



PLANT MATERIALS TECH NOTE

Development and Use of Cost Estimate Matrices for Project Planning and Evaluation

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Introduction: The following information describes the development and use of cost estimate matrices for determining the value of NRCS Plant Materials Program products and services in order to plan, monitor, and meet contractual obligations with cooperators. Although this tool and the example detailed in this bulletin, was developed specifically for Plant Materials—National Park Service (NPS) projects, it is applicable to other cooperative agreements and projects. The cost estimate matrix described was developed for project planning and evaluation purposes and was not designed as an accounting or budgeting tool. The products and services itemized in the attached example reflect those relevant to NRCS, Bridger Plant Materials Center—National Park Service projects. Other centers may offer different products and services. There are multiple approaches to determining the value of a product or service. The methods described in this technical note have been found to provide a level of accuracy and ease of use acceptable for the intended purpose.

I. DEFINITIONS

Cost Estimating: *Cost estimating* involves assigning monetary values to each product and service provided by a contractor (producer) in order to balance production and costs (charges) for meeting contractual obligations with a second party (consumer). Cost estimating can be used as a planning or evaluation tool. As a planning (prediction) tool, it estimates the value of products and services to be produced in the future. As an evaluation tool, it identifies the value of products and services already produced and supplied, usually within a specified time frame. Although cost estimating provides only an approximation of the value of production, it is more accurate as an evaluation tool since actual products and services are known. A *matrix* is a diagram or form consisting of a series of intersecting columns and rows. In our example, the rows are labeled with the product provided and the columns with various product-specific headings, including cost. (SEE APPENDIX 1)

II. COST ESTIMATE MATRICES

General: The design and organization of a cost estimate matrix varies with the needs of the contractor and consumer and should be developed with input from all parties involved. Other factors might include the types of products and services being supplied, method of agency billing, level of detail desired or required by those involved, and the nature and requirements of the contract. The matrix described in this bulletin was designed to provide an estimate of the value of products and services provided by the Bridger Plant Materials Center (BPMC) to the National Park Service (NPS) for various projects. The cost matrix should be organized so that the most important or valued products appear first.

Employee Value: *Employee Value* includes salary, benefits, and support costs (supplies, repairs, rent, fuel, phones, vehicles, etc.). It represents the cost to the agency to employ that person. It may be calculated on a specific employee(s) basis, the average of all employees at a PMC, or an average of all

NRCS employees in the state. In Montana, the average value of a BPMC employee working on National Park Service Projects is based on an average salary (\$23.85 per hour) plus employee benefits (27%) and support costs (25%), resulting in a value of $(\$23.85 \times 1.52) = \36.25 per hour. It should be noted that some accounting methods use an “offset value” or “overhead” charge to bill for administrative and other expenses in lieu of this approach. If a percentage of the total contract is billed for overhead or administrative expenses, the Employee Value is based solely on salary.

Product Values: The value or cost of PMC products should be equal to or greater than comparable commercial products. Although PMC costs are generally higher than commercial sources due to small-scale production, PMC products do not include a built-in profit margin. When the value of a PMC product largely reflects employee time, its cost should be based directly on the value and amount of that employee’s time.

III. PRODUCTS AND SERVICES

Technical Support: *Technical Support* is the technical expertise provided to the consumer through meetings, phone calls, on-site technical consultations, electronic mail, written correspondence, and all other forms of communication. It often represents the primary reason that one agency contracts with another. The value of technical support is calculated on a straight time basis and is based on the amount of time spent providing technical assistance multiplied by the Employee Value.

a. Annual Technical Report and Physical Inventory: Most PMC–NPS projects require an Annual Technical Report summarizing contractual obligations and/or modifications, seed and plant accessioning and inventorying, collection site information, seed conditioning, seed and plant production, seed and plant distribution, trials, and technology development. Since the physical inventory is conducted in conjunction with the development of the annual report at the BPMC, we include it as part of that cost. The cost of the report is calculated on a straight time basis using the aforementioned hourly Employee Value figure. (APPENDIX 1, ITEM 1) The average time to produce the report (based on several years) may be used or the actual hours tallied for a given year.

FORMULA:

$$(\text{Employee Value per hour}) \times (\text{number of employee hours}) = \text{VALUE OF ANNUAL TECHNICAL REPORT.}$$

EXAMPLE: $(\$36.25 \text{ per hour}) \times (92 \text{ employee hours}) = \$3,335.00.$

b. On-Site Consultation: The value of *On-Site Consultation* is based on Employee Value, overnight travel expenses (lodging, per diem, etc.), and any other expenses incurred on behalf of the consumer. This may be calculated on an actual expense (trip) basis or estimated as a per-day cost. In APPENDIX 1, ITEM 2, On-Site Consultation is calculated on a per-day basis based on an 8-hour work day, employee salary, benefits, support (as described earlier), per diem, anticipated motel costs, and any other incurred or anticipated expenses. When the National Park (or other consumer) provides meals or lodging, that amount is subtracted from the On-Site Consultation figure. If the number of days on-site exceeds per diem and lodging, subtract these costs as well.

PER-DAY FORMULA

$$[(\text{Employee Value per hour}) \times (\text{no. of hours})] + (\text{per diem}) + (\text{lodging}) + (\text{other expenses}) = \text{cost per day per employee for On-Site Consultation.}$$

EXAMPLE: $[(\$36.25 \text{ per hour}) \times (8 \text{ hours})] + (\$30.00 \text{ per diem}) + (\$100.00 \text{ per night lodging}^1) = \$420.00 \text{ per day per employee.}$

$$(\$420.00 \text{ per day}) \times (4 \text{ days}) = \$1,680.00.$$

¹ – Based on average cost of lodging in National Parks in our service area.

c. Miscellaneous Technical Support: This includes all consultation and technology transfer not covered elsewhere. This includes meetings, phone calls, emails, and other forms of information transfer that are not considered in the value of other products. It is also calculated on a straight time basis as described in Annual Technical Report and Physical Inventory. (APPENDIX 1, ITEM 3)

EXAMPLE: (\$36.25 per hour) x (44 hours) = \$1,595.00.

Research Projects: The value of *Research Projects* is calculated on a straight time basis using the aforementioned hourly Employee Value figure. The cost of travel or any other incurred expenses (land rental, irrigation, fertilizer, etc.) may also be included as long as they are not included elsewhere in the cost matrix—specifically, Technical Support, On-Site Consultation, Supplies, or related expenses.

FORMULA:

[(Employee Value per hour) x (number of hours)] + (other expenses) = value of Research Projects.

EXAMPLE: No Research Project Value is provided in APPENDIX 1, ITEM 4 because no research activities occurred in that year.

Seed Processing: *Seed Processing* includes all handling, cleaning, packaging, weighing, accessioning, inventorying, and distribution of seed lots. It may be based on the actual value of employee time plus supplies for a given year, or it may be based on a multi-year average. The BPMC calculates the value of Seed Processing on a per lot basis based on a multi-year average. (APPENDIX 1, ITEM 5) This value is calculated as follows:

[(average annual number of lots processed) ÷ (average annual employee time to process)]
x (Employee Value) = average value per lot processed

[(300 lots) ÷ (180 hours)] x (\$36.25) = \$60.00 per lot

FORMULA: (average value per lot processed) x (no. of lots processed) = value of Seed Processing

EXAMPLE: (\$60.00 per lot) x (155 lots) = \$9,300.00.

Seed Production: *Seed Production* is based on bulk clean seed (on a weight basis). The value of production reflects both the size of the production field and the difficulty of production. The per-unit weight value of production increases as the size of the production field decreases and the difficulty of production increases. Difficulties may include low or delayed germination, weed control problems, time consuming or specialized harvesting, processing challenges, or other factors.

FIGURE 1.

<u>SPECIES</u>	<u>FIELD SIZE</u> (ACRES)	<u>DIFFICULTY OF</u> <u>PRODUCTION</u>	<u>UNIT VALUE</u> (PER POUND)	<u>AMOUNT OF</u> <u>SEED PRODUCED</u> (POUNDS)	<u>SPECIES</u> <u>VALUE</u>
1. AGSC	0.12	Moderate	\$40.00	9.95	\$398.00
2. AGSC	0.23	Moderate	\$40.00	22.00	\$880.00
3. BRMA	0.19	Easy	\$25.00	23.00	\$575.00
4. BRMA	0.12	Easy	\$25.00	17.00	\$425.00
5. BRMA	0.12	Easy	\$25.00	36.00	\$900.00
6. BRMA	0.23	Easy	\$25.00	38.00	\$950.00
7. ELEL	0.23	Difficult	\$75.00	9.57	\$718.00
8. ELGL	0.23	Moderate	\$40.00	27.50	\$1,100.00
9. ELTR	0.23	Easy	\$25.00	67.52	\$1,688.00
10. ELTR	0.12	Easy	\$25.00	62.00	\$1,550.00
11. FEID	0.23	Moderate	\$40.00	2.38	\$95.00
12. LECI	0.15	Easy	\$25.00	27.00	\$675.00
13. PSSP	0.23	Moderate	\$25.00	27.00	\$675.00
14. STCO	0.27	Difficult	\$60.00	30.00	\$1,800.00
				Subtotal:	\$12,429.00

In APPENDIX 1, ITEM 6 AND FIGURE 1, a large seed production field is considered >0.25 acre, a medium field is 0.1 to 0.25 acre, and a small field 0.1 acre or less. These size designations correlate with changes in the cost of production based on the estimated amount of time required per amount of seed produced as field size changes. Production difficulty is categorized as easy, moderate, or difficult. The baseline cost of an individual species should be equal to or greater than the current market value of Foundation seed of the same species. Given efficiency gained in commercial production from economies of scale and other factors, PMC production should, in most cases, exceed the current market value of seed of the same species by 50 to 100 percent (1.5x to 2.0x)—more for small lots.

FORMULA / EXAMPLE: SEE FIGURE 1. Given the species, field size, difficulty of production, and amounts of clean grass seed produced in Year 2000, the total value of seed produced in this example is \$12,429.00.

Plant Production

a. Bareroot Production: The BPMC estimates the value of bareroot plant production from current industry rates adjusted for production interval and the level of production difficulty. (APPENDIX 1, ITEM 7) The BPMC sets the baseline value of bareroot plant production on current State Forest Tree Nursery and commercial rates and then adjusts upward. Use local or regional nursery data and/or contact the NRCS or NPS liaisons at the Denver Service Center for industry standards. The value of PMC bareroot production should be greater than commercial sources as described in Seed Production. The value of BPMC bareroot production is averaged across 1- and 2-year production intervals, but increases for 3–0 stock as a result of significantly higher handling and shipping costs. The BPMC does not adjust the value of bareroot production as a function of the number of plants produced, although this is an option. The value of BPMC bareroot production does increase as the difficulty of production increases. The level of difficulty reflects length of dormancy breaking period, germination level and rate, and other factors. No example is provided since no bareroot production occurred in Year 2000.

b. Container Production: The BPMC estimates the value of container plant production based on current industry rates adjusted for container size and the level of production difficulty (APPENDIX 1, ITEM 8) The value of 4- to 10-cubic-inch grasses is lower than comparably sized woody plants because of the ease of production. Large plant material is priced separately on a species by species basis. No example is provided since no container production occurred in Year 2000.

Germination Tests: The value of *Germination Tests* can be based on industry standards or on actual employee time plus materials basis. Again, the cost of PMC products should be equal to or greater than commercial sources. In the example provided, an average per-test value based on current commercial levels is used. The per-test value is multiplied by the number of tests to determine the total cost.

FORMULA: (value per germination test) x (number of tests) = value of Germination Tests

EXAMPLE: (\$30.00 per test) x (13 tests) = \$390.00

Other Supplies: In some cases, supplies may be required that are not included in the Employee Cost rate as described earlier. These should only be included if they represent a significant expense to the producer. This would not include any expense already incorporated into the cost of production. Other Supplies could be estimated on the average annual cost of miscellaneous supplies or determined each year on an item by item basis.

Annual Inflation Adjustment: The *Annual Inflation Adjustment* is used in Year 2 and beyond of multi-year contracts to “adjust” for the additional cost of doing business over time. This may be tied to the national inflation rate for that year or it may be based on a long-term average annual rate. It is not used for 1-year contracts or multi-year contracts that have already been adjusted over time for inflation. The Inflation Adjustment is multiplied by the subtotal of all product costs and then added to the subtotal figure.

FORMULA: [(subtotal of all product values) x (0.04)] + (subtotal of all product costs) or
(subtotal of all product values) x (1.04) = Total Value of All Products for that year or contract.

EXAMPLE: [(\$30,229.00) x (0.04)] + (\$30,229.00) = \$31,438.00.

APPENDIX 1. Cost Estimate Matrix for 1-Year of a Multi-Year Contract.

ITEM NO.	ITEM	AMOUNT (DOLLARS)	EASY	MODERATE	DIFFICULT	UNITS	CALENDAR YEAR 2000
Technical Support							
1	A. Annual Technical Report/ Physical Inventory	36.25/hr				92 hrs	\$3,335.00
2	B. On-Site Consultation	420.00/day				4 days	1,680.00
3	C. Miscellaneous Technical Support	36.25/hr				44 hrs	1,595.00
4	Research Projects	36.25/hr				0	0
5	Seed Processing	60.00/ collection				155 lots	9,300.00
6	Seed Production						12,429.00
	a. Small amount (0.1 acres or less)		35.00	50.00	100.00		
	b. Medium amount (0.1 to 0.25 acres)		25.00	40.00	75.00		
	c. Large amount (>0.25 acres)		15.00	30.00	60.00		
	d. Forbs		50-100	100-300	300+		
Plant Production							
7	A. Bareroot Production					0	0
	a. 1-0 or 2-0		1.00	2.00	3.00		
	b. 3-0		1.50	2.50	4.00		
8	B. Container Production					0	0
	a. 4-10 cubic inch (grass)		1.00	2.00	4.00		
	b. 4-10 cubic inch (shrub)		2.00	3.00	5.00		
	c. 4-6 inch square pots (shrub)		3.00	5.00	7.50		
	d. 1-3 gal (shrub)		5.00	7.50	10.00		
	e. >3 gal priced separately (shrub)		N/A	N/A	N/A		
	f. b&b priced separately (shrub)		N/A	N/A	N/A		
9	Germination Tests	30.00 ea.				13	390.00
10	Other Supplies						1,500.00
SUBTOTAL:							\$30,229.00
11	Annual Inflation Adjustment					0.04	1,209.00
GRAND TOTAL:							\$31,438.00

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