



AACE® International Recommended Practice No. 56R-08

**COST ESTIMATE CLASSIFICATION SYSTEM –
AS APPLIED FOR THE BUILDING AND GENERAL CONSTRUCTION INDUSTRIES
TCM Framework: 7.3 – Cost Estimating and Budgeting**

Rev. December 5, 2012

Note: As AACE International Recommended Practices evolve over time, please refer to www.aacei.org for the latest revisions.

Contributors:

Disclaimer: The opinions expressed by the authors and contributors to this recommended practice are their own and do not necessarily reflect those of their employers, unless otherwise stated.

Peter R. Bredehoeft, Jr. CEP (Author)
Jeffery J. Borowicz, CCC CEP PSP
Robert B. Brown, PE
Daniel C. Donaldson, PE CEP
Larry R. Dysert, CCC CEP
Ricardo Garcia da Roza
Jon M. Hollman, CCC CEP
John K. Hollmann, PE CCE CEP

Frank Kutilek
Tamera L. McCuen
Donald E. Parker, PE CCE
Todd W. Pickett, CCC CEP
Kumar Sinnathamby, CCC
H. Lance Stephenson, CCC
Kul B. Uppal, PE CEP
James D. Whiteside, II PE

COST ESTIMATE CLASSIFICATION SYSTEM – AS APPLIED FOR THE BUILDING AND GENERAL CONSTRUCTION INDUSTRIES

TCM Framework: 7.3 – Cost Estimating and Budgeting



December 5, 2012

PURPOSE

As a recommended practice of AACE International, the *Cost Estimate Classification System* provides guidelines for applying the general principles of estimate classification to project cost estimates (i.e., cost estimates that are used to evaluate, approve, and/or fund projects). The *Cost Estimate Classification System* maps the phases and stages of project cost estimating together with a generic project scope definition maturity and quality matrix, which can be applied across a wide variety of construction industries.

This addendum to the generic recommended practice (17R-97) provides guidelines for applying the principles of estimate classification specifically to project estimates for the building and general construction industries. It supplements 17R-97 by providing:

- a section that further defines classification concepts as they apply to the building and general construction industries;
- a chart that maps the extent and maturity of estimate input information (project definition deliverables) against the class of estimate.

As with the generic recommended practice, the intent of this addendum is to improve communications among all of the stakeholders involved with preparing, evaluating, and using project cost estimates specifically for the building and general construction industries.

The overall purpose of this recommended practice is to provide the building and general construction industry definition deliverable maturity matrix which is not provided in 17R-97. It also provides an approximate representation of the relationship of specific design input data and design deliverable maturity to the estimate accuracy and methodology used to produce the cost estimate. The estimate accuracy range is driven by many other variables and risks, so the maturity and quality of the scope definition available at the time of the estimate is not the sole determinate of accuracy; risk analysis is required for that purpose.

This document is intended to provide a guideline, not a standard. It is understood that each enterprise may have its own project and estimating processes and terminology, and may classify estimates in particular ways. This guideline provides a generic and generally acceptable classification system for the building and general construction industries that can be used as a basis to compare against. This addendum should allow each user to better assess, define, and communicate their own processes and standards in the light of generally-accepted cost engineering practice.

INTRODUCTION

For the purposes of this addendum, the term general construction is assumed to include both new construction, as well as renovation construction projects. It is intended to be used for building (vertical) construction, as well as site/civil projects. It is intended to cover projects which are repetitive and repeatable. Examples for buildings include: residential construction, commercial buildings, hotels, resorts, offices, retail, etc. This also includes site/civil projects. Examples for site/civil projects include: site development, utility infrastructure, telecommunications, water pipelines, sanitary sewer pipelines, storm water and water resources projects. The common thread among these industries for the purpose of estimate classification is their reliance on project definition documents (basis of design) and schematic drawings as primary scope defining documents. These

December 5, 2012

documents are key deliverables in determining the degree of project definition, and thus the extent and maturity of estimate input information. This applies to both traditional design, bid, build (DBB), design-build (DB), construction management for fee (CM-fee), construction management at risk (CM-at risk), and private-public partnerships (PPP) contracting methods.

Estimates for buildings center on: functional space requirements, structural requirements, site requirements, architectural elements, sustainability, and supporting mechanical, electrical, plumbing, and life-safety systems. As building information modeling (BIM) evolves and expands into cost estimating, AACE will be developing BIM related recommended practices in the future.

This addendum specifically does not address cost estimate classification in: process industries, environmental remediation, transportation (horizontal) infrastructure, dams, reservoir, tunnel, processes such as assembly and manufacturing, “soft asset” production such as software development, and similar industries. This RP does not cover “one-of-a-kind” type project, like concert halls, sports stadium, research building, health facilities, science laboratories and hi-tech manufacturing. Future cost estimate classification recommended practices may be defined for these specific industries.

The owner, agency, or contractor may require individual cost estimates at each of these estimate classifications or phases. The owner, agency or contractor may provide specific input on the project data or design deliverable requirements.

This guideline reflects generally-accepted cost engineering practices. This addendum was based upon the practices of a wide range of companies in the building and general construction from around the world, as well as published references and standards. Company and public standards were solicited and reviewed by the AACE International Cost Estimating Subcommittee, and the practices were found to have significant commonalities.

COST ESTIMATE CLASSIFICATION MATRIX FOR THE BUILDING AND GENERAL CONSTRUCTION INDUSTRIES

Table 1 provides a summary of the characteristics of the five estimate classes. The maturity level of definition is the sole determining (i.e., primary) characteristic of Class. In Table 1, the maturity is roughly indicated by a % of complete definition; however, it is the maturity of the defining deliverables that is the determinant, not the percent. The specific deliverables, and their maturity, or status, are provided in Table 3. The other characteristics are secondary and are generally correlated with the maturity level of project definition deliverables, as discussed in the generic RP. The characteristics are typical for the building and general construction industries but may vary from application to application.

This matrix and guideline outline an estimate classification system that is specific to the building and general construction industries. Refer to the generic estimate classification RP for a general matrix that is non-industry specific, or to other addendums for guidelines that will provide more detailed information for application in other specific industries. These will provide additional information, particularly the project definition deliverable maturity matrix which determines the class in those particular industries.

Table 1 illustrates typical ranges of accuracy ranges that are associated with the building and general construction industries. Depending on the technical and project deliverables (and other variables) and risks associated with each estimate, the accuracy range for any particular estimate is expected to fall into the ranges identified (although extreme risks can lead to wider ranges).

December 5, 2012

ESTIMATE CLASS	Primary Characteristic	Secondary Characteristic		
	MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical variation in low and high ranges ^[a]
Class 5	0% to 2%	Functional area, or concept screening	SF or m ² factoring, parametric models, judgment, or analogy	L: -20% to -30% H: +30% to +50%
Class 4	1% to 15%	or Schematic design or concept study	Parametric models, assembly driven models	L: -10% to -20% H: +20% to +30%
Class 3	10% to 40%	Design development, budget authorization, feasibility	Semi-detailed unit costs with assembly level line items	L: -5% to -15% H: +10% to +20%
Class 2	30% to 75%	Control or bid/tender, semi-detailed	Detailed unit cost with forced detailed take-off	L: -5% to -10% H: +5% to +15%
Class 1	65% to 100%	Check estimate or pre bid/tender, change order	Detailed unit cost with detailed take-off	L: -3% to -5% H: +3% to +10%

Note: [a] The state of construction complexity and availability of applicable reference cost data affect the range markedly. The +/- value represents typical percentage variation of actual cost from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

Table 1 – Cost Estimate Classification Matrix for Building and General Construction Industries

In addition to the degree of project definition, estimate accuracy is also driven by other systemic risks such as:

- Complexity of the project.
- Quality of reference cost estimating data.
- Quality of assumptions used in preparing the estimate.
- Experience and skill level of the estimator.
- Estimating techniques employed.
- Time and level of effort budgeted to prepare the estimate.

Systemic risks such as these are often the primary driver of accuracy; however, project-specific risks (e.g. risk events) also drive the accuracy range^[9].

Another way to look at the variability associated with estimate accuracy ranges is shown in Figure 1. Depending upon the technical complexity of the project, the availability of appropriate cost reference information, the degree of project definition, and the inclusion of appropriate contingency determination, a typical Class 5 estimate for a building and general construction industry project may have an accuracy range as broad as -30% to +50%, or as narrow as -20% to +30%.

This figure also illustrates that the estimating accuracy ranges overlap the estimate classes. There are cases where a Class 5 estimate for a particular project may be as accurate as a Class 3 estimate for a different project. This may be the case if the Class 5 estimate was based on a repeat project with good cost history and data, whereas the Class 3 estimate was for a project involving a more complex building. It is for this reason that Figure 1 provides ranges of accuracy values. The accuracy range is determined through risk analysis of the specific project.

For example, extremes are often caused by items well outside the scope of the estimate or by not defining the scope properly. An example would be a building based on a US average cost and a final decision to build it in New York City, without the estimate being re-estimated or updated to account for this change in scope.

December 5, 2012

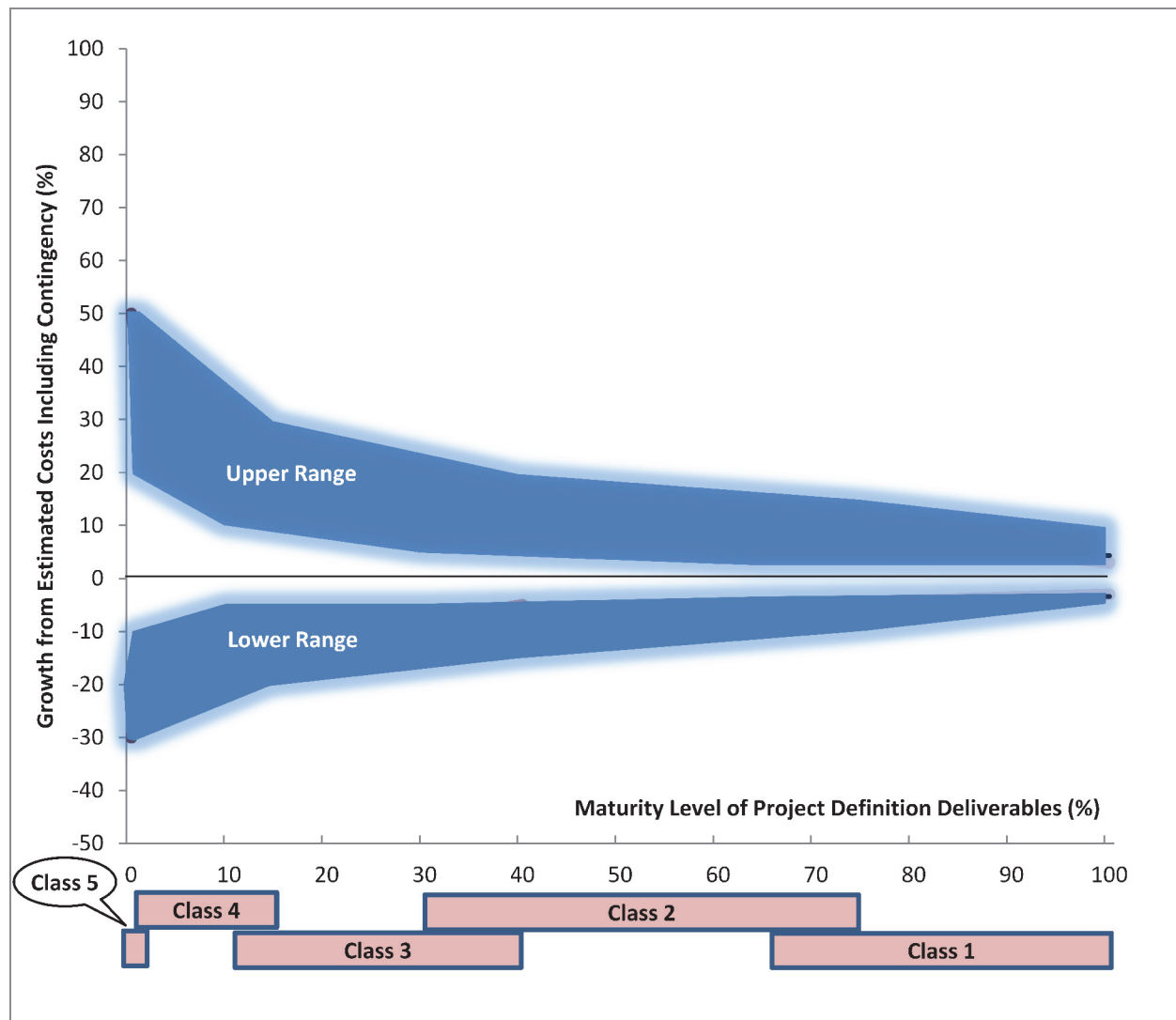


Figure 1 – Example of the Variability in Accuracy Ranges for a Building and General Construction Industry Estimate

DETERMINATION OF THE COST ESTIMATE CLASS

The cost estimator makes the determination of the estimate class based upon the maturity level of project definition (design % complete). While the determination of the estimate class is somewhat subjective, the design input data, completeness and quality of the design deliverables serve to make the determination more objective.

CHARACTERISTICS OF THE ESTIMATE CLASSES

The following tables (2a through 2e) provide detailed descriptions of the five estimate classifications as applied in the building and general construction industries. They are presented in the order of least-defined estimates to the

December 5, 2012

most-defined estimates. These tables include brief discussions of each of the estimate characteristics that define an estimate class. For each table, the following information is provided:

- **Description:** A short description of the class of estimate, including a brief listing of the expected estimate inputs based on the maturity level of project definition deliverables.
- **Maturity Level of Project Definition Deliverables (Primary Characteristic):** Describes a particularly key deliverable and a typical target status in building and general construction decision processes, plus an indication of approximate percent of full definition of project and technical deliverables. For the building and general construction industries, this correlates with the percent of engineering and design complete.
- **End Usage (Secondary Characteristic):** A short discussion of the possible end usage of this class of estimate.
- **Estimating Methodology (Secondary Characteristic):** A listing of the possible estimating methods that may be employed to develop an estimate of this class.
- **Expected Accuracy Range (Secondary Characteristic):** Typical variation in low and high ranges after the application of contingency (determined at a 50% level of confidence). Typically, this provides an 80% confidence level that the actual cost will fall within the bounds of the low and high ranges. The estimate confidence interval or accuracy range is driven by the reliability of the scope information available at the time of the estimate in addition to the other variables and risk identified above.
- **Alternate Estimate Names, Terms, Expressions, and Synonyms:** This section provides other commonly used names that an estimate of this class might be known by. These alternate names are not endorsed by this Recommended Practice. The user is cautioned that an alternative name may not always be correlated with the class of estimate as identified in Tables 2a-2e.

CLASS 5 ESTIMATE	
<p>Description: Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systemic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with little effort expended—sometimes requiring less than an hour to prepare. Often, little more than proposed building type, location, functional space building requirements (SF or m2), and number of stories are known at the time of estimate preparation.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: Total building area and number of stories agreed upon by stakeholders. 0% to 2% of full project definition.</p> <p>End Usage: Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.</p>	<p>Estimating Methodology: Class 5 estimates generally use stochastic estimating methods such as area factors and other parametric and modeling techniques. For example, historical unit prices or functional use unit prices driven.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 5 estimates are -20% to -30% on the low side, and +30% to +50% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Block schematic estimate, functional area based estimate or scoping study estimate, concept design, ratio, rough order of magnitude, idea study, concept screening estimate, prospect estimate, rule-of-thumb.</p>

Table 2a – Class 5 Estimate

December 5, 2012

CLASS 4 ESTIMATE	
<p>Description: Class 4 estimates are generally prepared based on limited information and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 15% complete, and would comprise at a minimum the following: preliminary room layouts, new proposed site plan, existing site plan, markups of existing drawings for demolition and utilities, design criteria report or technical memorandum by division of work.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: Functional space requirements have been fully indentified. 1% to 15% of full project definition.</p> <p>End Usage: Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.</p>	<p>Estimating Methodology: Class 4 estimates generally use stochastic estimating methods such as parametric models, and assembly driven models. For example, functional space unit price or model driven.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 4 estimates are -10% to -20% on the low side, and +20% to +30% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Schematic design estimate or pre-feasibility estimate, feasibility, screening, top-down, feasibility, authorization, factored, pre-study, concept study.</p>

Table 2b – Class 4 Estimate

December 5, 2012

CLASS 3 ESTIMATE	
<p>Description: Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum completed design information for the following: defined site civil information such as site plan, existing site conditions, demolition drawings, utility plan, site electrical plans, room layouts, mechanical system layouts, plumbing layouts, and one-line electrical diagram.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: building code or standards requirements; exterior closure description; and finishes descriptions and requirements, are all defined. 10% to 40% of full project definition.</p> <p>End Usage: Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase “control estimates” against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate is often the last estimate required and could very well form the only basis for cost/schedule control.</p>	<p>Estimating Methodology: Class 3 estimates generally involve more deterministic estimating methods than stochastic methods. They usually involve a high degree of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project. For example, assembly driven, with some detailed items and engineering/design assumptions and specifications if known.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 3 estimates are -5% to -15% on the low side, and +10% to +20% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks..</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, development, basic engineering phase estimate, target estimate.</p>

Table 2c – Class 3 Estimate

December 5, 2012

CLASS 2 ESTIMATE	
<p>Description: Class 2 estimates are generally prepared to form a detailed contractor control baseline (and update the owner control baseline) against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the bid estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at minimum completed design information. All drawings, plan views, elevation drawings and section drawings are complete; except detailed design schedules, architectural details and control diagrams, which may still be in draft form.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: draft specifications, building systems, and soils and hydrology report are defined. 30% to 75% of full project definition.</p> <p>End Usage: Class 2 estimates are typically prepared as the detailed contractor control baseline (and update the owner control baseline) against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change management program.</p>	<p>Estimating Methodology: Class 2 estimates generally involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detail takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods. For example: assembly and detail items, with draft specifications across most divisions of work; limited engineering/design assumptions; detailed labor, material, equipment, subcontractor and other costs; or some quotations.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 2 estimates are -5% to -10% on the low side, and +5% to +15% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Design development estimate, detailed estimate, control, forced detail, execution phase, master control, engineering.</p>

Table 2d – Class 2 Estimate

December 5, 2012

CLASS 1 ESTIMATE	
<p>Description: Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, engineering is from 70% to 100% complete, and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: all deliverables in the maturity matrix complete. 65% to 100% of full project definition.</p> <p>End Usage: Generally, owners and designers use Class 1 estimates to support their change management process. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.</p> <p>Construction contractors may prepare Class 1 estimates to support their bidding and to act as their final control baseline against which all actual costs and resources will now be monitored for variations to their bid. During construction, Class 1 estimates may be prepared to support change management.</p>	<p>Estimating Methodology: Class 1 estimates generally involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities. For example, detailed bottoms up estimate, with detailed labor, materials, equipment, subcontractor and other costs, with specific quotations, based upon detailed drawings and specifications. This would be a unit price estimate driven by crews and productivity.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 1 estimates are -3% to -5% on the low side, and +3% to +10% on the high side, depending on the construction complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Construction document estimate, pre-tender estimate, pre-construction estimate, or project control estimate, full detail estimate, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, control, control estimate, fair price, bid/tender definitive, change order estimate (if in construction phase).</p>

Table 2e – Class 1 Estimate

ESTIMATE INPUT CHECKLIST AND MATURITY MATRIX

Table 3 maps the extent and maturity of estimate input information (deliverables) against the five estimate classification levels. This is a checklist of basic deliverables found in common practice in the building and general construction industries. The maturity level is an approximation of the completion status of the deliverable. The degree of completion is indicated by the following letters:

- **None (blank):** Development of the deliverable has not begun.
- **Started (S):** Work on the deliverable has begun. Development is typically limited to sketches, rough outlines, markup of existing drawings, assumed engineering/design data, or similar levels of early completion.
- **Preliminary (P):** Work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- **Complete (C):** The deliverable has been reviewed and approved as appropriate.

December 5, 2012

	ESTIMATE CLASSIFICATION				
	Class 5	Class 4	Class 3	Class 2	Class 1
MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data:					
Project General Scope Description	Assumed	Preliminary	Defined	Defined	Defined
Project Location	General	Approximate	Specific	Specific	Specific
Total Building Area - SF or m2	Preliminary	Preliminary	Defined	Specific	Specific
Functional Space Requirements - SF or m2	Started	Preliminary	Defined	Specific	Specific
No. of Building Stories	Preliminary	Preliminary	Defined	Specific	Specific
Exterior Closure Description	Assumed	Preliminary	Defined	Defined	Defined
Finishes Descriptions and Requirements	Assumed	Preliminary	Defined	Defined	Defined
Building Code or Standards Requirement	Assumed	Preliminary	Defined	Defined	Defined
Mechanical Systems and Total Capacity	Preliminary	Defined	Defined	Defined	Defined
Electrical Capacity	Preliminary	Defined	Defined	Defined	Defined
Communication Systems	Preliminary	Defined	Defined	Defined	Defined
Fire Protection and Life Safety Requirements	Assumed	Preliminary	Defined	Defined	Defined
Security System	Assumed	Preliminary	Defined	Defined	Defined
Anti-Terrorism Force Protection Requirements	Preliminary	Defined	Defined	Defined	Defined
LEED Certification Level	Preliminary	Defined	Defined	Defined	Defined
Soils and Hydrology Report	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	Approximate	Defined	Defined	Defined	Defined
Work Breakdown Structure	Preliminary	Defined	Defined	Defined	Defined
Project Code of Accounts	Preliminary	Defined	Defined	Defined	Defined
Contracting Strategy	Assumed	Preliminary	Defined	Defined	Defined
Escalation Strategy and Basis	Assumed	Preliminary	Defined	Defined	Defined
Design Deliverables:					
Building Codes and Standards Drawing		S/P	C	C	C
Fire Protection and Life Safety Requirements		S/P	C	C	C
Site Plan	S	P	C	C	C
Existing Site Plan	S	P	C	C	C

December 5, 2012

	ESTIMATE CLASSIFICATION				
	Class 5	Class 4	Class 3	Class 2	Class 1
MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
Demolition Plan and Drawings		S/P	P	C	C
Utility Plan and Drawings		S/P	P	C	C
Site Electrical Plan and Drawings		S/P	P	C	C
Site Lighting Plan and Drawings		S/P	P	C	C
Site Communications Plan and Drawings		S/P	P	C	C
Erosion Control Plan and Drawings		S/P	P	C	C
Stormwater Plan and Drawings		S/P	P	C	C
Landscaping Plan and Drawings		S/P	P	C	C
Exterior Elevations		S/P	P	C	C
Interior Elevations			S	P	C
Interior Section Views		S/P	P	C	C
Partition or Wall Types		S/P	S/P	C	C
Finish Schedule		S/P	P	C	C
Door Schedules		S/P	P	P	C
Window Schedules		S/P	P	P	C
Restroom Schedules		S/P	P	P	C
Furniture Plans, Schedules and Drawings		S/P	P	C	C
Signage Drawings and Schedules		S/P	P	P	C
Fire Protection Plan, Drawings and Details		S/P	P	C	C
Room Layout Plan and Drawings		S/P	C	C	C
Foundation Plan and Drawings		S/P	P	C	C
Foundation Sections and Details		S/P	P	C	C
Structural Plans and Drawings					
Structural Sections and Drawings					
Roof Plan, Drawings and Details		S/P	P	C	C
Material, Equipment and Systems Specifications		S/P	P	C	C
Building envelope/moisture protection/flashing details		S/P	P	C	C
Mechanical/HVAC Plan and Drawings		S/P	P	C	C

December 5, 2012

	ESTIMATE CLASSIFICATION				
	Class 5	Class 4	Class 3	Class 2	Class 1
MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
Mechanical/HVAC Details			S/P	P	C
Mechanical/HVAC Schedules			S/P	P	C
Flow Control Diagrams		S/P	P	P	C
Plumbing Plan and Drawings		S/P	P	C	C
Plumbing Details			S/P	P	C
Plumbing Riser Diagram			S/P	P	C
One-Line Electrical Diagram		S/P	P	C	C
Electrical Power Plan		S/P	P	C	C
Interior Lighting Plan and Drawings			S/P	P	C
Security Plan and Drawings			S/P	P	C
Emergency Communication Plan and Drawings			S/P	P	C
Life Safety Plan and Drawings		S	S/P	C	C
Lightning Protection Plan and Drawings			S/P	P	C
Motor Control Diagram			S/P	P	C
Lighting Control Diagram			S/P	P	C
Lighting Schedules			S/P	P	C
Electrical/Control Panel Schedule			S/P	P	C
Equipment Schedule		S	S/P	P	C
Information Systems/Telecommunication Plan			S/P	P	C
Information Systems/Telecommunication Details			S/P	P	C

Table 3 – Estimate Input Checklist and Maturity Matrix (Primary Classification Determinate)**DOCUMENTATION**

The basis of estimate (BOE) typically accompanies the cost estimate. The basis of estimate is a written documentation that describes how an estimate, schedule, or other plan component which develops and defines the information used in support of development of the cost estimate. A basis document commonly includes, but is not limited to, a description of the scope included, methodologies used, references and defining deliverables used, assumptions and exclusions made, clarifications, adjustments, and some indication of the level of uncertainty.

December 5, 2012

The BOE in some ways is more important than the estimate, since it documents the scope and assumptions and provides a level of confidence to the estimate. The estimate is incomplete without a well documented basis of estimate. See AACE Recommended Practice 34R-05 *Basis of Estimate* for more information.

PROJECT DEFINITION RATING INDEX

The next logical step in documenting the maturity level of project definition is to develop a project definition rating index (PDRI). The PDRI system is a tool or methodology for users to develop a project specific weighted index, which measures the maturity of project definition and scope definition compared to project success. This measures the completeness of the project definition and scope development. This methodology involves management and project stakeholders. The following organizations have similar indexes: The Construction Industry Institute (CII) 113-2 (process industry) and 115-2 (buildings)^[15,16], NASA adopted CII, US Department of Energy (DOE)^[17], and US Army Corp of Engineers (USACE).

The estimate input checklist and maturity matrix (Table 3) can also be turned into your own company's or organization's internal project requirements. This rating system can be rated independently by the estimating and the design team, and then reviewed for comparison and overall concessions.

REFERENCES

1. AACE International, Recommended Practice 17R-97, *Cost Estimate Classification System*, AACE International, Morgantown, WV, (latest revision).
2. American Institute of Architects (AIA), *Integrated Project Delivery: A Guide, Version 1*, American Institute of Architects (AIA), Washington, DC, 2007.
3. Marr, Kenneth F., Sr., *Standards for Construction Cost Estimators*, 1977 AACE Transactions, AACE International, Morgantown, WV, 1977.
4. U.S. General Services Administration (GSA), *Project Planning Guide*, U.S. General Services Administration, Washington, DC, 2005
5. Construction Management Association of America (CMAA), *CM Standards of Practice: Cost Management*, CMAA, McLean, VA, 2009
6. ASTM, Standard E1804-07 *Standard Practice for Performing and Reporting Cost Analysis During the Design Phase of a Project*, ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/E1804-07, www.astm.org.
7. Construction Industry Institute (CII), *Project Definition Rating Index Workshop*, CII, Austin, TX, September 20, 2004
8. ASTM, Standard 2516-06, *Standard Classification for Cost Estimate Classification System*, ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/E2516-06, www.astm.org.
9. AACE International, Recommended Practice 10S-90, *Cost Engineering Terminology*, AACE International, Morgantown, WV, (latest revision).
10. Hollmann, John K., Editor, *Total Management Framework: An Integrated Approach to Portfolio Program and Project Management, 1st Edition, Revised*, AACE International, Morgantown, WV, 2012.
11. American Society of Professional Estimators (ASPE), *Standard Estimating Practice, Levels of Estimate*, section 2, 7th edition, July 11, 2008.
12. The American Institute of Architects (AIA), *E202-2008 Building Information Modeling Protocol Exhibit*, 2008.
13. Construction Specifications Institute (CSI), *Uniformat 2010 and Masterformat 2010*, Alexandria VA, 2010.
14. AACE International BIM Committee in Association with the BuildingSmart Alliance, *Quantification (Take-off) Process and Standards for BIM: BIM Standards for Cost Estimating*, DRAFT – V3 – March 14, 2008.

December 5, 2012

15. Construction Industry Institute (CII), PDRI: Project Definition Rating Index – Building Projects, Version 3.2 (115-2), Austin, TX, December 1, 2009.
16. Construction Industry Institute (CII), PDRI: Project Definition Rating Index – Industrial Projects, Version 3.2 (113-2), Austin, TX, December 1, 2009.
17. U.S. Department of Energy (DOE), *Project Definition Rating Index Guide for Traditional Nuclear and Non-Nuclear Construction Projects*, DOE G 413.3-12, July 22, 2010.

CONTRIBUTORS

Disclaimer: The opinions expressed by the authors and contributors to this recommended practice are their own and do not necessarily reflect those of their employers, unless otherwise stated.

Peter R. Bredehoeft, Jr. CEP (Author)
Jeffery J. Borowicz, CCC CEP PSP
Robert B. Brown, PE
Daniel C. Donaldson, PE CEP
Larry R. Dysert, CCC CEP
Ricardo Garcia da Roza
Jon M. Hollman, CCC CEP
John K. Hollmann, PE CCE CEP
Frank Kutilek
Tamera L. McCuen
Donald E. Parker, PE CCE
Todd W. Pickett, CCC CEP
Kumar Sinnathamby, CCC
H. Lance Stephenson, CCC
Kul B. Uppal, PE CEP
James D. Whiteside, II PE