

Estimating the Value of Partner Contributions to Flood Mapping Projects “Blue Book”

Version 1.1

November 2006



FEMA

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1. Background

In 1997, the Department of Homeland Security's Federal Emergency Management Agency (FEMA) created a Flood Map Modernization (Map Mod) Plan to modernize the flood hazard mapping effort and eliminate the backlog of outdated flood hazard maps. Since its development in 1997, the plan continues to evolve as FEMA creates new processes and product standards and updated information is gathered about community mapping needs. The Map Mod Plan outlines the following objectives:

- Developing up-to-date flood hazard data nationwide for all floodprone areas
- Providing maps and data in digital format
- Integrating FEMA's community and State partners into the mapping process
- Improving processes for faster map creation and updates
- Improving customer service

One of FEMA's key goals for Map Mod is to increase local involvement in the development and long-term maintenance of their flood hazard maps. To meet this objective, FEMA created the Cooperating Technical Partners (CTP) program. The CTP program allows communities, tribal nations, regional agencies, and State agencies that have the interest and capability to become active partners in FEMA's flood hazard mapping effort. Partners enter into formal agreements with FEMA to provide specific contributions to the flood hazard mapping effort for their communities. Through these partnerships, local knowledge and expertise are incorporated into the flood hazard maps, and partners' contributions are maximized to leverage Federal funding to the fullest extent possible, while consistently maintaining national standards.

FEMA has been tracking the extent to which its mapping funds have been leveraged through the CTP program since the first partnership agreements were signed in 1999. To estimate each partner's contribution to ongoing mapping activities, FEMA has applied a series of unit costs that are indicative of FEMA's costs to produce a National Flood Insurance Program (NFIP) map. While leverage is generally associated with the CTP Program, other partners who are not members of the CTP Program can provide FEMA with flood mapping-related data and thus leverage their data.

2. Purpose

The purpose of this document is to outline the unit cost approach FEMA uses in estimating the value of mapping activities contributed by communities, tribal nations, regional agencies and State agencies for updated Flood Insurance Rate Map production.

The unit cost approach described in this document should only be used to determine the value of a partner's contribution. Because the actual costs associated with individual projects may vary significantly, **under no circumstances should these unit costs be used to estimate the cost of individual projects.** Resources are available through FEMA's Regional Offices to assist in

estimating the cost of individual projects. Please contact the appropriate FEMA CTP Regional Coordinator for more information (http://www.fema.gov/plan/prevent/fhm/ctp_key.shtm).

The Blue Book is a living document. Because of changing conditions in technologies, processes, and the economy, this publication will be evaluated each fiscal year and FEMA will determine whether revisions are warranted.

3. Overview of Approach

FEMA documents the contributions of its mapping partners (primarily participants in the CTP program) by estimating the value of their contributions to the production of their flood hazard maps. The approach for evaluating partner contributions was originally developed for the CTP program by way of leveraged activity. This approach includes estimates of each partner's contribution to ongoing mapping activities and the overall value of the partner's mapping efforts relative to FEMA's investment in these mapping activities. The methodology uses a series of unit costs and applies them to the number of work units (i.e., linear miles of study or number of panels) to estimate the cost of various project elements in the map production process.

FEMA developed these unit costs to ensure that the value of each map product reflects only the costs typically incurred by FEMA to produce them. Partners may choose to incur costs above and beyond what FEMA would normally expend for the same activity, and these additional costs should not skew the estimate of the project's value to FEMA. For example, a partner that plans to use the topographic data for additional purposes may choose to include data and information that FEMA would not normally include. Accordingly, the cost to collect and process such data should not be considered when evaluating the value of the topographic data.

Moreover, by using uniform unit costs, the value of partnering with communities, tribal nations, regional agencies and State agencies can be estimated at any stage of a mapping project. FEMA can determine the extent to which it is leveraging Federal funds while projects are ongoing. This would not be the case if actual costs were used because the full costs would not be known until the project is complete. For example, although a preliminary Digital Flood Insurance Rate Map (DFIRM) may have already been produced for a partner, the costs incurred will likely change as a result of appeals and/or protests.

FEMA intends to use the unit cost approach (or this Blue Book) to estimate only those partner contributions that will lead to the production of new or updated DFIRMs. It is also important to note that in order to be used and given credit, products submitted by partners must meet the requirements of FEMA's current Guidelines and Specifications for Flood Hazard Mapping Partners. Unit costs have been developed for the following mapping project elements:

- Scoping
- Field surveys

- Topographic data (in square miles and panels)
- Detailed riverine methods
- Limited detailed riverine methods
- Detailed coastal and alluvial methods
- Approximate analyses
- Redelineation of detailed study areas
- Base map acquisition
- Independent Quality Assurance/Quality Control (QA/QC) activities
- DFIRM production
- Outreach
- QA/QC Activities for Mapping Project Elements

4. Federal Matching Programs

The Federal Government has several matching grant programs available to partners, where the Government and the partner each agree to fund a certain percentage of the total cost of a given project. In these cases where a Federal financial contribution is met by a matching (whole or partial) financial contribution from the partner, and those monies are used to accomplish a flood mapping task, FEMA will evaluate the percentage of the unit cost attributed to the task that will be credited to the partner. The partner will not receive 100 percent of the credit for that task unless the task is completely non-Federally funded. For example, a Federal agency and the partner participate in an 80/20 grant program, where the Federal agency funds 80 percent of the project and the partner funds 20 percent of the project. In this example, the project entails completing field surveys for X miles. FEMA would consider the partner's leverage to be 20 percent of the unit cost for X miles of the field survey activity. For the purposes of the CTP Program and leverage calculations for all mapping partners, only the 20 percent match would be credited for leverage. This does not mean that the CTP Program would become a grant program where fiscal matching was required.

5. Methodology

FEMA's Blue Book was first published in 2002. The unit costs in this original version of the document were developed for FEMA's Mapping Needs Update Support System. In 2003, there was the need to adjust these unit costs for inflation. An inflation rate of 2.2 percent was assumed and used to update the unit costs. Since then, it has become obvious to FEMA that the entire set of unit costs need to be updated using the best available data. This update was a thorough update and not merely based on inflation. The methodology to develop the updated unit costs follows.

Data for this update was collected by the National Service Provider's ten Regional Management Centers (RMCs), offices that assist FEMA's Regional offices with many tasks essential to the success of Map Mod. The data was reviewed for consistency and obvious errors, reformatted and

merged into a single file. Data was also collected from the Mapping Information Platform (MIP), FEMA's workflow-based program management system. The data received from the MIP was sorted by State and county and was used as an index field to match the task and funding data from the MIP to the study miles and scope data provided by the RMCs. The matching was performed using the 'vlookup' function in Microsoft Excel.

Matching the task and funding data with the scope data created an aggregate database that associated study scope with the task and funding data. This aggregate database was reviewed for missing data and, in some cases, was supplemented with historical data retrieved from the Management Information for Contracted Studies database. After removing missing data points, the aggregate data was subdivided by task. For each task, the appropriate unit of study (i.e. stream miles, square miles, or number of panels) was identified. In some cases, such as the development of topographic data, the acquisition of base map data, or field surveys, the most representative unit of study was not clear, so unit costs were developed for two different units.

Once the unit of study was identified for each task, the data was reviewed and further subdivided to determine whether the study units represented a single study type (such as detail, limited detail, approximate, or coastal) or multiple study types. For some tasks, such as preliminary panel production, post-preliminary processing, the development of topographic data, QA/QC, or the acquisition of base data, the study type was not viewed as indicative of unit costs. However, for the remaining tasks, such as hydraulic and hydrologic analyses, floodplain mapping, redelineation, and field surveys, the study type was seen as a key differentiator between study costs. In some cases, the task and funding data could be associated with a single study type, although the scope often indicated a mixture of study types.

Once the study type was identified, the funding data was used to calculate a cost per unit for each data point within each task. The average, minimum, and maximum unit costs for each task and, in some cases, for each study type within the task, were computed. The Pivot-table function in Microsoft Excel was used to develop the unit costs summarized in Table 1.

It is important to note that the unit costs provided in the following table are based on certain assumptions that reflect "typical" study conditions and may not accurately represent actual site-specific conditions. **Under no circumstance should these unit costs be used to estimate the cost of individual projects. These figures are intended to provide an estimate of the value to FEMA, and not the actual cost incurred for the activity.**

Table 1 lists the updated unit costs sorted by type of study and task. Table 2 lists the same unit costs, sorted alphabetically.

6. Unit Costs

Table 1. Unit Cost Factors

Project Element		Unit	Unit Cost (\$/unit)
Scoping	Prescoping	Panels	\$256
	Scoping	Panels	\$620
Field Surveys	Field Surveys	Linear miles	\$2,920
	QA/QC of Field Surveys	Linear miles	\$71
Topographic Data	Topographic Data	Square miles	\$59
	QA/QC of Topographic Data	Square miles	\$11
Detailed Riverine	Hydrologic Analysis	Linear miles	\$1,781
	Independent QA/QC of Hydrologic Analysis	Linear miles	\$1,781
	Hydraulic Analysis	Linear miles	\$3,730
	Independent QA/QC of Hydraulic Analysis	Linear miles	\$680
	Floodplain Mapping	Linear miles	\$3,663
	Independent QA/QC of Floodplain Mapping	Linear miles	\$1,154
	Redelineation	Linear miles	\$1,293
	QA/QC of Redelineation	Linear miles	\$232
Limited Detail Riverine	Hydrologic Analysis	Linear miles	\$402
	Independent QA/QC of Hydrologic Analysis	Linear miles	\$402
	Hydraulic Analysis	Linear miles	\$624
	Independent QA/QC of Hydraulic Analysis	Linear miles	\$116
	Floodplain Mapping	Linear miles	\$3,515
	Independent QA/QC of Floodplain Mapping	Linear miles	\$1,146
Detailed Coastal	Coastal Analyses	Linear miles	\$1,428
	QA/QC of Coastal Analyses	Linear miles	\$318
	Floodplain Mapping	Linear miles	\$1,119
	QA/QC of Floodplain Mapping	Linear miles	\$791
Detailed Alluvial	Engineering Analyses	Square miles	\$3,600
	Floodplain Delineation	Square miles	\$5,200
Approximate Analysis	Hydrologic Analysis	Linear miles	\$138
	Independent QA/QC of Hydrologic Analysis	Linear miles	\$138
	Hydraulic Analysis	Linear miles	\$261
	Independent QA/QC of Hydraulic Analysis	Linear miles	\$47
	Floodplain Mapping	Linear miles	\$598
	Independent QA/QC of Floodplain Mapping	Linear miles	\$241
	Redelineation	Linear miles	\$166

**Please Note: Under no circumstance should these unit costs be used to estimate the cost of individual projects. These figures are intended to provide an estimate of the value to FEMA, and not the actual cost incurred for the activity.

Table 1 (cont.). Unit Cost Factors

Project Element		Unit	Unit Cost (\$/unit)
Base Map Acquisition and Preparation	Base Map Acquisition and Preparation	Square miles	\$51
	QA/QC of Base Map	Square miles	\$5
	Base Map Acquisition and Preparation	Panels	\$553
	QA/QC of Base Map	Panels	\$33
	1 meter Orthophoto	Square miles	\$25
DFIRM Production	Preliminary DFIRM Production	Panels	\$1,168
	QA/QC Preliminary DFIRM Production	Panels	\$100
	Post-Preliminary DFIRM Production	Panels	\$1,600
Outreach	Informational Mailing	1000 Brochures	\$2,900
	Community Meeting	Meeting	\$5,000
	Web site	Web site	\$20,000
	Multimedia Promotion	Promotion	\$10,000

Table 2. Alphabetical Listing of Unit Cost Factors

Project Element	Unit	Unit Cost (\$/unit)
1 meter Orthophoto	Square miles	\$25
Approximate Analysis Floodplain Mapping	Linear miles	\$598
Base Map	Panels	\$553
Base Map	Square miles	\$51
Coastal Analysis	Linear miles	\$1,428
Coastal Floodplain Mapping	Linear miles	\$1,119
Detailed Floodplain Mapping	Linear miles	\$3,663
Field Survey - Detail Study	Linear miles	\$2,920
Field Survey - Limited Detail Study	Linear miles	\$2,099
Hydraulic Analysis - Approximate Study	Linear miles	\$261
Hydraulic Analysis - Detailed Study	Linear miles	\$3,730
Hydraulic Analysis - Limited Detailed Study	Linear miles	\$624
Hydrologic Analysis - Approximate Study	Linear miles	\$138
Hydrologic Analysis - Detailed Study	Linear miles	\$1,781
Hydrologic Analysis - Limited Detailed Study	Linear miles	\$402
Independent QA/QC of Approximate Floodplain Mapping	Linear miles	\$241

**Please Note: Under no circumstance should these unit costs be used to estimate the cost of individual projects. These figures are intended to provide an estimate of the value to FEMA, and not the actual cost incurred for the activity.

Table 2 (cont.). Alphabetical Listing of Unit Cost Factors

Project Element	Unit	Unit Cost (\$/unit)
Independent QA/QC of Coastal Floodplain Mapping	Linear miles	\$791
Independent QA/QC of Detailed Floodplain Mapping	Linear miles	\$1,154
Independent QA/QC of Hydraulic Analysis - Approximate Study	Linear miles	\$47
Independent QA/QC of Hydraulic Analysis - Detailed Study	Linear miles	\$680
Independent QA/QC of Hydraulic Analysis - Limited Detailed Study	Linear miles	\$116
Independent QA/QC of Hydrologic Analysis - Approximate Study	Linear miles	\$138
Independent QA/QC of Hydrologic Analysis - Detailed Study	Linear miles	\$1,781
Independent QA/QC of Hydrologic Analysis - Limited Detail Study	Linear miles	\$402
Independent QA/QC of Limited Detailed Floodplain Mapping	Linear miles	\$1,146
Limited Detail Floodplain Mapping	Linear miles	\$3,515
Outreach - Community Meeting	Meeting	\$5,000
Outreach - Informational Mailing	1000 brochures	\$2,900
Outreach - Multimedia Production	Promotion	\$10,000
Outreach - Web Site	Web site	\$20,000
Post-Preliminary DFIRM Processing	Panels	\$1,600
Preliminary DFIRM Production	Panels	\$1,168
Prescoping	Panels	\$256
QA/QC Base Map	Square miles	\$5
QA/QC Base Map	Panels	\$33
QA/QC Field Survey - Detail Study	Linear miles	\$71
QA/QC of Coastal Analysis	Linear miles	\$318
QA/QC of Redelineation - Detail Study	Linear miles	\$232
QA/QC Preliminary DFIRM Production	Panels	\$100
QA/QC Topographic Data	Square miles	\$11
QA/QC Topographic Data	Panels	\$58
Redelineation - Approximate Study	Linear miles	\$166
Redelineation - Detail Study	Linear miles	\$1,293
Scoping	Panels	\$620

**Please Note: Under no circumstance should these unit costs be used to estimate the cost of individual projects. These figures are intended to provide an estimate of the value to FEMA, and not the actual cost incurred for the activity.

7. Changes

Most of the unit costs are different from those published in the 2002 version of this document. As no data were available for the cost of detailed alluvial analyses and floodplain mapping or for outreach, these unit costs were not updated. The unit costs that were updated reflect the availability of current data.

Another change since the 2002 version is the exclusion of limitations. The 2002 version of this document specified limitations to the amount of credit that could be given to a partner in such activities as topographic data and outreach. For the topographic data activity, a partner had to provide FEMA with the ability to redistribute the data in order to receive full credit. For outreach, a partner had to participate in at least four outreach activities to receive full credit. These restrictions were deleted to encourage partners to participate in these tasks and to fully value a partner's contribution to the NFIP and Map Mod.

A final change was the removal of one task. With the advent of the MIP, the information technology system task was deleted. The purpose of the Blue Book is to identify cost savings to the government. Therefore, the fact that a system is in place to address these program management needs disqualifies this activity as a savings.

8. Definitions

In order to provide users with the information to implement the unit costs associated with the Blue Book, there are some items that must be defined. First, topographic data should be limited to the area within the floodplain buffer. Leveraged topographic data should not encompass the entire area (i.e. county, community or map panel) unless that is actually the extent of the floodplain.

Outreach is another warrants definition. The unit cost for a web site represents one entire site and not each page within the site. For multimedia productions, the unit costs represent each different multimedia project or promotion, not each aspect within the production. For meetings, the unit costs represent each meeting. And lastly, for mailings, the unit costs represent 1000 brochures.

As stated throughout this document, **under no circumstance should these unit costs be used to estimate the cost of individual projects. These figures are intended to provide an estimate of the value to FEMA, and not the actual cost incurred for the activity.**

Any questions about these or other unit costs should be presented to FEMA for consideration. If additional unit costs are warranted, suggestions and the associated data should be presented to FEMA for future versions of this document.