Designation: E2168 – 10 (Reapproved 2016)

Standard Classification for Allowance, Contingency, and Reserve Sums in Building Construction Estimating[1]

This standard is issued under the fixed designation E2168; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

In building construction estimating the terms allowance, contingency, and reserve are often used almost interchangeably and are assumed to be universally understood, yet they often mean different things to different people. Consequently they can be ambiguous in meaning and intent.

Applying these terms, as classified herein, adds a needed precision and rigor in their use as each term is held to be specific in its meaning, intent, and use.

1. Scope

1.1 This classification establishes a classification for allowance, contingency, and reserve sums used in construction, project, and program estimating.

1.2 This classification applies to all construction work.

1.3 This classification is not based on permanent physical elements of construction (as defined and classified in Classification E1557). Rather, the classification items are cost components common to construction, project, and program estimates.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E631 Terminology of Building Constructions
E833 Terminology of Building Economics
E1557 Classification for Building Elements and Related Sitework—UNIFORMAT II
E1804 Practice for Performing and Reporting Cost Analysis During the Design Phase of a Project
E1946 Practice for Measuring Cost Risk of Buildings and Building Systems and Other Constructed Projects
E2013 Practice for Constructing FAST Diagrams and Performing Function Analysis During Value Analysis Study

3. Terminology

3.1 *Definitions*—For definitions of terms used in this classification, refer to Terminologies E631 and E833.

4. Significance and Use

4.1 When preparing construction, project, and program cost estimates, it is often necessary to make monetary provision for change or risk, or both, or other exigencies where information is incomplete.

4.2 Such allowance, contingency or reserve sums are employed by many persons engaged in the planning, delivery, and financing of construction work.

4.3 These users include owners, developers, facilities programmers, cost planners, estimators, schedules, architects and engineers, specification writers, operating and maintenance staff, manufacturers, educators, financial managers, and comptrollers.

4.4 *Usage:*

4.4.1 These sums are especially appropriate when performing the following activities:

Cost budgeting;
Conceptual, design, and construction cost estimating;
Preparing complete forecast cost for economic evaluation, investment analysis, and approval; and
Controlling cost during planning, design, and construction.

4.4.2 In any of these activities a needed requirement, or component, of the planned construction can be known while the defined solution, design or specification, for providing this may not. The usual, and appropriate, response in these situations, is the inclusion of a monetary sum, within an estimate, to provide for this (these) requirement(s).

4.4.3 Such sums may be general or specific in scope, may be planned to be spent or may only be included as possible mitigation for unplanned events and requirements.

[1] This classification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.81 on Building Economics.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

4.4.4 To distinguish between these sums, and in recognition of their differing purpose, they are described, and classified here, using the terms allowance, contingency, or reserve.

NOTE 1—Section 5 includes a generic statement of purpose for each of the three terms and provides a sub-classification that distinguishes between sums included for specific purposes and for non-specific, that is, general purposes. In cost budgeting, conceptual and design estimating especially, an estimator may intuitively recognize the need for a general purpose sum. This recognition comes in the absence of any known specific requirement other than the need to ensure the estimate total is a reasoned forecast of a reasonable bid result.

4.5 This classification defines allowance, contingency, and reserve sums as items common to construction, project, and program estimates through planning, design, construction, and completion. The terms are sufficiently generic to be applied in all forms of construction work.

5. Basis of Classification

5.1 *Classification Criteria:*

5.1.1 The selected classification of terms is based on the following criteria. The terms shall:

Be readily distinguishable one from the other,
Be simple and must identify their properties and usage directly,
Be appropriate in all forms of construction financial activities, and
Allow a distinction between the environments (internal or external) within which they are applied.

5.2 *Primary Classification:*

5.2.1 *Allowance*—A sum of money that is intended to be spent on the planned scope of work. Used in the absence of precise knowledge, and estimated, to the best of one's abilities, to ensure a full and complete estimate. Allowances cover events and activities that are normally internal and so are directly controllable within the project plan.

5.2.2 *Contingency*—A sum of money that is provided to cover the occurrence of unintended departures from the planned scope of work. Used in the absence of precise knowledge, and estimated, to the best of one's knowledge to ensure that a financial buffer is available within a budget. Contingencies assist in mitigating the effects of unplanned events and other risks that are external to, and are not directly controllable within, a project plan.

5.2.3 *Reserve*—A sum, usually held by management (client) to be disbursed only when project requirements are changed. Used to provide insurance against a project or program failing to complete on budget or for the revision of a budget in the case of changed management or program direction and requirement.

NOTE 2—For the purposes of the classification an internal environment is that which exists within an organization. An internal environment may readily allow cost control through revision of design or specification, or both. External environment changes impact the project cost and may be the result of contractual obligation, uncovered site conditions or changed legislation, for example. External environment changes may allow little or no opportunity for mitigation.

5.3 *Secondary Classification:*

5.3.1 Each of the Primary Classifications may be further sub-classified as:

5.3.2 *Specific*—Where the content of a sum is uniquely identified and the sum is calculated solely for that distinct purpose, and

5.3.3 *Non-Specific*—Where the content of a sum is only broadly identified and the sum is calculated for application to that general purpose.

NOTE 3—Reference should also be made to Practice E1946, which describes a formal methodology for estimating the amount of each sum.

NOTE 4—For examples of specific allowance items refer to Practice E1804.

5.4 *Classifications in Context:*

5.4.1 Placing these classifications in the context of typical/generic usage provides an additional understanding of the distinctions between the classified terms.

5.4.2 Table 1 is a tabulation of the basic properties, events and methods defined for allowances, contingencies, and reserves as typically applied in the building construction industry. This table identifies the key differences, and some similarities, makes for easy identification of the generic principles driving the classifications, and so allows consistent application. It also draws attention to the need for a subsidiary

TABLE 1 Classification of Allowance, Contingency, and Reserve—Typical Application

	Allowance	Contingency	Reserve
1. Intend to spend?	Yes	No	No
2. Applied to work actions that are:	Intended	Unintended	At Client Discretion
3. Expenditure is effected by:			
Internal Change	Yes	No	No
External Change	No	Yes	No
Management (Client) Change	No	No	Yes
4. Is an integral part of:			
Construction Estimate	Yes	No	No
Project Estimate	Yes	Yes	No
Program Estimate	Yes	Yes	Yes
5. Commitment Sanctioned by:			
Consultants	Yes	No	No
Project Manager	Yes	Yes	No
Management (Client)	Yes	Yes	Yes
6. Calculated on the basis of:			
Past Personal/Corporate Experience	Yes	Yes	Yes
Statistical Analysis of Past Projects	Yes	Yes	Yes
Probabilistic Assessment of Change	Yes	No	No
Probabilistic Assessment of Risk	No	Yes	No
Management Policy	No	No	Yes

cost classification that is typically part of a generic Work Breakdown Structure.

5.5 *Subsidiary Classification:*

5.5.1 *Construction Estimate*—An estimated cost for the construction work including all trade costs and the prime contractors' Field Requirements and Office Overhead & Profit: that is, an estimate of construction work intended to forecast the amount of a reasonable bid figure. A construction estimate may include both specific and non-specific allowance(s).

5.5.2 *Project Estimate*—An estimated cost that includes Design and Project Management Fees & Disbursements, and other costs, in addition to the Construction Estimate, that are discretely packaged as a total project: that is, a total estimate includes acquisition costs, construction work, fees (professional and legal), expenses, and any other disbursements. A project estimate may include both specific and non-specific contingency(s).

5.5.3 *Program Estimate*—An estimated cost that includes all Client Costs in addition to the Project Estimate(s) that are collectively part of the main Program of Work, that is, an overall management estimate including project estimate(s), and other program delivery, operation and maintenance, estimates. A program estimate may include both specific and non-specific reserve(s).

NOTE 5—These subsidiary classifications, while not obviously needed to classify allowances, contingences, and reserves, are important to understanding the context in which they are used.

6. Keywords

6.1 allowance; budgeting; building economics; classification; construction estimating; contingency; cost control; cost estimating; cost planning; cost risk; reserve; UNIFORMAT II

APPENDIXES

(Nonmandatory Information)

X1. GUIDANCE NOTES

X1.1 These guidance notes are included to aid in understanding the application of the classification terms. A simple and relatively common arrangement used in building construction has been used, within the mandatory information as Table 1, describing a common usage. Appendix X2 provides an example of its application within the transportation construction sector.

X1.2 Most especially with design construction estimates there is a need to make provision for the, as yet, undefined detail. It is necessary to make allowance for this if an estimate total is to be a reasoned forecast of construction cost. An estimate based on complete drawings and specifications will include only those allowances specifically prescribed in that documentation. Both specific allowances and non-specific allowances may be required, particularly during the early design stages.

X1.3 Table 1 considers just three levels of a typical Work Breakdown Structure—program, project, and construction—and the cost estimates within them. Each rolls up into the other, with program being the top level. In Table 1, it is assumed that responsibility for maintaining these levels within budget is delegated down from management/client (program), to project manager (project), to consultant (construction), although each level has an oversight responsibility for their subordinate's actions. Table 1 uses this hierarchy.

X1.4 *Construction Level*—When summarizing estimates specific allowances are usually included within the section to which they apply, that is, an allowance for rock excavation would be included within the appropriate trade or elemental category. Non-specific allowances, by their very nature, cannot be treated that way and so must be included in a unique section or category of their own. In architectural building parlance, an allowance is sometimes described as provision for a deferred or evolving design decision.

NOTE X1.1—This summary methodology and its distinction between the specific and the non-specific also applies to contingencies and reserves.

X1.5 *Project Level*—A project manager, whose responsibility is to deliver a project "on time and within budget," will make provision within the project estimate for risk items when advising management of their financial exposure. This may be done by including a contingency sum within the total forecast project cost. Although estimated in several possible ways contingency sums should reflect both the upside and down side of identified project risks. Contingencies are reasoned sums that take into account the probability of occurrence of such identified risks. Such sums may likely be included for funds appropriation purposes and are only to be expended, as needed, against those risks.

X1.6 *Program Level*—A prudent client may also make provision for changes in overall program direction, changes in requirement, and other discretionary or unavoidable changes. A management reserve is the usual approach. For purposes of this discussion, a program may include several projects but only one reserve. Such reserves are controlled by the client and the amount may be based on company policy, calculation, or the recommendation of others. Again it is a measure of possible exposure and is for use in the event that the client needs to change the program's direction. Similar in many respects to a contingency the name reserve identifies the party concerned with its control.

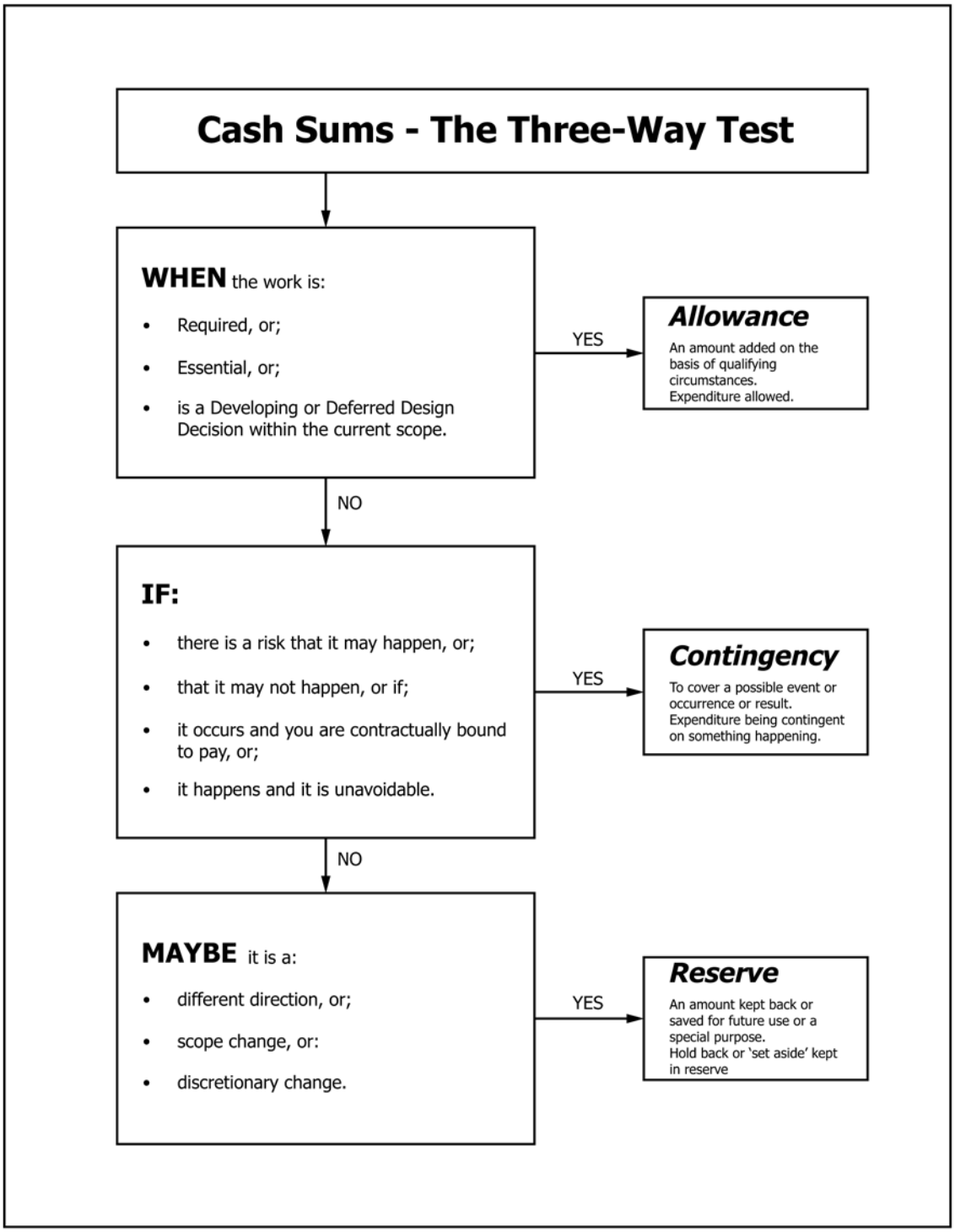

FIG. X1.1 Cash Sums – The Three-Way Test

X1.7 A simple chart summarizing the distinction and choice between the three terms, Allowance, Contingency, and Reserve, in a generic decision tree follows as Fig. X1.1.

X2. RECONSTRUCTION OF I-94 IN DETROIT, MICHIGAN

INTRODUCTION

This Appendix X2 applies the principles contained in this standard to a "real world" example. Appendix X2 is based on Managing Transportation Projects with ASTM International Standards, a Standardized News piece published by ASTM in November 2007. That article, written by Muthiah Kasi, was awarded first place in the 2007 ASTM International Advantage Award Competition.

X2.1 The Michigan Department of Transportation (MDOT) conducted a unique, highly successful three-week Value Planning (VP) Study of the planning and engineering data component of the I-94 Early Preliminary Engineering (EPE) Study. The subject of the VP Study was a seven mile, $1.2 billion reconstruction and widening of I-94 through downtown Detroit, including two freeway to freeway interchanges and seven local interchanges. The proposed project consisted of total reconstruction of the existing six lane depressed freeway plus widening to a total of four through lanes in each direction and median barrier plus a total reconstruction of 30 bridges within the two freeway interchanges and another 40 bridges over the freeway. The freeway and service drive project would require the purchase of approximately 100 business and residential properties adjacent to existing I-94 (see Fig. X2.1).

X2.2 The Value Planning was performed in two one-week sessions with a 10-day break. The participants included engineers from MDOT and five other consultants. The cost model for the $1.2 billion expenditure was developed by following E2168 – 06. In the planning phase of any transportation project, there are many uncertain elements. The project extends more than 10 to 20 years from planning to construction phases and there are many unknowns in design, planning and field conditions. The decision makers change in this long period and so various program changes will occur. Using this standard, various possibilities were allocated under allowance, contingency and Reserve.

X2.3 In this study, Practice E2013 was utilized to analyze the function cost of major elements, such as: Retain Earth; Detour Traffic; Separate Traffic; and Discharge Water. The computation of the costs of each of these functions is shown below:

X2.3.1 Retaining Wall (Retain Earth): The base cost was listed as $20.6 million. Analysis indicated a total length greater than what had been assumed. Since no survey was done to accurately compute the length an allowance of $21 million was estimated. This cost was based on aerial photography and contour maps. In addition, the VP team questioned the unit price of $60 per square feet. Recent bids on other projects show a cost of $100 per square feet. Based on this cost difference, a contingency of $27.75 million was assigned until a better verification of unit price could be achieved. The height of the wall was based on location. Base Cost and Allowance was

FIG. X2.1 Aerial View of I-94 Interchange

based on the wall closer to the mainline (see Fig. X2.2). If the wall is moved away from the mainline, the height of the wall will be increased (see Fig. X2.3). Since the decision to use a shorter wall may be changed in the future and there is a likelihood it may happen, a cost increase of $23.13 million was assigned to the Reserve.

X2.3.2 The cost of the retaining wall will be in a Minimum range of $20.6 to $41.6 million, Expected Cost in a range of $41.6 to $69.4 million, and Maximum Cost in the range of $69.4 to $92.1 million (see Fig. X2.4). As the project progresses for the next five to eight years, the real cost will emerge within these ranges. Since the decision to move the wall has a price tag of $23.13 million, the decision makers will weigh this decision carefully.

X2.4 *Traffic Control (Detour Traffic/Maintain Traffic)*—The desire was to close I-94 and detour traffic through the improved service roads. Since the actual decision may not be made for another five to eight years, it was prudent to investigate an alternative. If the project were built in one direction at a time, substantial sheeting would be required to support the adjacent roadway.

X2.4.1 In function analysis, the functions "Maintain I 94 Traffic" and "Detour I-94 Traffic" were analyzed. "Detour I-94 Traffic" is much less expensive than "Maintain I-94 Traffic" along the interstate. Existing I-94 traffic will be lowered by two feet to three feet to get a higher vertical clearance under crossing bridges. The recommendation at this point is to "Detour Traffic" (see Fig. X2.5).

X2.4.2 However, as the project progresses, the detour may not be acceptable to the neighborhood or to the city. In that case the traffic may have to be maintained on I-94 along the construction with sheeting between existing roadway and new construction. The sheeting is necessary since the proposed roadway is depressed three feet below the existing roadway (see Fig. X2.6). Cost of the function "Maintain Traffic" for the entire corridor is $50 million.

X2.5 *Storm Water (Discharge Water)*—The project at its early stage assumed that the elaborate drainage of the improved highway would be connected to the existing city storm sewer system that eventually discharges into the river. This was based on the assumption that there was a willingness and capacity of the stakeholder to accept this extra load. The alternative was to construct a parallel system. The cost of such a parallel system was calculated as $40.6 million. The parallel storm sewer along the I-94 corridor with pump stations and treatment system would independently discharge the water into the river.

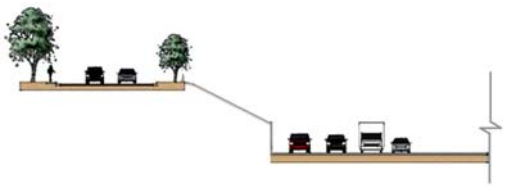

FIG. X2.2 Wall Close to the Mainline

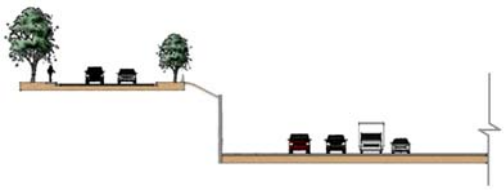

FIG. X2.3 Wall Away from the Mainline

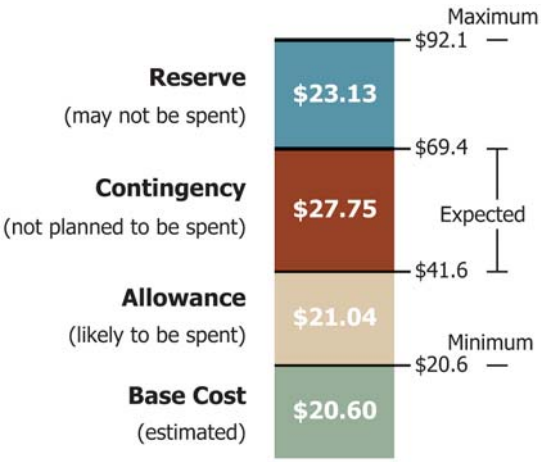

FIG. X2.4 Cost Distribution

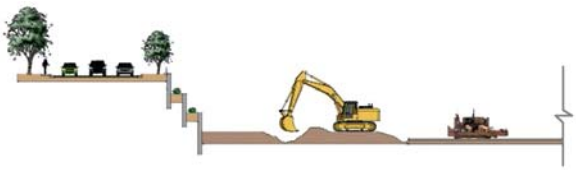

FIG. X2.5 Closed – Detour Traffic Total I-94 Reconstruction

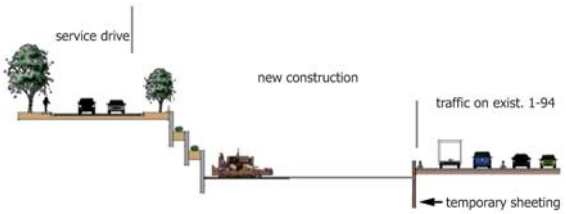

FIG. X2.6 Maintaining Traffic on I-94 Partial I-94 Construction

X2.6 The above issues are typical of the ones that are addressed in most transportation projects by a Value Engineering Team. Forecasting costs ahead and itemizing them are keys to good cost management. The three-week study cost was $270 000, about 0.02 percent of the $1.2 billion project cost. The study recommended a savings of $87.4 million with $65.8 million additional spending for project improvements. This resulted in an accepted net savings of $21.6 million.

X2.7 In the preliminary report of this project, $357 million was allocated to general contingency. The limitation of this traditional approach is that the owners, planners, designers, stakeholders, and contractors assume that this substantial amount of money is available to satisfy their needs. Individually each one looks at this amount as a large sum; however,

collectively it may or may not be enough. In addition, as the project progresses over the years, the communication of the assumptions may be lost or misinterpreted.

X2.8 Fig. X2.7 summarizes the total project cost possibilities for all categories in the cost distribution model. If the project ends up (with no surprises) as planned and the owner does not have to change course, then the cost will be Base Cost plus Allowance (Minimum Cost). If everything goes against what was assumed, the cost will be Minimum Cost plus Contingency (Expected Cost). Finally, if the owners have to change their program to accommodate all stakeholders' interests, then the cost will be Expected Cost plus Reserve (Maximum Cost) (see Fig. X2.7) summarizes all the above groupings. In the planning stage, the established range from minimum to maximum with proper explanation will help the owner manage the cost.

X2.9 *What Happens to the Allowance?*—As the design progresses, the elements will be measured, quantities calculated and unit prices applied, and appropriate allowances will be rolled into Base Cost. The decision-makers will meet with all interested parties and special groups to understand their needs, desires, and constraints. In this process some of the needs or constraints may be revised because of changed conditions or directions. They may be dropped or placed in the Reserve. Dropped items will be removed from the Allowance category or Base Cost. In addition some desired items may be accepted. These desires will be removed from the Reserve and placed in the Allowance category or Base Cost.

X2.10 *What Happens to the Contingency?*—Contingency (and Allowance too) has two major divisions; specific and non-specific. Non-specific covers overall unexpected events or items. This is based on how comfortable the design professionals feel about the project. Specific contingency is divided into three major items; planning contingency, design contingency, and construction contingency. Examples of planning contingency are location of retaining wall or extent of right-of-way. Examples of design contingency are lack of knowledge of alignment or soil conditions. Construction contingency covers unknowns such as location of utilities, level of maintenance of traffic, number of stages, or the degree of acceleration of

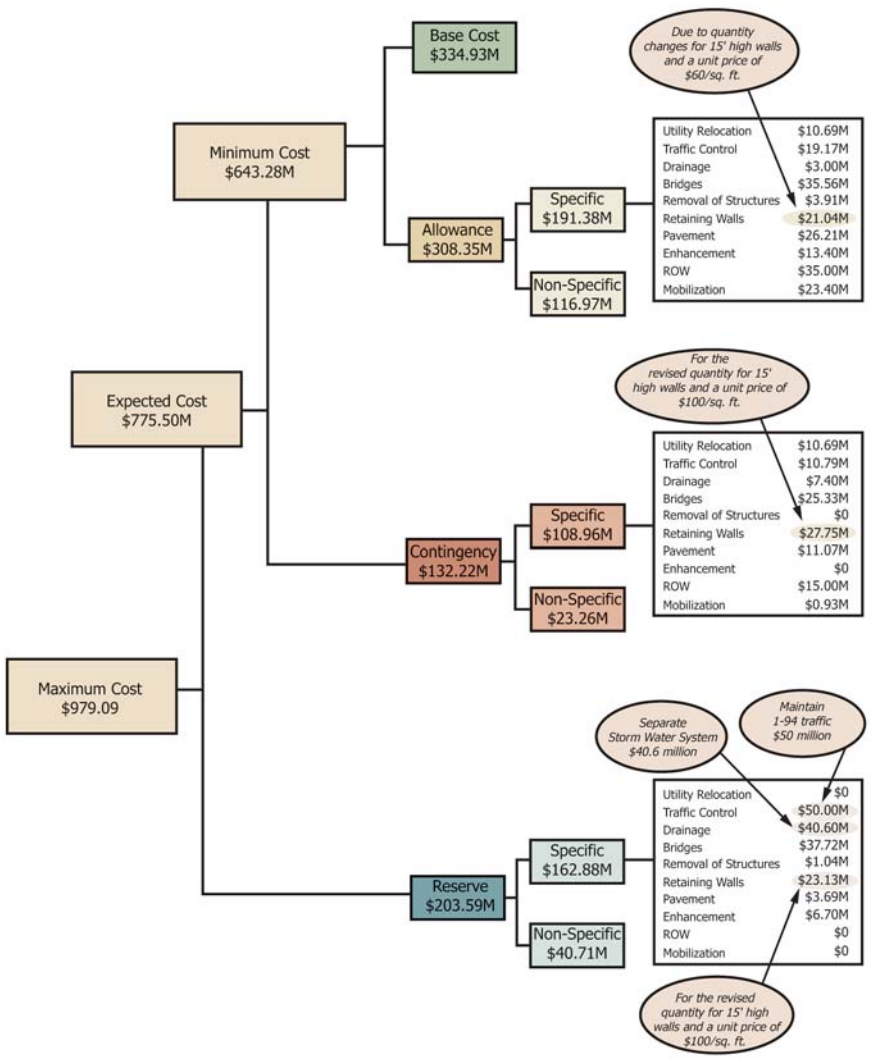

FIG. X2.7 Summary of Cost Model

schedule. As the project progresses, through the planning, some design contingencies will be converted to appropriate base cost. Construction contingency will remain until the construction is complete.

X2.11 *What Happens to the Reserve?*—As the project moves from the concept level, the decision-makers will meet with all interested parties and special groups to more fully understand their needs, desires, and constraints. In this process some of the desires will be dropped or scaled down because they are not affordable or are found to be not important to the general public interest. Cost of the rejected desires may be removed from the Reserve. Cost of the undecided items will remain in the Reserve. Cost of each accepted desire will be broken down into work items and added into the Base Cost. In addition, as noted before, some needs and constraints may be reclassified as desires and their costs placed in the Reserve.

X2.12 *Summary*—Assumptions and decisions that are made today will impact the cost eight to ten years from now when the actual construction begins. By dividing costs into groups, the intent of each is explained and the purpose of cost allocation will be clear. In addition, ownership of each major cost is identified. This will streamline the decision-making process and force people to be aware of the consequences of their decisions financially.