PLANKS

- COASTAL REGION DOUGLAS FIR-LARCH ROUGH SAWN NO.1 GRADE, GRADING RULES AGENCY - WWPA, WCLIB

RUNNING PLANKS

- COASTAL REGION DOUGLAS FIR-LARCH ROUGH SAWN NO.2 GRADE, GRADING RULES AGENCY - WWPA, WCLIB

RAILS & POSTS (SEE PROJECT CRITERIA)

UNTREATED

- REDWOOD, S4S, NO.1 GRADE GRADING RULES AGENCY - RIS
- WESTERN RED CEDAR, S4S, SELECT STRUCTURAL GRADE GRADING RULES AGENCY - WWPA, WCLIB

TREATED

- HEM-FIR/DOUGLAS FIR, S4S, NO.1 GRADE GRADING RULES AGENCY - WWPA, WCLIB

TREATMENT: SEE PROJECT CRITERIA FOR MEMBERS IDENTIFIED TO BE TREATED AND FOR TREATMENT TYPE. PRESERVATIVE TREATMENT SHALL BE IN ACCORDANCE WITH THE CURRENT AMERICAN WOOD PROTECTION ASSOCIATION (AWPA) SPECIFICATIONS USING THE TREATMENT MATERIALS LISTED BELOW. TREATMENT WILL COMPLY WITH THE REQUIREMENTS OF THE CURRENT EDITION OF WESTERN WOOD PRESERVERS INSTITUTE (WWPI) "BEST MANAGEMENT PRACTICES FOR THE USE OF TREATED WOOD IN AQUATIC ENVIRONMENTS".

STRINGERS, DECKING, RUNNING PLANKS, & RAILING SYSTEM, IF TREATED

- AWPA USE CATEGORY SYSTEM (U1) FOR USE CATEGORY 3B ABOVE GROUND-EXPOSED (UC3B)
- PENTACHLOROPHENOL IN LIGHT OIL (TYPE C SOLVENT)
- COPPER NAPHTHENATE (CuN) IN LIGHT OIL (TYPE C SOLVENT)

SILLS, BACKING PLANKS, CRIBS, & TIMBER WALLS, IF TREATED

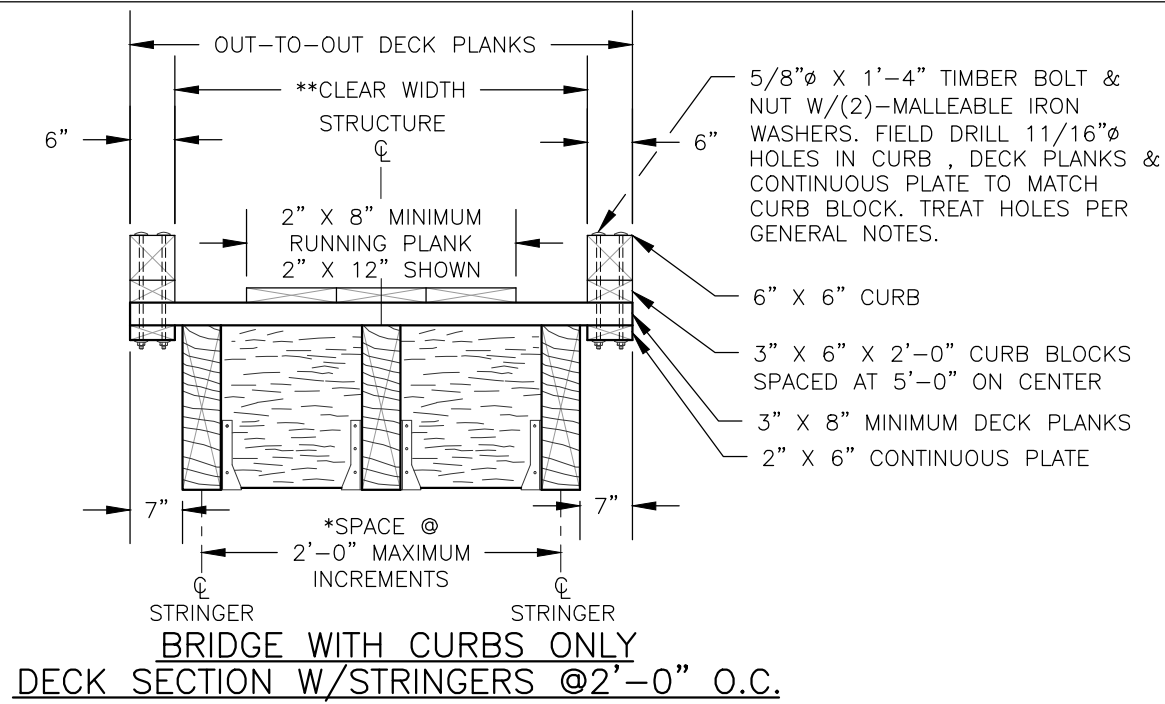
- AWPA USE CATEGORY SYSTEM (U1) FOR USE CATEGORY 4B GROUND CONTACT-HEAVY DUTY (UC4B)
- PENTACHLOROPHENOL IN HEAVY OIL (TYPE A SOLVENT)
- COPPER NAPHTHENATE (CuN) IN HEAVY OIL (TYPE A SOLVENT)

FIELD TREATMENT: COPPER NAPHTHENATE (2% SOLUTION) SHALL BE FURNISHED FOR FIELD TREATING OD WOOD. ALL ABRASIONS AND FIELD CUTS -APPROVED BY THE C.O.R.- SHALL BE CAREFULLY TRIMMED AND GIVEN THREE BRUSH COATS OF THE FIELD TREATMENT SOLUTION. WHERE APPROVED FIELD DRILLING OF BOLT OR NAIL HOLES IS REQUIRED, THE HOLES SHALL BE FILLED WITH PRESERVATIVE PRIOR TO INSERTING THE FASTENERS.

HARDWARE AND STRUCTURAL STEEL: SEE PROJECT DESIGN CRITERIA FOR STEEL HARDWARE FINISH. GALVANIZED OR UNFINISHED HARDWARE SHALL MEET THE REQUIREMENTS OF AASHTO M270, GRADE 36, WITH NUTS AND BOLTS CONFORMING TO ASTM A307, GRADE A. WEATHERING STEEL AND HARDWARE SHALL MEET THE REQUIREMENTS OF AASHTO M270, GRADE 50W, WITH BOLTS AND NUTS CONFORMING TO ASTM A325, TYPE 3. USE MALLEABLE IRON WASHERS AGAINST WOOD UNLESS OTHERWISE NOTED.

WHEN STRUCTURAL STEEL IS TO BE WELDED, THE WELDING PROCEDURE SHALL BE IN ACCORDANCE WITH AWS D1.1 AND SHALL BE SUITABLE FOR THE GRADE OF STEEL AND INTENDED USE OR SERVICE.

FABRICATION: SUBMIT SHOP DRAWINGS FOR ALL BRIDGE COMPONENTS (EXCEPT TIMBER RUNNING PLANKS). SHOW ALL DIMENSIONS AND FABRICATION DETAILS FOR ALL CUT OR BORED TIMBER. FIELD DRILLING OF HOLES SHALL NOT BE ALLOWED UNLESS OTHERWISE NOTED ON THE PLANS.



* MINIMUM NUMBER OF STRINGERS IS THREE
** INSIDE FACE TO INSIDE FACE OF RAILING SYSTEM

GENERAL NOTES:

SPECIFICATIONS: MATERIALS AND CONSTRUCTION OF THIS STRUCTURE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS (FP-03) AND STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON FEDERAL PROJECTS,

TIMBER & LUMBER: SOLID SAWN TIMBER MEMBERS SHALL CONFORM TO THE REQUIREMENTS OF THE GRADING RULES AGENCY FOR THE SPECIES, TYPE, AND GRADE SPECIFIED BELOW.

DECK PLANKS, CURBS, SILLS, & BACKING PLANKS RUNNING PLANKS

- SOUTHERN PINE NO.2 GRADE GRADING RULES AGENCY - SPIB
- SOUTHERN PINE NO.2 GRADE GRADING RULES AGENCY - SPIB

RAILS & POSTS (SEE PROJECT CRITERIA)

UNTREATED

- BALDCYPRESS, S4S, NO.1 GRADE GRADING RULES AGENCY - SPIB
- WHITE OAK, S4S, SELECT STRUCTURAL GRADE GRADING RULES AGENCY - NELMA

TREATED

- SOUTHERN PINE, S4S, NO.1 GRADE GRADING RULES AGENCY - SPIB

TREATMENT: SEE PROJECT CRITERIA FOR MEMBERS IDENTIFIED TO BE TREATED AND FOR TREATMENT TYPE. PRESERVATIVE TREATMENT SHALL BE IN ACCORDANCE WITH THE CURRENT AMERICAN WOOD PROTECTION ASSOCIATION (AWPA) SPECIFICATIONS USING THE TREATMENT MATERIALS LISTED BELOW. TREATMENT WILL COMPLY WITH THE REQUIREMENTS OF THE CURRENT EDITION OF WESTERN WOOD PRESERVERS INSTITUTE (WWPI) "BEST MANAGEMENT PRACTICES FOR THE USE OF TREATED WOOD IN AQUATIC ENVIRONMENTS".

STRINGERS, DECKING, RUNNING PLANKS, & RAILING SYSTEM, IF TREATED

- AWPA USE CATEGORY SYSTEM (U1) FOR USE CATEGORY 3B ABOVE GROUND-EXPOSED (UC3B)
- PENTACHLOROPHENOL IN LIGHT OIL (TYPE C SOLVENT)
- COPPER NAPHTHENATE (CuN) IN LIGHT OIL (TYPE C SOLVENT)

SILLS, BACKING PLANKS, CRIBS, & TIMBER WALLS, IF TREATED

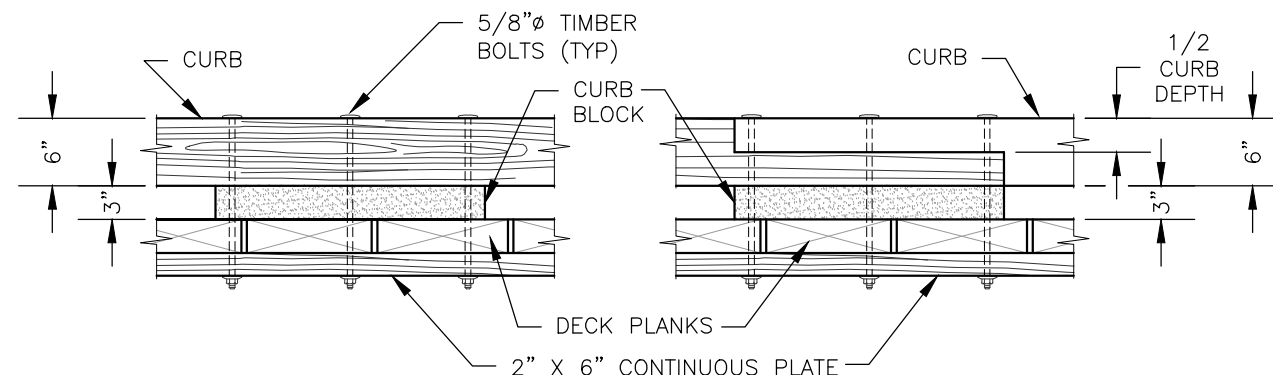
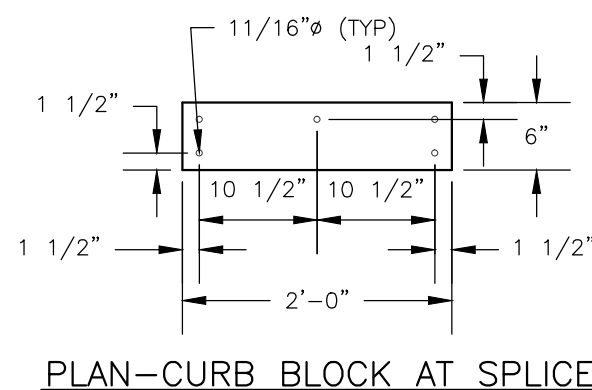
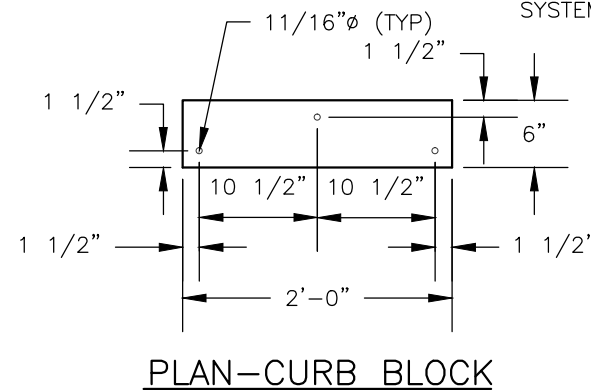
- AWPA USE CATEGORY SYSTEM (U1) FOR USE CATEGORY 4B GROUND CONTACT-HEAVY DUTY (UC4B)
- PENTACHLOROPHENOL IN HEAVY OIL (TYPE A SOLVENT)
- COPPER NAPHTHENATE (CuN) IN HEAVY OIL (TYPE A SOLVENT)

FIELD TREATMENT: COPPER NAPHTHENATE (2% SOLUTION) SHALL BE FURNISHED FOR FIELD TREATING OD WOOD. ALL ABRASIONS AND FIELD CUTS -APPROVED BY THE C.O.R.- SHALL BE CAREFULLY TRIMMED AND GIVEN THREE BRUSH COATS OF THE FIELD TREATMENT SOLUTION. WHERE APPROVED FIELD DRILLING OF BOLT OR NAIL HOLES IS REQUIRED, THE HOLES SHALL BE FILLED WITH PRESERVATIVE PRIOR TO INSERTING THE FASTENERS.

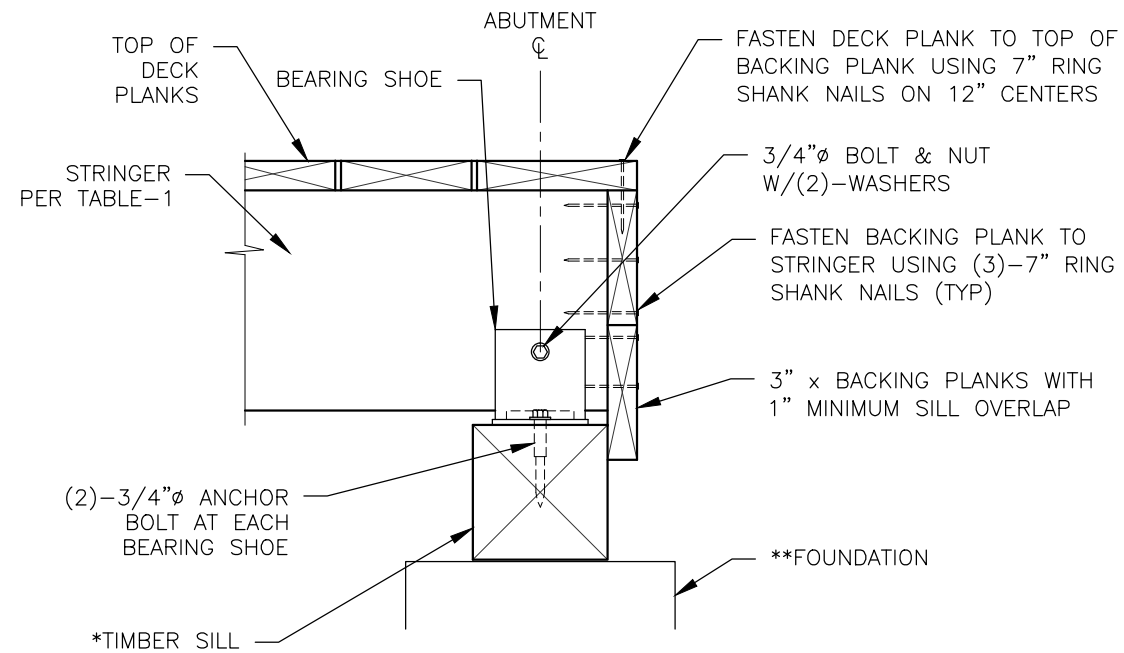
HARDWARE AND STRUCTURAL STEEL: SEE PROJECT DESIGN CRITERIA FOR STEEL HARDWARE FINISH. GALVANIZED OR UNFINISHED HARDWARE SHALL MEET THE REQUIREMENTS OF AASHTO M270, GRADE 36, WITH NUTS AND BOLTS CONFORMING TO ASTM A307, GRADE A. WEATHERING STEEL AND HARDWARE SHALL MEET THE REQUIREMENTS OF AASHTO M270, GRADE 50W, WITH BOLTS AND NUTS CONFORMING TO ASTM A325, TYPE 3. USE MALLEABLE IRON WASHERS AGAINST WOOD UNLESS OTHERWISE NOTED.

WHEN STRUCTURAL STEEL IS TO BE WELDED, THE WELDING PROCEDURE SHALL BE IN ACCORDANCE WITH AWS D1.1 AND SHALL BE SUITABLE FOR THE GRADE OF STEEL AND INTENDED USE OR SERVICE.

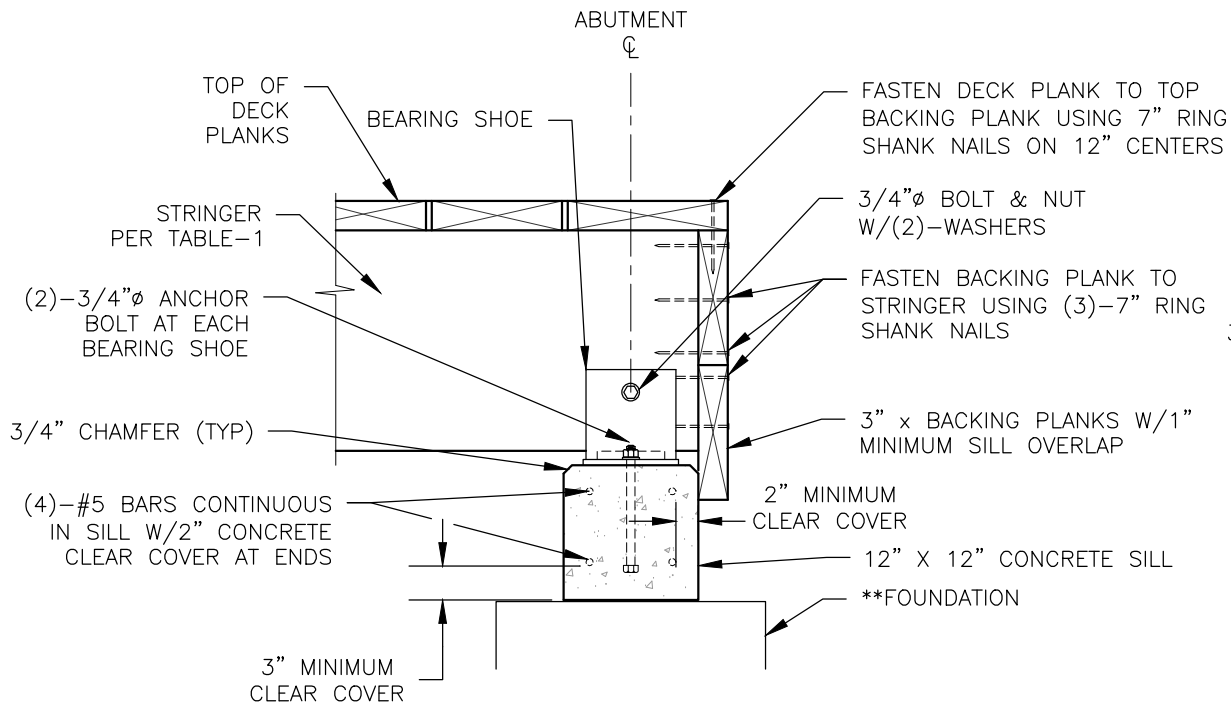
FABRICATION: SUBMIT SHOP DRAWINGS FOR ALL BRIDGE COMPONENTS (EXCEPT TIMBER RUNNING PLANKS). SHOW ALL DIMENSIONS AND FABRICATION DETAILS FOR ALL CUT OR BORED TIMBER. FIELD DRILLING OF HOLES SHALL NOT BE ALLOWED UNLESS OTHERWISE NOTED ON THE PLANS.



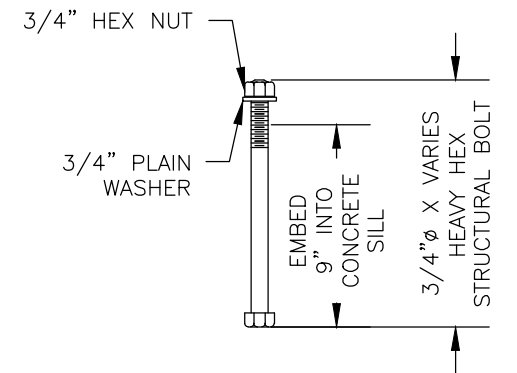
SOLID SAWN CURB CONNECTION DETAILS



GLU-LAM/SAWN TIMBER SILL CONNECTION DETAIL



CONCRETE SILL CONNECTION DETAIL



CONCRETE SILL ANCHOR BOLT DETAIL

BACKING PLANK STIFFENER NOT SHOWN FOR CLARITY

** TIMBER SILL CAN BE EITHER 12" X 12" SOLID SAWN 10 3/4" X 12" GLUE-LAMINATED, BUILT-UP 3" X 12", 4" X 12", & 6" X 12" TREATED MEMBERS.

** SEE STANDARD DRAWINGS 965-10, 965-20, 965-30, & 965-40 FOR FOUNDATION ALTERNATIVES

NOTES:

SPECIFICATIONS: MATERIALS AND CONSTRUCTION OF THIS STRUCTURE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS (FP-03) AND STANDARD SPECIFICATIONS FOR CONSTRUCTION OF TRAILS AND TRAIL BRIDGES ON FEDERAL PROJECTS,

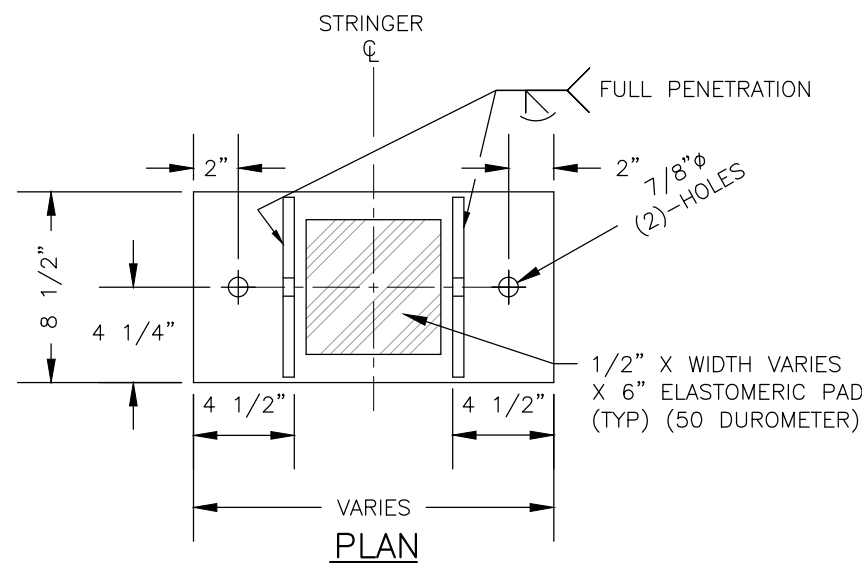
CONCRETE: USE STRUCTURAL CONCRETE WITH 7 SACK MINIMUM MIX APPROVED BY THE C.O., CONCRETE SHALL RECEIVE A TOWELED SURFACE FINISH. CONCRETE SHALL HAVE 4%-6% ENTRAINED AIR. MAXIMUM SIZE AGGREGATE SHALL BE 3/4-INCH AND CONCRETE SLUMP SHALL NOT EXCEED 4-INCHES.

REINFORCING STEEL: PROVIDE REINFORCING STEEL THAT CONFORMS TO ASTM A615 (AASHTO M31), GRADE 40 OR 60. PROVIDE 2-INCH CLEAR CONCRETE COVER FOR ALL REBAR, UNLESS NOTED OTHERWISE ON THE PLANS.

HARDWARE AND STRUCTURAL STEEL: SEE SHEET 3 FOR PROJECT DESIGN CRITERIA AND GENERAL NOTES.

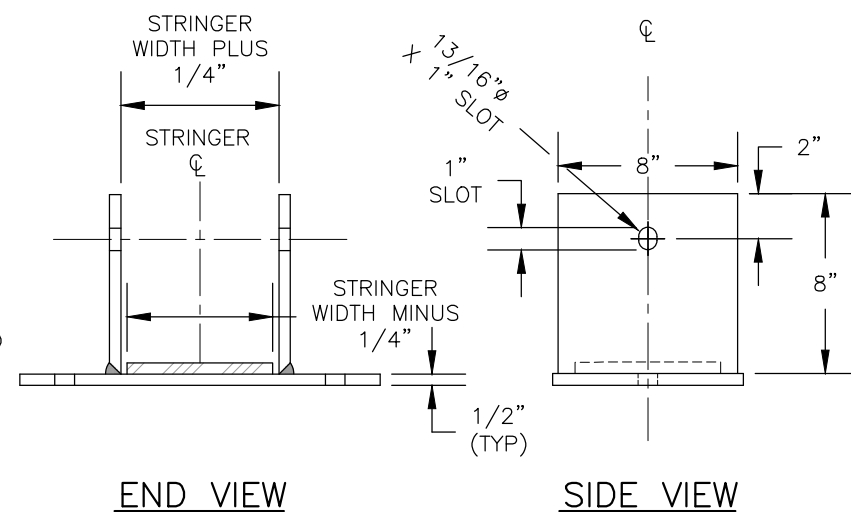
TREATED TIMBER & LUMBER: REFER TO THE GENERAL NOTES ON THE SUBSTRUCTURE DRAWINGS FOR TREATED TIMBER & LUMBER SPECIFICATIONS AND FIELD TREATING OF WOOD

LAG SCREW INSTALLATION: PRE-BORE LAG SCREW HOLES USING TWO DIAMETERS, ONE FOR THE SHANK AND ONE FOR THE THREADS. THE LEAD HOLE FOR THE SHANK IS TO BE 1/16-INCH LARGER THAN THE SHANK DIAMETER AND IS TO BE BORED TO THE DEPTH OF PENETRATION OF THE SHANK. THE LEAD HOLE FOR THE THREADED PORTION IS TO BE 70% OF THE BOLT DIAMETER AS SHOWN ON THE PLANS AND IS TO BE BORED AT LEAST TO THE LENGTH OF THE THREADS. **DO NOT DRIVE LAG SCREWS WITH A HAMMER.**



BEARING SHOE DETAIL

MATERIAL = 1/2" STEEL PLATE A36



END VIEW

SIDE VIEW