



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
AITC	American Institute of Timber Construction
ALSC	American Lumber Standards Committee
ANSI	American National Standards Institute
APA	American Plywood Association
ARTBA	American Road and Transportation Builders Association
ASTM	American Society for Testing and Material
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
CFR	Code of Federal Regulations
CRSI	Concrete Reinforcing Steel Institute
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
ISSA	International Slurry Surfacing Association
MIL	Military Specification(s)
MSHA	Mine Safety and Health Administration
MUTCD	Manual on Uniform Traffic Control Devices
NBS	National Bureau of Standards
OSHA	Occupational Safety and Health Administration
PCI	Prestressed Concrete Institute
PTI	Post-Tensioning Institute
SI	International System of Units
SSPC	Steel Structures Painting Council
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•m)	energy
K	- kelvin	temperature
L	- liter	volume
lx	- lux	illuminance
m	- meter	length
m ²	- square meter	area
m ³	- cubic meter	volume
min	- minute	time
N	- newton (kg•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) SI Slope Notation (vertical : horizontal). For slopes flatter than 1:1, express the slope as the ratio of one unit vertical to a number of units horizontal. For slopes steeper than 1:1, express the slope as the ratio of a number of units vertical to one unit horizontal.

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
BMP	Best Management Practice
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
CTB	Cement-treated base
DAR	Durability Absorption Ratio
Dia	Diameter
DQ	Designed quantities
DTI	Direct tension indicator
Dwgs	Drawings
FM	Fineness modulus
GFM	Government-furnished materials
Gr	Grade
h	Hour
H	Height
ha	Hectare

HDO	High-density overlay
HDPE	High-density polyethylene
Hor	Horizontal
HSLA	High-strength low-alloy
kg	Kilogram
kL	Kiloliter
kL km	Kiloliter kilometer
km	Kilometer
L	Length
l	Liter
LSL	Lower specification limit
m	Meter
m ²	Square meter
m ³	Cubic meter
m ³ km	Cubic meter kilometer
Matl	Material
max.	Maximum
Mbf	Thousand board feet
min.	Minimum
Misc	Miscellaneous
mm	Millimeter
N/C	Numerically controlled
PG	Performance-graded
PI	Plasticity index
ppm	Parts per million
PS	Product Standard (issued by the U.S. Department of Commerce)
PVC	Polyvinylchloride
SQ	Staked quantities
t	Ton (1,000 kg)
t km	Ton kilometer
T	Temperature
T&L	Tops and limbs
TFE	Tetraflouroethylene
Th	Thickness
TV	Target value
USL	Upper specification limit
Vert	Vertical
VMA	Voids in Mineral Aggregate
VOC	Volatile organic compound
W	Width
W/	With
W/O	Without
WW	Woven wire
WWF	Welded wire fabric

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 1 kilometer. (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.

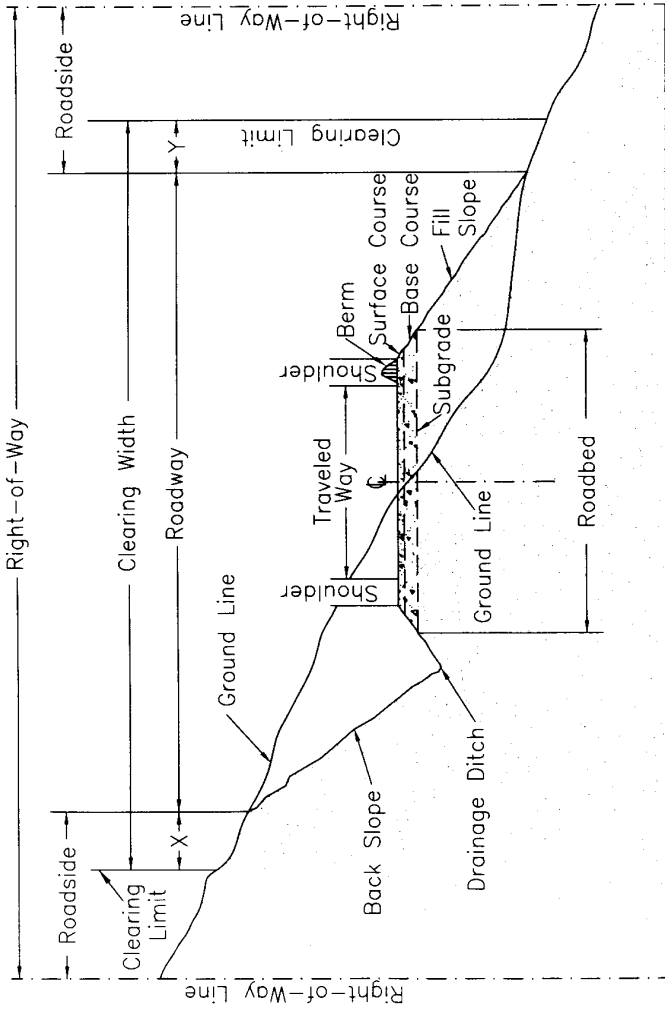
Traveled Way. The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes. (See figure 102-1.)

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.



Note: Shapes and dimensions will vary to fit local conditions. see drawings for typical sections. X and Y denote clearing outside of roadway.

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 *30 minutes*, 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 limita-

tions 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 in accordance with Section 305.

105.02 Weighing Devices

When the measurement is by weight, provide weigh scales and transport the materials so they can be weighed. Perform all weighing.

(a) Platform Scales. Provide platform scales of sufficient length and capacity to permit simultaneous weighing of all axle loads of each hauling unit.

Provide scales accurate to within 1 percent of the correct weight throughout the range of use. Before using the scales and as frequently thereafter as necessary to ensure accuracy, have the scales checked, adjusted, and certified by a representative of the State agency responsible for weights and measures or by a qualified manufacturer's representative.

Provide copies of weight tickets from a certified scale.

Material may be weighed on other certified scales without additional compensation. In this case, furnish certified weight tickets for all material delivered to the project, and guarantee permission to periodically check the weighing procedure and records.

(b) Belt Conveyor Scales. Belt conveyor weighing will be accepted in lieu of platform scales, provided this method or device meets the requirements specified below and is compatible with the provisions of measurement and payment in the applicable specifications.

Use a belt conveyor scale that meets the design, marking, installation, and tolerance requirements of the National Bureau of Standards (NBS) Handbook No. 44. Provide a copy of a NBS Prototype Examination Report of Test to certify the scale.

Use a weighing mechanism that contains a weight totalizer and a self-printing device that legibly imprints the load-out weight on appropriate serially numbered and time-dated tickets. Time date manually, or use an automatic printing device.

Deliver each ticket at the job site or point of use. Furnish the totalizer calibration adjustment and ticket imprinting device with a security lock and key.

Under observation of the CO, run a daily zero-load test in accordance with NBS Handbook No. 44.

105.03 Sampling & Testing of Aggregate

When Designated Sources or Contractor-Furnished Sources are specified (see Subsections 105.06(a) and (b)), submit test results and a Certificate of Compliance that states that the aggregate meets the contract requirements. Equip crushing, screening, and mixing plants with sampling devices. Submit test results within 16 working hours of obtaining sample(s). Take additional samples, if required by the CO, to validate the certification.

Before incorporating material into the work, ensure that sampling and testing of material conform to the American Association of State Highway and Transportation Officials (AASHTO) requirements, and occur as follows:

- (a) For on-site-produced materials at crushing or screening plants: after additions of any necessary blending material.
- (b) For commercially produced aggregates: at the producer's plant or stockpile.
- (c) For gradation of combined aggregate in bituminous plant mixtures: either before or after introduction of bituminous material.

These test results shall not preclude later sampling and testing for final acceptance after final processing of the material.

105.04 Certification & Sampling of Asphalt Materials

(a) Certification With Shipments. When each load of asphalt material is delivered, furnish one copy of the Bill of Lading; a fully executed Certificate of Compliance in the format shown in figure 105-1; and a copy of the refinery test reports. The refinery test reports should include the following information:

- (1) Consignee.
- (2) Contract number.
- (3) Date of shipment.
- (4) Type and grade of material.
- (5) Test results as follows:
 - (a) For performance-based asphalt and performance-graded asphalt cements:
 - (1) Flash point.
 - (2) Absolute viscosity of the original asphalt at 60 °C.

Consignee _____	Designation _____
Contract Number _____	Date _____
Identification (truck no., car no., etc.) _____	
Type and Grade _____	With Additive (percent and brand) _____
Loading Temp. _____	Net Weight _____
Net Liters _____	Specific Gravity _____
<p>This shipment of bituminous material identified above and covered by this Bill of Lading complies with Forest Service STANDARD SPECIFICATIONS as modified by SPECIAL PROJECT SPECIFICATIONS applicable to this project.</p>	
<p>Producer _____</p> <p>Signed _____</p> <p style="margin-left: 200px;">Producer's Representative</p>	

Figure 105-1.—Sample Bill of Lading and Certificate of Compliance.

- (3) Absolute viscosity of the residue from the Rolling Thin Film Oven test at 60 °C.
- (4) Penetration of the residue from the Rolling Thin Film Oven test at 4 °C.
- (b) For aged-residue graded asphalt cements:
 - (1) Flash point.
 - (2) Absolute viscosity of the original asphalt at 60 °C.
 - (3) Absolute viscosity of the residue from the Rolling Thin Film Oven test at 60 °C.
 - (4) Penetration of the residue from the Rolling Thin Film Oven test at 25 °C.
- (c) For asphalt concrete graded asphalt cements:
 - (1) Flash point.
 - (2) Absolute viscosity of original and residue asphalt at 60 °C.
 - (3) Penetration of the original asphalt at 25 °C.
- (d) For pen graded asphalt cements:
 - (1) Flash point.
 - (2) Penetration of the original and residue asphalt at 25 °C.
- (e) For emulsified asphalt:
 - (1) Percent residue from distillation.
 - (2) Saybolt furoil viscosity of the emulsion at the specified temperature.
 - (3) Penetration of the residue from distillation at 25 °C.
 - (4) Oil distillate, by volume of emulsion.
 - (5) If applicable, torsional recovery or toughness tenacity.
- (f) For cutback asphalt:
 - (1) Flash point.
 - (2) Percent residue from distillation.

- (3) Original kinematic viscosity at 60 °C.
- (4) Absolute viscosity of the residue from distillation at 60 °C.

A separate Certificate of Compliance will not be required if the standard Bill of Lading contains the essential information required by the certificate.

(b) Sampling. Unless otherwise directed, take at least two samples of bituminous material from each hauling unit of the transporting vehicle, or samples representing each hauling unit taken from the distribution truck. Obtain samples in the presence of the CO; samples will become property of the Government. Obtain polymer-modified emulsified asphalt samples from the distribution truck just prior to application.

Construct all delivery and plant equipment to permit sampling in conformance with AASHTO T 40 test procedure.

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

- (a) With the written approval of the CO, suitable stone, gravel, sand, or other material found in the excavation can be used on the project. Payment will be made both for the excavation of such materials at the corresponding contract unit price and for the pay items for which the excavated material is used. Replace, without additional compensation, sufficient suitable materials to complete the portion of the work that was originally contemplated to be constructed with such material.
- (b) Materials produced or processed from Government lands in excess of the quantities required for performance of this contract are the property of the Government. The Government is not obligated to make reimbursement for the cost of producing these materials.

105.06 Material Sources

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

Utilize all suitable material in the source. The designation of a source includes the Contractor's right to use areas SHOWN ON THE DRAWINGS for the purposes designated (that is, plant sites, stockpiles, and haul 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.

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

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

Section 106—Measurement & Payment

106.01 Measurement & Payment

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

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

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

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

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

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

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

106.02 Determination of Quantities

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

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

The average end area method shall be used to compute volumes of excavation or embankment. However, if in the judgment of the CO the average end area method

is impractical, measurement shall be made by volume in hauling vehicles, or by other three-dimensional methods.

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

For items that have linear measurements, such as pipe culverts, fencing, guardrails, and underdrains, measurements shall be made parallel to the base or foundation upon which the structures are placed. Pipe and pipe arch culverts shall be measured along center of invert, and arches shall be measured at spring line.

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

For asphalt material, volumes shall be measured at 15.6 °C, or shall be corrected to the volume at 15.6 °C by using ASTM D 1250 for asphalt. Emulsified asphalt shall be measured at 15.6 °C, or by converting the volume at another temperature to volume at 15.6 °C by means of the following formula:

$$L \text{ at } 15.6 \text{ }^{\circ}\text{C} = \frac{L \text{ at } T \text{ }^{\circ}\text{C}}{1 + 0.00045 (T \text{ }^{\circ}\text{C} - 15.6 \text{ }^{\circ}\text{C})}$$

where

$T \text{ }^{\circ}\text{C}$ = temperature of the emulsified asphalt at the time the volume is measured

For vehicular shipments, net certified scale weights or weights based on certified volumes shall be used as a basis of measurement. Measurements shall be adjusted when asphalt material has been lost from the vehicle or from the distributor, has been wasted, or has otherwise not been incorporated into the work. True weights of hauling vehicles shall be determined by weighing the empty vehicles at least once a day at the times the CO specifies. Each vehicle shall bear a plainly legible identification mark.

When asphalt materials are shipped, net certified weights, or volume corrected for loss of foaming, can be used for computing quantities.

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 Meter in Place (m³).** Measure solid volumes by the average end area method as follows:
- (1) Measure cross sections of the original ground and use with design or staked templates, or take other comparable measurements to determine the end areas. Do not measure work outside of the established lines or slopes.
 - (2) If any portion of the work is acceptable, but is not completed to the established lines and slopes, remeasure cross sections or comparable measurements of that portion of the work. Deduct any quantity outside the designated or staked limits. Use these measurements to calculate new end areas.
 - (3) Compute the quantity using the average end areas multiplied by the horizontal distance along a centerline or reference line between the end areas. Deduct any quantity outside the designed or staked limits.

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

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

(b) **Cubic Meter in the Hauling Vehicle.** Measure the cubic meter 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 meters 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) Hectare (ha). 10,000 m². Make longitudinal and transverse measurements for area computations horizontally. Do not make deductions from the area computation for individual exclusions having an area of 50 m² or less.

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

(f) Kilogram (kg). 1,000 g. If sacked or packaged material is furnished, the net weight as packed by the manufacturer may be used.

(g) Kilometer (km). 1,000 m. Measure horizontal along the centerline of each roadway, approach road, or ramp.

(h) Liter (l). 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) Meter (m). Measure from end to end, parallel to the base or foundation being measured, or horizontal.

(k) Station. 1,000 m measured horizontally.

(l) Square Meter (m²). 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 1 m² 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). 1,000 kg.

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.

106.05 Price Adjustment for Asphalt Materials

Asphalt materials are defined as all types and grades of asphalt cement, cutback, and emulsified asphalt.

The refinery test reports and the Certificate of Compliance required in Subsection 105.04 will be reviewed and used to support acceptance of the asphalt material incorporated into the project.

If materials are found not to be in conformance with the specified tolerances or within the specification limits, the CO will determine an equitable adjustment in payment.

If the CO elects to test field samples, the test results may be used for acceptance.

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 30 m, as necessary to produce the designed roadway section and to balance earthwork. Such adjustments will not be considered “changes.”