

***GENERAL INFORMATION
AND INSTRUCTIONS***

General Information

TABLES OF WEIGHTS AND MEASURES

Linear Measure

Linear Unit of Measure	U.S. or Standard Unit of Measure	Metric
1 inch		= 2.54 centimeters
12 inches	= 1 foot	= 0.3048 meter
3 feet	= 1 yard	= 0.9144 meter
5 1/2 yards 16 1/2 feet	= 1 rod (or pole or perch)	= 5.029 meters
40 rods	= 1 furlong	= 201.17 meters
8 furlongs 1,760 yards 5,280 feet	= 1 (statute) mile	= 1,609.3 meters
3 miles	= 1 (land) league	= 4.83 kilometers

Square Measure

Square Unit of Measure	U.S. or Standard Unit of Measure	Metric
1 square inch		= 6.452 square centimeters
144 square inches	= 1 square foot	= 929 square centimeters
9 square feet	= 1 square yard	= 0.8361 square meter
30 1/4 square yards	= 1 square rod = square pole = square perch	= 25.29 square meters
160 square rods 4,840 sq yards 43,560 sq ft	= 1 acre	= 0.4047 hectare
640 acres	= 1 square mile	= 259 hectares = 2.59 sq kilometers

Cubic Measure

Cubic Unit of Measure	U.S. or Standard Unit of Measure	Metric
1 cubic inch		= 16,387 cubic centimeters
1,728 cubic inches	= 1 cubic foot	= 0.0283 cubic meter
27 cubic feet	= 1 cubic yard	= 0.7646 cubic meter
16 cubic feet	= 1 cord foot	
8 cord feet	= 1 cord	= 3.625 cubic meters

Dry Measure

1 pint		= 33.60 cubic inches	= 0.5505 liter
2 pints	= 1 quart	= 67.20 cubic inches	= 1.1012 liters
8 quarts	= 1 peck	= 537.61 cubic inches	= 8.8096 liters
4 pecks	= 1 bushel	= 2,150.42 cubic inches	= 35.2383 liters

1 British dry quart	= 1.032 U.S. dry quarts
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Liquid Measure

1 gill	= 4 fluid ounces	= 7.219 cubic inches	= 0.1183 liter
4 gills	= 1 pint	= 28.875 cubic inches	= 0.4732 liter
2 pints	= 1 quart	= 57.75 cubic inches	= 0.9463 liter
4 quarts	= 1 gallon	= 231 cubic inches	= 3.7853 liters

The British imperial gallon (4 imperial quarts) = 277.42 cubic inches = 4.546 liters.

The barrel in Great Britain equals 36 imperial gallons, in the United States, usually 31 1/2 gallons.

Avoirdupois Weight

1 dram or 27.34 grains		= 1.772 grams
16 drams or 437.5 grains	= 1 ounce	= 28.3495 grams
16 ounces or 7,000 grains	= 1 pound	= 453.59 grams
100 pounds	= 1 hundredweight	= 45.36 kilograms
2,000 pounds	= 1 ton	= 907.18 kilograms

The grain is equal to 0.0648 gram

In Great Britain, 14 pounds (6.35 kilograms) = 1 stone, 112 pounds (50.80 kilograms) = 1 hundred weight, and 2,240 pounds (1,016.05 kilograms) = 1 long ton.

THE METRIC SYSTEM

Linear Measure

10 millimeter	= 1 centimeter	= 0.3937 inch
10 centimeters	= 1 decimeter	= 3.937 inches
10 decimeters	= 1 meter	= 39.37 inches or 3.28 feet
10 meters	= 1 decameter	= 393.7 inches
10 decameters	= 1 hectometer	= 328 feet 1 inch
10 hectometers	= 1 kilometer	= 0.621 mile
10 kilometers	= 1 myriameter	= 6.21 miles

Square Measure

100 square millimeters	= 1 square centimeter	= 0.15499 square inch
100 square centimeters	= 1 square decimeter	= 15.499 square inches
100 square decimeters	= 1 square meter	= 1,549.9 square inches = 1.196 square yards
100 square meters	= 1 square decameter	= 119.6 square yards
100 square decameters	= 1 square hectometer	= 2.471 acres
100 square hectometers	= 1 square kilometer	= 0.386 square mile

Land Measure

1 square meter	= 1 centiare	= 1,549.9 square inches
100 centiares	= 1 are	= 119.6 square yards
100 ares	= 1 hectare	= 2.471 acres
100 hectares	= 1 square kilometer	= 0.386 square mile

Volume Measure

1,000 cubic millimeters	= 1 cubic centimeter	= .06102 cubic inch
1,000 cubic centimeters	= 1 cubic decimeter	= 61.02 cubic inches
1,000 cubic decimeters	= 1 cubic meter	= 35.314 cubic feet

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10 kilograms	= 1 myriagram	= 22.046 pounds
10 myriagrams	= 1 quintal	= 220.46 pounds
10 quintals	= 1 metric ton	= 2,204.6 pounds

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Revisions and Updates. There is one annual revision of the Cost Guide which is published in February. Major cost items will be checked quarterly and adjusted, if appropriate.

The Forest Service has adopted the FP-03 (Standard Specifications for Construction of Roads and Bridges on federal Highway Projects. This has resulted in a major change in the cost guide and required a set of FSSS (Forest Service Supplemental Specifications) so that the specifications will conform to the Forest Service Contract Requirements. As a result the description of the specification items have changed for some of the items and many of the Specification numbers have changed. The Items have also been rearranged. However, the content of the information in this costguide has changed very little except for the updated costs. The FP-03 and FSSS are available in either Metric or US Customary (English) units.

Time and Equipment (Constructive) Estimates. On some items, it may be necessary to develop estimates by "time and equipment." When making time and equipment estimates, be sure to include allowances for:

- **Supervision.** On very small jobs this may be provided by an operator/ supervisor at essentially no additional cost.
- **Taxes** on purchase of material.
- **Bonding** cost (may be included in Section 151).
- **"Standby time"** for equipment and operators that are part of a "spread" performing a segment of work, but who are not working at full capacity all the time, averages 2 to 2 1/ 2 of the total contract cost (do not include bonding on timber sales). For example, during placement of aggregate, a grader, roller and water truck are needed. The grader and roller may be operating full time; the water truck only part time. The estimate should include standby time for the water truck to compensate for having it available on the job during the entire time of placing aggregate.
- **Support Equipment** - fuel trucks, pickups, crew transportation, etc.
- **Permits.**

Please note that the labor and equipment rates shown in the Cost Guide include applicable "payroll loading" and profit and overhead.

Unit Costs. To ensure compatibility with the Spreadsheet for Preparation and Administration of Road Contracts (SPARCS), unit costs must be at least rounded to the nearest whole cent (\$0.01); however, the estimator should attempt to round off the unit price to the nearest significant figure. For example, clearing costs generally should be rounded to the nearest \$10 or \$25 per acre, excavation costs should be rounded to the nearest \$.01 per cy, and CMP costs are rounded to \$.50/ LF. Quantities should never be carried out further than the nearest one-hundredth (0.01), and generally no further than the nearest one-tenth (0.1), depending on accuracy of measurements and cost or value of the item.

Use of Average Cost in Project. Use average cost for individual roads within the project whenever possible unless there are significant variations in the character of work from one road to another. Variations are sometimes appropriate for clearing, excavation, hauling, or other unique situations. In these situations, each road should have separate and distinct unit costs for those items; otherwise, the use of overall project unit costs may create problems with design changes, alternate facilities, etc.

Profit and Risk Factor. The profit and risk factor used in this Cost Guide is 6 percent. All unit prices shown in the Guide include this allowance, including the equipment rates (Table 622). Payroll overhead costs of 10 percent are used in all rates in addition to the 6 percent profit and risk factor.

Time Estimates. In accordance with Section 52.212-3 of the Federal Acquisition Regulations (FAR's), contract time for public works contracts must be calculated based on a continuous run of contract time. The contract time

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must include an estimate of the winter shutdown time. If the midpoint of construction is computed, it should be based on the midpoint of work or the midpoint of estimated cash flow, not the midpoint of contract time.

Section Number. The Specifications are referred to by Section Numbers. The Section Numbers are further broken down by paragraphs with decimal points (ie. 213.08). Supplemental Specifications are referred to by Forest Service Supplemental Specifications (FSSS). The FSSS's replace or modify the parent specification.

Public Works & Timber Sale Estimates. All engineer's estimates for road construction, with the exception of allowances for quality control, are to be prepared as if construction is to be accomplished by a public works contract. Quality control policy for timber sales may change after Guide is published.

Davis-Bacon (D-B) /Purchaser Wage Rate Adjustments: To arrive at Specified Road Construction Cost, the engineer's cost estimate shall be adjusted by the estimated cost difference between the applicable Davis-Bacon wage rates and the local prevailing wage rates using the appropriate labor factor given for the labor percentages shown for each work item. These adjustments are mandatory and will be used for all timber sale contracts having specified road construction. Note that some work items are not normally performed by a Timber Sale Purchaser but are subcontracted. No reduction should be made for these items, if the subcontractor is likely to pay Davis-Bacon wage rates. Reductions will be made for those situations where it is unlikely that D-B wages are paid. Refer to FSH 7709.56-7.54 (Preconstruction Handbook) for more information, and refer to Labor Rates in back of this Guide for D-B wage information. An example of this may be dust palliative treatments. For additional information, see section entitled Davis-Bacon/ Purchaser Wage Rate Adjustments.

Fuel Prices. Fuel costs can be quite variable over a period of time due to geopolitical conditions. Equipment prices in this Guide may need to be adjusted by the estimator to compensate for these variations. Other machinery/ equipment that uses fuel or propane such as asphalt plant dryers, generators, etc. may also cost more/ less to operate. The overall effect on the typical road construction project is that 30-40% fuel price increases will increase the total cost of construction about 2-5%. The estimator should be aware of big (10% plus) fuel price increases/ decreases that would affect the unit bid prices shown in this Guide. Fuel price variations will have more effect on items that are equipment oriented such as excavation, than those that are material and labor oriented such as signs.

Contractor Quality Control (QC) and Quantity Measurement. Section 153 is for use on Capital Investment and 14i (turnback) contracts; costs are to be subsidiary to their associated pay items. Do not have a separate pay item for quality control. Please note that R-1's FSSS for Section 160 outlines the frequency of sampling and testing and are mandatory for public works road contracts. R-1 FSSS 105 is required for timber sales which have aggregate surfacing, and does have some measurement and sampling requirements. Estimating procedures and unit costs for contractor QC are outlined in Section 153 of this Guide. Estimator is reminded to stay current with policy regarding timber sale QC requirements.

Midpoint of Construction. The midpoint for construction for unit costs shown in the bid summary in this Guide is estimated to be April. Until further notice, no adjustments to unit costs for inflation will be calculated.

Use of Costs Other Than Shown in the Cost Guide. When local experience indicates unit costs are different than those shown in this Guide, local costs should be considered. Cost deviations from this Guide shall be documented and included in the project file.

Small Quantity Adjustments. Estimates should consider all roads that are included in a contract package that are within a five mile radius as one project for the purposes of small quantity adjustments. Therefore, small quantity factors should not be applied to individual road costs when the individual roads are part of a larger group of road projects in the same vicinity and part of the same contract. On the other hand, where small quantities are involved, estimators should increase allowances due to the inefficiencies generally encountered in small projects. Of particular concern, are projects where small quantities of aggregate are involved. Mobilization of equipment may outweigh the direct costs of the aggregate, short road construction projects also have a relatively high mobilization cost for transport of dozers and excavators.

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Signs. On public works contracts, the contract should require the contractor to furnish and install all signs in accordance with the project sign plan. For 14i (turnback) and timber sale contracts, Regional policy (FSM 7720 supplement) may be revised which will require the furnishing and installation of regulatory and warning signs by the timber purchaser. However, at the date of publishing, existing policy has not been revised. Current policy is that signs for closure devices (gates, barricades, etc.) on timber sale projects (including 14i contracts) are considered as a part of the closure device and should be furnished and installed by the purchaser (or 14i contractor), this includes advance warning signs for such closures. Route markers are part of the road work and are furnished by the purchaser (mile markers are also required road work signs). Other necessary regulatory/ warning signs are to be furnished by the Government and installed by the purchaser (14i contractor).

Purchaser Engineering. Recent changes in Forest Service FRP budgets have introduced or revised several concepts for timber sale roads: post-award engineering (PAE) including possible purchaser survey and/ or design, restricted public use of haul routes, deposits for engineering work on road reconstruction, converting some planned short-term specified roads to temporary roads that remain open for a short period after purchasers use, and use of salvage sale funding for engineering work. Estimator should refer to specific C-provision requirements when estimating purchaser engineering costs.

Change Orders & Design Changes. The principles, costs, etc. listed in this Guide can be used to assist in determining unit costs for contract design changes and change orders; however, site specific and project related information should be used to the maximum extent possible.

North Dakota/ South Dakota/ Washington. Costs estimates for road construction in these States should be adjusted by local equipment and material costs, applicable Davis-Bacon wage rates, and local labor rates. The costs in this Guide are oriented to activity in Idaho and Montana.

FP-03 Specifications. All cost in this guide are associated with the FP-03 and FSSS specifications. Specifications may change and users of this guide should verify that the costs are associated with the correct type of work.

Storm Water Permitting. EPA regulations require permits for road construction activity with more than 5 acres disturbance except in Montana where the disturbance is 1 acre, or rock pits and quarries. Timber sale road construction is exempt from the regulations, but rock pits or quarries for timber sale roads must be permitted.

EPA does the permitting in Idaho, in South Dakota the Department of Environmental and Natural Resources, in Montana permits are obtained from the Water Protection Bureau, in North Dakota permits are obtained from the Division of Water Supply and Pollution Control.

Permits must be obtained by the contractor before construction begins.

In Montana the application fee is \$450.00 per receiving water plus an additional annual fee of \$450 per receiving water, which equates to \$900 for the first year and \$450 additional each year for each receiving water.

Montana Stream Protection Act (SPA 124) and 318 Authorization Permits. SPA 124 permits issued by the Montana Department of Fish, Wildlife and Parks are required any project including the construction of new facilities or the modification, operation, and maintenance of an existing facility that may affect the natural existing shape and form of any stream or its banks or tributaries. There is a 60 day review period. There is no application fee.

Any activity in any state water that will cause unavoidable short term violations of water quality standards will require a 318 Authorization Permit. The 318 permits are administered by the Montana Department of Environmental Quality with an application fee of \$150. Usually 30 to 60 day review period.

Internet. The cost guide can be found on the internet at [www.fs.fed.us/ r1](http://www.fs.fed.us/r1) (click on Programs and Plans). It will be updated whenever new data is available or as corrections are needed. The major up date will again be in

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February of each year. The Cost Guide has been set up in sections so that you can access/ print only the portion that you need. The sections are identified in bold print in the Table of Contents. This will save on printing costs, make the cost guide available to anyone that wants it, and make the updates more timely. If you do not have access to a computer and the internet, you can request a copy from U. S. Forest Service, Region One, Engineering.

Summary. This is a guide and not a cookbook. Estimators need to use judgement and knowledge of the specific project and local conditions when preparing cost estimates.

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End of General Information