Cost Estimating Requirements Handbook

National Park Service (NPS) - Denver Service Center (DSC) | 5-9-22

Table of Contents

[Chapter 1 Introduction 3](#_Toc102984522)

[1.1 Preface 3](#_Toc102984523)

[1.2 Purpose 3](#_Toc102984524)

[1.3 Application 4](#_Toc102984525)

[1.4 Standards 4](#_Toc102984526)

[Chapter 2 - Design Construction Cost Estimate Submission 5](#_Toc102984527)

[2.1 Submission Levels 5](#_Toc102984528)

[2.2 Phased Projects 7](#_Toc102984529)

[2.3 Multi-Building/Multi-Asset/Major Project Element Estimates 7](#_Toc102984530)

[2.4 Optional Contract Line Items 8](#_Toc102984531)

[2.5 Resolution of NPS DSC Review Comments 8](#_Toc102984532)

[2.6 Revise and Resubmit Construction Cost Estimate if Required 8](#_Toc102984533)

[Chapter 3 Cost Estimating Practices 9](#_Toc102984534)

[3.1 Cost Management 9](#_Toc102984535)

[3.2 Basis of Estimate Statement 10](#_Toc102984536)

[3.3 Estimating Formats and Work Breakdown Structure (WBS) 11](#_Toc102984537)

[3.4 English Unit Costs 12](#_Toc102984538)

[3.5 Unit Pricing 13](#_Toc102984539)

[3.6 Source of Cost Data 13](#_Toc102984540)

[3.7 Estimate Mark-ups 13](#_Toc102984541)

[3.8 Adjusting for Inflation Escalation 18](#_Toc102984542)

[Chapter 4 Standards of Conduct 19](#_Toc102984543)

[4.1 Standards 19](#_Toc102984544)

[4.2 False Statements 19](#_Toc102984545)

[Appendix A - Class A Construction Cost Estimates 19](#_Toc102984546)

[Class A (Actual) Construction Cost Estimating 19](#_Toc102984547)

[Class A Construction Estimate Mark-ups and Design Contingencies 22](#_Toc102984548)

[Government Furnished Property (GFP) 24](#_Toc102984549)

[Work Breakdown Structure for Class A Construction Cost Estimates 24](#_Toc102984550)

[Submittal Package Requirements for Class A Construction Cost Estimates 26](#_Toc102984551)

[Appendix B - Class B Construction Cost Estimates 26](#_Toc102984552)

[Class B (Budgetary) Construction Cost Estimating 27](#_Toc102984553)

[Class B Construction Cost Estimate Mark-ups and Design Contingencies 29](#_Toc102984554)

[Government Furnished Property (GFP) 31](#_Toc102984555)

[Work Breakdown Structure for Budgetary Class B Construction Cost Estimates 31](#_Toc102984556)

[Submittal Package Requirements for Budgetary Class B Estimates 32](#_Toc102984557)

[Appendix C - Class C Construction Cost Estimates 33](#_Toc102984558)

[Class C (Conceptual) Construction Cost Estimating 33](#_Toc102984559)

[Class C Construction Cost Estimate Mark-ups and Design Contingencies 36](#_Toc102984560)

[Government Furnished Property (GFP) 38](#_Toc102984561)

[Work Breakdown Structure for Conceptual Class C Construction Cost Estimates 38](#_Toc102984562)

[Submittal Package Requirements for Conceptual Class C Estimates 40](#_Toc102984563)

[Appendix D - Wage Rate Factor Analysis Worksheet 41](#_Toc102984564)

[Appendix E - Market Survey 41](#_Toc102984565)

[Application 41](#_Toc102984566)

[Survey Approach 41](#_Toc102984567)

[Report Content 42](#_Toc102984568)

[Scheduling 42](#_Toc102984569)

[Appendix G - NPS Asset Categories 42](#_Toc102984570)

[Appendix H - Uniformat II 43](#_Toc102984571)

[Appendix J - Federal Acquisition Regulation (FAR) 36.609-1 & 36.609-2 44](#_Toc102984572)

# Chapter 1 Introduction

## 1.1 Preface

Our Collective goal is to manage the execution of the project within the funding limit approved by Congress. NPS has a responsibility to act as a steward of tax dollars. This stewardship is conveyed in turn to the design team. NPS expects the entire design team to take ownership of the project construction budget and to be an advocate for successful execution of the project within the available funding. The Architect-Engineer (A/E) Cost Estimator role is a critical element of project cost management. Rather than limiting responsibilities to simply reporting costs, the estimator and cost professionals must be an integral part of the design team, continually interacting and providing input to the design decision at every stage of development.

## 1.2 Purpose

The NPS Cost Estimating Handbook tailors and applies policies and practices to support the unique needs of the capital improvement and construction programs within the NPS. Technical and administrative requirements are presented for the development, preparation, documentation, and submittal of construction cost estimates during the project life cycle of a NPS construction project’s pre-planning/predesign (PD), schematic design (SD), design development (DD), and construction document (CD) preparation phases. This handbook shall be the standard by which NPS projects are estimated both internal and at the consultant level with Architectural and Engineering firms.

1. Adherence to these requirements will enhance the NPS ability to process and accept construction cost estimate submittals by:
	1. Following a consistent methodology and format for all construction cost estimates submitted.
	2. Providing documentation of background information, all sources of cost information, estimating assumptions.
	3. Tracking major changes in project scope, programming, and design elements, from one estimate to the next that have significant impacts on cost.
	4. Streamlining the review process, allowing reviewers to focus on the technical merits of submitted estimates rather than wasting resources and time attempting to decipher the materials presented.
	5. Meeting Government Accountability Office (GAO) best practice guides for Cost Estimating:
		1. [GAO-20-195G Cost Estimating and Assessment Guide: Best Practice by Developing and Managing Program Cost](https://www.gao.gov/assets/710/706933.pdf)
		2. [GAO-16-89G Schedule Assessment Guide: Best Practices for Project Scheduled](https://www.gao.gov/assets/gao-16-89g.pdf)
2. Improving and standardizing cost estimating practices yields significant benefits to the overall success of the design and construction process.
	1. Project costs can be better managed to stay within previously authorized and appropriate limits.
	2. Project costs and scope changes will be easier to manage and track through the planning, design, and construction process.
	3. Increase reliability of early cost estimates can reduce the amount of redesign necessary to bring projects within budget.
	4. Controlling and managing project performance relies on the project planning process. Integrating the planning process is essential to managing the relationship between cost, time, and scope. Coordinating requirements for cost, time and scope is the path to achieving project success.
	5. Improved estimate documentation will lead to improved review efficiencies and shorter review cycle times.
	6. Facilitate the development and maintenance of a NPS cost data base, which can be used to establish a baseline and assist in planning and estimating future projects.

## 1.3 Application

The instructions and criteria contained herein are to be incorporated by reference with the Design A/E and other professional services contracts involving cost management and/or estimating tasks. Criteria describing practices and documentation requirements apply to all sources of professional services whether provided through contract or NPS estimators.

1. **Well-documented:** The estimate is thoroughly documented, including source data and significance, clearly detailed calculations and results, and explanations for choosing a particular method or reference.
2. **Comprehensive:** The estimate’s level of detail ensures that cost elements are neither omitted nor double counted.
3. **Accurate:** The estimates are unbiased, neither overly conservative nor overly optimistic, and based on an assessment of most likely costs.
4. **Credible:** Discusses any limitations of the analysis from uncertainty of biases surrounding data or assumptions.

NPS cost estimates will meet the four key requirements as identified by the GAO.

## 1.4 Standards

1. **NPS Estimating Standards:** This handbook shall be the standard by which NPS projects are estimated both internal and at the consultant level with Architectural and Engineering (AE) firms.
2. **Design within Budget:** Unless otherwise specified in the design contract documents, the A/E shall design the project so that bid construction costs will not exceed funding limitations established as the “Basis of Fee Negotiation.” (Federal Acquisition Regulation (FAR 36.609-1) This regulation applies, conditionally requiring the A/E to redesign the project **at their own expense** to assure a responsive construction bid amount will be within funding limitations.
3. **Cost Databases:** NPS maintains a historical cost database of its completed new construction and repair/rehabilitation projects. The database supports functional area/asset type unit costs within the National Park System. To facilitate the implementation of the database program, both cost estimating and as-built construction cost data shall be prepared and collected to support a UNIFORMAT II Level 3 building system cost database. NPS as-built cost information may also be evaluated, processed and analyzed to this same level or detail for inclusion in the historical database.
4. **Quality Control:** The A/E is responsible for Quality control including fully reviewing and vetting per NPS requirements, scope and accuracy on any estimate whether done in house of by third party prior to submitting to the NPS. Upon reviewing and accepting any estimate, the A/E shall sign off on the estimate prior to submission.
5. **Accuracy of Estimates:**
6. Class C predesign estimate (-20/+30%)
7. Class C schematic estimate (-10/+20%)
8. Class B preferred alternative estimate (-10/+10%)
9. Class B design development estimate (-5/+10%)
10. Class A construction document estimate (-5/+5%)

# Chapter 2 - Design Construction Cost Estimate Submission

## 2.1 Submission Levels

NPS recognizes three levels of estimating (Class C, Class B and Class A). Definitions and a Template for these estimate levels can be found in the Appendix portion of this document.

The following is a list of required cost related submissions during the design process and the level of estimate required:

1. Predesign (PD) Submittal
	1. Basis of Estimate Statement
	2. Class C Construction Cost Estimate
2. Schematic Design (SD) Submittal
	1. Class C Construction Cost Estimates for Value Analysis (VA) Alternatives
		1. Used to compare three (3) more alternatives through the Choosing by Advantage (CBA) analysis process and VA workshops.
		2. Typically, not submitted for Quality Assurance (QA) review prior to workshops but are included in CBA/VA report.
		3. Shall contain a greater level of detail and fewer allowances than the estimate submitted at the PD phase.
		4. Updated Basis of Estimate Statement with details for each area.
	2. Class B Construction Cost Estimate for Preferred Alternative
		1. Provide a greater level of detail for the preferred alternative.
		2. Formatted to the requirements for a Class B Construction Cost Estimate.
		3. Provide a revised and updated Basis of Estimate Statement that reflects outcome of CBA and VA process.
		4. Allowances, lump sums, and general conditions are broken out to an appropriate unit detail level.
		5. Initial market research that reflects current local cost for major materials, labor, and equipment in the general project areas.
3. Design Development (DD) Submittal
	1. Updated Basis of Estimate Statement
		1. Shall clarify questions associate with the SD cost estimate submittal.
		2. Shall provide justification for a reduced level of mark-ups than previous estimates.
		3. Should provide a pre-construction design schedule laying out critical path to derive durations-based cost.
	2. Updated Class B Construction Cost Estimate
		1. Shall contain a greater level of detail and fewer assumptions, allowances broken out and described at the unit detail level than the estimate submitted at the SD phase.
		2. Shall contain at a minimum a breakdown of cost line items that reflect the level of detail of the DD plans and specifications being concurrently submitted.
		3. Shall include an initial draft breakdown of the General Condition line items as a verification check on General Conditions mark-up factors used in the estimate summary.
	3. Market research that reflects current local costs for materials, labor and equipment in the general project area. Wage determination analysis for prevailing wage.
4. 100% Draft Construction Document (CD) Submittal
	1. Contract Price Schedule
	2. Basis of Estimate Statement
		1. Clarify questions associated with the DD cost estimate submittal.
		2. Provide justification for a reduced level of mark-ups than previous estimates.
		3. Location and remoteness factors may need adjustment to reflect the cost effects that project/location specific material and vendor quotes have on the need for these mark-ups.
		4. Identify sources of contractor, vendor, and manufacturer cost information for major systems. Clarify assumptions and detail changes from previous estimate submittal.
	3. Class A Construction Cost Estimate
		1. Contain a greater level of detail than the estimate submitted at the DD phase and few if any allowances.
		2. Include a breakdown of cost line items that completely identify all cost elements associated with the improvements shown in the CD plans and specifications.
		3. Include a complete cost breakdown of all General Condition cost items as a separate line item in the direct cost. The use of General Condition mark-up factors should be phased out or eliminated at this level and accounted for under the broken-out cost.
		4. Many of the direct costs may already reflect location and project specific costs based on local market research, vendor quotes, contractor inquiries, etc. Some adjustment of location and remoteness factors or NPS park location factor may be required.
		5. Design contingency should be approaching zero (0), since the CDs are approaching their final form.
5. 100% Complete CD Submittal
	1. Contract Price Schedule
		1. Revise as necessary to address Draft CD review comments.
	2. Revised Basis of Estimate Statement
		1. Clarify questions and comments associated with the Draft CD estimate submittal.
		2. Describe cost related changes made since the Draft CD estimate submittal.
	3. Revised Class A Construction Cost Estimate
		1. Revise costs to reflect design changes that have occurred since the Draft CD submittal.
		2. Adjust mark-up factors if needed, i.e. escalation inflation to midpoint of construction.
		3. Design contingency should be zero (0) for most projects with 100% Complete CDs and well defined limits of work. Some projects requiring tie-in to existing structures, historic preservation, or selective demolition to define work limits may still need to carry a small design contingency.

## 2.2 Phased Projects

For project work divided into more than one construction contract (phase), the minimum level of cost estimating submissions required is based upon the summed costs of all phases. Each phase must be supported by its own separate cost estimate. The individual phase cost estimates should also be accompanied by an overall project estimate summary containing a tabulation of each phase and a total project cost.

## 2.3 Multi-Building/Multi-Asset/Major Project Element Estimates

Each Structure, Asset, or Major Project Element must be broken out separately in the estimate and in the estimate summary. Multiple structures, assets, or major project elements should never be included within the same contract price item. When estimating at the Class B or Class A estimate level, each building/Asset/Project Element must be supported by its own separate cost estimate. The individual Building/Asset/Major Project Element should also be accompanied by an overall project estimate summary containing a tabulation of each Building/Asset/Major Project Element. Reference section [3.3 Estimating Formats and Work Breakdown Structure (WBS)](#_3.3_Estimating_Formats).

## 2.4 Optional Contract Line Items

Where project design requires construction contract line items as options, each option shall be estimated as a separate contract line item. Reference section [3.3 Estimating Formats and Work Breakdown Structure (WBS)](#_3.3_Estimating_Formats).

Optional Contract Line Item is defined as a contract line item or series of contract line items that will be broken out from base bid items.

Optional Contract Line Items need to be detailed and holistic reflecting all associated cost, easily separated from base bid item estimated cost.

## 2.5 Resolution of NPS DSC Review Comments

NPS DSC review comments of A/E estimate submissions shall be resolved in writing in accordance with other design submission review/comment response requirements defined within the task order scope of services (SOS).

## 2.6 Revise and Resubmit Construction Cost Estimate if Required

In some cases, a Construction Cost Estimate will be reviewed by NPS and deemed **Not Accepted**. This typically only occurs when an estimate lacks clarity in defining the work being estimated, or the estimate is either over, or understated to the point that the total cost estimated does not appear to reasonably represent the anticipated cost of the project, as defined by the planning, design or construction documents.

If an estimate is deemed **Not Accepted**, the design team must either revise and resubmit the estimate until accepted or provide whatever supplemental information necessary to clarify and support the previously submitted estimate to the satisfaction of the NPS Reviewer.

1. The required response to an estimate deemed **Not Accepted** is dependent upon the design phase with which the estimate was submitted:
	1. **PD Construction Cost Estimate:** Unless noted as **Revise and Resubmit**, all review comments must be addressed in the estimate detail and responses submitted with the first submittal for the Schematic Design phase.
	2. **SD Construction Cost Estimate:** Review comments should be addressed directly with the Project Manager and Estimate Reviewer prior to Investment Review Board (IRB) submittal. If warranted by that review, the estimate should be revised and resubmitted.
	3. **DD Construction Cost Estimate:** Unless noted as **Revise and Resubmit**, review comments must be addressed in the Construction Cost Estimate and comment responses submitted with the 100% Draft CD.
	4. **100% Draft CD:** The estimate must be revised and resubmitted to address all review comments prior to proceeding to 100% Complete CD. It may be necessary to address the comments directly with the Project Manager and Estimate Reviewer before resubmitting the estimate. It may be necessary and is strongly recommended to obtain an additional independent estimate from a separate source not affiliated with the design team or original estimator.
	5. **100% Complete CD:** Review comments and estimate issues must be addressed and the estimate must be revised before submitting design for director’s approval and proceeding to procurement.

# Chapter 3 Cost Estimating Practices

## 3.1 Cost Management

The process of estimating, control, and data analysis to establish a continuous cycle of cost information for efficient implementation of projects. All types of projects can benefit from appropriate application of cost management techniques, not just the biggest companies.

Cost estimate submittals, outlined in section [2.1 Submission Levels](#_2.1_Submission_Levels), allow for NPS to review and comment on project construction costs a minimum of 5 times during the design process of a project. It is imperative that the cost of NPS Construction Projects remains within budget throughout the planning, design, and construction processes. NPS tries to incorporate real-time cost management methodologies into this process by requiring:

1. **Independent Cost Estimate Preparation:** Estimates must be prepared independently of the design team for all capital improvement projects. Estimates shall be prepared under the direct supervision of a professional cost estimator whose full time or primary duty is that of construction cost estimating.1 The estimator’s work shall be influenced by the design team only to the extent that drawings and specifications are modified.

***1Certification*** *- Although not required, certification by the Association for the Advancement of Cost Engineering (AACE) or American Society of Professional Estimators (ASPE) as a cost engineer, certified cost consultant, or value engineer, will be accepted as evidence of someone whose primary duty is that of estimating.*

1. **Period of Performance:** Estimates need to be based on a logically correct construction schedule and is critical to determining the correct field general requirements/conditions of the project. The estimator will need to verify with the NPS project team what specific schedule requirements the park may have that will affect the cost, i.e. seasonal work, traffic flows, resource adjustments, etc. Estimates must clearly define what the basis of the schedule is stating, start, end, and duration of work.
2. **Appropriately Scheduled Cost Estimate Submittals:** The class of a (C, B, or A) construction cost estimate is not defined by the timing of its submittal but rather by the completion level of the design and construction documents that it is submitted with. In most cases, the cost estimate can only be as detailed as the design documents from which it is derived.
	1. If the design documents submitted with a schematic design level are incomplete and do not meet schematic design submittal requirements in either whole or part, the construction cost estimate level cannot be better than a Class C (instead of a Class B), in whole or part.
		1. During the early stages of planning and design, it may be appropriate to make cost item detail assumptions that are not yet shown on the plans to reflect cost items that can reasonably be expected to occur.
		2. The use of cost allowances as place holders for expected future cost details is an appropriate method to include anticipated costs in the direct cost portion of the estimate.
	2. In contrast, if the design documents are completed to a higher level of detail than is required for the design stage that is being submitted, the estimate detail should match the information presented in the design documents.

## 3.2 Basis of Estimate Statement

Perhaps one of the most important elements in a well-documented cost estimate is a clear and concise Basis of Estimate Statement. The Basis of Estimate Statement should clearly describe the scope of work being estimated, identify the source(s) of cost data used to prepare the estimate, document any assumptions made, and define the rationale behind any adjustments or mark-ups applied to the basic cost model. The Basis of Estimate Statement must also clearly identify any major changes that have been made from previous estimate submittals, which have a significant effect on the overall project cost or to the cost of major project elements.

1. **Background Supporting Material (Scope of Work):** This section establishes the foundation from which costs are derived by defining precisely the scope of work items that are and are not included in the cost estimate. Regardless of the purpose for preparing a cost estimate, developing a thorough and well documented scope of work will allow reviewers and future users of the cost information to fully understand the extent and purpose of the work covered by the estimate. As development, construction or repair plans evolve, changes in design or design intent can be readily identified and the cost implications of those changes easily evaluated. This is especially important, in a business environment with a highly mobile work force or rapid personnel turnover rate, where the original estimator may not be available to assist with future iterations of the cost model or clarify questions that may arise regarding the original cost estimate.
2. **Source of Cost Data:** Clearly identifying the source or sources of cost information used to prepare an estimate is an essential part of the Basis of Estimate Statement. The source of cost data establishes the criteria necessary for determining the need for and application of appropriate mark-up factors. If publicly available, published cost databases are used, the database name, version, volume number, data date and format of the database should be listed. If proprietary databases are used, the same information is required, plus a description of the underlying data sources and processing methodology should be included. In some cases, actual project specific costs, vendor quotes and/or park specific cost data may also be used and should be well documented. In many cases, a combination of these and other types of data sources are frequently used to develop a cost estimate.
3. **Documentation of Estimate Assumptions:** Any and all assumptions made during the preparation of an estimate must be clearly documented in the Basis of Estimate Statement to provide a historical record of how costs were developed and highlight areas where additional information is required for future estimates.
4. **Definition of Mark-ups:** The Basis of Estimate Statement should contain a brief description of how mark-up factors were determined and the rationale behind the selection of the values used for the individual factors. In many cases, if location specific data, vendor quotes, or historical park specific
data are used, the need for additional mark-ups may not be required or the typical values may need to be adjusted to reflect the actual data used to develop costs.
5. **Identification of Major Changes from Previous Estimate:** Any major changes that have been made to the project, or cost estimate, as the design process is refined must be clearly identified in the Basis of Estimate Statement Major changes may include additions or deletions in the scope of work, significant changes in material selection, clarifications of previous assumptions made, substantial design revisions or any combination of these and other factors that significantly affect the overall cost of the project to the cost of individual project elements.
6. **Other Comments:** Provide any additional information that is relevant to assist in the documentation and review of the estimate. It could include information regarding the estimator or estimating company that may have changed; significant market events that may have an effect on the costs; or other information not included elsewhere.

## 3.3 Estimating Formats and Work Breakdown Structure (WBS)

It is important that cost estimates be formatted consistently and orderly to facilitate design cost analysis, monitoring of costs from the programming phase through the completion of construction documents, and analysis/negotiation of construction proposals. A WBS is used to organize (index) projects from one main and relatively large entity into many smaller, defined, manageable and controllable units. The WBS can be viewed as an organization chart of the main project components of the project.

1. **Asset Categories:** NPS has classified and defined 35 asset categories in their asset management program, Facilities Management Software System (FMSS), and listed in [Appendix G](#_Appendix_G_-). All levels of estimates shall be broken down to the individual asset at its top hierarchy. For projects with more than one physical asset, building, site area, etc. Costs for each asset must be estimated individually.
2. **Estimate Format:** UNIFORMAT II is the required format.
	1. **UNIFORMAT II:** Government Services Administration (GSA), in conjunction with the American Institute of Architects (AIA), established this twelve part cost classification format, corresponding to major building systems. This format is particularly suited to project planning and early design estimating, as well as, for work and pay schedules during construction. This approach is necessary as detailed design take-off assessments and measurements may not be possible in a project’s early development. UNIFORMAT II is represented in [Appendix H](#_Appendix_H_-).
		1. **Levels:** Criteria references for required estimating detail are designated by UNIFORMAT II Levels, corresponding to the assigned cost element2 and number.
			1. For example, the UNIFORMAT II cost element **D** (Services) represents Level 1.
			2. D**20** (Plumbing) representing Level 2.
			3. D20**10** (Plumbing Fixtures) representing Level 3.
			4. D20**13** (Lavatories) representing Level 4.

*2Elements, as defined here, are major components common to most buildings and related site work. Elements usually perform a given function, regardless of design specification, construction method, or materials used.*

* + 1. **Where a UNIFORMAT II Level is specified**, the estimator must as a minimum address all project related cost elements at that level, supporting backup cost estimate data at a greater degree of detail, when available or applicable. Whenever more detailed design information is available, it should be used to prepare the estimate and should be noted in the Basis of Estimate Statement.
		2. **Detailed Backup Data:** Cost estimating back-up materials and cost breakdowns for any specified UNIFORMAT II Level should be presented in a systematic format or organization hierarchy.
			1. UNIFORMAT II, Level 1 estimate summaries should be detailed to Level 2.
			2. UNIFORMAT II, Level 2 estimate summaries should be detailed to Level 3.
			3. UNIFORMAT II, Level 3 estimate summaries should be detailed to Level 4.
1. **Contract Line Items:**
	1. **Construction of New Assets Projects:** A general guide for contract line items for new construction projects is to make each asset a separate contract line item.
		1. There are several asset categories that would tend to have multiple contract line items per asset. For example: a project for construction of a new wastewater utility system would likely have separate contract line items for portions of the system (i.e., sewage collection system, wastewater treatment system, disposal or discharge system).
		2. In some situations, additional contract line items would be conducive to efficient proposal analysis/negotiation and construction payment (i.e., various sizes of pipes, types of pipes).
		3. It may also be advantageous to provide additional contract line items that break individual assets into their major UNIFORMAT II components. This will allow for the collection and comparison of price information between projects of a similar nature. It can also be used as to evaluate a bidder’s understanding of the complexity of a project.
		4. More contract line items are not always better; achieving a balance of the proper quantity of contract line items to define and track the work is important for acquiring the best contract line proposals and developing useful information for future projects.
	2. **Repair/Rehabilitation Construction of Existing Assets Projects:** A general guide for contract line items for repair/rehabilitation projects repair or rehabilitation work on each system (UNIFORMAT II, Level 3) within the asset should be designated as a separate contract line item. For example, Contract Line Item 1 could be replacement of windows, Contract Line Item 2 could be a replacement roof shingles, etc. As an alternative to contract line items defined according to building system (UNIFORMAT II), contract line items may also be defined by area of work within an asset. For example, Contract Line Item 1: Refinish vestibule surfaces, Contract Line Item 2: Replace Electrical in West Wing, etc. In some situations, additional contract line items would be conducive to efficient price proposal analysis/negotiation and construction payment (i.e., various sizes of pipes, types of pipes). More contract line items are not always better; balance of the proper quantity of contract line items is important for acquiring the best contract price proposals.

## 3.4 English Unit Costs

A/E design calculations and drawing/specification measurements will typically be represented in English units of measurement unless otherwise addressed within contract documents. As such, estimators shall be expected to convert between English and Metric units as necessary to utilize existing cost data bases/sources. Unless otherwise provided within contract documents, all costs represented within cost estimates shall be in English units.

## 3.5 Unit Pricing

Unit prices shall be based upon construction costs as if the overall construction contract were awarded on the date of the estimate. Unit costs shall include mark-ups as prescribed below.

1. **Class C Construction Cost Estimates:** Mark-ups should be applied to the end of the estimate.
2. **Class B Construction Cost Estimates:** Unit costs should include overhead and profit allowances only at the sub-contractor or installing contractor level. All other mark-ups should be applied to the end of the estimate.
3. **Class A Construction Cost Estimates:** Mark-ups associated with project location should be allocated to unit costs rather than added to the project total. Unit costs should include overhead and profit allowances only at the sub-contractor or installing contractor level. Mark-up for state and local levied taxes should be allocated to and included in unit costs. All other mark-ups should be applied to the end of the estimate.

## 3.6 Source of Cost Data

The estimator should provide a narrative description in the Basis of Estimate Statement, defining the sources of cost data (unit costs, system costs and quantities) used within the estimate.

1. The description should include the name, publication date, revision number or date, and any other identifying information to describe the data source.
	1. This is not to be construed as requiring individual source references for each itemized cost element.
	2. The estimator must be able and willing to discuss the source and applicability of any quantity or unit cost within an estimate.
	3. This description should be in the Basis of Estimate Statement portion of the estimate.
2. In many cases cost information may be provided by vendors familiar with the proposed type of construction and experienced with working at the actual project location. When this is the case both the source of the information should be provided, as well as an explanation of what site or project specific costs may already be included in the costs. This information will be important for determining what if any mark-ups may be applicable later in the estimating process.

## 3.7 Estimate Mark-ups

For construction cost estimating during project planning and early design it is a common estimating practice to add adjustment factors to the direct cost portion of the estimate to account for cost items that may not yet be well-defined. Other factors also may need to be applied to adjust for site conditions, location specific costs or other project specific impacts that are not typically included in generic database estimating systems.

1. **Published Location Factor:** This factor adjusts generic, national average cost data to regional or local construction market pricing for labor, material and/or equipment. If a local cost database is being used rather than national data, a location factor adjustment will not be required. The Published Location Factors are provided by the publishers of several cost databases specifically for use with their published data to adjust costs generated with their generic average data to represent costs at a specific published location.
	1. There are many published location factors available (i.e., RSMeans (Robert Snow Means), Department of Defense (DoD), ENR (Engineering News-Record), McGraw Hill, etc.). Some can be used for comparisons between published locations and others are provided specifically for use with the publishers own generic cost database. Most nationally published cost databases have developed cost data that are national or regional averages derived from multiple projects. They use location factors specific to the data set that are applied to the average estimate to generate location specific costs.
	2. If the direct cost items already include the cost impacts associated with performing the work at the actual location of the project, no additional Location Factor markups may be necessary, provided that the source of information is well documented and the costs can be substantiated.
	3. **CAUTION:** It may not be appropriate to use Published Location Factors provided by one publisher to adjust data from another source. Many location factors are database specific factors intended only for use to adjust estimates generated from that specific database.
	4. One publisher, RSMeans, publishes location factors called the **City Cost Indexes** for over 700 US cities. These factors indicate the cost of commercial construction for each of these locales as compared to RSMeans 30-city national average.
		1. An example range of the RSMeans factors is from 133.2 for New York, New York to 67.4 for Guymon Oklahoma, indicating that the cost of construction would be 33.2 percent more in New York City and 32.8 percent less in Guymon than the national average.
	5. Our A/E design firms and their estimators are encouraged to know and utilize appropriate published factors for regional market economics for their project estimates, as appropriate for the cost data they have utilized.
	6. The location factors used and the rational for the location factor selected should be clearly documented in the Basis of Estimate Statement.
2. **Remoteness Factor:** A majority of NPS park units are **not** located in one of the nearly 700 cities listed in the RSMeans City Cost Index, or similar indexes. Thus, they are remotely located away from significant source areas of labor pools, material vendors and equipment suppliers. Because of the remote nature of most national parks, there typically needs to be an adjustment made for mobilization/demobilization, labor pool per diem, compensated commute times, and shipping costs of materials, as well as less tangible impacts of managing remote operations. If labor, equipment, and materials can be delivered to the project site by over-the road transportation we generally use a remoteness factor of 1 percent for each 10 miles that the project is located away from the commercial center used in determining the location factor. There should also be considerations made for difficult to access sites via unimproved roads, backcountry areas, or where water or aerial access is required. If a project site is significantly remote from normal vehicular transportation access, some attempt should
be made to estimate the direct transport costs (pack teams, boat/barge, off road vehicles, or helicopters), or the estimator can add an allowance cost or other percentage allowance based on their best estimating judgment or professional experience.
	1. Even NPS units such as Statue of Liberty National Monument, is remote from New York City or Newark, New Jersey, since it is on an island in New York Harbor.
	2. There are additional cost consequences to projects, because of their remote locations affecting both material and labor costs.
		1. The distance from a major market center may require special labor cost accommodations to account for union work rules, lodging, productivity loses, etc.
		2. Material delivery costs may be increased due to additional shipping charges.
		3. Remote staging areas may be required, or materials may have to be handled several times before being installed in the finished project.
	3. As an example, the nearest published location factor to the South Rim of Grand Canyon National Park is Flagstaff, Arizona which is located approximately 85 miles away. This distance will have an effect on both the costs and availability of materials, equipment and labor. These cost impacts must be considered and accounted for in the construction cost estimates prepared for NPS projects.
	4. Some National Park units may have more than one remoteness factor based on their size, geography or other constraints.
		1. The North Rim of Grand Canyon National Park is situated just a few miles farther from Flagstaff than the South Rim cited above, but because of the intervening Grand Canyon, it is over a two hundred mile drive from one side to the other.
		2. Portions of Yosemite National Park are closer to the published market center of Fresno, California and others are closer to Modesto, California or Carson City, Nevada. In these cases, both the Location and Remoteness Factors may vary between projects in the same park.
	5. Sometimes the remoteness factor may reflect more than just the project’s distance from the published market center to account for cost impacts like access restrictions, poor road conditions, over water or air access, etc.
		1. As the design process evolves and the estimates become refined, many of the cost impacts associated with a project’s remoteness may be incorporated into the direct unit costs as adjustments to productivity, individual impact cost elements, or as line items in
		the detailed General Conditions portion of the estimate.
3. **Federal Wage Rate Factor:** The Federal Wage Rate Factor is used to adjust the labor costs of an estimate to reflect the difference between the location factor, adjusted labor data used to prepare an estimate and the federally mandated Davis-Bacon Act Labor rates in effect for the project location.
	1. Contractors on federal construction projects are required to pay their workers a minimum wage in accordance with the Davis-Bacon Act published wage rates. These rates are generally broken down by State and County and are constantly being renegotiated and revised.
	2. In areas, with strong labor union influences, the Davis-Bacon Act wage rates may exceed the prevailing wage rates reflected in the published location factors. It is important to note that the Davis-Bacon Act wages only reflect the minimum required wages, plus fringe benefits. They
	do not include cost impacts associated with union work rules, which can have additional significant impacts to the labor component of project costs.
	3. In other areas without a strong union presence Davis-Bacon wages may be less than the actual market rates, so additional research may be required to determine what, if any, wage rate adjustment factor may be appropriate to use for the estimate.
	4. This mark-up should only be applied against the labor portion of direct cost not the entire direct cost amount. If the labor component is itemized separately, the calculation is simple; if not, only a portion of the factor can be applied against the total direct cost.
	5. If the labor costs are not itemized, for most general construction work the labor component typically makes up 40%-60% of the total cost. However, for some specialty trades it may be significantly higher or lower.
	6. For repair/rehabilitation projects labor generally comprises 50%-75% of the total cost.
	7. Considerable analysis and sound judgment are required to select an appropriate wage adjustment factor to use and the rationale behind the selection should be well documented.
	8. In some cases, the Davis-Bacon Act prevailing wages may already be included in the direct cost items. If this is the case, no additional mark-up for federal wage rates is required, provided that the wage rate information is well documented and the costs can be substantiated. Reference [Appendix D Wage Rate Factor Analysis Worksheet](#_Appendix_D_-).
4. **Taxes:** Construction Contractors for the NPS are required to pay local and state taxes on material and rental equipment used on the project. There are pathways for a contractor to become exempt from these taxes, but most find the paperwork required for this consideration to be far too cumbersome and less than worth their time to pursue since they are allowed to pass the taxes along to the government.
	1. Sales and use tax mark-ups should only be applied against the material and equipment portion of direct costs, not the entire direct cost amount. If these costs are not itemized, the component typically makes up 40%-60% of the total cost. However, for some specialty trades it may be significantly higher or lower.
	2. Some states and localities also impose additional taxes on wages earned within their jurisdictional boundaries, project impact fees, or other taxes that must be included in the total project costs.
	3. There are also several states that have Building and Occupancy taxes and or Privilege Taxes that are computed against the total.
	4. State and Local taxes can vary greatly from project to project and year to year. It is important to conduct research for each project to assure that these costs are included in an estimate.
5. **Design Contingencies:** This mark-up relates to the accuracy of the estimate and completeness of the design/construction documents. Design Contingencies should **not** be confused with Design Cost or Construction Contingencies. Design Contingencies vary by project, but also vary (gradually reducing) by the stage the project is in the design process. At the preliminary stages of planning and design it is very difficult to determine the complete scope of the project in detail, therefore the design contingency is set at a high percentage.
	1. Typical ranges for design contingency are:
		1. Class C Construction Cost Estimate (Conceptual Design) 15% to 50%
		2. Class B Construction Cost Estimate (Schematic Design) 10 % to 20%
		3. Class B Construction Cost Estimate (Design Development) 5% to 15%
		4. Class A Construction Cost Estimate (Construction Documents) 0% to 10%
	2. Once the construction documents are finalized, the design contingency should be at or near zero, provided that the nature of the work is well defined. Some repair/rehab work may still have some uncertainty until demolition work is performed, so it may be appropriate to retain some design contingency for this type of work.
6. **General Conditions (General Requirements):**
	1. **Standard General Conditions:** These are the project indirect cost incurred by the contractor that is typically defined in the Division 1 specifications for a project. The costs associated with temporary utilities, field offices, fencing, field engineering, operation, and maintenance manuals, etc. are all included as standard general conditions. Also included in the General Conditions percentage should be the cost of construction permits, bonds, and insurance.
		1. These costs are typically spread across all contract line items unless individual line items are specifically provided for them.
		2. Standard general conditions costs can run from 4 to 20 percent of the cost of construction, depending on the size, location, and complexity, as well as other variables of the project and estimate. They should also be applied to the Total Direct Construction Costs, including location markups and design contingency,
		3. In the later stages of the design process, the Standard General conditions should be itemized separately to reflect the requirements of the Division 1 specifications and actual site conditions.
	2. **Government General Conditions:** These costs, which are not included in the *Standard General Conditions*, are the costs of doing work for the US Government and NPS. Many of these government costs are attributable to the increased administrative requirements and quality requirements along with sensitivity to the NPS mission of protecting the cultural and natural resources while allowing the public access and enjoyment thereof.
7. **Historic Preservation Factor:** Many projects within NPS involve work in and around historical structures or cultural landscapes. It is part of NPS’s mission to preserve and maintain the integrity of the original architectural construction, historical fabric and cultural appearance of the assets at or near the proposed work. This requirement often creates additional access control issues, protection process requirements and coordination problems during construction, which lead to additional cost impacts to a project. In some cases, material costs are often increased significantly because of the need to select compatible materials. The range for this factor can vary significantly and considerable judgment is required to formulate an appropriate factor. The rationale and justification for the Historic Preservation Factor should be well documented in the Basis of Estimate Statement.
8. **Overhead:** The cost a contractor has for staying in business. A general contractor has expenses not directly related to the construction of a project, but vital to the contractor’s business operations. These include fixed overhead (Federal and State Unemployment costs, Social Security Tax, Builder’s Risk Insurance and Public Liability Costs) and variable overhead (Worker’s Compensation Insurance, Main Office Overhead, etc.).
	1. Many published databases do not include these costs in their **Bare Costs** tabulations.
	2. In some publications these costs are included in the tabulations that include the installer/sub-contractor overhead and profit.
	3. It is important to know what overhead costs are included in the direct cost totals of an estimate and clearly document them in the Basis of Estimate Statement.
9. **Profit:** The cost or fee that a contractor charges to provide a return on their investment and to compensate them for assuming risk on a project. The amount of profit charged is highly variable and dependent on a number of factors, including local market conditions, the size of job, the amount of risk associated with the work, the contractor’s total work volume and company size. Contractors generally take more profit on a smaller job. One factor that is often overlooked in preparing Independent Government Estimates (IGE) and A estimates is that not only is the General Contractor entitled to compensation for overhead and profit, but so are any subcontractors or independent installers that they employ to perform the work. Some cost databases include installer overhead and profit in a separate column.
10. **Contracting Method Adjustment:** A majority of the construction contracting for NPS is not performed using typical low bid procurement processes. As a result, there is a limitation on competition for most projects which tends to have an upward impact on project costs.
	1. The primary procurement method used by NPS is competitive negotiation where award is based on negotiating a price with the best technically qualified contractor. This method may typically add 5% or more to the cost of contracting over the purely, lowest price, competitive bid procurement processes.
	2. NPS also awards many contracts through the Small Business Administration’s 8(a), Service-Disabled Veteran (SDV) and Hub-Zone programs. These awards may be made on either on a limited competitive or sole source negotiated basis. Depending on the Procurement method chosen, costs can be affected as much as 10-15% or more.

## 3.8 Adjusting for Inflation Escalation

Independent Government and A/ E estimates are generally prepared well in advance of contract procurement. Therefore, some sort of factor needs to be applied to an estimate’s total cost to account for a changing market over time. Direct unit costs within the estimates should be priced using current (date of estimate) costs.
An adjustment for inflation is then added to the bottom-line total of the estimate. This escalation must be based on a careful analysis of current market trends and published construction economics predictions. Escalation should be dated to the proposed mid-point of construction. If actual historical costs from the park or project location are used to develop the direct costs, it may be necessary to escalate the costs from the time period that they were incurred to present values first, and then escalate them to the mid-point of construction. Whatever escalation methods or rates are used should be justified and thoroughly documented in the Basis of Estimate Statement.

# Chapter 4 Standards of Conduct

## 4.1 Standards

The standards of practice described within the Canons of Ethics, published by the American Association of Cost Engineers, International (AACE) shall be applied to all estimating services. This document is available through the AACE, International, 209 Prairie, Morgantown, West Virginian, 26501.

## 4.2 False Statements

NPS contractors are advised that in accordance with 18 USC 1001 (United States Code), reflecting provisions of the False Statements Act, “Whoever, in any matter within the jurisdiction of any department, or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statements or representations, or makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement, or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.”

# Appendix A - Class A Construction Cost Estimates

This Appendix describes the estimating products and services to be prepared for Class A (Actual) Construction Cost Estimate. The following estimate submittals are considered Class A estimates:

1. Draft 100% Construction Documents (Draft CD)
2. 100% Complete Construction Documents (Complete CD)
3. Final Construction Documents (Final CD)

## Class A (Actual) Construction Cost Estimating

Class A Construction Cost Estimates are referred to as **Actual** estimates by the design and construction industry. These estimates are generally prepared with a fully defined scope of work (SOW). The project programming and major project elements are completely defined, with all drawings and construction details provided, as well as a complete set of project specifications. In the NPS, Class A estimates are generally used for:

1. Draft 100% Construction Documents (Draft CD) submittal.
	1. A pre-final Quality Assurance review.
	2. Cost evaluation of minor revisions to, or addition of final detail drawings.
	3. Cross reference check between the drawings and project specifications.
	4. Verification of costs for major mechanical, electrical, and plumbing systems.
	5. The Class A Construction Cost Estimate at the Draft CD level requires detailed quantity surveys and real market price research. All direct cost items should be completely defined and include localized pricing information.
2. Complete Construction Documents (Complete CD) submittal.
	1. Verification of changes identified during Draft CD submittal.
	2. Minor quantity adjustments.
	3. Minor cost adjustments due to final detail revisions.
	4. Minor cost adjustments based on additional or updated market research.
	5. Class A Construction Cost Estimate at both CD levels should contain detailed line items that represent all anticipated cost elements.
3. Final Independent Government Estimates (IGE) for procurement verification.

A Class A Construction Cost Estimate is an actual cost estimate based on a combination of detailed installation analysis, actual individual work element quantity measurements, and localized construction market research, supplemented with detailed resource & duration, productivity based, or unit item projected costs. Support information for Class A Construction Cost Estimates should include:

1. CD Level support information:
	1. Architectural building designs (100% drawings).
		1. Complete and finalized floor plans, elevations, building sections, reflected ceiling plans, etc.
		2. Typical wall sections showing structural systems, insulation, wall sheathing etc.
		3. Final detailed floor and roof sections.
		4. Final door and window schedules.
		5. Complete finish schedules
	2. Final Site improvement plans.
		1. Existing condition plan
		2. Site Clearing & Demolition plan, including limits of disturbance, demolition of existing improvements, tree removal, tree protection, etc.
		3. Complete Grading and drainage plans, with details.
		4. Utility improvement plans, including sewer, water, subsurface drainage and dry utilities, include all installation details.
		5. Site improvement plans showing parking, roadways, sidewalks, retaining walls, flatwork, etc., including details and sections.
		6. Landscaping & Irrigation plans, including way finding signage, interpretive displays, etc.
	3. Mechanical, Electrical and Plumbing System Designs
		1. Detailed system sizing and equipment layout plans.
		2. Final design and layouts for alternative energy systems.
		3. Detailed plans & design for other unique systems (ground source heat pumps, heat exchangers, battery storage, etc.
		4. Complete installation details.
	4. Final Structural Design
		1. Foundation designs, including foundation sizing, typical and special footing sections, structural wall sections, column details, etc.
		2. Connection details
		3. Roof framing plans, including truss specification, beam sizing, roof sheathing requirements, tie downs, etc.
		4. Complete structural details, installation notes, reinforcement schedules, etc.
		5. Detailed installation sections for other unique structural systems (SIPS (structurally insulated panels), straw bale, adobe, rammed earth, green roof, etc.).
	5. Complete Project Specifications
		1. Final Division 1 specifications.
		2. Complete specifications for balance of project.
	6. Vendor research information including price quotes for major project elements.
	7. Detailed local market research for construction commodities and labor.
		1. Whenever possible, market research should include preliminary pricing from vendors willing to perform the work for the price quoted.
			1. Special care must be exercised to avoid violating the Federal Acquisition Regulations (FAR), while performing market research.
				1. Only warranted Contracting Officers can engage in actual negotiations.
				2. It must be made clear to vendors that no commitments are being made in exchange for information.
				3. Thoroughly document all research and conversations.
			2. It is important to verify the point of delivery included in any preliminary pricing quotations and be sure to include any shipping, storage, or other freight charges in the estimate.
			3. For Class A Construction Cost Estimates, sales and use taxes need to be included in material component of the direct cost.
			4. In some cases, industry standard installation practices may not be completely depicted in the design details. The costs associated with performing industry standard practices must be included in the direct cost total of Class A Construction Cost Estimates.
		2. Because of the critical nature of NPS Class A Construction Cost Estimates during the procurement process for NPS projects, it is imperative that estimators clearly document the scope of work in the Basis of Estimate Statement, as well as other factors that may have an impact on the overall estimated costs.
			1. All supporting material use to define the scope of work should be thoroughly documented in the Basis of Estimate Statement. Any specific instructions from the end user, as well as known project constraints should also be included. List any items, or elements of work that are specifically excluded from the estimate.
			2. The sources of all cost data used to prepare the estimate must be listed. Include information about costs obtained from vendors, manufacturers, or derived from similar projects.
			3. If any items, design elements or assumptions have changed since previous cost estimates were prepared, describe and quantify the changes.

## Class A Construction Estimate Mark-ups and Design Contingencies

The cost information used to prepare Class A Construction Cost Estimates are based on complete final design documents. Estimated costs should be based on local market conditions, vendor information and project specific data. Therefore, the need for mark-ups, adjustment factors and contingencies are minimal.

1. **Location Adjustments:** Location specific cost impacts should be incorporated into the individual direct costs. Except in rare cases no additional location adjustments should be warranted.
	1. **Published Location Factor:** All direct cost items for the project should already take the local market conditions into account.
	2. **Remoteness Factor:** Project remoteness impacts should be incorporated in the individual direct cost items. Productivity impacts should be reflected in the labor component of direct cost; material delivery surcharges into material costs; and specialty equipment into the equipment costs. Costs for other remoteness related impacts, such as lodging, per diem, staging areas, specialty mobilizations, etc. should be reflected in the detailed breakdown of General Conditions.
	3. **Federal Wage Rate Factor:** All direct unit costs must be based on paying at least the required minimum Davis-Bacon Act mandated wage rates for the project.
		1. **CAUTION:** In some areas, Davis Bacon Act wages may be less than the normal wages that are being paid by contractors for skilled labor. When this occurs, no adjustment for Davis-Bacon Act is necessary, but it still may be necessary to adjust the direct costs to reflect the actual local prevailing wage rates. Some additional research and estimating judgment are required.
	4. **State & Local Taxes:** All applicable state, local and other tax costs should be included in the direct cost detail items. The applicable tax rates for each estimate should be individually researched and clearly documented in the Basis of Estimate Statement.

***Special Note for Project Specific Cost Data:*** *If cost data used to derive the estimate is derived from project or park specific data that already corresponds to the current estimate project location and includes payment of mandated prevailing wages, taxes, etc., the use of Location Adjustments may not be required.*

1. **Design Contingency:** Since the design documents used to prepare Class A Construction Cost Estimates, are supposed to be in a complete and final form, the application of a Design (Estimating) Contingency mark-up should be minimal.
	1. The typical Design (Estimating) Contingency used for NPS Class A Construction Cost estimates is 0% to 5%.
		1. At the Draft CD stage, Class A Construction Cost Estimates generally apply a Design Contingency at or near the 1% to 5% range.
		2. Later, at the Final CD stage Class A Construction Cost Estimates generally reduce the Design Contingency to 0%.
2. **General Conditions:** The direct cost line items in Class A Construction Cost estimates do not include allowances for General Conditions or job-site indirect costs, so the costs must be added to cover these project expenses.
	1. **Standard General Conditions**, also known as job site indirect costs, or General Requirements should be itemized in detail to reflect the actual anticipated costs associated with managing the work. The total cost for General Conditions should then be proportionately allocated to the individual bid items.
	2. **Government General Conditions** are other project specific indirect costs associated with doing business with the Federal Government and NPS. These costs will typically add an additional 5% to 10% to the location adjusted project costs and should either be itemized with the Standard General Conditions or added to them prior to allocation to the individual bid items.
3. **Historic Preservation Factor:** All anticipated cost impacts associated with preserving the historic or cultural character of the project should either be included in the direct cost line items or itemized in the General Conditions. No additional mark-ups should be necessary.
	1. For many new construction and other non-historical projects, it is common for the impacts associated with historic preservation to be zero (0). For purely historical preservation/restoration projects all of these costs should be included in the direct cost items.
4. **Overhead & Profit:** The rates for overhead and profit (O&P) are based on the anticipated market conditions at the time the work will be performed. Under normal market conditions, the normal range for O&P should be 10% to 25%, depending on the project size, complexity and level of risk associated with work.
5. **Bonds & Permits:** The normal range for bonds and permits is 1% to 3% and should be included as an itemized cost in the General Conditions.
6. **Contracting Method Adjustment:** When Class A Construction Cost Estimates are typically submitted, the contracting method should already be established. The appropriate mark-up factors are discussed in the main body of the estimating handbook. The mark-up factor chosen and the rationale for the selection should be well documented in the Basis of Estimate Statement.
7. **Inflation Escalation:** The inflation escalation factor is based on the projected inflation rates from the time of the estimate until the mid-point of construction, compounded annually. The rate used and the rational for the selection should be well documented in the Basis of Estimate Statement.

## Government Furnished Property (GFP)

In rare cases, the Government may pre-purchase some of the materials or specialized equipment required for a project, or they may be provided out of Government inventory. When this occurs, provided that the purchase price includes the cost of taxes and freight to the project site, most of the mark-up factors should not be applied to the amount of the purchase or the value of the GFP provided. If the GFP is projected as a future purchase, the Inflation Escalation may still apply. All GFP must be listed in the Basis of Estimate Statement and the associated costs should be accounted for separately in the estimate.

## Work Breakdown Structure for Class A Construction Cost Estimates

The Work Breakdown Structure (WBS) for Class A Construction Cost Estimates should be structured to provide a logical hierarchy of cost elements. This hierarchy can provide the framework for future cost analysis, scheduling, and bid comparisons.

1. **Project Cost Summary:** At the project cost summary level cost should be organized by individual bid items that represent each major asset or protect element, with supplemental additional detail organized by UNIFORMAT II, detail Level 2.
2. **Bid Item Cost Summary:** At the estimate bid item cost summary level project costs should be organized first by individual major Asset or Project Element, then by UNIFORMAT II, detail Level 2.
3. **Line Item Cost Summary:** Additional WBS cost detail should be provided for each of the Estimate Summary line items.
	1. Cost detail should be organized using the UNIFORMAT II, Elemental Classification System.
	2. Detailed costs should be presented at UNIFORMAT II, detail Level 3.
	3. For Class A Construction Cost Estimates it is appropriate to refine the level of WBS detail beyond the required UNIFORMAT II, Level 3.
		1. Additional WBS detail should be organized and presented using the UNIFORMAT II, Level 4 hierarchy.
		2. This higher level of detail is required for Class A Construction Cost Estimates.
4. **Estimate Format:** The estimate should present the cost information in a tabular or spreadsheet format:
	1. The Project Cost Summary should arrange each bid item to represent major Assets or Project Elements as individual line items.
		1. The horizontal format for the estimate should include a minimum of thirteen (13) columns for tabulating the following information in each line item:
			1. Bid Item Number
			2. Bid Item Description
			3. Total Material Cost
			4. Total Labor Cost
			5. Total Equipment Cost
			6. Total Direct Construction Cost
			7. Design Contingency
			8. General Conditions
			9. General Contractor Overhead
			10. General Contractor Profit
			11. Contracting Method Adjustment
			12. Inflation Escalation
			13. Bid Item Total
	2. The Bid Item Summary should arrange each Asset or Project Element as individual line items organized by WBS at the UNIFORMAT II, detail Level 2.
		1. The horizontal format for the Bid Item summary should include a minimum of eleven (11) columns for tabulating the following information in each line item:
			1. Item Number
			2. UNIFORMAT II, WBS code
			3. Description
			4. Material Unit Cost
			5. Total Material Cost
			6. Labor Unit Cost
			7. Total Labor Cost
			8. Equipment Unit Cost
			9. Total Equipment Cost
			10. Direct Unit Cost
			11. Total Direct Cost
		2. An additional two (2) columns may be provided to present the NET Construction Costs spread across the individual WBS line items.
			1. Net Unit Cost
			2. Total Net Cost
	3. The Class A Construction Cost Estimate templates are provided as a guideline only and its use is not required, provided that all estimates submitted contain the required information and are presented in a similar format, as specified above and elsewhere in the handbook.
	4. Care must be exercised if using the templates to avoid corrupting embedded formulas and other automated functions.
	5. Each estimator is responsible for proof reading, data verification and mathematical checks for their own estimates.
	6. NPS assumes no liability resulting from the use or misuse of the cost estimating templates by third parties.

## Submittal Package Requirements for Class A Construction Cost Estimates

The estimate submittal package shall contain the following at a minimum:

1. **Basis of Estimate Statement:** This page(s) of the estimate doubles as a cover page for the estimate. The Basis of Estimate statement page should include the following items:
	1. Project Title
	2. Park name and location within park, if applicable
	3. Park's four letter alpha code
	4. PMIS number for the project
	5. Date of estimate
	6. Estimator’s Name, Company, Address and Contact information.
	7. List of background supporting material describing the scope of work and any information used or referenced for preparing the estimate.
	8. Documentation of all sources of cost data, detailing the cost data used to prepare the estimate; include source name, date, volume number, etc.
	9. Description of any assumptions made, or relied on, to prepare the estimate.
	10. Brief description of any major changes in the scope of work, materials, systems, or assumptions, relative to previous cost estimates for the same project.
	11. Short descriptions and justifications for all mark-ups, add-ons, and escalation factors used in estimate.
	12. Other comments and assumptions regarding the estimate or supporting material.
2. **Project Cost Summary:** The estimate Project Cost Summary should be formatted as described above and show all bid items, mark-ups, bid item totals and total project cost.
3. **Bid Item Summaries:** The estimate Bid Item Summaries should be formatted as described above and show all Level 2, WBS cost items, subtotals, mark-ups and bid item totals.
4. **Line Item Cost Summaries:** The cost estimate detail should be formatted to the WBS detail as described above.

# Appendix B - Class B Construction Cost Estimates

This Appendix describes the estimating products and services to be prepared for Class B (Budgetary) Construction Cost Estimate. The following estimate submittals are considered Class B estimates:

1. Schematic Design (SD) submittal of preferred design alternative
2. Design Development (DD) submittal
3. Other intermediate design level budget purposes

## Class B (Budgetary) Construction Cost Estimating

Class B Construction Cost Estimates are referred to as **budgetary** estimates by the design and construction industry. These estimates are generally prepared with a partially defined scope of work (SOW). The project programming and major project elements are generally well defined, design efforts are becoming focused on key systems and development of specific details. However, some aspects of the final details are still evolving and portions of the SOW still require some level of interpretation and assumptions to prepare a comprehensive cost estimate. In the NPS, Class B estimates are generally used for:

1. Schematic Design (SD) preferred alternative submittal (Least Detailed)
	1. Many design elements are still undefined, dimensioned drawings are not typically available.
	2. Detail drawings are typically not provided.
	3. Some materials are identified in the basis of design report but detailed specifications are not available.
	4. Major mechanical, electrical and plumbing system requirements are identified but the systems have not been designed and no layouts are provided.
	5. The Class B Construction Cost Estimate at the SD level requires significant interpretation and assumptions to fill in the blanks. Many cost items are expressed as lump sum allowances or gross square foot allowances.
2. Design Development (DD) submittal (More Detailed)
	1. Construction plans are 40% to 50% complete
	2. Some detail drawings are provided but many are being refined. Other details are merely place holders or are still not provided.
	3. Division 1 draft specifications and outline specifications provide some supplemental information to the basis of design report.
	4. Major mechanical, electrical and plumbing systems have been sized and some preliminary layouts may be available. Few if any details are provided.
	5. The Class B Construction Cost Estimate at the DD level should contain detailed line items that represent most anticipated cost elements. Some interpretation and assumptions are still necessary.

A Class B Construction Cost Estimate is a budgetary cost estimate based on a combination of detailed installation analysis, typical assembly costs and some lump sum or square footage costs derived from similar projects. Support information for Class B Construction Cost Estimates should include:

1. SD Level support information:
	1. Preliminary floor plans
	2. Preliminary site layouts
	3. Basis of Design Report
	4. Frequently the same information used to select the Preferred Alternative in the Choosing by Advantage (CBA)/Value Analysis (VA) process.
2. DD Level support information
	1. Architectural building designs (40% to 50% drawings).
		1. Nearly finalized floor plans, elevations, building sections, reflected ceiling plans, etc. Some are still subject to change.
		2. Preliminary typical wall sections showing proposed structural systems, insulation, wall sheathing etc. Many are still missing or just place holders.
		3. Partially completed floor and roof sections, typically pending structural design confirmation.
		4. Initial door and window schedules.
		5. Draft finish schedules.
	2. Site improvement plans (40% to 50% drawings).
		1. Existing conditions plan
		2. Preliminary site clearing & demolition plan, including proposed limits of disturbance, demolition of existing improvements, tree removal, tree protection, etc.
		3. Proposed grading and drainage plans.
		4. Initial utility improvement plans, including sewer, water, subsurface drainage and dry utilities.
		5. Partial site improvement plans showing parking, roadways, sidewalks, flatwork, etc.
		6. Sheet layout and initial design for landscaping & irrigation plans, including way finding signage, interpretive displays, etc. Still pending finalized site layout, building footprints and refinement of accessibility features.
	3. Mechanical, Electrical and Plumbing System Initial Designs
		1. Scoping and preliminary design for alternative energy systems.
		2. Identification and preliminary design for other unique systems (ground source heat pumps, heat exchangers, battery storage, etc.
	4. Structural Design based on initial calculations but pending finalized architectural details.
		1. Preliminary foundation designs, including foundation sizing, typical footing sections, structural wall sections, column details, etc.
		2. Draft roof framing plans, including truss specification, beam sizing, roof sheathing requirements, tie downs, etc.
		3. Initial structural details and typical section for other unique structural systems (SIPS (structurally insulated panels), straw bale, adobe, rammed earth, green roof, etc.)
	5. Outline Specifications
		1. Draft Division 1 specifications
		2. Outline specifications for balance of project

## Class B Construction Cost Estimate Mark-ups and Design Contingencies

The cost information used to prepare Budgetary Class B Construction Cost Estimates may be a combination local costs obtained through detailed research and/or derived from sources other than park/project specific cost data. Complete design details may not be available to precisely define every aspect of the work and some design elements may still change somewhat, or be eliminated, while others may need to be added.

1. **Location Adjustments:** Generic publicly available cost databases usually consist of averages compiled from nationwide or regional bid results. They typically do not reflect the local market conditions prevalent at most NPS locations. To make the Budgetary Class B cost estimates reflect anticipated project specific costs it may be necessary to apply location and other project specific adjustment factors or mark-ups to the direct costs developed using non-project specific cost data.
	1. **Published Location Factor:** At the Budgetary Class B estimate stage the location factor is used either to adjust generic average cost data to a specific location, or to adjust cost data from one specific location to another. Most published location factors or cost indexes do not have specific values that reflect NPS project locations, so it is common practice to select either the closest published market center, or the one that is most likely to reflect the market conditions that will be most prevalent for the project. **Some additional estimating judgments may be required to determine the appropriate location factor to use if cost data is a combination of local cost information and generic cost data.**
	2. **Remoteness Factor:** Since most NPS units are not located in major metropolitan areas, and/or are difficult to access, merely adjusting the direct costs to the appropriate market center may not completely reflect the cost of performing work on the project. For most NPS Budgetary Class B estimates an additional markup is usually required to account for remoteness and access.
	3. **Federal Wage Rate Factor:** Generic databases use average cost data derived from a variety of sources that may, or may not, include projects where Davis-Bacon Act prevailing wage rates were paid to workers. The average wage rates included in the cost database must be compared to the minimum Davis-Bacon Act mandated wages for county where the project is located, and an appropriate adjustment should be applied to the labor component of the direct cost.
		1. **CAUTION:** In some areas, Davis Bacon Act wages may be less than the normal wages that are being paid by contractors for skilled labor. When this occurs, no adjustment for Davis-Bacon Act is necessary, but it still may be necessary to adjust the direct costs to reflect the actual local prevailing wage rates. Some additional research and estimating judgment are required.
	4. **State & Local Taxes:** Rates will vary for each project. Sales and use taxes are generally only applicable to material and rental equipment costs. In a few areas, other local taxes may be applicable to the contractor’s total revenue. Some adjustment to the mark-up structure may be necessary for special tax situations. The applicable tax rates for each estimate should be individually researched and clearly documented in the Basis of Estimate Statement.

***Special Note for Project Specific Cost Data:*** *If cost data used to derive the estimate is derived from project or park specific data that already corresponds to the current estimate project location and includes payment of mandated prevailing wages, taxes, etc., the use of Location Adjustments may not be required.*

1. **Design Contingency:** With the design documents used to prepare Budgetary Class B cost estimates, some design details are still being refined. It may not be possible to develop firm quantities or identify all cost elements during this process, so a Design (Estimating) Contingency mark-up is added the direct cost to account for detailing, changes and minor scope adjustments.
	1. The typical Design (Estimating) Contingency used for NPS Budgetary Class B Construction Cost estimates is 10% to 20%.
		1. At the Schematic Design (SD) stage, Class B estimates generally apply a Design Contingency at or near the 15% to 20% range.
		2. Later, at the Design Development stage Class B Construction Cost estimates generally reduce the Design Contingency to the 10% to 15% range as the level of detail increases.
2. **General Conditions:** The direct cost line items in Budgetary Class B estimates do not include allowances for General Conditions or job-site indirect costs, so mark-up factors are applied to include cost to cover these project expenses.
	1. **Standard General Conditions**, also known as job site indirect costs, or General Requirements, typically vary between 4% and 20% of the location adjusted project costs.
	2. **Government General Conditions** are other project specific indirect costs associated with doing business with the Federal Government and NPS. These costs typically add an additional 5% to 10% to the location adjusted project costs.
	3. In many cases, it may be appropriate to begin itemizing the anticipated General Conditions costs as part of the Class B Construction Cost Estimating process rather than relying solely on a percentage mark-up.
3. **Historic Preservation Factor:** If the project involves additions or repairs to historic structures or is in close proximity to historical or cultural sites, it may be necessary to apply a Historic Preservation Factor to account for unknown or unidentified costs associated with protecting and/or matching the historical fabric of the resource.
	1. At the Schematic Design (SD) stage, few of these impacts are typically quantified for most projects, so it is appropriate to apply a mark-up factor to allow for the associated costs. A range of 0% to 10% is not uncommon.
	2. Later, at the Design Development stage, many of the historical and cultural preservation requirements should be identified and to the extent possible, cost impacts should be included in the direct costs. A small mark-up (0% to 5%) may still be appropriate, depending on the level of historical detail contained in the project documents and included in the direct costs.
	3. For many new construction and other non-historical projects, it is common for this mark-up factor to be zero (0). For purely historical preservation/restoration projects all of these costs should be included in the direct cost items.
4. **Overhead & Profit:** The rates for overhead and profit (O&P) are based on the anticipated market conditions at the time the work will be performed. Under normal market conditions, the normal range for O&P should be 10% to 25%, depending on the project size, complexity and level of risk associated with work.
5. **Bonds & Permits:** The normal range for bonds and permits is 1% to 3%. Many estimators choose to include Bond & Permit costs as an itemized cost in the General Conditions.
6. **Contracting Method Adjustment:** By the time Class B Construction Cost estimates are typically submitted, the NPS project manager or contracting officer should have specified the preferred contracting method. The appropriate mark-up factors are discussed in the main body of the estimating handbook. The mark-up factor chosen and the rationale for the selection should be well documented in the Basis of Estimate Statement.
7. **Inflation Escalation:** The inflation escalation factor is based on the projected inflation rates from the time of the estimate until the mid-point of construction, compounded annually. The rate used and the rational for the selection should be well documented in the Basis of Estimate Statement.

## Government Furnished Property (GFP)

In rare cases, the Government may pre-purchase some of the materials or specialized equipment required for a project, or they may be provided out of Government inventory. When this occurs, provided that the purchase price includes the cost of taxes and freight to the project site, most of the mark-up factors should not be applied to the amount of the purchase or the value of the GFP provided. If the GFP is projected as a future purchase, the Inflation Escalation may still apply. All GFP must be listed in the Basis of Estimate Statement and the associated costs should be accounted for separately in the estimate.

## Work Breakdown Structure for Budgetary Class B Construction Cost Estimates

The Work Breakdown Structure (WBS) for Class B Construction Cost Estimates should be structured to provide a logical hierarchy of cost elements. This hierarchy will provide the framework upon which future, more detailed cost estimates will be assembled.

1. **Project Cost Summary:** At the estimate summary level project costs should be organized first by individual major Asset or Project Element, then by UNIFORMAT II, detail Level 2.
2. **Estimate Detail / Line Item Cost Summary:** Additional WBS cost detail should be provided for each Project Cost Summary line items.
	1. Cost detail should be organized using the UNIFORMAT II, Elemental Classification System.
	2. Detailed costs should be presented at UNIFORMAT II, detail Level 3.
	3. In most cases, it is both desirable and appropriate to refine the level of WBS detail beyond the required UNIFORMAT II, Level 3.
		1. Additional WBS detail should be organized and presented using UNIFORMAT II, Level 4.
		2. Providing this greater level of detail is strongly encouraged.
3. **Estimate Format:** The estimate should present the cost information in a tabular or spreadsheet format:
	1. The estimate summary should arrange each Asset or Project Element as individual line items.
	2. The horizontal format for the estimate should include a minimum of seven (7) columns for tabulating the following information in each line item:
		1. Item Number
		2. UNIFORMAT II, WBS code
		3. Item Description
		4. Total Material Cost
		5. Installation Unit Cost
		6. Total Installation Cost
		7. Direct Unit Cost
		8. Total Direct Cost
	3. An additional two (2) columns may be provided to present the NET Construction Costs spread across the individual WBS line items. Each line item:
		1. Net Unit Cost
		2. Total Net Cost
	4. Care must be exercised if using the templates to avoid corrupting embedded formulas and other automated functions.
	5. Each estimator is responsible for proof reading, data verification and mathematical checks for their own estimates.
	6. NPS assumes no liability resulting from the use or misuse of the cost estimating templates by third parties.

## Submittal Package Requirements for Budgetary Class B Estimates

The estimate submittal package shall contain the following at a minimum:

1. **Basis of Estimate Statement:** This page(s) of the estimate doubles as a cover page for the estimate. The Basis of Estimate statement page should include the following items:
	1. Project Title
	2. Park name and location within park, if applicable
	3. Park's four letter alpha code
	4. PMIS number for the project
	5. Date of estimate
	6. Estimator’s Name, Company, Address and Contact information.
	7. List of background supporting material describing the scope of work and any information used or referenced for preparing the estimate.
	8. Documentation of all sources of cost data, detailing the cost data used to prepare the estimate; include source name, date, volume number, etc.
	9. Description of any assumptions made or relied on to prepare the estimate.
	10. Brief description of any major changes in the scope of work, materials, systems, or assumptions, relative to previous cost estimates for the same project.
	11. Short descriptions and justifications for all mark-ups, add-ons, and escalation factors used in estimate
	12. Other comments and assumptions regarding the estimate or supporting material.
2. **Project Cost Summary:** The estimate project cost summary should be formatted as described above and show all cost items, subtotals, mark-ups and total.
3. **Line Item Cost Summaries:** The line item cost summary estimate detail should be formatted to the WBS detail as described above.

# Appendix C - Class C Construction Cost Estimates

This Appendix describes the estimating products and services to be prepared for Class C (Conceptual) Construction Cost Estimate. The following estimate submittals are considered Class C estimates:

1. General Management Plans (GMP)3
2. Condition Assessments Cost (CAC) estimates using FMSS and CESS4
3. Preliminary cost estimates used for project initiation and entry into the Project Management Information System (PMIS)
4. Predesign (PD) programming estimates are used for development of project scope and preliminary validation of PMIS Estimate
5. Schematic Design (SD) concept estimates for comparing design alternatives for use in Value Analysis studies during the early stage in the Schematic Design Phase

*3Director's Order (DO) 2 has established a need for a Class D estimating guide to be developed for General Management Plan (GMP) cost estimates.*

*4Facility Management Software System (FMSS) & Cost Estimating Software System (CESS) - systems created and maintained by the Facility Management Program Division of the NPS to manage the maintenance requirements of NPS facilities (assets).*

## Class C (Conceptual) Construction Cost Estimating

Class C Construction Cost Estimates are referred to as **conceptual** estimates by the design and construction industry. These estimates are generally prepared without a fully defined scope of work (SOW). They are general in nature, representative of a broad based vision rather than focused on specific details and require great deal of interpretation and assumptions on the part of the estimator to fill in the blanks between programmed elements, Class C estimates are generally used for:

1. Feasibility studies (Least Detailed)
	1. Most design elements are only partially programmed, and many may be undefined, project scope and cost parameters may need to be derived through interpretation of a broader vision, rather than from clear programming documentation.
	2. Dimensioned drawings are not typically available. Some programming sketches and general site layouts may be available.
	3. General project design theme alternatives may be provided, but architectural styles and finish levels may require broad assumptions to be made, on the part of the estimator. Some materials may be identified. However, a basis of design report is not usually provided and detailed specifications are not available.
	4. The Class C Construction Cost Estimates for feasibility studies require significant interpretation and assumptions to fill in the blanks. Most cost items are typically expressed as lump sum or gross square foot allowances.
2. Development of project scope and program (More Detailed)
	1. Design elements are being clarified; project scope and cost parameters can be extrapolated from preliminary programming documentation. Some interpretation is still required to discern the design intent.
	2. Dimensioned drawings are not typically available. Programming sketches, conceptual elevations, and preliminary site layouts are usually available.
	3. Architectural styles and finish levels are generally selected, but some assumptions still need to be made, on the part of the estimator. A preliminary basis of design report may be provided; however, detailed specifications are not available.
	4. The Class C Construction Cost Estimates for project scope development still require significant interpretation, allowance and assumptions. Most cost items are expressed as lump sum or gross square foot allowances.
3. Establishing preliminary budgets (Increased Definition and Detail)
	1. Conceptual layouts and preliminary sketches are fairly well defined.
	2. Functional programming of desired project functions and individual project elements are being clarified.
	3. The Class C Construction Cost Estimate for preliminary budget purposes may still require a great deal of interpretation to develop a complete estimate. Some cost item may be detailed enough for preliminary assembly cost estimating; however most cost items are still expressed as lump sum or gross square foot allowances.
4. Selection from among alternative designs (Most Detailed)
	1. Conceptual site layouts and preliminary sketches are fairly well defined.
	2. Functional programming of major design elements is clearly stated.
	3. Sizes of various program elements have been determined.
	4. Energy and sustainability goals are usually defined.
	5. Major mechanical, electrical and plumbing systems may be identified, but few if any details are provided.
	6. The Class C Construction Cost Estimate for selecting alternatives should contain fairly detailed line items that represent the major anticipated cost elements. Some allowances and assumptions may still be necessary to develop a comprehensive estimate.

A Class C Construction Cost Estimate is a Conceptual cost estimate based on a combination of detailed installation analysis, typical assembly costs and some lump sum or square footage costs derived from similar projects. Support information for Class C Construction Cost Estimates should include:

1. Anticipated square footage, building type, or project element:
	1. Larger facilities should be broken down by functional program area types (entry foyer, office space, food prep, concessions, interpretation, display, storage, etc.
	2. Each building should be estimated as an individual Asset or Project Element.
2. Anticipated site development, including existing and proposed utilities
	1. Site clearing, tree removal, grading.
	2. Sewer, water drainage
	3. Parking, roadways, sidewalks, flatwork
	4. Landscaping, way finding, interpretive displays, etc.
3. Anticipated mechanical and electrical needs (often based on square footage of building or anticipated power load)
	1. Identification and cost allowances for alternative energy systems.
	2. Identification and cost allowances for other unique systems.
4. Anticipated structural systems
	1. Define foundation needs, basement areas, etc.
	2. Identification and cost allowances for special structural types (post and beam, SIPS (structurally insulated panels), glass walls, etc.)
	3. Identification and cost allowance for other unique structural elements (straw bale, adobe, rammed earth, green roof, etc.)
5. Anticipated site utility requirements and utility systems
	1. All supporting material use to define the scope of work should be thoroughly documented in the Basis of Estimate Statement. Any specific instructions from the end user, as well as known project constraints should also be included. List any items, or elements of work that are specifically excluded from the estimate.
	2. The sources of all cost data used to prepare the estimate must be listed. Include information about costs obtained from vendors, manufacturers, or derived from similar projects.
	3. List any assumptions relied on during the estimating process. Highlight any questions or information that may need clarification for future estimates.
	4. If any items, design elements or assumptions have changed since previous cost estimates were prepared, describe and quantify the changes.

## Class C Construction Cost Estimate Mark-ups and Design Contingencies

The cost information used to prepare Conceptual Class C cost estimates may be a combination local costs obtained through detailed research, and/or be derived from sources other than park/project specific cost data. Complete design details are likely not available to precisely define every aspect of the work and some design elements may still change somewhat, or be eliminated, while others may need to be added.

1. **Location Adjustments:** Generic publicly available cost databases usually consist of averages compiled from nationwide or regional bid results. They typically do not reflect the local market conditions prevalent at most NPS locations. To make the Conceptual Class C cost estimates reflect anticipated project specific costs it may be necessary to apply location and other project specific adjustment factors or mark-ups to the direct costs developed using non-project specific cost data.
	1. **Published Location Factor:** At the Conceptual Class C estimate stage the location factor is used either to adjust generic average cost data to a specific location, or to adjust cost data from one specific location to another. Most published location factors or cost indexes do not have specific values that reflect NPS project locations, so it is common practice to select either the closest published market center, or the one that is most likely to reflect the market conditions that will be most prevalent for the project. **Some additional estimating judgments may be required to determine the appropriate location factor to use if cost data is a combination of local cost information and generic cost data.**
	2. **Remoteness Factor:** Since most NPS units are not located in major metropolitan areas, and/or are difficult to access, merely adjusting the direct costs to the appropriate market center may not completely reflect the cost of performing work on the project. For most NPS Conceptual Class C estimates an additional markup is usually required to account for remoteness and access.
	3. **Federal Wage Rate Factor:** Generic databases use average cost data derived from a variety of sources that may, or may not, include projects where Davis-Bacon Act prevailing wage rates were paid to workers. The average wage rates included in the cost database must be compared to the minimum Davis-Bacon Act mandated wages for county where the project is located and an appropriate adjustment should be applied to the labor component of the direct cost.
		1. **CAUTION:** In some areas, Davis Bacon Act wages may be less than the normal wages that are being paid by contractors for skilled labor. When this occurs, no adjustment for Davis-Bacon Act is necessary, but it still may be necessary to adjust the direct costs to reflect the actual local prevailing wage rates. Some additional research and estimating judgment are required.
	4. **State & Local Taxes:** Rates will vary for each project. Sales and use taxes are generally only applicable to material and rental equipment costs. In a few areas, other local taxes may be applicable to the contractor’s total revenue. Some adjustment to the mark-up structure may be necessary for special tax situations. The applicable tax rates for each estimate should be individually researched and clearly documented in the Basis of Estimate Statement.

***Special Note for Project Specific Cost Data:*** *If cost data used to derive the estimate is derived from project or park specific data that already corresponds to the current estimate project location and includes payment of mandated prevailing wages, taxes, etc., the use of Location Adjustments may not be required.*

1. Design Contingency: With the design documents used to prepare Conceptual Class C cost estimates, some design details are still being refined. It may not be possible to develop firm quantities or identify all cost elements during this process, so a Design (Estimating) Contingency mark-up is added the direct cost to account for detailing, changes and minor scope adjustments.
	1. The typical Design (Estimating) Contingency used for NPS Conceptual Class C Construction Cost estimates is 15% to 30%.
		1. At the feasibility study stage, Class C estimates generally apply a Design Contingency at or near the 30% range. In some cases, a higher percentage may be justified during the very early analysis of feasibility studies.
		2. For Condition Assessment Cost (CAC) estimates the Design Contingency can vary greatly depending on the nature and complexity of the work. Since CAC estimates are used to prioritize deferred maintenance work scheduling, it may be advisable to conduct supplemental investigations whenever the perceived scope of work (SOW) uncertainty exceeds 25%.
		3. At the Pre-Design (PD) stage, design contingencies in the 25% to 30% range are typically employed, depending on the complexity, level of definition, and perceived risk of the project.
		4. Later at the Schematic Design Alternative Development stage, Class C Construction Cost estimates generally reduce the Design Contingency to the 15% to 20% range as the level of detail increases.
2. **General Conditions:** The direct cost line items in Conceptual Class C estimates do not include allowances for General Conditions or job-site indirect costs, so mark-up factors are applied to include cost to cover these project expenses.
	1. **Standard General Conditions**, also known as job site indirect costs, or General Requirements, typically vary between 4% and 20% of the location adjusted project costs.
	2. **Government General Conditions** are other project specific indirect costs associated with doing business with the Federal Government and NPS. These costs typically add an additional 5% to 10% to the location adjusted project costs.
	3. In many cases, it may be appropriate to begin itemizing the anticipated General Conditions costs as part of the Class C Construction Cost Estimating process rather than relying solely on a percentage mark-up.
3. **Historic Preservation Factor:** If the project involves additions or repairs to historic structures or is in close proximity to historical or cultural sites, it may be necessary to apply a Historic Preservation Factor to account for unknown or unidentified costs associated with protecting and/or matching the historical fabric of the resource.
	1. At the Class C Construction Cost Estimate level, few of these impacts are typically quantified for most projects, so it is appropriate to apply a mark-up factor to allow for the associated costs. A range of 0% to 10% is not uncommon.
	2. For many new construction and other non-historical projects, it is common for this mark-up factor to be zero (0). For purely historical preservation/restoration projects all of these costs should be included in the direct cost items.
4. **Overhead & Profit:** The rates for overhead and profit (O&P) are based on the anticipated market conditions at the time the work will be performed. Under normal market conditions, the normal range for O&P should be 10% to 25%, depending on the project size, complexity and level of risk associated with the work.
5. **Bonds & Permits:** The normal range for bonds and permits is 1% to 3%. Many estimators choose to include Bond & Permit costs in the General Conditions.
6. **Contracting Method Adjustment:** By the time Class C Construction Cost estimates are typically submitted, the NPS project manager or contracting officer may have an opinion regarding the preferred contracting method. The appropriate mark-up factors are discussed in the main body of the estimating handbook. The mark-up factor chosen and the rationale for the selection should be well documented in the Basis of Estimate Statement.
7. **Inflation Escalation:** The inflation escalation factor is based on the projected inflation rates from the time of the estimate until the mid-point of construction, compounded annually. The rate used and the rational for the selection should be well documented in the Basis of Estimate Statement.

## Government Furnished Property (GFP)

In rare cases, the Government may pre-purchase some of the materials or specialized equipment required for a project, or they may be provided out of Government inventory. When this occurs, provided that the purchase price includes the cost of taxes and freight to the project site, most of the mark-up factors should not be applied to the amount of the purchase or the value of the GFP provided. If the GFP is projected as a future purchase, the Inflation Escalation may still apply. All GFP must be listed in the Basis of Estimate Statement and the associated costs should be accounted for separately in the estimate.

## Work Breakdown Structure for Conceptual Class C Construction Cost Estimates

The Work Breakdown Structure (WBS) for Class C Construction Cost Estimates should be structured to provide a logical hierarchy of cost elements. This hierarchy will provide the framework upon which future, more detailed cost estimates will be assembled.

1. **Project Cost Summary:** At the estimate summary level project costs should be organized by individual major Asset or Project Element.
2. **Estimate Detail / Line Item Cost Summary (optional):** Although not required for all Class C Construction Cost estimates, whenever possible, additional WBS cost detail should be provided for each of the Project Cost Summary line items.
	1. Cost detail should be organized using the UNIFORMAT II, Elemental Classification System.
	2. Detailed costs should be presented at UNIFORMAT II, detail Level 2.
	3. In most cases, it is both desirable and appropriate to refine the level of WBS detail beyond the required UNIFORMAT II, Level 2.
		1. Additional WBS detail should be organized and presented using the UNIFORMAT II, Level 3 hierarchy.
		2. This additional level should be provided for all Schematic Design (SD) stage, Class C Construction Estimates.
		3. Providing this greater level of detail is also strongly encouraged in all stages of Class C Construction Cost Estimates.
3. **Estimate Format:** The estimate should present the cost information in a tabular or spreadsheet format:
	1. The Project Cost Summary should arrange each Asset or Project Element as individual line items.
	2. The horizontal format for the estimate should include a minimum of five (5) columns for tabulating the following information in each line item:
		1. Item Description
		2. Item Quantity
		3. Unit of Measure
		4. Direct Unit Cost
		5. Total Direct Cost
4. **Estimate Template, Instructions, Sample, and Guideline:** Reference Predesign (PD) > Prepare Class C Construction Cost Estimate - [Design-Bid-Build (DBB)](https://www.nps.gov/dscw/dbbpredesign.htm#classc) or [Design-Build (DB)](https://www.nps.gov/dscw/dbpredesign.htm#classc).
	1. The Class C Construction Cost Estimate template is **provided as a guideline only and its use is not required**, provided that all estimates submitted contain the required information and are presented in a similar format, as specified above and elsewhere in the handbook.
	2. Care must be exercised if using the templates to avoid corrupting embedded formulas and other automated functions.
	3. Each estimator is responsible for proof reading, data verification and mathematical checks for their own estimates.
	4. NPS assumes no liability resulting from the use or misuse of the cost estimating templates by third parties.

## Submittal Package Requirements for Conceptual Class C Estimates

The estimate submittal package shall contain the following at a minimum:

1. **Basis of Estimate Statement:** This page(s) of the estimate doubles as a cover page for the estimate. The Basis of Estimate statement page should include the following items:
	1. Project Title
	2. Park name and location within park, if applicable
	3. Park four letter alpha code
	4. PMIS number for the project
	5. Date of estimate
	6. Estimator’s Name, Company, Address and Contact information
	7. List of background supporting material describing the scope of work and any information used or referenced for preparing the estimate.
	8. Documentation of all sources of cost data, detailing the cost data used to prepare the estimate; include source name, date, volume number, etc.
	9. A description of any assumptions made or relied on to prepare the estimate.
	10. A brief description of any major changes in the scope of work, materials, systems, or assumptions, relative to previous cost estimates for the same project.
	11. Short descriptions and justifications for all mark-ups, add-ons, and escalation factors used in estimate.
	12. Other comments and assumptions regarding the estimate or supporting material.
2. **Project Cost Summary:** The estimate project cost summary should be formatted as described above and show all cost items, subtotals, mark-ups and total.
3. **Line Item Cost Summaries (optional):** The line item cost summary estimate detail should be formatted to the WBS detail as described above. Whenever Class C Construction Cost Estimates are prepared using the additional level of detail, the detailed cost workups should be included in the submittal package.

# Appendix D - Wage Rate Factor Analysis Worksheet



**Conclusion:** Davis-Bacon Wage Rates for Tuolumne County are on average ­5.9%­ more than RSMeans Wage Rates adjusted for city Modesto, California. Fringe Adjusted Bureau of Labor Statistics wage surveys for Eastern Sierra Non-Metropolitan are 29.4% less than the RSMeans rates. The Davis-Bacon Wage determination date was 12/03/2010 and should be compared to 2011 RSMeans data if later estimates use the most use the most current publications.

The above example reflects a wage rate adjustment factor analysis for a fictitious park and project located near Greensboro, North Carolina. The analysis is based on an estimate that was prepared using generic national average costs from RSMeans 2010 Building Construction Cost Data publication. The RSMeans City Cost analysis, the City Cost Index-Installation index was used to adjust the average RSMeans wage rates to reflect **Market Adjusted** wages in the Greensboro area. The Davis-Bacon Act wages are very low relative to the adjusted RSMeans rates and may not reflect the actual fair market rates. An additional comparison was made with Bureau of Labor Statistics (BLS) wage survey data. BLS wage information is significantly higher than the Davis-Bacon wage rates, but still less than **Market Adjusted** RSMeans data. In this case, the fair market wage rates are probably closer to BLS survey wages, but it is strongly recommended the estimator perform additional research into local wages before finalizing project budget.

# Appendix E - Market Survey

## Application

It is strongly recommended that a Market Survey be conducted to verify that projected unit costs are appropriate and to assure that project delivery assumptions of materials and labor availability are reasonable, for every project anticipated to have an estimated NET construction cost greater than $4,000,000, or when requested by the NPS project manager.

## Survey Approach

The Estimator shall visit the site and local market areas to determine:

* Availability of major materials to be in the project
* Capability of local fabricators, pre-cast yards, concrete plants, etc.
* Availability of labor crafts necessary for the project
* Availability of special erection equipment
* Anticipated capacity of local contractors during proposed solicitation period
* Special conditions that may influence price proposals
* Local escalation experience
* Site accessibility

## Report Content

Submit a written report (the Market Survey) which shall include:

* Who was contacted
* Location of those contacted in relation to project site
* Date of contact(s)
* Why contact was made
* Information obtained
* A summary assessment with specific recommendations

## Scheduling

The market survey should be conducted during design development. The market survey should be submitted with the Budgetary (Class B Estimate) as part of the design development submittal to enable the designer to address/revise design, incorporate price proposal alternates, change construction schedule, or whatever else might be necessary to assure project feasibility.

# Appendix G - NPS Asset Categories

NPS Facility Management Division has developed a list of Asset Types and Categories for management of NPS Assets. NPS defines an asset as a physical structure or grouping of structures, land features, or other tangible property which has a specific service or function. NPS employees manage over thirty different categories of assets - from roads, trails, campgrounds, buildings, and utility systems to maintained landscapes, waterfronts, monuments, ruins, and fortifications. The following are the Categories & Asset Codes for the NPS.

0000 Site/Area

1100 Road

1300 Parking Area

1700 Road Bridge

1800 Road Tunnel

2100 Trail

2200 Trail Bridge (Substantial)

2300 Trail Tunnel (Substantial)

3100 Maintained Landscapes

3600 Campground/Overnight Campsite

3700 Picnic Area

3800 Boundary

4100 Building

4300 Housing

5100 Water System

5200 Wastewater System

5300 Heating & Cooling Plant

5400 Electrical System

5500 Radio System

5510 Phone System

5520 Information Technology (IT) System (i.e. Local Area Network (LAN))

5700 Fuel System

5800 Solid Waste/Recycling System

6100 Dam/Levee/Dike

6200 Constructed Waterway

6300 Marina/Waterfront System

6400 Aviation System

6500 Railroad System

7100 Outdoor Sculptures/Monuments/Memorials/Large Interpretive Objects

7200 Ruins

7300 Fortification

7400 Towers/Missile Silos

7900 Amphitheaters

8999 Fleet

9999 No Asset Code Available

# Appendix H - Uniformat II

Uniformat II is an elemental or a systems classification framework providing a consistent reference for the description, economic analysis, and management of buildings during all phases of their life cycle. Elements are major components, common to most buildings, that usually perform a given function regardless of the design specification, construction method, or materials used. Examples of elements are foundations, exterior walls, sprinkler systems, and lighting.

The need for an elemental classification is most apparent in the economic evaluation of building alternatives at the design stage. One way of obtaining an estimate of the lifecycle costs of design alternatives is to perform detailed quantity takeoffs of all materials and tasks associated with the construction, operation, and maintenance of the buildings. It is in the early stages of design that economic analysis is most important in establishing the economically efficient choices among building alternatives. Only estimates based on an elemental classification such as UNIFORMAT II provide the necessary cost information for the analyst to evaluate building alternatives in a cost-effective manner.5

***5****Charette, Robert P. and Marshall, Harold E.,* ***UNIFORMATII Elemental Classification for Building Specifications, Cost Estimating and Cost Analysis, NISTIR 6389****, National Institute of Standards and Technology, U.S. Department of Commerce, October 1999.*

ASTM UNIFORMAT II [Classification of Building Elements](https://www.uniformat.com/index.php/unifrmt-ii/past-site-articles/98-classification-of-building-elements-per-astm-uniformat-ii-standard) (E1557.97)

ASTM UNIFORMAT II [Classification of Building Related Sitework](https://www.uniformat.com/index.php/unifrmt-ii/past-site-articles/97-classification-of-building-related-sitework-per-astm-uniformat-ii-standard) (E1557.97)

# Appendix J - Federal Acquisition Regulation (FAR) 36.609-1 & 36.609-2

View [FAR 36.609-1 Design within funding limitations.](https://www.acquisition.gov/far/36.609-1) and [FAR 36.609-2 Redesign responsibility for design errors or deficiencies.](https://www.acquisition.gov/far/36.609-2) regarding the importance of true and accurate reporting of estimates and the A/E Contractor's responsibility to design with available funds.