Designation: E2514 – 15 (Reapproved 2020)

Standard Practice for Presentation Format of Elemental Cost Estimates, Summaries, and Analyses[1]

This standard is issued under the fixed designation E2514; 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.

1. Scope

1.1 This practice covers the concurrent use of relevant ASTM standards for the preparation of elemental cost estimates, summaries, and analyses and specifically their presentation in a concise, consistent, and logical manner.

1.2 While the style and directions use construction terms applied to buildings, the principles apply equally well to other forms of construction where appropriate elemental classifications exist.

1.3 This practice is not an estimating manual, nor is it a guide to the skills and knowledge required of an estimator or other cost professional.

NOTE 1—The skills and knowledge acquired by a trained and experienced estimator are essential to the successful application of any elemental presentation format. They are the foundation of any estimate and the underpinning knowledge required when applying the elemental technique.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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

E1836/E1836M Practice for Building Floor Area Measurements for Facility Management

E2083 Classification for Building Construction Field Requirements, and Office Overhead & Profit

E2168 Classification for Allowance, Contingency, and Reserve Sums in Building Construction Estimating

2.2 *ASTM Adjunct:*

Basic Instructional Model Spreadsheet [3]

3. Terminology

3.1 *Definitions:* Definitions—For other definitions of general terms related to building construction used in this practice, refer to Terminology E631; and for general terms related to building economics, refer to Terminology E833.

3.1.1 *element, n—in construction planning, design, specification, estimating, and cost analysis*, a significant component part of the whole that performs a specific function, or functions, regardless of design, specification, or construction method.

3.1.1.1 *Discussion*—While through analysis, or by direct application, construction estimates categorized into elements (functional elements) with allocated costs, may be summarized in an **elemental cost summary** or **elemental cost analysis**; elements (functional elements) also provide a framework for consistent preliminary project description, outline, and performance specification, through all stages of planning, design, construction, and maintenance.

3.1.2 *elemental cost analysis, n—in construction planning, design, specification, estimating, and cost analysis*, a tabulation of cost categorized by **major group element**, **group element**, or **element**, or any combination thereof, to which a **parameter quantity**, or parameter quantities, has, or have, been applied to derive benchmark figures (rates, ratios, percentages, and so forth).

[1] This practice 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.

[3] Available from ASTM International Headquarters. Order Adjunct No. ADJE2514.

3.1.2.1 *Discussion*—Elemental cost analyses are valuable tools in planning, estimating, and controlling construction cost through all stages of planning and design. The benchmark figures are primarily derived from underlying estimate detail but can, in some circumstances, be used directly to approximate estimates for other projects.

3.1.3 *elemental cost summary, n—in construction planning, design, specification, estimating, and cost analysis*, a tabulation of cost categorized by **major group element**, **group element**, or **element**.

3.1.4 *group element, n—in construction planning, design, specification, estimating, and cost analysis*, a significant component part of the whole that includes relevant **elements** which, as a group, perform specific function, or functions, regardless of design, specification or construction method.

3.1.5 *major group element, n—in construction planning, design, specification, estimating, and cost analysis*, a very significant component part of the whole that includes relevant **group elements** which, as a group, perform major specific function, or functions, regardless of design, specification or construction method.

3.1.6 *parameter quantity, n—in construction planning, design, specification, estimating, and cost analysis*, a measure of the amount (quantity) of work included within a **major group element**, **group element**, or **element**, or any combination thereof, which, using standardized metrics, ensures consistent **elemental cost analysis** preparation and comparison.

3.1.7 *sub-element, n—in construction planning, design, specification, estimating, and cost analysis*, a component part of an **element** that performs a specific function, or functions, regardless of design, specification or construction method.

3.1.8 *UNIFORMAT II UII, n*—a hierarchical breakdown structure of construction work ordered by **elements**.

3.1.8.1 *Discussion*—Primarily designed for cost management (planning, control, and analysis) during the planning, budgeting, and design phases of construction, its hierarchical elemental breakdown structure is also used for qualitative – text rich – reports (preliminary project description, condition assessment, asset description), and other quantitative – text and numerical – purposes (value engineering, risk analysis, preliminary time schedule, building information modeling).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *elemental cost plan, n*—an estimate, summarized and presented in element groups, that has been sanctioned by the owner/client.

3.2.1.1 *Discussion*—In practice an elemental cost plan includes the high level presentation figures contained in any of the relevant presentation formats referenced in this standard which, when sanctioned, become the benchmark figures against which subsequent estimates are compared.

3.3 For additional guidance on certain other terminology related to estimates, budgets, cost plans, and cost models refer to Appendix X1.

4. Summary of Practice

4.1 This practice covers the concurrent use of several ASTM standards that together form a valuable and tried framework for elemental cost presentation especially when used for design stage construction cost estimating of buildings, and also:

4.1.1 Identifies three arrangements, estimate, summary, and analysis, of elemental cost presentation;

4.1.2 Provides conventions for use in completing these presentations; and

4.1.3 Provides suggestions for some typical uses, including reporting, error checking, change tracking, and comparison through the planning, design, construction, and final archival record stages common to all building projects.

4.2 This practice is about arrangement, format, and presentation only. It is not an estimating manual and relates solely to the presentation of elemental estimates or costs, or both, in a very specific format.

4.3 For the purposes of this practice an estimate is deemed to be the whole *corpus* of measurement, description, and pricing detail that together make up the total sum. The two formats referred to in this practice, elemental summary and elemental analysis, are either a summary arrangement or an analysis arrangement of this underlying estimate detail. These formats represent a high-level presentation of the basic estimate. An elemental estimate is different in that there is no underlying detail and so, in this case, the presentation is the estimate, using the elemental analysis format.

5. Significance and Use

5.1 *Significance:*

5.1.1 The application of elements (see 3.1.1 and Terminology E833) to the description and the summary and analysis of building construction cost provides a consistency, commonality, and utility through all stages of design that other forms of estimate presentation do not.

5.1.2 This practice describes a simple format for elemental cost analysis presentation that is both valuable and informative when used during the various design stages of construction development.

5.2 *Use*—Users include owners, developers, contractors, cost professionals, estimators, architects, engineers, quantity surveyors, facility managers, and others involved in property development, construction, maintenance, and management.

5.2.1 *Reporting*—Cost reports structured by elements provide estimates, summaries, and analyses by applying “Cost to Function.” This application works whether the approach is “Design to Cost” or “Cost to Design.” Value analysis is greatly assisted through the allocation of estimated cost to elements.

5.2.2 *Controlling*—Comparison of progressively more detailed estimates is simplified where cost is allocated to appropriate elements regardless of design or specification, permitting efficient review and checking of new estimates. Design estimating using elements allows for benchmarking and the setting of cost limits (baseline) for a building design from the outset, and also permits the establishment of an elemental cost plan (see 3.2.1). Baseline records and cost plans are accessed and compared with current reports.

5.2.3 *Recording*—Historic and baseline cost records are easily kept for all forms of building construction, and in a format that can be used for the planning and design of future projects.

5.2.4 *Other Uses*—Elemental summaries and analyses are equally useful in forensic estimating and in quantitative risk analysis.

5.2.5 *Relationship to "Trade" Estimating*—Traditional trade (or construction) estimating summarizes cost to a product, or trade classification. This is valuable when construction work has been fully specified or contracted, but is less so through the planning and design stages. The two systems (trade and elemental) are compatible in that they both relate to the same end product, for example, a building; they differ solely in the way cost is aggregated. Each estimate form can be converted to the other by coding or allocating each construction component to an appropriate trade/product division or element. During design evolution, changes in design and specification can make trade estimates difficult to compare with previous or other, or both, estimates and so can hinder the process of cost control during the design phase.

5.2.6 *Additional Narrative Information*—While costs presented in these formats are descriptive in themselves they do not tell the full story of a project's design. Narrative description of the construction work should also be an integral part of any complete presentation. Reference and description of this narrative form can be found in Practice E1804, and in Classification E1557 Appendix X3—Preliminary Project Description (PPD).

5.3 A detailed description of the presentation formats now follows. These descriptions are provided in eight sections, each intended to aid understanding of a particular facet of the formats:

Appearance	Section 6
Element Inclusions and Exclusions	Section 7
Basic Rules	Section 8
Layout	Section 9
Numeric Precision	Section 10
Estimate Calculation	Section 11
Analysis Calculation	Section 12
Variations and Additions	Section 13

6. Presentation Format—Appearance

6.1 *Elemental Cost Estimate*—It is not always readily apparent whether an elemental presentation format is actually an elemental cost estimate or an elemental cost analysis. They are quite specifically designed to be consistent in appearance with a common, structured layout that permits the ready comparison of one with another. Elemental cost summaries are obviously different in appearance however. An example elemental cost estimate is included as Appendix X3.

6.1.1 The least used of the three elemental presentation arrangements. While outwardly identical in appearance to the *analysis* format, the derivation of the data displayed within it is quite different.

6.1.2 Its limited use is primarily caused by its intent. It provides a means of preparing a structured estimate for a project when little, if any, design information is available, by using the results of elemental analyses from other, similar, designs.

6.1.3 Once design has commenced each succeeding estimate is prepared using the increasingly more detailed design documents. Consequently, there are construction details that can be identified, quantified and estimated very early in the process, which will become progressively more detailed. These updates will be consistently presented in a format that is valuable in tracking cost by means of comparison and so quickly become either an *elemental summary* or an *elemental analysis*.

6.1.4 *Hierarchy of Use*—An *elemental cost estimate* requires the use of cost figures derived from other, pre-existing, *analyses*.

6.1.4.1 The *estimate* presentation uses high order parameter ratios and unit rates derived from a database of *elemental cost analyses* of similar work.

6.1.4.2 The retention of *analyses* from previous projects is an essential prerequisite to the successful preparation of an *elemental estimate* presentation.

6.1.5 The preparation of continuing estimates through the design and documentation phases is an iterative process, while preparation of the initial cost estimate is not. Continuing design estimate presentations, based on increasingly developed design detail will far outnumber those of an initial cost estimate during the design life cycle of a project.

6.1.6 Cost modeling, based upon empirical knowledge, an understanding of basic requirements, and data obtained from elemental cost analyses of similar, completed, projects, can also be used to generate an elemental cost estimate, summary or analysis presentation.

6.1.7 An initial cost estimate will be very simple and brief, although the presentation will appear to be identical to an elemental cost analysis of a detailed estimate, or a complex cost model.

6.2 *Elemental Cost Summary*—This format is primarily used for reporting as it provides a summary of the underlying, detailed, estimate in a simple, consistent, form. An example elemental cost summary is included as Appendix X4.

6.2.1 It is a cost summary only and makes no attempt to analyze the result.

6.2.2 It provides more information than a total cost lump sum by showing the distribution of estimated cost among the various building elements and, when sanctioned by the owner/client, may become the elemental cost plan. This cost summary not only permits the speedy comparison of the various, ongoing, design estimates for the specific project, but with estimates for other projects too.

6.2.3 The comparisons made are usually between two cost summaries: the current summary and either another summary, a baseline summary, or the elemental cost plan. Included as part of a report to an owner, client, consultant, or other members of the project team, a cost summary permits each team member to compare and assess the impact of their recent design decisions and to reflect on their specific impact, both positive and negative, on the project's overall cost and economic viability.

6.2.4 This ready comparison is made easier by the use of a standard format and specifically defined element titles, wherein cost is applied to function (element) and not a trade or material