



Designation: E1557 – 09 (Reapproved 2015)

## Standard Classification for Building Elements and Related Sitework—UNIFORMAT II<sup>1</sup>

This standard is issued under the fixed designation E1557; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This classification establishes a classification of building elements and related sitework. Elements, as defined here, are major components common to most buildings. Elements usually perform a given function, regardless of the design specification, construction method, or materials used. The classification serves as a consistent reference for analysis, evaluation, and monitoring during the feasibility, planning, and design stages of buildings. Using UNIFORMAT II ensures consistency in the economic evaluation of buildings projects over time and from project to project. It also enhances reporting at all stages in construction—from feasibility and planning through the preparation of working documents, construction, maintenance, rehabilitation, and disposal.

1.2 This classification applies to buildings and related site work. It excludes specialized process equipment related to a building's functional use but does include furnishings and equipment.

1.3 The classification incorporates three hierarchical levels described as Levels 1, 2, and 3. **Appendix X1** presents a more detailed suggested Level 4 classification of sub-elements.

1.4 UNIFORMAT II is an elemental format similar to the original UNIFORMAT<sup>2</sup> elemental classification. UNIFORMAT II differs from the original UNIFORMAT, however, in that it takes into consideration a broader range of building types and has been updated to categorize building elements as they are in current building practice.

1.5 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

<sup>1</sup> 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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<sup>2</sup> The original UNIFORMAT classification was developed jointly by the General Services Administration (GSA) and the American Institute of Architects (AIA).

### 2. Referenced Documents

#### 2.1 *ASTM Standards*:<sup>3</sup>

- E833 Terminology of Building Economics
- E917 Practice for Measuring Life-Cycle Costs of Buildings and Building Systems
- E964 Practice for Measuring Benefit-to-Cost and Savings-to-Investment Ratios for Buildings and Building Systems
- E1057 Practice for Measuring Internal Rate of Return and Adjusted Internal Rate of Return for Investments in Buildings and Building Systems
- E1074 Practice for Measuring Net Benefits and Net Savings for Investments in Buildings and Building Systems
- E1121 Practice for Measuring Payback for Investments in Buildings and Building Systems
- E1185 Guide for Selecting Economic Methods for Evaluating Investments in Buildings and Building Systems
- E1369 Guide for Selecting Techniques for Treating Uncertainty and Risk in the Economic Evaluation of Buildings and Building Systems
- E1804 Practice for Performing and Reporting Cost Analysis During the Design Phase of a Project
- E2083 Classification for Building Construction Field Requirements, and Office Overhead & Profit
- E2168 Classification for Allowance, Contingency, and Reserve Sums in Building Construction Estimating
- E2514 Practice for Presentation Format of Elemental Cost Estimates, Summaries, and Analyses

#### 2.2 *Adjuncts*:

- Discount Factor Tables, Adjunct to Practices E917, E964, E1057, E1074, and E1121<sup>4</sup>

### 3. Terminology

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

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> Available from ASTM International Headquarters. Order Adjunct No. ADJE091703.

#### 4. Significance and Use

4.1 This classification defines building elements as major components common to most buildings. The classification is the common thread linking activities and participants in a building project from initial planning through operations, maintenance, and disposal.

4.2 The users of UNIFORMAT II include owners, developers, facilities programmers, cost planners, estimators, schedulers, architects and engineers, specification writers, operating and maintenance staff, manufacturers, and educators.

4.3 Use this classification when doing the following:<sup>5</sup>

4.3.1 Structuring costs on an elemental basis for economic evaluations (Practices E917, E964, E1057, E1074, E1121, and E1804) early in the design process. Using UNIFORMAT II helps reduce the cost of early analysis and contributes to substantial design and operational savings before decisions have been made that limit options for potential savings.

4.3.2 Estimating and controlling costs during planning, design, and construction. Use UNIFORMAT II to prepare budgets and to establish elemental cost plans before design begins. The project manager uses these to control project cost, time, and quality, and to set design-to-cost targets. See Appendix X2 for an example of a UNIFORMAT II building elemental design cost estimate.

4.3.3 Conducting value engineering workshops. Use UNIFORMAT II as a checklist to ensure that alternatives for all elements of significant cost in the building project are analyzed in the creativity phase of the job plan. Also, use the elemental cost data to expedite the development of cost models for building systems.

4.3.4 Developing initial project master schedules. Since projects are built element by element, UNIFORMAT II is an appropriate basis for preparing construction schedules at the start of the design process.

4.3.5 Performing risk analyses. Simulation is one technique (Practice E1369) for developing probability distributions of building costs when evaluating the economic risk in undertaking a building project. Use individual elements and group elements in UNIFORMAT II for developing probability distributions of elemental costs. From these distributions, build up probability distributions of total project costs to establish acceptable project contingencies or to serve as inputs to an economic analysis. (See Practice E1185 for guidance as to what economic method to use.)

4.3.6 Structuring cost manuals and recording construction, operating, and maintenance costs in a database. Having a

<sup>5</sup> For a more comprehensive discussion of the uses of UNIFORMAT II, see Bowen, Charette, and Marshall, *UNIFORMAT II—A Recommended Classification for Building Elements and Related Sitework*, National Institute of Standards and Technology Special Publication 841, Gaithersburg, MD, 1992, and Charette and Marshall, *UNIFORMAT II Elemental Classification for Building Specifications, Cost Estimating, and Cost Analysis*, National Institute of Standards and Technology NISTIR 6389, Gaithersburg, MD, 1999.

manual or database in an elemental format helps you perform economic analysis early in the design stage and at reasonable cost.

4.3.7 Structuring preliminary project descriptions during the conceptual design phase. It facilitates the description of the scope of the project for the client in a clear, concise, and logical sequence; it provides the basis for the preparation of more detailed elemental estimates during the early concept and preliminary design phases, and it enhances communications among designers and other building professionals by providing a clear statement of the designer's intent. See Appendix X3 for a sample preliminary project description (PPD) based on UNIFORMAT II.

4.3.8 Coding and referencing standard details in computer-aided design systems. This allows an architect, for example, to reference an exterior wall assembly according to UNIFORMAT II element designations and build up a database of standard details structured according to the classification.

4.4 UNIFORMAT II, as described in this classification, includes sitework normally related to buildings but does not apply to major civil works. It is also unsuitable for process applications or for preparing trade estimates.

#### 5. Basis of Classification

5.1 What part of the built environment is included? The framework in Fig. 1 shows how buildings and related sitework fit in with the rest of the built environment. This classification describes exclusively the elements that make up the blocks shaded under the *building* block, that is, construction of buildings and related sitework. UNIFORMAT II does not treat other aspects of buildings or other features of the built environment, which are indicated by the non-shaded blocks.

NOTE 1—The other features of the built environment in Fig. 1 are listed for illustrative purposes and are not intended to be a comprehensive list of other features.

5.2 *Criteria for the Classification*—The selected classification, what items to include in it, and in which parts of the classification to include them are based on the following criteria:

5.2.1 The classification will be applicable to any building type, while at the same time allowing for details desirable for specialized buildings. The classification of building elements

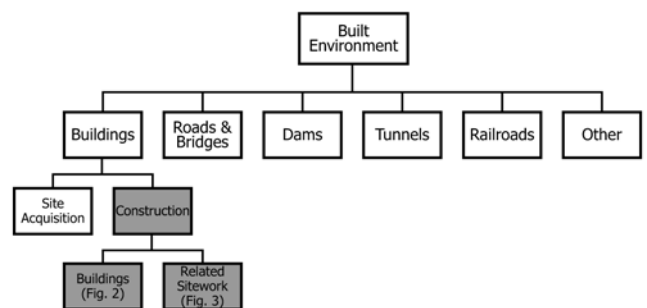


FIG. 1 Possible Framework of the Built Environment

<b>Level 1 Major Group Elements</b>	<b>Level 2 Group Elements</b>	<b>Level 3 Individual Elements</b>
A SUBSTRUCTURE	A10 Foundations	A1010 Standard Foundations A1020 Special Foundations A1030 Slab on Grade
	A20 Basement Construction	A2010 Basement Excavation A2020 Basement Walls
B SHELL	B10 Superstructure	B1010 Floor Construction B1020 Roof Construction
	B20 Exterior Enclosure	B2010 Exterior Walls B2020 Exterior Windows B2030 Exterior Doors
	B30 Roofing	B3010 Roof Coverings B3020 Roof Openings
C INTERIORS	C10 Interior Construction	C1010 Partitions C1020 Interior Doors C1030 Fittings
	C20 Stairs	C2010 Stair Construction C2020 Stair Finishes
	C30 Interior Finishes	C3010 Wall Finishes C3020 Floor Finishes C3030 Ceiling Finishes
D SERVICES	D10 Conveying	D1010 Elevators & Lifts D1020 Escalators & Moving Walks D1090 Other Conveying Systems
	D20 Plumbing	D2010 Plumbing Fixtures D2020 Domestic Water Distribution D2030 Sanitary Waste D2040 Rain Water Drainage D2090 Other Plumbing Systems
	D30 HVAC	D3010 Energy Supply D3020 Heat Generating Systems D3030 Cooling Generating Systems D3040 Distribution Systems D3050 Terminal & Package Units D3060 Controls and Instrumentation D3070 Systems Testing & Balancing D3090 Other HVAC Systems & Equipment
	D40 Fire Protection	D4010 Sprinklers D4020 Standpipes D4030 Fire Protection Specialties D4090 Other Fire Protection Systems
	D50 Electrical	D5010 Electrical Service & Distribution D5020 Lighting and Branch Wiring D5030 Communications & Security D5090 Other Electrical Systems
E EQUIPMENT & FURNISHINGS	E10 Equipment	E1010 Commercial Equipment E1020 Institutional Equipment E1030 Vehicular Equipment E1090 Other Equipment
	E20 Furnishings	E2010 Fixed Furnishings E2020 Movable Furnishings
F SPECIAL CONSTRUCTION & DEMOLITION	F10 Special Construction	F1010 Special Structures F1020 Integrated Construction F1030 Special Construction Systems F1040 Special Facilities F1050 Special Controls and Instrumentation
	F20 Selective Building Demolition	F2010 Building Elements Demolition F2020 Hazardous Components Abatement

**FIG. 2 UNIFORMAT II Classification of Building Elements with Alpha-Numeric Designations**

will be separate from the classification of building-related sitework. The classifications will be hierarchical to allow different levels of aggregation and summarization. And they will relate to other elemental classifications<sup>6</sup> such as UNIFORMAT and the classification of the Canadian Institute of Quantity Surveyors.<sup>7</sup>

5.2.2 Items in the classification will have significant influence on cost and a high frequency of occurrence. Categories will be defined so as to provide a framework for cost control. The decision as to where among the classification elements to include specific items is to rely on professional judgment as to where building professionals in current practice normally look for such items.

5.2.3 *Classification of Building Elements*—Fig. 2 presents the UNIFORMAT II classification of building elements. It comprises three hierarchical levels: Major Group Elements for Level 1, Group Elements for Level 2, and Individual Elements for Level 3. See Section 6 for detailed lists of specific items that are included and excluded under each individual element listed in the Level 3 category. A list of suggested level 4 building sub-elements is presented in Table X1.1.

5.2.4 *Classification of Building-Related Sitework*—Fig. 3 presents the UNIFORMAT II classification of building-related sitework. See Section 7 for detailed lists of specific items that are included and excluded under each individual element listed in the Level 3 category. A list of suggested Level 4 building-related sitework sub-elements is presented in Table X1.1.

5.2.4.1 UNIFORMAT II is not intended to classify elements of major civil works. Rather, it is provided for exclusive use in support of the construction of buildings. Buildings are usually

<sup>6</sup> For more information on other elemental classifications, see Brian Bowen and Robert Charette, "Elemental Cost Classification Standard for Building Design," 1991 *AACE Transactions*, 1991.

<sup>7</sup> Available from the Canadian Institute of Quantity Surveyors (CIQS), 90 Nolan Court, Unit 19, Markham, ON, Canada, L3R 4L9, <http://www.ciqs.org>.

constructed with roads, utilities, parking areas, and other non-building features. The UNIFORMAT II classification of building-related sitework provides guidance so that planners do not have to resort to multiple elemental classifications for one project.

**6. Description of Building Elements**

6.1 The following lists show what items are included and excluded in the recommended classification at Level 3. Note that the listings of inclusions and exclusions are not intended to be an exhaustive listing. Rather, they provide a general outline of what to expect in that element consistent with the selection criteria outlined in 5.2. Exclusions are listed to help readers find items quickly. For example, an elemental format might show exterior load bearing walls under Exterior Walls or Superstructure. UNIFORMAT II puts them under Exterior Walls based on technical judgment and current practice. Putting under Superstructure a cross-reference to Exterior Walls directs the person who looks first under Superstructure to the appropriate element. Note that the table in Fig. 2 incorporates an alphanumeric designation for the classification: a single character letter code for Level 1 Major Group Elements, a three character alphanumeric code for Level 2 Group Elements, and a five character alphanumeric code for Level 3 Individual Elements.

6.2 *Foundations (A10):*

6.2.1 *Standard Foundations (A1010):*

6.2.1.1 Includes:

- (1) Wall and column foundations;
- (2) Foundation walls up to level of top of slab on grade;
- (3) Pile caps;
- (4) Foundation excavation, backfill, and compaction;
- (5) Footings and bases;
- (6) Perimeter insulation;
- (7) Perimeter drainage;

<b>Level 1 Major Group Elements</b>	<b>Level 2 Group Elements</b>	<b>Level 3 Individual Elements</b>
G BUILDING SITEWORK	G10 Site Preparation	G1010 Site Clearing G1020 Site Demolition and Relocations G1030 Site Earthwork G1040 Hazardous Waste Remediation
	G20 Site Improvements	G2010 Roadways G2020 Parking Lots G2030 Pedestrian Paving G2040 Site Development G2050 Landscaping
	G30 Site Mechanical Utilities	G3010 Water Supply G3020 Sanitary Sewer G3030 Storm Sewer G3040 Heating Distribution G3050 Cooling Distribution G3060 Fuel Distribution G3090 Other Site Mechanical Utilities
	G40 Site Electrical Utilities	G4010 Electrical Distribution G4020 Site Lighting G4030 Site Communications & Security G4090 Other Site Electrical Utilities
	G90 Other Site Construction	G9010 Service and Pedestrian Tunnels G9090 Other Site Systems & Equipment

**FIG. 3 UNIFORMAT II Classification of Building Related Sitework with Alpha-Numeric Designations**



- (8) Anchor plates; and
- (9) Dewatering.
- 6.2.1.2 Excludes:
  - (1) General excavation to reduce levels (see G1030, Site Earthwork),
  - (2) Excavation for basements (see A2010, Basement Excavation),
  - (3) Basement walls (see A2020, Basement Walls), and
  - (4) Under-slab drainage and insulation (see A1030, Slab on Grade).
- 6.2.2 *Special Foundations (A1020)*:
  - 6.2.2.1 Includes:
    - (1) Piling,
    - (2) Caissons,
    - (3) Underpinning,
    - (4) Dewatering,
    - (5) Raft foundations,
    - (6) Any other special foundation conditions, and
    - (7) Grade beams.
  - 6.2.2.2 Excludes:
    - (1) Pile caps (see A1010, Standard Foundations), and
    - (2) Rock excavation (unless associated with Special Foundations) (see A1010, Standard Foundations, and A2010, Basement Excavation).
- 6.2.3 *Slab on Grade (A1030)*:
  - 6.2.3.1 Includes:
    - (1) Standard,
    - (2) Structural,
    - (3) Inclined slabs on grade,
    - (4) Trenches,
    - (5) Pits,
    - (6) Bases,
    - (7) Under-slab drainage, and
    - (8) Under-slab insulation.
  - 6.2.3.2 Excludes:
    - (1) Applied floor finishes (see C3020, Floor Finishes), and
    - (2) Hardeners and sealers to the slab (see C3020, Floor Finishes).
- 6.3 *Basement Construction (A20)*:
  - 6.3.1 *Basement Excavation (A2010)*:
    - 6.3.1.1 Includes:
      - (1) Additional excavation required for construction of basement,
      - (2) Backfill and compaction, and
      - (3) Excavation support system.
    - 6.3.1.2 Excludes:
      - (1) General grading to reduce levels over site (see G1030, Site Earthwork).
  - 6.3.2 *Basement Walls (A2020)*:
    - 6.3.2.1 Includes:
      - (1) Basement wall construction,
      - (2) Moisture protection, and
      - (3) Basement wall construction below grade.
    - 6.3.2.2 Excludes:
      - (1) Walls above grade that enclose basements (see B2010, Exterior Walls), and
      - (2) Perimeter drainage (see A1010, Standard Foundations).
- 6.4 *Superstructure (B10)*:

- 6.4.1 *Floor Construction (B1010)*:
  - 6.4.1.1 Includes:
    - (1) Floor structural frame,
    - (2) Interior structural walls,
    - (3) Floor slabs and decks,
    - (4) Inclined and stepped floors,
    - (5) Expansion and contraction joints,
    - (6) Balcony construction,
    - (7) Suspended ramps,
    - (8) Exterior stairs and fire escapes, and
    - (9) Other floor construction (for example, catwalks, space frames, etc.).
  - 6.4.1.2 Excludes:
    - (1) Exterior load bearing walls (see B2010, Exterior Walls),
    - (2) Applied and suspended ceiling and floor finishes (see C3020, Floor Finishes and C3030, Ceiling Finishes),
    - (3) Stair construction (see C2010, Stair Construction), and
    - (4) Balcony walls and railings (see B2010, Exterior Walls).
- 6.4.2 *Roof Construction (B1020)*:
  - 6.4.2.1 Includes:
    - (1) Roof structural frame;
    - (2) Structural interior walls supporting roof;
    - (3) Roof decks, slabs, and sheathing;
    - (4) Canopies; and
    - (5) Other roof construction.
  - 6.4.2.2 Excludes:
    - (1) Roof coverings (see B3010, Roof Coverings),
    - (2) Skylights and roof openings (see B3020, Roof Openings), and
    - (3) Stair construction (see C2010, Stair Construction).
- 6.5 *Exterior Enclosure (B20)*:
  - 6.5.1 *Exterior Walls (B2010)*:
    - 6.5.1.1 Includes:
      - (1) Exterior wall construction with facing materials, exterior applied finishes, back-up construction, framing, sheathing, wallboard, parapets, insulation, and vapor retarders;
      - (2) Exterior load-bearing wall construction;
      - (3) Exterior louvers and screens;
      - (4) Exterior sun control devices;
      - (5) Balcony walls and railings; and
      - (6) Exterior soffits.
    - 6.5.1.2 Excludes:
      - (1) Applied finishes to interior faces of exterior walls (see C3010, Wall Finishes),
      - (2) Columns and beams in exterior walls (see B10, Superstructure),
      - (3) Venetian blinds (see E20, Furnishings),
      - (4) Other interior sun control devices (see E20, Furnishings),
      - (5) Roof eaves and eaves soffits (see B3010, Roof Coverings), and
      - (6) Glazed curtain walls (see B2020, Exterior Windows).
  - 6.5.2 *Exterior Windows (B2020)*:
    - 6.5.2.1 Includes:
      - (1) Windows;
      - (2) Storefronts;
      - (3) Curtain walls;

- (4) Exterior painting of windows; and
- (5) Wall opening elements such as lintels, sills, flashings, etc.

6.5.2.2 Excludes:

- (1) Window treatments (see E20, Furnishings).

6.5.3 *Exterior Doors (B2030):*

6.5.3.1 Includes:

- (1) Personnel doors,
- (2) Revolving doors,
- (3) Overhead doors, and
- (4) Other doors (for example, hanger doors, blast-resistant doors, and so forth).

6.6 *Roofing (B30):*

6.6.1 *Roof Coverings (B3010):*

6.6.1.1 Includes:

- (1) Roofing membranes, shingles, and tiles;
- (2) Traffic coatings;
- (3) Waterproof membranes below paving;
- (4) Expansion joints;
- (5) Vapor retarders;<sup>8</sup>
- (6) Roof and deck insulation;
- (7) Roof fill;
- (8) Flashings and trim;
- (9) Gutters and downspouts; and
- (10) Eaves and eaves soffits.

6.6.1.2 Excludes:

- (1) Roof openings (see B3020, Roof Openings),
- (2) Roof drains (see D2040, Rain Water Drainage), and
- (3) Parapets (see B2010, Exterior Walls).

6.6.2 *Roof Openings (B3020):*

6.6.2.1 Includes:

- (1) Skylights,
- (2) Area glazing,
- (3) Roof hatches,
- (4) Gravity roof ventilators, and
- (5) Smoke vents.

6.6.2.2 Excludes:

- (1) Powered and ducted ventilators (see D3040, Distribution Systems).

6.7 *Interior Construction (C10):*

6.7.1 *Partitions (C1010):*

6.7.1.1 Includes:

- (1) Fixed partitions,
- (2) Demountable partitions,
- (3) Retractable and movable partitions,
- (4) Operable partitions,
- (5) Interior balustrades and screens, and
- (6) Interior window and storefronts.

6.7.1.2 Excludes:

- (1) Stair balustrades (see C2010, Stair Construction),
- (2) Interior load bearing and shear walls (see B10, Superstructure), and
- (3) Applied wall finishes (see C3010, Wall Finishes).

6.7.2 *Interior Doors (C1020):*

6.7.2.1 Includes:

- (1) Standard swinging doors,
- (2) Glazed doors,
- (3) Sliding and folding doors,
- (4) Fire doors,
- (5) Other doors,
- (6) Door frames,
- (7) Door hardware,
- (8) Door opening elements,
- (9) Door painting and staining, and
- (10) Hatches and access doors.

6.7.2.2 Excludes:

- (1) Vault doors (see E10, Equipment), and
- (2) Operable partitions (see C1010, Partitions).

6.7.3 *Fittings (C1030):*

6.7.3.1 Includes:

- (1) Chalk and tack boards,
- (2) Identifying devices,
- (3) Lockers,
- (4) Toilet and bath accessories,
- (5) Storage shelving,
- (6) Handrails and ornamental metals,
- (7) Fabricated toilet partitions,
- (8) Fabricated compartments and cubicles, and
- (9) Closet specialties.

6.7.3.2 Excludes:

- (1) Equipment (see E10, Equipment),
- (2) Furniture (see E20, Furnishings),
- (3) Special construction (see F10, Special Construction),
- (4) Fire extinguishers (see D4030, Fire Protection Specialities), and
- (5) Manufactured case work (see E20, Furnishings).

6.8 *Stairs (C20):*

6.8.1 *Stair Construction (C2010):*

6.8.1.1 Includes:

- (1) Stair treads, risers, and landings; and
- (2) handrails and balustrades.

6.8.1.2 Excludes:

- (1) Steps in structural slabs (see B1010, Floor Construction).

6.8.2 *Stair Finishes (C2020):*

6.8.2.1 Includes:

- (1) Finishes to treads, risers, landings, and soffits; and
- (2) Finishes to handrails and balustrades.

6.9 *Interior Finishes (C30):*

6.9.1 *Wall Finishes (C3010):*

6.9.1.1 Includes:

- (1) Concrete wall finishes,
- (2) Wall plastering,
- (3) Wallboard,
- (4) Tile and terrazzo,
- (5) Painting,
- (6) Wall coverings,
- (7) Acoustic wall treatment, and
- (8) Other coatings and finishings.

6.9.1.2 Excludes:

- (1) Wallboard integral to interior walls and partitions (see C1010, Partitions, and B2010, Exterior Walls).

6.9.2 *Floor Finishes (C3020):*

<sup>8</sup> A vapor retarder was formerly referred to as a vapor barrier.

**6.9.2.1 Includes:**

- (1) Floor toppings and traffic membranes;
- (2) Hardeners and sealers;
- (3) Tile, terrazzo, wood, and resilient flooring;
- (4) Carpeting;
- (5) Masonry and stone flooring;
- (6) Other flooring (for example, conductive, armored);
- (7) Painting and staining; and
- (8) Access pedestal flooring.

**6.9.2.2 Excludes:**

- (1) Stair finishes (see C2020, Stair Finishes).

**6.9.3 Ceiling Finishes (C3030):**
**6.9.3.1 Includes:**

- (1) Exposed concrete finishes,
- (2) Plaster ceiling finishes,
- (3) Wallboard ceiling finishes,
- (4) Acoustic ceiling tiles and panels,
- (5) Painting and staining,
- (6) Metal strip ceilings,
- (7) Other ceilings, and
- (8) All systems.

**6.9.3.2 Excludes:**

- (1) Finishes to stair soffits (see C2020, Stair Finishes), and
- (2) Finishes to exterior soffits (see B2010, Exterior Walls).

**6.10 Conveying (D10):**
**6.10.1 Elevators and Lifts (D1010):**
**6.10.1.1 Includes:**

- (1) Passenger elevators,
- (2) Freight elevators,
- (3) People lifts, and
- (4) Wheel chair lifts.

**6.10.1.2 Excludes:**

- (1) Elevator pits (see A1030, Slab on Grade).

**6.10.2 Escalators and Moving Walks (D1020):**
**6.10.2.1 Includes:**

- (1) Escalators, and
- (2) Moving walks.

**6.10.3 Other Conveying Systems (D1090):**
**6.10.3.1 Includes:**

- (1) Hoists and cranes;
- (2) Conveyors;
- (3) Dumbwaiters;
- (4) Pneumatic tube systems;
- (5) Linen, trash, and mail chutes;
- (6) Turntables;
- (7) Operable scaffolding; and
- (8) Transportation systems (for example, baggage handling and aircraft loading systems).

**6.11 Plumbing (D20):**
**6.11.1 Plumbing Fixtures (D2010):**
**6.11.1.1 Includes:**

- (1) Water closets,
- (2) Urinals,
- (3) Lavatories,
- (4) Sinks,
- (5) Showers,
- (6) Bathtubs,
- (7) Drinking fountains, and

**(8) Bidets.**
**6.11.1.2 Excludes:**

- (1) Domestic hot water heaters (see D2020, Domestic Water Distribution),
- (2) Hose bibbs (see D2020, Domestic Water Distribution), and
- (3) Other equipment (see D2090, Other Plumbing Systems).

**6.11.2 Domestic Water Distribution (D2020):**
**6.11.2.1 Includes:**

- (1) Pipes and fittings;
- (2) Valves, hydrants, and hose bibbs;
- (3) Water heaters;
- (4) Domestic water supply equipment; and
- (5) Insulation.

**6.11.2.2 Excludes:**

- (1) Plumbing fixtures (see D2010, Plumbing Fixtures).

**6.11.3 Sanitary Waste (D2030):**
**6.11.3.1 Includes:**

- (1) Waste pipe and fittings,
- (2) Vent pipe and fittings,
- (3) Floor drains,
- (4) Sanitary waste equipment, and
- (5) Insulation.

**6.11.4 Rain Water Drainage (D2040):**
**6.11.4.1 Includes:**

- (1) Pipe and fittings,
- (2) Roof drains, and
- (3) Insulation.

**6.11.4.2 Excludes:**

- (1) Gutters and downspouts (see B3010, Roof Coverings).

**6.11.5 Other Plumbing Systems (D2090):**
**6.11.5.1 Includes:**

- (1) Other piping systems,
- (2) Gas distribution,
- (3) Acid waste systems,
- (4) Pool equipment, and
- (5) Fountain piping systems and devices.

**6.12 HVAC (D30):**
**6.12.1 Energy Supply (D3010):**
**6.12.1.1 Includes:**

- (1) Oil, gas, and coal supply;
- (2) Steam, hot, and chilled water supply;
- (3) Solar energy supply; and
- (4) Wind energy supply.

**6.12.1.2 Excludes:**

- (1) Electrical energy supply systems (see D5090, Other Electrical Systems, and D5010, Electrical Service and Distribution).

**6.12.2 Heat Generating Systems (D3020):**
**6.12.2.1 Includes:**

- (1) Boilers, including electric;
- (2) Piping and fittings adjacent to boilers;
- (3) Primary pumps;
- (4) Auxiliary equipment; and
- (5) Equipment and piping insulation.

**6.12.2.2 Excludes:**

(1) Electric space unit heaters and baseboard, fuel fired unit heaters, and furnaces (see D3050, Terminal and Package Units), and

(2) Controls and instrumentation (see D3060, Controls and Instrumentation).

### 6.12.3 *Cooling Generating Systems (D3030):*

#### 6.12.3.1 Includes:

- (1) Chillers,
- (2) Cooling towers and evaporative coolers,
- (3) Condensing units,
- (4) Piping and fittings,
- (5) Primary pumps,
- (6) Direct expansion systems, and
- (7) Equipment and piping insulation.

#### 6.12.3.2 Excludes:

(1) Secondary chilled water pumps (see D3040, Distribution Systems),

(2) Distribution piping (see D3040, Distribution Systems), and

(3) Controls and instrumentation (see D3060, Controls and Instrumentation).

### 6.12.4 *Distribution Systems (D3040):*

#### 6.12.4.1 Includes:

(1) Supply and return air systems, including air handling units with coils (electric included), filters, ductwork, and associated devices such as VAV boxes, duct heaters, induction units, and grilles;

- (2) Ventilation and exhaust systems;
- (3) Steam, hot water, glycol, and chilled water distribution;
- (4) Associated terminal devices including convectors, fan-coil units, induction units, and water and steam unit heaters;
- (5) Heat recovery equipment;
- (6) Auxiliary equipment such as secondary pumps, heat exchangers, sound attenuation, and vibration isolation; and
- (7) Piping, duct, and equipment insulation.

#### 6.12.4.2 Excludes:

(1) Electric, gas, or oil fired unit heaters (see D3050, Terminal and Package Units);

(2) Furnaces (gas or oil) (see D3050, Terminal and Package Units);

(3) Floor, ceiling, and rooftop package units (see D3050, Terminal and Package Units); and

(4) Controls and instrumentation (see D3060, Controls and Instrumentation).

### 6.12.5 *Terminal and Package Units (D3050):*

#### 6.12.5.1 Includes:

(1) Electric baseboard;

(2) Electric or fossil fuel fired unit heaters, unit ventilators, and radiant heaters;

(3) Window or through-the-wall air conditioners, with or without heating of any type;

(4) Reverse-cycle, water- or air-cooled, terminal heat pumps;

(5) Wall sleeves where required;

(6) Electric or fossil fuel fired air-handling units or furnaces;

(7) Self-contained, air- or water-cooled, floor, ceiling, and rooftop air conditioners, and heat pumps;

(8) Ductwork and accessories, including flue stacks; and

(9) Factory-integrated controls.

#### 6.12.5.2 Excludes:

(1) Piping and accessories (see D3040, Distribution Systems);

(2) Hydronic or steam convectors, fan-coil units (see D3040, Distribution Systems);

(3) Cooling towers, remote air-cooled condensers, and evaporative coolers (see D3030, Cooling Generation Systems);

(4) Air-handling units with only hydronic heating or steam coils (see D3040, Distribution Systems); and

(5) Air-handling units with chilled water or direct expansion cooling coils (see D3040, Distribution Systems).

### 6.12.6 *Controls and Instrumentation (D3060):*

#### 6.12.6.1 Includes:

- (1) Heating generating systems,
- (2) Cooling generating systems,
- (3) Heating/cooling air handling units,
- (4) Exhaust and ventilating systems,
- (5) Terminal devices,
- (6) Energy monitoring and control, and
- (7) Building automation systems.

#### 6.12.6.2 Excludes:

(1) Factory-installed controls, when an integral part of terminal and package units (see D3050, Terminal and Package Units).

### 6.12.7 *Systems Testing and Balancing (D3070):*

#### 6.12.7.1 Includes:

- (1) Piping systems testing and balancing, and
- (2) Air systems testing and balancing.

### 6.12.8 *Other HVAC Systems and Equipment (D3090):*

#### 6.12.8.1 Includes:

- (1) Special cooling systems and devices,
- (2) Special humidity control,
- (3) Dust and fume collectors,
- (4) Air curtains,
- (5) Air purifiers,
- (6) Paint spray booth ventilation systems, and
- (7) General construction items associated with mechanical systems.

### 6.13 *Fire Protection (D40):*

#### 6.13.1 *Sprinklers (D4010):*

##### 6.13.1.1 Includes:

- (1) Water supply equipment,
- (2) Piping valves and fittings, and
- (3) Sprinkler heads and release devices.

#### 6.13.2 *Standpipes (D4020):*

##### 6.13.2.1 Includes:

- (1) Water supply equipment,
- (2) Piping valves and fittings, and
- (3) Cabinets and hoses.

#### 6.13.3 *Fire Protection Specialties (D4030):*

##### 6.13.3.1 Includes:

- (1) Fire extinguishers, and
- (2) Fire extinguisher cabinets.

#### 6.13.4 *Other Fire Protection Systems (D4090):*

##### 6.13.4.1 Includes:

- (1) Carbon dioxide systems,



- (2) Clean agent systems,
- (3) Foam generating systems,
- (4) Dry chemical systems, and
- (5) Exhaust hood systems.

6.14 *Electrical (D50)*:

6.14.1 *Electrical Service and Distribution (D5010)*:

6.14.1.1 Includes:

- (1) Primary transformers,
- (2) Secondary transformers,
- (3) Main switchboard,
- (4) Interior distribution transformers,
- (5) Branch circuit panels,
- (6) Enclosed circuit breakers,
- (7) Motor control centers, and
- (8) Conduit and wiring to circuit panels.

6.14.1.2 Excludes:

- (1) Outdoor transformers (see G4010, *Electrical Distribution*),
- (2) Emergency power (see D5090, *Other Electrical Systems*), and
- (3) Branch wiring (see D5020, *Lighting and Branch Wiring*).

6.14.2 *Lighting and Branch Wiring (D5020)*:

6.14.2.1 Includes:

- (1) Branch wiring and devices for lighting fixtures,
- (2) Lighting fixtures,
- (3) Branch wiring for devices and equipment connections,
- (4) Devices, and
- (5) Exterior building lighting.

6.14.2.2 Excludes:

- (1) Underfloor raceways (see D5090, *Other Electrical Systems*), and
- (2) Exterior site lighting (see G4020, *Site Lighting*).

6.14.3 *Communications and Security (D5030)*:

6.14.3.1 Includes:

- (1) Fire alarm systems,
- (2) Call systems,
- (3) Telephone systems,
- (4) Local area networks,
- (5) Public address and music systems,
- (6) Intercommunication systems and paging,
- (7) Clock and program systems,
- (8) Television systems, and
- (9) Security systems.

6.14.3.2 Excludes:

- (1) Other electrical systems (see D5090, *Other Electrical Systems*).

6.14.4 *Other Electrical Systems (D5090)*:

6.14.4.1 Includes:

- (1) Emergency generators,
- (2) UPS,
- (3) Emergency lighting systems,
- (4) Power factor correction,
- (5) Lightning and grounding protection systems,
- (6) Raceway systems, and
- (7) Power generation systems.

6.14.4.2 Excludes:

- (1) Electric baseboard (see D3050, *Terminal and Package Units*),

- (2) Electric coils and duct heaters (see D3040, *Distribution Systems*),

- (3) Building automation and energy monitoring systems (see D3060, *Controls and Instrumentation*), and

- (4) Communications and security systems (see D5030, *Communications and Security*).

6.15 *Equipment (E10)*:

6.15.1 *Commercial Equipment (E1010)*:

6.15.1.1 Includes:

- (1) Security and vault equipment,
- (2) Teller and service equipment,
- (3) Registration equipment,
- (4) Checkroom equipment,
- (5) Mercantile equipment,
- (6) Commercial laundry and dry cleaning equipment,
- (7) Vending equipment, and
- (8) Office equipment.

6.15.2 *Institutional Equipment (E1020)*:

6.15.2.1 Includes:

- (1) Ecclesiastical equipment,
- (2) Library equipment,
- (3) Theater and stage equipment,
- (4) Instrumental equipment,
- (5) Audio-visual equipment,
- (6) Detention equipment,
- (7) Laboratory equipment,
- (8) Medical equipment, and
- (9) Mortuary equipment.

6.15.3 *Vehicular Equipment (E1030)*:

6.15.3.1 Includes:

- (1) Vehicular service equipment,
- (2) Parking control equipment, and
- (3) Loading dock equipment.

6.15.4 *Other Equipment (E1090)*:

6.15.4.1 Includes:

- (1) Maintenance equipment;
- (2) Solid waste handling equipment;
- (3) Food service equipment;
- (4) Residential equipment;
- (5) Unit kitchens;
- (6) Darkroom equipment;
- (7) Athletic, recreational, and therapeutic equipment;
- (8) Planetarium equipment;
- (9) Observatory equipment; and
- (10) Agricultural equipment.

6.16 *Furnishings (E20)*:

6.16.1 *Fixed Furnishings (E2010)*:

6.16.1.1 Includes:

- (1) Fixed artwork,
- (2) Fixed casework,
- (3) Window treatment,
- (4) Fixed floor grilles and mats,
- (5) Fixed multiple seating, and
- (6) Fixed interior landscaping.

6.16.2 *Movable Furnishings (E2020)*:

6.16.2.1 Includes:

- (1) Movable artwork,
- (2) Furniture and accessories,
- (3) Movable rugs and mats,
- (4) Movable multiple seating, and
- (5) Movable interior landscaping.

6.17 *Special Construction (F10):*

6.17.1 *Special Structures (F1010):*

6.17.1.1 Includes:

- (1) Air supported structures,
- (2) Pre-engineered structures, and
- (3) Other special structures.

6.17.2 *Integrated Construction (F1020):*

6.17.2.1 Includes:

- (1) Integrated assemblies,
- (2) Special purpose rooms, and
- (3) Other integrated construction.

6.17.3 *Special Construction Systems (F1030):*

6.17.3.1 Includes:

- (1) Sound, vibration, and seismic construction;
- (2) Radiation protection;
- (3) Special security systems; and
- (4) Other special construction systems.

6.17.4 *Special Facilities (F1040):*

6.17.4.1 Includes:

- (1) Aquatic facilities,
- (2) Ice rinks,
- (3) Site constructed incinerators,
- (4) Kennels and animal shelters,
- (5) Liquid and gas storage tanks, and
- (6) Other special facilities.

6.17.5 *Special Controls and Instrumentation (F1050):*

6.17.5.1 Includes:

- (1) Recording instrumentation,
- (2) Building automation systems, and
- (3) Other special controls and instrumentation.

6.18 *Selective Building Demolition (F20):*

6.18.1 *Building Elements Demolition (F2010):*

6.18.1.1 Includes:

- (1) Demolition of existing building components.

6.18.1.2 Excludes:

(1) Site demolition (see G1020, Site Demolition and Relocations).

6.18.2 *Hazardous Components Abatement (F2020):*

6.18.2.1 Includes:

(1) Removal or encapsulation of hazardous building materials and components.

## 7. Description of Building-Related Sitework

7.1 The following lists show what items are included and excluded in the sitework classification at Level 3. Note again that the table in Fig. 3 incorporates an alphanumeric designation for the classification; a single character letter code for Level 1 Major Group Elements, a three character alphanumeric code for Level 2 Group Elements, and a five character code for Level 3.

7.2 *Site Preparation (G10):*

7.2.1 *Site Clearing (G1010):*

7.2.1.1 Includes:

- (1) Clearing and grubbing, and
- (2) Tree removal and thinning.

7.2.2 *Site Demolition and Relocations (G1020):*

7.2.2.1 Includes:

- (1) Complete building demolition,
- (2) Demolition of site components, and
- (3) Relocation of buildings and utilities.

7.2.2.2 Excludes:

(1) Selective demolition within building (see F20, Selective Building Demolition).

7.2.3 *Site Earthwork (G1030):*

7.2.3.1 Includes:

- (1) Grading, excavating, and fill to modify site contours;
- (2) Soil stabilization and treatment;
- (3) Site dewatering;
- (4) Site shoring; and
- (5) Embankments.

7.2.3.2 Excludes:

(1) Building excavation for foundations and basements (see A10, Foundations, and A20, Basement Construction).

7.2.4 *Hazardous Waste Remediation (G1040):*

7.2.4.1 Includes:

- (1) Removal and restoration of contaminated soil.

7.3 *Site Improvement (G20):*

7.3.1 *Roadways (G2010):*

7.3.1.1 Includes:

- (1) Paving sub-base,
- (2) Paving and surfacing,
- (3) Curbs and gutters,
- (4) Rails and barriers,
- (5) Painted lines, and
- (6) Markings and signage.

7.3.2 *Parking Lots (G2020):*

7.3.2.1 Includes:

- (1) Parking lot paving and surfacing;
- (2) Curbs, rails, and barriers;
- (3) Parking booths and equipment; and
- (4) Markings and signage.

7.3.3 *Pedestrian Paving (G2030):*

7.3.3.1 Includes:

- (1) Paving and surfacing, and
- (2) Exterior steps.

7.3.3.2 Excludes:

(1) Waterproof membranes under terrace and plaza paving (see B3010, Roof Coverings).

7.3.4 *Site Development (G2040):*

7.3.4.1 Includes:

- (1) Fences and gates;
- (2) Retaining walls;
- (3) Terrace and perimeter walls;
- (4) Signs;
- (5) Site furnishings;
- (6) Fountains, pools, and watercourses;
- (7) Playing fields;
- (8) Flagpoles;
- (9) Miscellaneous structures; and

(10) Site equipment (for example, car wash, banking system, and theatre equipment located on the site).

7.3.4.2 Excludes:

(1) Signs (see G2010, Roadways, and G2020, Parking Lots).

7.3.5 *Landscaping (G2050)*:

7.3.5.1 Includes:

- (1) Fine grading and soil preparation,
- (2) Top soil and planting beds,
- (3) Seeding and sodding,
- (4) Planting,
- (5) Planters,
- (6) Other landscape features, and
- (7) Irrigation systems.

7.3.5.2 Excludes:

- (1) Interior planters and planting (see E20, Furnishings), and
- (2) Site grading (see G1030, Site Earthwork).

7.4 *Site Mechanical Utilities (G30)*:

7.4.1 *Water Supply (G3010)*:

7.4.1.1 Includes:

- (1) Potable and non-potable water systems,
- (2) Well systems,
- (3) Fire protection systems,
- (4) Pumping stations, and
- (5) Water storage.

7.4.1.2 Excludes:

- (1) Irrigation systems (see G2050, Landscaping).

7.4.2 *Sanitary Sewer (G3020)*:

7.4.2.1 Includes:

- (1) Piping,
- (2) Manholes,
- (3) Septic tanks,
- (4) Lift stations, and
- (5) Package waste water treatment plants.

7.4.3 *Storm Sewer (G3030)*:

7.4.3.1 Includes:

- (1) Piping,
- (2) Manholes,
- (3) Catch basins,
- (4) Lift stations,
- (5) Retention ponds, and
- (6) Ditches and culverts.

7.4.4 *Heating Distribution (G3040)*:

7.4.4.1 Includes:

- (1) Steam supply,
- (2) Condensate return
- (3) Hot water supply systems, and
- (4) Pumping stations.

7.4.4.2 Excludes:

(1) Service tunnels (see G9010, Service and Pedestrian Tunnels).

7.4.5 *Cooling Distribution (G3050)*:

7.4.5.1 Includes:

- (1) Chilled water piping,
- (2) Wells for cooling,
- (3) Pumping stations, and
- (4) Cooling towers on site.

7.4.5.2 Excludes:

(1) Service tunnels (see G9010, Service and Pedestrian Tunnels).

7.4.6 *Fuel Distribution (G3060)*:

7.4.6.1 Includes:

- (1) Piping,
- (2) Equipment, and
- (3) Storage tanks.

7.4.7 *Other Site Mechanical Utilities (G3090)*:

7.4.7.1 Includes:

- (1) Industrial waste systems, and
- (2) POL (Petroleum Oil and Lubricants) distribution systems.

7.5 *Site Electrical Utilities (G40)*:

7.5.1 *Electrical Distribution (G4010)*:

7.5.1.1 Includes:

- (1) Substations,
- (2) Overhead power distribution,
- (3) Underground power distribution,
- (4) Ductbanks, and
- (5) Grounding.

7.5.2 *Site Lighting (G4020)*:

7.5.2.1 Includes:

- (1) Fixtures and transformers,
- (2) Poles,
- (3) Wiring conduits and ductbanks,
- (4) Controls, and
- (5) Grounding.

7.5.3 *Site Communications and Security (G4030)*:

7.5.3.1 Includes:

- (1) Overhead and underground communications,
- (2) Site security and alarm systems,
- (3) Ductbanks, and
- (4) Grounding.

7.5.4 *Other Site Electrical Utilities (G4040)*:

7.5.4.1 Includes:

- (1) Cathodic protection, and
- (2) Emergency power generation.

7.6 *Other Site Construction (G90)*:

7.6.1 *Service and Pedestrian Tunnels (G9010)*:

7.6.1.1 Includes:

- (1) Constructed service and pedestrian tunnels and trench boxes, and
- (2) Prefabricated service and pedestrian tunnels and trench boxes.

7.6.2 *Other Site Systems (G9090)*:

7.6.2.1 Includes:

- (1) Snow melting systems.

## 8. Keywords

8.1 building assemblies; building economics; building elemental format; building elements; building functional elements; building systems classification; cost estimation; cost planning; design economics; economic analysis; economic evaluation; elemental building classification; elemental/systems specifications; facilities planning; life-cycle costing;

master schedules; outline specifications; risk analysis; standard classification of building systems; UNIFORMAT; value engineering

## APPENDIXES

### (Nonmandatory Information)

#### X1. EXAMPLE LEVEL 4 FOR THE UNIFORMAT II CLASSIFICATION

X1.1 The example Level 4 Classification of sub-elements for buildings and related sitework in **Table X1.1** is adapted from the Department of Defense Work Breakdown Structure (WBS) and is included in the NAVFAC Design-Build Master as part of the Design-Build Request for Proposal website.<sup>9</sup> The full structure also includes suggested Units of Measure at each level of the classification for use in elemental cost analysis and elemental cost estimating. As a whole it can be utilized to develop more comprehensive databases for capital and life-cycle costs, and to facilitate building condition assessment,

reporting, and budgeting. Level 4 of Section G, Sitework, is particularly applicable to small and medium-sized civil works projects such as parks and multi-building sites.

NOTE X1.1—Typically, there may be several options to use as an elemental unit of measure quantity definition, and user preferences and data needs may require the selection of an alternative unit. One example alternative has been included within this Example Level 4 and has been marked by an asterisk (\*).

NOTE X1.2—This example frequently uses the term Assembly, or Assemblies, when describing work within a particular section. This term refers to the use of a combination cost, or description, where a component or work description contains more than one discrete part. The use of such assemblies is a common practice within the fields of estimating and outline specification writing.

<sup>9</sup> The Design-Build Request for Proposal website can be accessed at <http://www.wbdg.org/ndbm>.

**TABLE X1.1 Example Level 4 for the UNIFORMAT II Classification of Building Elements (with Units of Measure)**

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
<b>A SUBSTRUCTURE</b>					SF	M2	Footprint area at grade
				*ALTERNATIVE Unit of Measure <i>This system includes all work below the lowest floor construction (including slab-on-grade) and the enclosing horizontal and vertical elements required to form a basement, together with the necessary mass excavation and backfill.</i>	*SF	*M2	*Area of elevated structure
<b>A10 FOUNDATIONS</b>					SF	M2	Footprint area at grade
				Foundations include the following Standard Foundations: wall and column foundations; foundation walls up to level of top of slab on grade; pile caps; foundation excavation, backfill, and compaction; footings and bases; perimeter insulation; perimeter drainage; anchor plates; and dewatering. Special Foundations include pile foundations, caissons, underpinning, dewatering, raft foundations, and pressure injected grouting. Slab on grade includes standard slab on grade, structural slab on grade, inclined slab on grade, trenches, pits and bases, and foundation drainage.			
<b>A1010 STANDARD FOUNDATIONS</b>					SF	M2	Footprint area at grade
				*ALTERNATIVE Unit of Measure <i>Continuous footings, spread footings, grade beams, foundation walls, pile caps, and column piers.</i>	*SF	*M2	*Area of elevated structure
<b>A101001 WALL FOUNDATIONS</b>					LF	M	Length of footings or wall foundations, or both
				<i>Continuous Footings</i> —Assemblies include excavation, hand-shaped bottom, compacted backfill, formwork and keyway, reinforcing steel, concrete and screed finish. <i>Foundation Walls</i> —Include work items associated with CIP foundation walls, grade beams, or CMU walls. Assemblies include excavation, compacted backfill, perimeter insulation, perimeter drainage, formwork, reinforcing steel, concrete or CMU, and wall finish.			
<b>A101002 COLUMN FOUNDATIONS AND PILE CAPS</b>					EA	EA	Number of footings, pile caps, or piers, or both
				<i>Spread Footings</i> —Individual or part of continuous pier footings. Assemblies include excavation, backfill and compaction, formwork, reinforcing steel, and concrete and screed finish. If structural steel columns set directly on spread footings, anchor bolts are included in this assembly.			