TIMBER SALE ROAD COST ESTIMATE BY SUBPROJECT WITH PUBLIC WORKS COSTS

Stewie Spruce Re-Offer Timber Sale - Summary of Quantities - All Associated Roads

Estimator: Goehl | Estimate Date: 08/2016 | Forest: GMUG | District: Gunnison

		Quantity	Units	Pub Wks Cost/Unit	Spec Rd Cost/Unit	Total Cost	% Labor	Road Data	AQ/DQ	PW Cost	SR Cost
203.17(a)	Drainage Excavation, Type - Rolling Dip, **Construct**, Tolerance 'J', Compaction Method 2	5	EA	$479.18		$2,395.90		drainage	AQ	$2,395.90	$2,395.90
203.17(b)	Drainage Excavation, Type - Rolling Dip, **Reconstruct**, Tolerance 'J', Compaction Method 2	6	EA	$339.26		$2,035.56		drainage	AQ	$2,035.56	$2,035.56
203.17(c)	Drainage Excavation, Type - Rolling Dip, **Recondition**, Tolerance 'J', Compaction Method 2	9	EA	$199.34		$1,794.06		drainage	AQ	$1,794.06	$1,794.06
203.17(d)	Grade Dip, **Recondition**, Tolerance 'J', Compaction Method 2 (Layer Placement/Equipment Travel)	2	EA	$116.07		$232.14		drainage	AQ	$232.14	$232.14
203.17(e)	Grade Dip, **Construct**, Tolerance 'J', Compaction Method 2 (Layer Placement/Equipment Travel)	8	EA	$300.00		$2,400.00		drainage	AQ	$2,400.00	$2,400.00
203.17(f)	Grade Dip, **Construct, Armor W/Geogrid & 24 CY CDOT Class 6 Aggregate**, Install 2 Rock	1	LS	$1,963.80		$1,963.80		drainage	DQ	$1,963.80	$1,963.80
	Underdrains (6 CY Minus 3" Angular Rock) Wrapped in Type III-A Geotextile,										
	Tolerance 'J', Compaction Method 2 (Layer Placement/Equipment Travel)										
306.01	Road Reconditioning, Compaction Method 'A' (Haul Equip.) or 'E' (Grid Roller), Includes Fringe	1.387	MI	$1,436.48		$1,992.40		prism	DQ	$1,992.40	$1,992.40
601.01	Mobilization (Includes Bonding, Profit & Overhead)	1	LS	$2,746.01		$2,746.01		prism	LSQ	$2,746.01	$2,746.01
603.01(18)	18" CMP Culvert, 0.064 Thick Steel (16 Ga.), Compaction Method 'A' (Density Exceeds Surrounding)	24	LF	$65.65		$1,575.60		drainage	AQ	$1,575.60	$1,575.60
	Includes Catch Basin Construction and 50 Linear Feet Ditching										
625.01	Seeding, Dry Method Without Mulch	1.7	AC	$473.08		$804.24		prism	DQ	$804.24	$804.24
703.05	Surface Course Aggregate, CDOT Class 6, Furnish, Spread & Comapct, Method 'A' or 'E' Section 304	110	CY	$28.30		$3,113.00		prism	DQ	$3,113.00	$3,113.00
		Subtotal Before Mobilization				$18,306.70					
		Subtotal With 15% Mob, P & OH				$21,052.71				$21,052.71	$21,052.71
				15% Mob, P & OH		$2,746.01					

APPROVED BY: [signature] DATE: 8/12/2016

APPROVED BY: George A. Goehl DATE: 8/12/2016

STEWIE SPRUCE RE-OFFER TIMBER SALE

Table of Contents ..... Page

DIVISION 100 - General Specifications 2
Section 101 - Abbreviations, Acronyms, & Terms 2
Section 102 - Definitions 8
Section 103 - Intent of Contract 15
Section 104 - Maintenance for Traffic 15
Section 105 - Control of Materials 16
Section 106 - Measurement & Payment 17
DIVISION 150 - Engineering 22
Section 156 – Public Traffic 22
Section 160 - Quality Control & Quantity Measurement 24
Section 161 - Certification for Quality & Quantity 26
DIVISION 200 - Earthwork 28
Section 201 - Clearing & Grubbing 28
Section 203 - Excavation, Embankment, & Haul 32
Section 204 - Soil Erosion & Water Pollution Control 39
Section 207 - Developing Water Supply & Watering 40
DIVISION 300 - Bases 42
Section 304 - Aggregate Base or Surface Course 42
Section 306 - Reconditioning Existing Road 44
DIVISION 600 - Incidental Construction 46
Section 601 - Mobilization 46
Section 603 – Metal Pipe 47
Section 625 - Seeding & Mulching 50
DIVISION 700 - Materials 52
Section 703 - Aggregate 52
Section 714 - Geotextile, Geocomposite Drain Material, & Geogrids 53
Section 718 - Traffic Signing & Marking Material 55
Appendices 56

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
be added to the item numm^2	-	square meter	area
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 roadway 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 road, 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 road 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 roads (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 road, 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 roads 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 roadway in excess of that needed for construction of designed roadways.

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 roadbed.

Pioneer Road. 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.)

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

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

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

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

Roadway. The portion of the road 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 roadway 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 roadway 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 roadbed 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 roads without base course or surface course, that portion of roadbed 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 roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes. (See Figure 102-1.)

Turnout. A short auxiliary lane on a one-lane road 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 roadway 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.

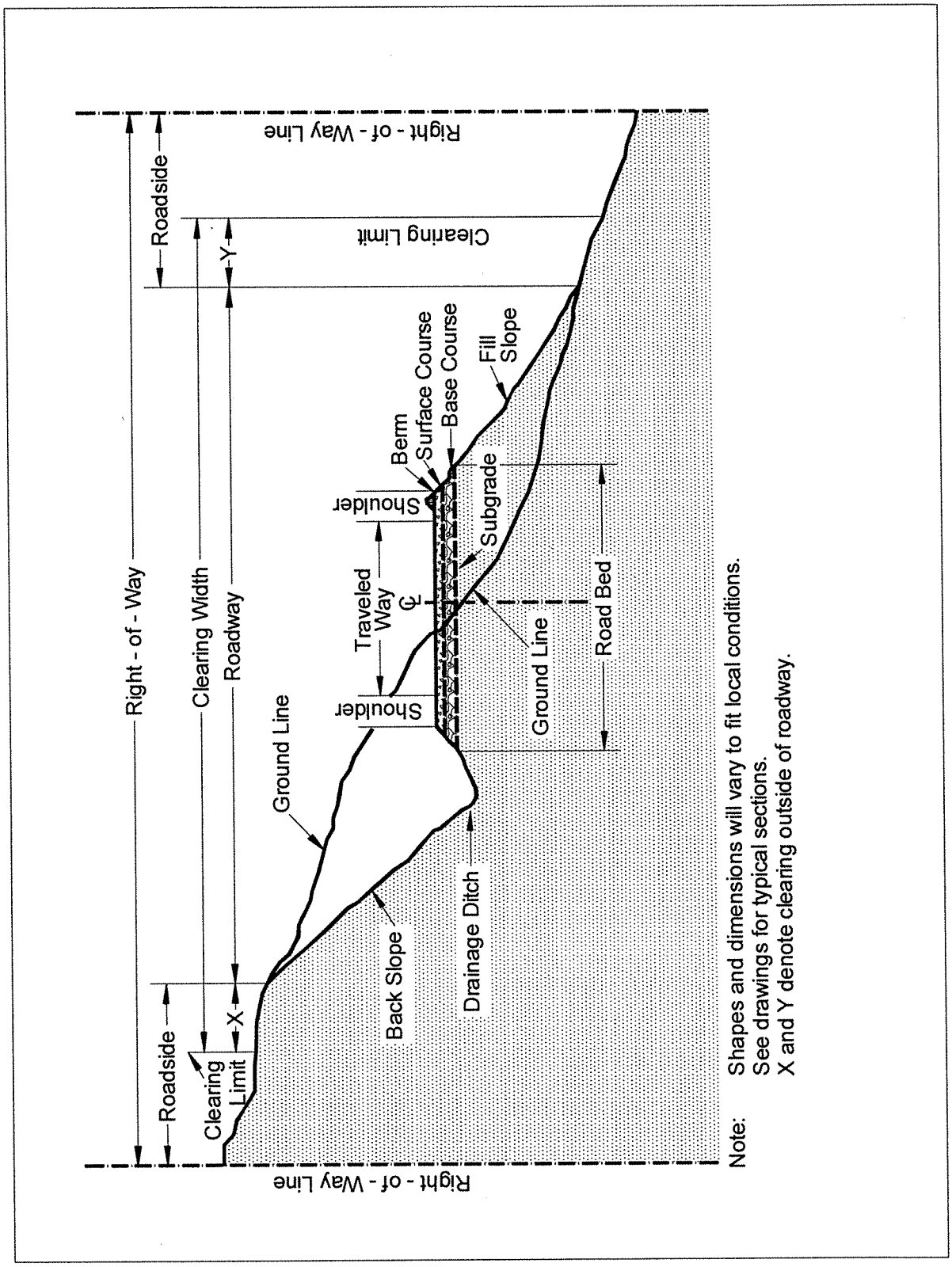

Figure 102-1 - Illustration of road structure terms.

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 Roads To Be Constructed

Unless otherwise SHOWN ON THE DRAWINGS or described in the SPECIAL PROJECT SPECIFICATIONS, keep existing roads open to all traffic during road 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 roadway 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, road segments may be closed to all traffic during the period(s) when construction is in progress. If any of the listed roads 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 ***1 HOUR***, in order to reasonably accommodate traffic.

104.02 Use of Roads by Contractor

The Contractor is authorized to use roads under the jurisdiction of the Forest Service for all activities necessary to complete this contract, subject to the limitations and authorizations SHOWN ON THE DRAWINGS, designated in the Road Order, or described in the SPECIAL PROJECT SPECIFICATIONS, when such use will not damage the roads 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 for placement upon the roads at locations approved by the CO.

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. IF ANY ARE DESIGNATED, sources of local materials 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 roads). 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.

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 (yd^3). 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.

(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 ft^2. 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 ft^2 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 roadway, approach road, 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 (yd^2). 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 ft^2 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 roadway, approach road, 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 roadway section and to balance earthwork. Such adjustments will not be considered "changes."

DIVISION 150 - Engineering

Section 156 – Public Traffic

Description

156.01 This work consists of controlling and protecting public traffic adjacent to and within the project.

Material

156.02 Conform to the MUTCD and the following Sections and Subsections:

Retroreflective sheeting	718.01
Temporary traffic control devices	718.25

156.03 General. Unless otherwise provided for in Table 156-1, keep existing roads open to all traffic during road improvement work, and maintain them in a condition that will adequately accommodate traffic. Delays may not exceed **90** minutes at any one time followed by an open period of no less than **15** minutes.

Perform no work that interferes or conflicts with traffic or existing access to the roadway surface until a traffic control plan has been approved. Post construction signs and traffic control devices in conformance with MUTCD. All required signs will be in place and approved prior to beginning work on project.

If the Contractor agrees in writing to allow public traffic to use a new road being constructed prior to completion, it will be considered an existing road for traffic control purposes.

156.04 Temporary Traffic Control. Install and maintain temporary traffic control devices adjacent to and within the project as required by the approved traffic control plan and the MUTCD. Install and maintain traffic control devices as follows:

(a) Furnish and install traffic control devices before the start of construction operations.

(b) All detours outside of clearing limits will be approved in writing by the Contracting Officer as part of the traffic control plan.

(c) Install only those traffic control devices needed for each stage or phase.

(d) Relocate temporary traffic control devices as necessary.

(e) Remove devices that no longer apply to the existing conditions.

(f) Immediately replace any device that is lost, stolen, destroyed, or inoperative.

(g) Keep temporary traffic control devices clean.

(h) Remove all temporary traffic control devices upon contract completion or when approved.

(i) When required, use flaggers certified by the American Traffic Safety Services Association, the National Safety Council, the International Municipal Signal Association, a state agency, or other acceptable organization. Perform the work described under MUTCD Part 6. Use type III, VII, VIII, or IX retroreflective sheeting on flagger paddles. Do not use flags. Flaggers must wear high visibility safety apparel as required by MUTCD 6E.02.

156.05 Temporary Closures. Road segments may be closed as shown in Table 156-1. The maximum consecutive days of closure shall be followed by a minimum number of consecutive days open to traffic as shown. Maintain traffic control devices during closure period(s). Appropriate barricades and signs will be erected and maintained as shown in the traffic control plan or as otherwise designated.

Prior to closing roads during construction, give written notice to the Contracting Officer at least 10 days in advance.

Table 156-1

Temporary Road Closures

Road Number	From Terminus	To Terminus	Maximum Consecutive Days of Closure	Minimum Consecutive Days Open

156.06 Acceptance. Public traffic work will be evaluated under Subsection 106.02.

Measurement and Payment

156.07 Do not measure Public Traffic for payment. Compensation is made as an indirect payment.

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.

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:

Road 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:

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

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:

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

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 roadway 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 roadway and not in a decking area, and that does not interfere with sight distance along the road.

(b) Performance. Grub all roots over 3 inches in diameter within the roadbed area to a minimum depth of 6 inches below subgrade. Cut flush with the excavated road 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 road and are sufficiently tall to reach the roadbed are designated for cutting. Fell hazard trees or unstable live trees that are tall enough to reach the roadbed, 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 roadbed, 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 and that contain one minimum piece, using one of the following methods, described in the Timber Sale portion of the contract:

(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 treating it as Construction Slash.

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. For slash resulting from clearing and grubbing, use treatment methods for tops and limbs _4_ or _5_, logs _11_, and stumps _4_ or _5_, as shown below. For utilization of timber use method _2_ as in Section 201.03, or as DESIGNATED IN THE SCHEDULE OF ITEMS:

(4) Scattering.

(5) Burying.

(6) Chipping or grinding.

(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. **Reduce ALL slash to within 2' of the ground surface.**

(a) All Methods. Construction slash placement will not be allowed in lakes, meadows, streams, or streambeds. Immediately remove any slash that interferes with drainage structures. If specified, slash mat in outlets must be constructed as per the drawings.

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:

(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. Reduce ALL slash to within 2' of the ground surface.

(5) Burying. Bury construction slash at the locations SHOWN ON THE DRAWINGS 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 roadway to a loose depth not exceeding 6 inches. Minor amounts of chips or ground woody material may be permitted within the roadway if they are thoroughly mixed with soil and do not form a layer.

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

Linear measurements are to be horizontal along the road centerline.

Area quantities are the number of acres within the clearing limits.

Individual removal of trees is the number of trees of the various size designations removed. Measure tree diameters at a height of 12 inches above ground. Do not count trees less than 6 inches in diameter. Size designations are shown in Table 201-1.

Table 201-1. - Size designations for trees removed.

Pay Item Designation	Size of Least Diameter at Height of 12 inches	
	Greater Than	Less Than
Small	6 inches	24 inches
Medium	24 inches	40 inches
Large	40 inches	-

Payment

201.07 Basis. The accepted quantities will be paid for at the contract unit price for each PAY ITEM DESIGNATED IN THE SCHEDULE OF ITEMS. **Payment for this item of work is incidental to Section 306.01 - Road Reconditioning for all Specified Roads in this contract.**

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. Process material from the Government furnished source (IF PROVIDED) in accordance with **Section 304.** Additional sources of borrow excavation will be subject to advance approval by the CO.

Construction

203.04 Clearing & Grubbing. Clear and grub in accordance with Section 201 before work under Section 203 begins. Road 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 roadway.

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, road 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 roadbed. Immediately remove any excavated material that inadvertently reaches a stream course.

203.07 Drainage Excavation. Construct side ditches, minor channel changes, inlet and outlet ditches, furrow ditches, ditches along the road but beyond roadway 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 road. 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 the 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 roads 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 road surface to be reasonably smooth, uniform, and shaped to conform to the typical sections as SHOWN ON THE DRAWINGS. Remove unsuitable material from the roadbed and replace it with suitable material. Finish roadbeds to the tolerance class shown in Table 203-1 or as SHOWN ON THE DRAWINGS.

Ensure that the subgrade for both surfaced and unsurfaced roads 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 roadbed for unsurfaced roads using one of the following methods, as SHOWN ON THE DRAWINGS:
(1) Method A. Ensure that the top 4 inches below the finished roadbed 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 roadbed 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.

203.09 Snow Removal. Remove snow and ice in advance of the work and deposit beyond the roadway 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.

203.11 Landscape & Stream Protection. Confine excavation, blasted material, and embankment material within the roadway 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
Roadbed 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.

203.14 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/in^2.

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

Quantities of excavation will include:

(a) Roadway excavation.

(b) Rock and unsuitable material below the required grade, and unsuitable material beneath embankment areas.

(c) Furrow ditches outside the roadway, except when furrow ditches are included in the SCHEDULE OF ITEMS.

(d) Topsoil and other material removed and stockpiled as directed.

(e) Borrow material used in the work, except when borrow is included in the SCHEDULE OF ITEMS.

(f) The volume of conserved materials taken from stockpiles and used in the work, except topsoil included under other PAY ITEMS.

(g) Slide material not attributable to negligence of the Contractor.

Quantities of excavation will not include:

(a) Material used for other than approved purposes.

(b) Unauthorized excavation or borrow.

(c) Quantity of material excavated from slope rounding or slope tapering.

(d) Overbreakage from the backslope in rock excavation requiring blasting.

(e) Material scarified in place to receive the first layer of embankment.

(f) Benching or stepping existing ground for embankment foundation.

(g) Stepping or scaling cut slopes.

(h) Oversize material removed when finishing unsurfaced roads.

When designed quantities are DESIGNATED IN THE SCHEDULE OF ITEMS as the method of measurement, estimate the quantities from design data based on undisturbed ground surface elevations.

When staked quantities are DESIGNATED IN THE SCHEDULE OF ITEMS as the method of measurement, determine excavation quantities by the average end area method using slope stake information taken prior to construction.

When actual quantities are DESIGNATED IN THE SCHEDULE OF ITEMS as the method of measurement, take preliminary cross sections, or comparable measurements, of the undisturbed ground surface; and measure final quantities in accordance with the following:

(a) When excavation is designated as a PAY ITEM in the SCHEDULE OF ITEMS, take final cross sections, or comparable measurements, of the completed and accepted work.

(b) When embankment is designated as a PAY ITEM in the SCHEDULE OF ITEMS, determine measurement in the final position.

(c) When borrow excavation is designated as a PAY ITEM in the SCHEDULE OF ITEMS, determine measurement in the original position.

Payment

203.20 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:

Pay Item		Pay Unit
203(01)	Excavation, placement method 1	Cubic Yard
203(07)	Excavation, placement method _____	Lump Sum
203(08)	Borrow excavation, placement method _____	Cubic Yard
203(10)	Unsuitable excavation	Cubic Yard
203(12)	Embankment, Placement Method _____	Linear Foot
203(15)	Drainage excavation, type _____	Cubic Yard

203(16) Drainage excavation, type _____ .....Linear Foot

203(17)a Drainage excavation, type Rolling Dip, Construct ..... Each

203(17)b Drainage excavation, type Rolling Dip, Reconstruct.....Each

203(17)c Drainage excavation, type Rolling Dip, Recondition.....Each

203(17)d Drainage excavation, type Grade Dip, Recondition .....Each

203(17)e Drainage excavation, type Grade Dip, Construct .....Each

203(17)f Drainage excavation, type Grade Dip, Construct, Armor With Geogrid & Aggregate, Install Underdrains .....Each

Section 204 - Soil Erosion & Water Pollution Control

Description

204.01 Work. Furnish, construct, and maintain permanent and temporary erosion and sediment control measures.

Materials

204.02 Requirements. Ensure that materials meet the requirements specified as SHOWN ON THE DRAWINGS or specified in the SPECIAL PROJECT SPECIFICATIONS.

Construction

204.03 Performance. Prior to the start of construction, submit a written plan that provides permanent and temporary erosion control measures to minimize erosion and sedimentation during and after construction.

Incorporate all permanent erosion control features into the project at the earliest practicable time, as outlined in the approved plan, to minimize the need for temporary erosion control.

Install any temporary erosion or pollution control measures that are required due to negligence or carelessness, without compensation.

204.05 Filter Barriers. Construct silt fence, straw bales, and brush barriers for filtering sediment from runoff and reducing the velocity of sheet flow.

204.06 Sediment Retention Structures. Construct sediment retention structures of the following types:

(a) ***Temporary Sediment Traps.*** Construct temporary sediment traps to detain runoff from disturbed areas and settle out sediment. Provide outlet protection.

(b) ***Sediment Basins.*** Construct sediment basins to store runoff and settle out sediment for large drainage areas. Construct sediment basins according to Section 203.

204.07 Outlet Protection. Construct riprap aprons or basins to reduce water velocity and prevent scour at the outlet of permanent and temporary erosion control measures. Place riprap and rearrange individual rocks to obtain a compact, uniform blanket with a reasonably smooth surface.

204.13 Maintenance & Cleanup. Maintain temporary erosion control measures in working condition until the project is complete or the measures are no longer needed. Clean erosion control measures when half full of sediment. Use the sediment in the work, if acceptable, or place it in accordance with Subsection 203.06.

Replace erosion control measures that cannot be maintained and those that are damaged by construction operations.

Remove and dispose of temporary erosion control measures when the turf is satisfactorily established, and when drainage and channels are lined and stabilized. Remove and dispose of erosion control measures according to Subsection 202.04.

Restore the ground to its natural or intended condition and provide permanent erosion control measures.

Measurement

204.14 Method. Use the method of measurement that is DESIGNATED IN THE SCHEDULE OF ITEMS if it applies.

Payment

204.15 Basis. This Item is considered incidental to other Pay Items and will be paid for accordingly unless otherwise designated IN THE SCHEDULE OF ITEMS.

Section 207 - Developing Water Supply & Watering

Description

207.01 Work. Furnish, haul, and apply water. No known source exists on National Forest lands in the local area.

Construction

207.03 Development of Supply & Access. Develop water supplies and access as necessary to perform the work.

207.04 Equipment. Use watertight tanks of known capacity with mobile watering equipment. Provide uniform and controlled application of water without ponding or washing. Maintain positive control of water from the driver's position at all times.

Measurement

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

Payment

207.06 Basis. This Item is considered incidental to other Pay Items and will be paid for accordingly unless otherwise designated IN THE SCHEDULE OF ITEMS.

DIVISION 300 - Bases

Section 304 - Aggregate Base or Surface Course

Description

304.01 Work. Furnish, haul, and place aggregate base or surface course on the subgrade or base or stockpile site approved by the CO. Work may include additive mineral filler, or binder as specified in the SPECIAL PROJECT SPECIFICATIONS. Produce aggregate by pit-run, grid-rolling, screening, or crushing methods if practicable. If no Government-furnished source is identified, procure and deliver COMMERCIAL AGGREGATE that meets the requirements described elsewhere in this contract and as DESIGNATED IN THE SCHEDULE OF ITEMS.

Materials

304.02 Source. Obtain materials from approved sources. Haul and place aggregate at locations shown on the plans.

304.03 Gradation. Ensure that crushing or screening operations produce material no greater than 1/2 the thickness of the depth of the layer they are to be compacted to.

After depositing aggregate upon the geotextile and processing on the road, remove all oversize material and dispose of it in designated or approved areas.

304.04 Quality. Furnish aggregates that meet the physical requirements of Section 703.05 & 703.06 and that conform to a gradation acceptable to the CO.

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

Construction

304.08 Preparation of Roadbed. Complete the roadbed in accordance with Section 203 or 306, and have it approved in writing by the CO before placing base or surface course.

304.09 Mixing & Placing. Ensure that aggregate and any required additives, water, mineral filler, and binder are mixed by method(s) as SHOWN ON THE DRAWINGS. except, if crushed aggregate products are being produced and mineral filler, binder, or additives are required, uniformly blend during crushing.

(c) Road Mix Method. After the aggregate for each layer has been placed, mix it with other required materials at the required moisture content until the mixture is uniform throughout. Mix aggregate and all other materials until a uniform distribution is obtained.

Spread the aggregate in a uniform layer, with no segregation of size, and to a loose depth that has the required thickness when compacted.

If the required compacted depth of any aggregate base or surface course exceeds 6 inches, place the aggregate base or surface course in two or more layers of approximately equal thickness. If the nominal maximum particle size exceeds 3 inches, place the aggregate in layers that do not exceed twice the maximum size of the specified aggregate size.

During placement of aggregate over geotextile or geogrid, place aggregate in a single lift to the full depth specified, unless otherwise SHOWN ON THE DRAWINGS or in the SPECIAL PROJECT SPECIFICATIONS.

Operate hauling equipment over the surface of the previously constructed layer in a dispersed manner to minimize rutting or uneven compaction.

304.10 Compaction. Compact the aggregate using one of the following methods, as specified in the SCHEDULE OF ITEMS:

(a) Compaction A. Compact the aggregate by operating spreading and hauling equipment over the full width of each layer of the aggregate.

(b) Compaction B. Moisten or dry the aggregate to a uniform moisture content suitable for compaction. Operate rollers that meet the requirements specified in Subsection 203.15(b), (c), or (d) over the full width of each layer until visual displacement ceases, making no fewer than three complete passes.

(e) Compaction E. Ensure that materials produced by pit-run and grid-rolling are visually moist and compacted using operating compaction equipment defined in Subsection 203.15(b), (c), and (d) over the full width of each layer until visual displacement ceases.

For all compaction methods, blade the surface of each layer during the compaction operations to remove irregularities and produce a smooth, even surface.

304.11 Stockpiling. If DESIGNATED IN THE SCHEDULE OF ITEMS or if the Contractor elects to produce and stockpile aggregates prior to placement, the aggregates shall be handled and stockpiled in sites at locations SHOWN ON THE DRAWINGS or approved by the CO.

Clear and grub stockpile sites, if required, in accordance with Section 201.

304.12 Thickness & Width Requirements. Ensure that the thickness and width of the compacted aggregate conform to the dimensions SHOWN ON THE DRAWINGS, and that measurements on the compacted aggregate meet the following criteria:

(a) The maximum variation from the specified thickness is 1 inch.

(b) The compacted thickness is not consistently above or below the specified thickness, and the average thickness of 4 or more measurements for any 2,000 feet of road segment is within ± 1/4 inch of the specified thickness.

(c) The compacted width is (+) 12 inch tolerance (Not Less Than Specified Width).

Measurement

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

Aggregate quantities include mineral filler, binder, and water.

Payment

304.14 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:

304(12) Crushed aggregate, type Surface Course, grading CDOT Class 6 (OR Approved Equal), compaction Method A (Equipment) .....Lump Sum

Section 306 - Reconditioning Existing Road

Description

306.01 Work. Recondition existing road; clean ditches, cattleguards, and culverts, including inlets and outlets; remove slide material; scarify where SHOWN ON THE DRAWINGS; and shape and compact the traveled way and shoulders, including parking areas, turnouts, and approach road intersections.

Perform Fringe Clearing in accordance with **Section 201 – Clearing & Grubbing.**

Construction

306.02 Blading & Shaping. Unless otherwise SHOWN ON THE DRAWINGS, blade and shape the existing traveled way and shoulders, including turnouts, to remove minor surface irregularities. Maintain the existing cross slope or crown, unless otherwise SHOWN ON THE DRAWINGS. Establish a blading pattern that will yield a driveable surface, retain as much existing vegetation as possible, and promote drainage from the surface within the completed road width.

Scarify and shape the existing traveled way and shoulders at locations and to the depth and width SHOWN ON THE DRAWINGS. Remove any rock larger than 4 inches in its greatest dimension that is brought to the surface during scarification, except as provided below.

Similarly treat the traveled way and shoulders of intersecting roads to provide a smooth transition for the distance SHOWN ON THE DRAWINGS.

306.04 Drainage. Grade the ditches to the typical sections and at the locations SHOWN ON THE DRAWINGS. Clean culverts a minimum of one shovel handle length on each end and make sure they are able to drain freely.

Remove excess materials from the roadbed, culverts, and ditches, and place material as SHOWN ON THE DRAWINGS.

306.05 Cattleguards. If present, remove cattleguard decks prior to cleaning, and reinstall them upon completion. Clean the area beneath the cattleguard of soil and other material to the bottom of the original foundation, or as SHOWN ON THE DRAWINGS, over the entire width of the installation.

Never leave the cattleguard opening unattended or open without an adequate barricade.

306.06 Compaction. Shape and compact the traveled way and shoulders using one of the methods described in Subsection 304.10, as DESIGNATED IN THE SCHEDULE OF ITEMS.

Measurement

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

Payment

306.08 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:

Pay Item		Pay Unit
306(01)	Reconditioning of roadbed, compaction Method A (Haul Equipment) or E (Grid Roller), Includes Fringe Clearing	Mile

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. **Clean all construction equipment to an acceptable weed-free condition prior to entering National Forest lands. Notify Forest Service personnel to perform pre-entry inspections. This includes all haul equipment and screening/classifying plants.**

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:

Pay Item	Pay Unit
601(01) Mobilization	**Lump Sum**

Section 603 – Metal Pipe

Description

603.01 Work. Furnish and install metal pipe and pipe appurtenances, including all bedding and backfilling required to complete the work. The term "metal" refers to aluminum and steel.

Materials

603.02 Requirements. Furnish materials that meet the requirements specified in the following:

Metallic-Coated Corrugated Steel Pipe - Furnish pipe, special sections (such as elbows, branch connections, and prefabricated flared end sections), and coupling bands that conform to AASHTO M 36 and AASHTO M 218, M 274, or M 289 for the dimensions and thicknesses specified.

Metallic-Coated Spiral Pipe - Furnish pipe, special sections (such as elbows and branch connections), and coupling bands that conform to AASHTO M 36, Type IR and IIR, and AASHTO M 218, M 274, or M 289 for the dimensions and thicknesses specified.

Repair of Damaged Coatings - Repair damaged coatings in accordance with AASHTO M 36 and ASTM A 849. Clean and paint damaged spelter coating caused by welding, field cutting, or mishandling, as specified.

Furnish bedding material that meets the requirements specified in Subsection 603.04.

Furnish backfill materials that meet the requirements specified in Subsection 603.08.

To prevent electrolysis or physical failure, use materials in each pipe installation that are compatible with each other.

Either annular or helical pipe corrugations will be acceptable. Helical corrugated pipe containing annular rerolled ends may be used in conjunction with annular pipe of like or compatible materials.

Provide fabricator's certification that the sheet and pipe fabrication are in accordance with AASHTO M 36, M 196, and M 245, as applicable. Submit the certification before installing the pipe.

The lengths and locations of individual pipe SHOWN ON THE DRAWINGS are approximate. Do not order pipe until culvert locations are DESIGNATED ON THE GROUND and a written list of the correct lengths is approved by the CO.

Construction

603.03 Excavation. Excavate trenches or foundation pits according to the following:

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 haunch. 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.

If they are known to exist, specific pipe installation time restrictions and installation plan requirements are SHOWN ON THE DRAWINGS.

603.04 Bedding. Bed the pipe to a depth of not less than 10 percent of its total height. After excavating in accordance with Subsection 603.03, compact the foundation surface in accordance with Subsection 603.08 and shape it to fit the pipe.

As bedding material, provide selected mineral soil that meets the requirements for backfill specified in Subsection 603.08. When SHOWN ON THE DRAWINGS, ensure that completed bedding has a longitudinal camber.

603.05 Laying Pipe. Lay the lower segment of the pipe so that it is in contact with the bedding for the required depth throughout its length. Place outside circumferential laps facing upstream.

Ensure that the final installed alignment allows no reverse grades, and does not permit any point to vary from a straight line drawn from inlet to outlet by more than 2 percent horizontally and vertically of the culvert length, or 12 inches, whichever is less.

Do not place any pipe in service until a suitable outlet is provided.

603.06 Joining Pipes. Firmly join pipe using form-fitting coupling bands. Attach end sections to the pipe using connecting bands or other means, as recommended by the manufacturer. Do not use dimpled bands when the slope of the pipe is greater than 15 percent.

Ensure that coupling bands meet the strength requirements of field joints for Nonerodible Soil Condition—Special Joint Type, according to division II, Section 26, of the "Standard Specifications for Highway Bridges" by AASHTO.

603.08 Backfilling. Do not place or backfill pipe until the excavation and foundation have been approved by the CO:

After the bedding is prepared and the pipe is placed, place selected material in layers not exceeding 6 inches loose thickness, and compact the material under the haunches and alongside the pipe. Use material that is readily compactible and free of frozen lumps, chunks of highly plastic clay (with a plasticity index greater than 10), or other objectionable material. Do not use rocks larger than 3 inches in greatest dimension within 12 inches of the pipe. On each side of the pipe, place an area of compacted material at least as wide as the diameter of the pipe. Compact the backfill without damaging or displacing the pipe.

Continue backfilling and compacting until the backfill is a minimum of 12 inches above the top of the culvert.
After bedding and backfilling the pipe, protect it with an adequate cover of embankment before heavy equipment is permitted to cross during roadway construction.
Replace any pipe that is distorted by more than 5 percent of nominal dimensions, or that is ruptured or broken.
Compact backfill using method A or C, as DESIGNATED IN THE SCHEDULE OF ITEMS.

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

(c) Method C. Ensure a moisture content suitable for obtaining compaction. Compact each layer using compaction equipment designed for this purpose until visual displacement ceases.

Measurement

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

Payment

603.10 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 made under:

Pay Item	Pay Unit
603(01)18 ... 18 -inch corrugated metal pipe, 0.064 -inch thickness for steel (16 ga.), Compaction Method A (Density Exceeds Surrounding).....	**Linear foot**

Section 625 - Seeding & Mulching

Description

625.01 Work. Prepare seedbeds, and furnish and place required seed.

Materials

625.02 Requirements. Ensure that materials meet the requirements specified in the SPECIAL PROJECT SPECIFICATIONS and SHOWN ON THE DRAWINGS.

Construction

625.03 Seeding Seasons. Observe the normal seasonal dates for seeding, as shown in the SPECIAL PROJECT SPECIFICATIONS. Do not apply seeding materials during windy weather or when the ground is excessively wet or frozen.

625.04 Soil Preparation. Finish the areas to be seeded, as required by other applicable sections, to the lines and grades SHOWN ON THE DRAWINGS. Restore areas that are damaged by erosion or other causes. Ensure that the surface soil is in a roughened condition favorable for germination and growth.

625.05 Application Methods for Seed. To control erosion, apply seed to disturbed soil and slopes within 30 days of disturbance. If the slopes have not been finished, apply the seed by the dry method as an interim erosion control measure.

The following methods may be used to place material:

> ***Dry Method.*** Use mechanical, landscape, or cultipacker seeders, seed drills, fertilizer spreaders, or other approved mechanical seeding equipment to apply the seed or seed and fertilizer in the amounts and mixtures shown below:

Seed Mix

Barley	12 lbs. /acre (30% of mix)
San Luis Valley Slender Wheatgrass	26 lbs. / acre 65% of mix)
Ariba Western Wheatgrass	2 lbs. / acre (5% of mix)
Total	40 lbs. / acre Pure Live Seed

Hand-operated seeding devices may be used to apply dry seed and fertilizer.

625.08 Care During Construction. Protect and care for seeded areas until the work is finally accepted. Repair all damage to seeded areas caused by construction, without additional compensation.

Measurement

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

Base area computations on surface measurements.

Payment

625.10 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:

Pay Item	Pay Unit
625(01) Seeding, Dry method (without mulch)	**Acre**

DIVISION 700 - Materials

Section 703 - Aggregate

703.05 Subbase, Base, & Surface Course Aggregate

(a) General. Furnish aggregates that consist of hard, durable particles or fragments of crushed stone, crushed slag, or crushed gravel meeting the appropriate gradation, as shown in Table 703-2 or 703-3, and conforming to the following:

(1) Los Angeles abrasion, AASHTO T 96 .....40% max.

(2) Sodium sulfate soundness loss (five cycles), AASHTO T 104 .....12% max.

(3) Durability index (coarse), AASHTO T 210 .....35 min.

(4) Durability index (fine), AASHTO T 210 .....35 min.

(5) Fractured faces, FLH T 507 .....50% min.

Furnish a material that is free from organic matter and lumps or balls of clay. Do not use material that breaks up when alternately frozen and thawed or wetted and dried.

Obtain the aggregate gradation by crushing, screening, and blending processes as necessary. Ensure that fine aggregate (material passing the No. 4 sieve) consists of natural or crushed sand and fine mineral particles.

(b) Subbase & Base Aggregates. Furnish subbase or base aggregate that conforms to specifications in Subsection 703.05(a), and to the following:

(1) Liquid limit, AASHTO T 89 .....25 max.

(2) Plastic limit, AASHTO T 90 .....Nonplastic

(c) Surface Course Aggregate. Furnish surface course aggregate that conforms to specifications in Subsection 703.05(a), and to the following:

(1) Liquid limit, AASHTO T 89 .....35 max.

(2) Plasticity index, AASHTO T 90:

(a) If the percent passing the No. 200 inch sieve is less than 12% .....2 to 9

(b) If the percent passing the No. 200 inch sieve is greater than 12% 0

Do not furnish material that contains asbestos fibers.

703.06 Crushed Aggregate

Furnish crushed hard, durable particles or fragments of stone or gravel meeting the size and quality requirements for crushed aggregate material normally used locally in the construction and maintenance of highways by Federal or State agencies.

Furnish crushed aggregate with a maximum size designated elsewhere in this contract or in the drawings. Furnish crushed aggregate that is uniformly graded from coarse to fine and is free of organic matter and lumps or balls of clay.

Section 714 - Geotextile, Geocomposite Drain Material, & Geogrids

714.01 Geotextiles

Use Type III (A) geotextile in the grade dip/cross drain as shown in the drawings. Form the geotextile into a stable network such that the filaments or yarns retain their dimensional stability relative to each other. Overlap all seams by a minimum of 12".

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

(3) Stabilization, Type III (A) .....Table 714-3

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.

Table 714-3. - Physical requirements for stabilization geotextile.

Property	Test Method ASTM	Units	Specifications[a]	
			Type III-A	Type III-B
Grab strength	D 4632	lbs.	315/200	250/160
Sewn seam strength	D 4632	lbs.	285/180	220/140
Tear strength	D 4533	lbs.	110/80	90[c]/55
Puncture strength	D 4833	lbs.	110/80	90/55
Burst strength	D 3786	psi	500/250	400/190
Permittivity	D 4491	s^{-1}	0.05	0.05
Apparent opening size	D 4751	in.	0.017[b]	0.017[b]
Ultraviolet stability	D 4355	%	50[d]	

[a] The first values in a column apply to geotextiles that break at < 50 percent elongation (ASTM D 4632). The second values in a column apply to geotextiles that break at ≥ 50 percent elongation (ASTM D 4632).
[b] Maximum average roll value.
[c] The minimum average roll tear strength for woven monofilament geotextile is 55 pounds.
[d] After 500 hours of exposure.

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 718 - Traffic Signing & Marking Material

718.01 Retroreflective Sheeting

Furnish retroreflective sheeting material that conforms to AASHTO M 268.

718.25 Temporary Traffic Control Devices

Furnish traffic control devices (barricades, cones, tubular markers, vertical panels, drums, portable barriers, warning lights, advance warning arrow panels, traffic control signals, and so forth) whose designs and configurations conform to the MUTCD.

Use suitable commercial-grade material for the fabrication of the temporary traffic control devices. Construct the devices from material that is capable of withstanding anticipated weather and traffic conditions and is suitable for the intended use. Do not use units that have been used on other projects without approval.

When interpreting the requirements in the applicable MUTCD sections, replace the word "should" with the word "shall."

Appendices

Appendix A

ENGINEERING CONVERSIONS FACTORS*

Quantity	From Imperial Units	Multiply By	To Metric Units**
Mass	lb kip (1000 lb) ton (short)	0.453 592 0.453 592 0.907 184	kg metric ton (1000 kg) metric ton
Mass/unit length	plf	1.488 16	kg/m
Mass/unit area	psf lb/sy	4.882 43 0.542 492	kg/m^2 kg/m^2
Mass density	pcf	16.018 5	kg/m^3
Force	lb kip	4.448 22 4.448 22	N k N
Force/unit length	plf klf	14.593 9 14.593 9	N/m kN/m
Pressure, stress, modulus of elasticity	psf ksf psi ksi	47.880 3 47.880 3 6.894 76 6.894 76	Pa kPa kPa Mpa
Bending moment, torque	ft-lb ft-kip	1.355 82 1.355 82	N*m KN*m
Volume/unit area	gal/sy	4.527 19	L/m^2

*Approximate conversions to SI units.
**To convert from metric units to imperial units, multiply by the reciprocal of the conversion factor.

Appendix B

SI* (MONDERN METRIC) CONVERSION FACTORS				
APPROXIMATE CONVERSIONS TO SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yards	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallon	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: Volumes greater than 1000 L shall be shown in m^3.				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5 (F – 32)/9 or (F – 32)/1.8	Celcius temperature	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with section 4 of ASTM E 380.

Appendix B (cont.)

SI* (MONDERN METRIC) CONVERSION FACTORS				
APPROXIMATE CONVERSIONS TO SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallon	gal
m^3	cubic meters	35.71	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
NOTE: Volumes greater than 1000 L shall be shown in m^3.				
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
TEMPERATURE (exact)				
°C	Celsius	1.8C + 32	Fahrenheit temperature	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with section 4 of ASTM E 380.