Designation: E1557 – 09 (Reapproved 2015)

Standard Classification for Building Elements and Related Sitework—UNIFORMAT II[1]

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 (ε) 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[2] 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.

2. Referenced Documents

2.1 *ASTM Standards:*[3]

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[4]

3. Terminology

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

[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.

Current edition approved Oct. 1, 2015. Published October 2015. Originally approved in 1993. Last previous edition approved in 2009 as E1557 – 09. DOI: 10.1520/E1557-09R15.

[2] The original UNIFORMAT classification was developed jointly by the General Services Administration (GSA) and the American Institute of Architects (AIA).

[3] 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] 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:[5]

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 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

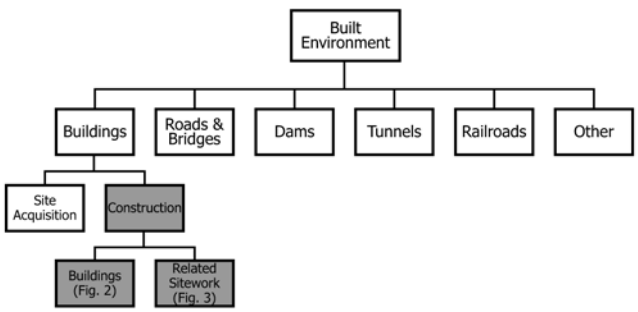

FIG. 1 Possible Framework of the Built Environment

[5] 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.

Level 1 Major Group Elements	Level 2 Group Elements	Level 3 Individual Elements
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[6] such as UNIFORMAT and the classification of the Canadian Institute of Quantity Surveyors.[7]

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 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;

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

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

Level 1 Major Group Elements	Level 2 Group Elements		Level 3 Individual Elements	
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;[8]
(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):*

[8] 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.[9] 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.

[9] 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
A	**SUBSTRUCTURE**				SF	M2	Footprint area at grade
				*ALTERNATIVE Unit of Measure *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.*	*SF	*M2	*Area of elevated structure
	A10	**FOUNDATIONS**			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.			
		A1010	**STANDARD FOUNDATIONS**		SF	M2	Footprint area at grade
				*ALTERNATIVE Unit of Measure *Continuous footings, spread footings, grade beams, foundation walls, pile caps, and column piers.*	*SF	*M2	*Area of elevated structure
			A101001	**WALL FOUNDATIONS**	LF	M	Length of footings or wall foundations, or both
				Continuous Footings—Assemblies include excavation, hand-shaped bottom, compacted backfill, formwork and keyway, reinforcing steel, concrete and screed finish. *Foundation Walls*—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.			
			A101002	**COLUMN FOUNDATIONS AND PILE CAPS**	EA	EA	Number of footings, pile caps, or piers, or both
				Spread Footings—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.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Pile Caps—Assemblies include excavation if required (normally due to installation of piles, the subgrade is at desired level for pile cap), hand-shaped bottom, compacted backfill, formwork, reinforcing steel, and concrete and screed finish. If structural steel columns set directly on spread footings, anchor bolts are included in this assembly. *Column Piers*—Assemblies include formwork, reinforcing steel, concrete or CMU, finish, break ties and patch, and set anchor bolts.			
			A101003	**DEWATERING**	SF	M2	Dewatered area
				Dewatering is the removal of water from excavations. The two principle methods of dewatering are by pump or by a system involving the sinking of a series of well-points around the area and extracting the water by suction pump. Assemblies would include pumps or well points and all associated dewatering materials and equipment.			
			A101099	**OTHER STANDARD FOUNDATIONS**	XX	XX	
				Standard foundations not described by the assembly categories listed above.			
		A1020		**SPECIAL FOUNDATIONS**	SF	M2	Footprint area at grade
				*ALTERNATIVE Unit of Measure	*SF	*M2	*Area of elevated structure
				All work associated with special foundations including piles, caissons, and any other special foundation situation.			
			A102001	**PILE FOUNDATIONS**	SF	M2	Footprint area at grade
				CIP concrete piles, precast concrete piles, steel pipe piles, steel H-piles, step-tapered steel piles, and treated wood piles. Applicable assemblies would include the material for piles, pile driving, and pile cut-offs if required.			
			A102002	**CAISSONS**	SF	M2	Footprint area at grade
				Drilled Caissons—Assemblies include drilled caissons, steel casings if required, reinforcing steel, bell bottom excavation, concrete, and loading and hauling of excavated material.			
			A102003	**UNDERPINNING**	LF	M	Length of underpinning
				Underpinning is the provision of permanent support for existing buildings by extending their foundations to a new, lower level containing the desired bearing stratum. Assemblies include excavation, backfill, and underpinning materials.			
			A102004	**DEWATERING**	SF	M2	Dewatered area
				Dewatering is the removal of water from excavations. The two principle methods of dewatering are by pump or by a system involving the sinking of a series of well-points around the area and extracting the water by suction pump. Assemblies would include pumps or well points and all associated dewatering materials and equipment.			
			A102005	**RAFT FOUNDATIONS**	SF	M2	Area of raft foundation
				Raft foundations or spread foundations consist of a solid slab of heavily reinforced concrete covering the entire building footprint area.			
			A102006	**PRESSURE INJECTED GROUTING**	SF	M2	Footprint area at grade
				Assemblies provide for injecting cement grout for foundation stabilization.			
			A102099	**OTHER SPECIAL FOUNDATIONS**	XX	XX	
				These could include cofferdams, soil compaction foundations, and other special foundations. Assemblies would include all material and labor necessary to perform the work for the special foundation condition.			
		A1030		**SLAB ON GRADE**	SF	M2	Footprint area at grade
				A slab poured on earth, whether on undisturbed or fill soil.			
			A103001	**STANDARD SLAB ON GRADE**	SF	M2	Area of slab
				Standard slab-on-grade is supported by compacted earth or gravel fill. The soil bearing capacity is sufficient to support the slab. Assemblies include fine grade, gravel fill, underslab insulation, edge forms, termite treatment (interior slabs only), vapor retarder, reinforcing, expansion joints, control joints, and finish and curing. Assemblies are based on thickness of slab.			
			A103002	**STRUCTURAL SLAB ON GRADE**	SF	M2	Area of slab
				A structural slab-on-grade is not supported by compacted earth or gravel fill. The soil bearing capacity is insufficient to support the slab. A structural slab is generally a minimum of eight inches thick and will be reinforced with reinforcing bars rather than welded wire fabric. Assemblies include fine grade, gravel fill, underslab insulation, edge forms, termite treatment, (interior slabs only), vapor retarder, reinforcing, expansion joints, control joints, and finish and curing. Assemblies are based on thickness of slab.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			A103003	**INCLINED SLAB ON GRADE**	SF	M2	Area of slab
				An inclined slab-on-grade is a slab that is poured on an incline. An example would be an inclined loading dock slab and associated ramps. Assemblies include fine grade, gravel fill, underslab insulation, edge forms, termite treatment (interior slabs only), vapor retarder, reinforcing, expansion joints, control joints, and finish and curing. Assemblies are based on thickness of slab.			
			A103004	**TRENCHES**	LF	M	Length of trench
				Cast-in-place trenches. Assemblies include excavation, hand-shaped bottoms, compacted backfill, formwork, reinforcing steel, concrete, and concrete finish. Examples include trench drains and dust trenches.			
			A103005	**PITS AND BASES**	EA	EA	Number of pits and bases
				Cast-in-place pits and bases. Assemblies include excavation, hand-shaped bottoms, compacted backfill, formwork, reinforcing steel, concrete, and concrete finish. Examples include elevator pits, dock leveler pits, oil change pits, and bases for equipment.			
			A103006	**FOUNDATION DRAINAGE**	LF	M	Length of foundation drainage material
				Foundation drainage directly associated with draining the foundation. This category does not include storm drainage piping for site. It would include drain pipe or drain tile at foundation or basement for specific purposes of draining foundation or basement. Assemblies would include excavation, hand-shaped bottoms, gravel, compacted backfill, and drain pipe, including accessories.			
			A103099	**OTHER SLAB ON GRADE**	XX	XX	
				Slab-on-grade not described by the assembly categories listed above.			
	A20	**BASEMENT CONSTRUCTION**			CY	M3	Volume of excavation
				Work Includes basement excavation, and basement walls.			
		A2010	**BASEMENT EXCAVATION**		CY	M3	Volume of excavation
				Excavation work associated with constructing a basement.			
			A201001	**EXCAVATION FOR BASEMENTS**	CY	M3	Volume of excavation
				All excavation, stockpiling, and hauling associated with basement excavations are included in this assembly.			
			A201002	**STRUCTURE BACKFILL AND COMPACTION**	CY	M3	Volume of backfill
				All backfill including hauling in of suitable soils and all necessary compaction is included in this assembly.			
			A201003	**SHORING**	SF	M2	Shoring contact area
				This type of shoring is to resist horizontal pressure and not intended to carry vertical loads. Assemblies would include sheet piling or other material and labor used to hold back earth around the perimeter of an excavation.			
			A201099	**OTHER BASEMENT EXCAVATION**	XX	XX	
				Basement excavation not described by the assembly categories listed above.			
		A2020	**BASEMENT WALLS**		SF	M2	Area of basement wall
				Assembly includes basement perimeter walls that are below grade and below the ground floor level of the building; this also includes elevator pits and other pits.			
			A202001	**BASEMENT WALL CONSTRUCTION**	SF	M2	Area of basement wall
				This includes work items associated with CIP foundation walls or CMU walls and penetrations. Assemblies include formwork, reinforcing steel, concrete or CMU, and wall finish and curing.			
			A202002	**MOISTURE PROTECTION**	SF	M2	Area of wall moisture protection
				This assembly would be based on the type and square footage of waterproofing used on the foundation wall.			
			A202003	**BASEMENT WALL INSULATION**	SF	M2	Area of wall insulation
				This assembly would be based on the type and square footage of insulation used on the foundation wall.			
			A202099	**OTHER BASEMENT WALLS**	XX	XX	
				Basement walls not described by the assembly categories listed above.			
B	**SHELL**				SF	M2	Area of supported floors
				This system includes all structural slabs, and decks and supports within basements and above grade. Note that the structural work will include both horizontal items (slabs, decks, etc.) and vertical structural components (columns and interior structural walls). Exterior load bearing walls are not included in this system but in System B2010, Exterior Walls.			
	B10	**SUPERSTRUCTURE**			SF	M2	Area of supported floors
				Work includes floor construction and roof construction.			
		B1010	**FLOOR CONSTRUCTION**		SF	M2	Area of supported floors
				This construction can be wood, concrete, CMU, steel frame, etc.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			B101001	**STRUCTURAL FRAME**	SF	M2	Area of supported floors
				The structural frame could consist of structural steel including columns, beams, joists, and all associated items. It could be a concrete frame utilizing concrete or masonry columns and concrete girders and beams. The structural frame could be wood columns with wood beams or wood trusses. The structural frame could be a combination of the above. For example, concrete or masonry columns with structural steel beams and joists. All associated work items should be included in each assembly. Separate assemblies would be used for different types of construction. The unit of measure at the assembly level is the square footage of the supported area. Decks and slabs are not included in this assembly.			
			B101002	**STRUCTURAL INTERIOR WALLS**	SF	M2	Area of wall
				Assemblies would be CIP or CMU walls or other structural interior walls. The assemblies would include the labor and material required to perform the construction tasks associated with this type of wall.			
			B101003	**FLOOR DECKS AND SLABS**	SF	M2	Area of supported floors
				Slabs above grade should be broken into assemblies according to their particular type of construction (that is, flat slab, pan slab, precast or pre-stressed slab, four-way slab, slabs on metal or wood decking with concrete fill, etc.). All associated work items should be included in each assembly, such as expansion and contraction joints.			
			B101004	**BALCONY CONSTRUCTION**	SF	M2	Area of supported balconies
				Balconies above grade should be broken into assemblies according to their particular type of construction. All associated items including handrails should be included in the assembly.			
			B101005	**RAMPS**	SF	M2	Area of supported ramps
				Ramps above grade should be broken into assemblies according to their type of construction. All associated items including handrails should be included in the assembly.			
			B101006	**FLOOR RACEWAY SYSTEMS**	SF	M2	Gross floor area
				Under floor or in-slab conduit including conduit and all associated devices.			
			B101007	**INCLINED AND STEPPED FLOORS**	SF	M2	Area of supported floors
				This assembly should be broken down according to their particular type of construction (that is, flat slab, pan slab, precast or pre-stressed slab, four-way slab, slabs on metal or wood decking with concrete fill, etc.). All associated work items should be included in each assembly, such as expansion and contraction joints.			
			B101099	**OTHER FLOOR CONSTRUCTION**	XX	XX	
				Any type of special floor construction not included above would fall in this category, such as catwalks, space frames, etc. All associated work items would be included in the assembly.			
		B1020		**ROOF CONSTRUCTION**	SF	M2	Area of supported roof
				This construction is similar to floor construction except that is applies to the framework supporting the roof and roof decks. (See also System B30, Roofing.)			
			B102001	**STRUCTURAL FRAME**	SF	M2	Area of supported roof
				The structural frame could consist of structural steel including columns, beams, joists, and all associated items. It could be a concrete frame utilizing concrete or masonry columns and concrete girders and beams. The structural frame could be wood columns with wood beams or wood trusses. The structural frame could be a combination of the above. For example, concrete or masonry columns with structural steel beams and joists. All associated work items should be included in each assembly. Separate assemblies would be used for different types of construction. The unit of measure at the assembly level is the square footage of the supported area. Decks and slabs are not included in this assembly.			
			B102002	**STRUCTURAL INTERIOR WALLS**	SF	M2	Area of walls
				Assemblies would be CIP or CMU walls or other structural interior walls. The assemblies would include the labor and material required to perform the construction tasks associated with this type of wall.			
			B102003	**ROOF DECKS AND SLABS**	SF	M2	Area of supported roof
				Roof decks and slabs should be broken into assemblies according to their particular type of construction (that is, flat slab, pan slab, precast or pre-stressed slab, four-way slab, slabs on metal or wood decking with concrete fill, etc.). All associated work items should be included in each assembly.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			B102004	**CANOPIES**	SF	M2	Area of supported canopies
				Canopies should be broken into assemblies according to their particular type of construction (that is, flat slab, pan slab, precast or pre-stressed slab, four-way slab, slabs on metal or wood decking with concrete fill, etc.). All associated work items should be included in each assembly.			
			B102099	**OTHER ROOF CONSTRUCTION**	XX	XX	
				Any type of special roof construction not included above would fall into this category. All associated work items would be included in this assembly.			
	B20			**EXTERIOR ENCLOSURE**	SF	M2	Area of exterior walls
				This system consists of the exterior facing of the facility, which includes all vertical and horizontal exterior closure such as exterior walls, exterior windows, and exterior doors. This system excludes roofing (See System B30, Roof). Load bearing exterior walls will be included here, and not in System B10, Superstructure. Structural frame elements at exterior such as columns, beams, spandrels, etc., would be included in Superstructure with only the applied exterior finishes (that is, paint, stucco, etc.) being included here. Finishes to the inside face of walls which are not an integral part of the wall construction will be included in System C30, Interior Finishes.			
		B2010		**EXTERIOR WALLS**	SF	M2	Area of exterior walls
				All materials associated with the following construction: exterior load-bearing walls, insulation and vapor retarder, parapets, exterior louvers and screens, sun control devices (exterior), balcony walls and handrails, exterior soffits, screen walls, and exterior coatings.			
			B201001	**EXTERIOR CLOSURE**	SF	M2	Area of exterior walls
				Assemblies would include material contained in exterior closure wall, such as masonry with brick veneer. Materials used for interior finishes on exterior walls are not included in this assembly. For example, if the interior side of this masonry wall is sheetrock applied on metal furring strips, the masonry wall is included in this assembly, but the furring strips and sheetrock are categorized as System C3010, Wall Finishes.			
			B201002	**EXTERIOR WALL BACKUP CONSTRUCTION**	SF	M2	Area of exterior walls
				Assemblies include the support structure for the exterior skin or provide load bearing walls for the facility, or both. Materials used for interior finishes on exterior walls are not included in this assembly. For example, if the interior side of the masonry wall is sheetrock applied on metal furring strips, the masonry wall is included in this assembly, but the furring strips and sheetrock are categorized as System C3010, Wall Finishes.			
			B201003	**INSULATION AND VAPOR RETARDER**	SF	M2	Area of insulation
				Assemblies would include all types of insulation associated with the exterior wall. Rigid, batt, and poured insulation should be separated into different assemblies.			
			B201004	**PARAPETS**	LF	M	Length of walls and parapets
				Assemblies include materials used in association with parapets. Parapets are long walls or railings usually along the edge of a roof or balcony.			
			B201005	**EXTERIOR LOUVERS AND SCREENS**	SF	M2	Area of louvers and screens
				Assemblies include louvers and screens which are located in exterior walls. The unit of measure at the assembly level is each.			
			B201006	**SUN CONTROL DEVICES (EXTERIOR)**	SF	M2	Area of sun control devices
				Assemblies include awnings, shades, and solar panels attached to the exterior of the building. A separate assembly should be used for each type of sun control device.			
			B201007	**BALCONY WALLS AND RAILINGS**	LF	M	Length of walls and railings
				Assemblies would include materials associated with balcony walls and handrails. These rails are usually guardrails and not associated with stairs.			
			B201008	**EXTERIOR SOFFITS**	SF	M2	Area of exterior soffits
				Assemblies would include all associated materials which make up the soffit and supports for the soffit. Typical materials would include wood, aluminum, exterior grade gypboard, stucco, etc.			
			B201009	**SCREEN WALL**	LF	M	Length of screen wall
				Exterior screen walls used for security purposes immediately adjacent to the building such as screen walls at a loading dock. Assemblies would include materials associated with all types of walls. Note that perimeter fencing that is typically more than five feet from the building's exterior is included in sitework rather than in this system.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			B201010	**EXTERIOR COATINGS**	SF	M2	Area of exterior coatings
				Assemblies include paint, stucco, etc. The unit of measure at the assembly level is area of exterior coatings.			
			B201011	**JOINT SEALANT**	LF	M	Length of joint sealant
				Exterior application of joint sealants			
			B201099	**OTHER EXTERIOR WALLS**	XX	XX	
				Exterior walls not described by the assembly categories listed above.			
		B2020		**EXTERIOR WINDOWS**	SF	M2	Area of windows
				All windows located in exterior walls or exterior skin.			
			B202001	**WINDOWS**	SF	M2	Area of windows
				Fixed or operable windows located in exterior walls or exterior skin. Assemblies would include frames, glazing, caulking, finishes, and other associated work.			
			B202002	**STOREFRONTS**	SF	M2	Area of storefronts
				Fixed storefronts including associated doors in exterior walls or exterior skin. Assemblies would include frames, glazing, caulking, finishes, and other associated work.			
			B202003	**CURTAIN WALLS**	SF	M2	Area of curtain walls
				This applies to glass curtain walls and spandrel glass in exterior walls or exterior skin. Assemblies would include frames, glazing, caulking, finishes, and other associated work.			
			B202004	**EXTERIOR GLAZING**	SF	M2	Area of glazing
				This includes acrylic, polycarbonate, and plastic glazing.			
			B202099	**OTHER EXTERIOR WINDOWS**	XX	XX	
				Exterior windows not described by the assembly categories listed above.			
		B2030		**EXTERIOR DOORS**	EA	EA	Number of doors
				All doors located in exterior walls or exterior skin.			
			B203001	**SOLID DOORS**	EA	EA	Number of doors
				Assemblies include all exterior solid doors, hollow metal or wood with frames. Solid doors may include viewing lites in door. Door hardware is located in B203008, Exterior Door Hardware.			
			B203002	**GLAZED DOORS**	EA	EA	Number of doors
				Assemblies include all glazed exterior doors with glass, frames (not included in storefront and curtain walls). These doors can be made of storefront materials, but are not part of a storefront. Door hardware is located in B203008, Exterior Door Hardware.			
			B203003	**REVOLVING DOORS**	EA	EA	Number of doors
				Assemblies include all revolving doors at exterior of the facility.			
			B203004	**OVERHEAD AND ROLL-UP DOORS**	SF	M2	Area of doors
				Overhead and roll-up doors installed in exterior walls or exterior skin. Assemblies include frames, hardware, hoisting devices, and finish and other associated work. The unit of measure at the assembly level is each door.			
			B203005	**HANGAR DOORS**	SF	M2	Area of doors
				Large aircraft doors used on medium and high bay hangars. Assemblies would include frames, hardware, hoisting devices, and finish and other associated work.			
			B203006	**BLAST RESISTANT DOORS**	SF	M2	Area of doors
				Special exterior doors used for blast resistance. Assemblies would include frames, hardware, hoisting devices, and finish and other associated work.			
			B203007	**GATES**	SF	M2	Area of gates
				Any special gate type used in the exterior wall or exterior skin of the building. Assemblies would include frames, hardware, hoisting devices, and finish and other associated work. The unit of measure at the assembly level is each gate.			
			B203008	**EXTERIOR DOOR HARDWARE**	EA	EA	Number of doors
				Exterior door hardware includes items such as closers, hinges, locksets, panic hardware, etc.			
			B203098	**OTHER EXTERIOR SPECIALTY DOORS**	XX	XX	
				Any special type door used in the exterior wall or exterior skin of the building. Assemblies would include frames, hardware, hoisting devices, and finish and other associated work. The unit measure at the assembly level is each door, or area of special doors, that is, hangar doors.			
			B203099	**OTHER EXTERIOR PERSONNEL DOORS**	XX	XX	
				Exterior personnel doors not described by the assembly categories listed above.			
B30				**ROOFING**	SF	M2	Gross area of roof

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				This system includes all waterproof roof coverings and insulation, expansion joints, together with skylights, hatches, ventilators, and all required trim. In addition to roof coverings, the system includes all waterproof membranes and traffic toppings over below grade enclosed areas, balconies, and the like.			
		B3010		**ROOF COVERINGS**	SF	M2	Gross area of roof
				This System includes all waterproof roof coverings and insulation, expansion joints, together with skylights, hatches, ventilators, and all required trim. In addition to roof coverings, the system includes all waterproof membranes and traffic toppings over below grade enclosed areas, balconies, and the like.			
			B301001	**HIGH SLOPE ROOF COVERINGS**	SF	M2	Area of roof covering
				Assemblies include roof coverings, such as shingle, wood shake, and standing seam, etc.			
			B301002	**LOW SLOPE MEMBRANE SYSTEMS**	SF	M2	Area of roof covering
				Assemblies include roof coverings, such as built-up, elastomeric, modified bitumen, etc. Also, walkways or work areas (used to gain access to rooftop equipment) will be included here.			
			B301003	**ROOF INSULATION AND FILL**	SF	M2	Area of insulation
				Assemblies include all types of insulation associated with the roof area.			
			B301004	**FLASHINGS AND TRIM**	SF	M2	Area of flashings
				Assemblies include all flashings associated with the roof, that is, eave flashing, gable flashing, etc.			
			B301005	**GUTTERS AND DOWNSPOUTS**	LF	M	Length of gutters and downspouts
				Assemblies include all gutters, downspouts, and associated work including splash blocks.			
			B301006	**ROOF OPENINGS AND SUPPORTS**	SF	M2	Area of openings
				All roof penetrations including roof hatches, sky lights, area glazing, roof hatches, gravity roof ventilators, smoke vents, etc.			
			B301099	**OTHER ROOFING**	XX	XX	
				Roofing not described by the assembly categories listed above.			
C	**INTERIORS**				SF	M2	Gross floor area
				Construction which takes place inside the exterior wall or exterior closure. The system does not include interior structural walls.			
	C10	**INTERIOR CONSTRUCTION**			SF	M2	Gross floor area
				This assembly includes partitions, interior doors, and fittings.			
		C1010		**PARTITIONS**	SF	M2	Area of partitions
				Includes all interior partitions.			
			C101001	**FIXED PARTITIONS**	SF	M2	Area of fixed partition walls
				Interior fixed partitions include metal or wood studs, sheetrock, masonry, and concrete walls.			
			C101002	**DEMOUNTABLE PARTITIONS**	SF	M2	Area of demountable partition walls
				Assemblies would include all demountable partitions and associated work including tracks and anchoring systems.			
			C101003	**RETRACTABLE PARTITIONS**	SF	M2	Area of retractable partition walls
				Assemblies would include all retractable or folding partitions and associated work including tracks and anchoring systems.			
			C101004	**INTERIOR GUARDRAILS AND SCREENS**	LF	M	Length of guardrails and screens
				Assemblies include balustrades (handrails and the row screen of posts that support them) and screens and associated work including tracks and anchoring systems. These balustrades/ guardrails are related to interior balconies and are not associated with stairs.			
			C101005	**INTERIOR WINDOWS**	SF	M2	Area of windows
				Fixed or operable windows. Assemblies would include frames, glazing, caulking and other associated work.			
			C101006	**GLAZED PARTITIONS AND STOREFRONTS**	SF	M2	Area of partitions and storefronts
				Fixed interior glazed partitions including interior storefronts with doors. Assemblies include frames, glazing, caulking, and other associated work.			
			C101007	**INTERIOR GLAZING**	SF	M2	Area of interior glazing
			C101008	**JOINT SEALANT**	LF	M	Length of joint sealants
			C101099	**OTHER PARTITIONS**	XX	XX	
				Interior partitions not described by the assembly categories listed above.			
		C1020		**INTERIOR DOORS**	LEF	LEF	Number of leaves
				All interior doors.			
			C102001	**STANDARD INTERIOR DOORS**	LEF	LEF	Number of leaves

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Assemblies include all standard interior wood or hollow metal doors with frames, finish, etc. Standard interior doors may include vision lites. Interior door hardware is located in C102007, Interior Door Hardware.			
			C102002	**GLAZED INTERIOR DOORS**	LEF	LEF	Number of leaves
				Assemblies include all glazed interior doors with glass, frames, finish, etc. Interior door hardware is located in C102007, Interior Door Hardware.			
			C102003	**FIRE DOORS**	LEF	LEF	Number of leaves
				Assemblies include all interior fire doors, including all necessary frames, and sensing devices integral with doors. Interior door hardware is located in C102007, Interior Door Hardware.			
			C102004	**SLIDING AND FOLDING DOORS**	SF	M2	Area of sliding or folding door
				Assemblies include all sliding and folding doors with frames, hardware, locking devices, tracks, and supporting systems. The unit of measure at the assembly level is each.			
			C102005	**INTERIOR OVERHEAD DOORS**	SF	M2	Area of doors
				Overhead doors installed in the interior of a facility. Assemblies include frames, hardware, hoisting devices, and finish and other associated work. The unit of measure at the assembly level is each door.			
			C102006	**INTERIOR GATES**	SF	M2	Area of gates
				Any special type gate installed in the interior of a facility. Assemblies include frames, hardware, hoisting devices, and finish and other associated work. The unit measure at the assembly level is each gate.			
			C102007	**INTERIOR DOOR HARDWARE**	EA	EA	Number of doors
				Interior door hardware includes items such as closers, hinges, locksets, panic hardware, etc.			
			C102098	**OTHER INTERIOR SPECIALTY DOORS**	XX	XX	
				Any special type door installed in the interior of a facility. Assemblies include frames, hardware, hoisting devices, and finish and other associated work. The unit measure at the assembly level is each gate.			
			C102099	**OTHER INTERIOR PERSONNEL DOORS**	XX	XX	
				Interior personnel doors not described by the assembly categories listed above.			
		C1030		**FITTINGS**	SF	M2	Gross floor area
				Most commonly used specialty items.			
			C103001	**COMPARTMENTS, CUBICLES AND TOILET PARTITIONS**	EA	EA	Number of compartments, cubicles, or toilet partitions
				Assemblies include individual compartments, cubicles, toilet partitions, and urinal screens.			
			C103002	**TOILET AND BATH ACCESSORIES**	EA	EA	Number of accessories
				Toilet and bath accessories. For example, soap dispensers, toilet paper holder, towel dispensers, grab bars, bathroom mirrors, etc.			
			C103003	**MARKER BOARDS AND TACK BOARDS**	SF	M2	Area of boards
				Assemblies include all marker boards, tackboards, and fastening devices. The unit of measure at the assembly level is each.			
			C103004	**IDENTIFYING DEVICES**	EA	EA	Number of identifying devices
				Assemblies include all signs, plaques, traffic markers, etc.			
			C103005	**LOCKERS**	EA	EA	Number of lockers
				Assemblies include all types of lockers, either wood or metal, single or double tier. Special bases used for lockers would be included in this assembly.			
			C103006	**SHELVING**	LF	M	Length of shelving
				Assemblies include all types of shelving with brackets and all supporting materials and finish, if required.			
			C103007	**FIRE EXTINGUISHER CABINETS**	EA	EA	Number of fire extinguisher cabinets
				This assembly would include all types and sizes of fire extinguisher cabinets. Fire extinguishers are not included in this assembly; they are included in Section D4030, Fire Protection Specialties.			
			C103008	**COUNTERS**	LF	M	Length of counters
				Assemblies include all counters and countertops with all necessary brackets and supporting materials and finish, if required.			
			C103009	**CABINETS**	LF	M	Length of cabinets
				This assembly includes all cabinetry and millwork items with associated accessories and anchoring devices. Cabinet finishes are included in this assembly. Metal cabinets should be a separate assembly from wood cabinets or millwork.			
			C103010	**CLOSETS**	LF	M	Length of closets

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				This assembly includes all built-in closets with all associated work and finishes. These closets are millwork items or prefabricated coat closets for schools and dormitories.			
			C103011	**FIRESTOPPING PENETRATIONS**	EA	EA	Each penetration
				Assembly includes sleeve, caulking, and flashing.			
			C103012	**SPRAYED FIRE-RESISTIVE MATERIALS**	SF	M2	Area of coverage
				Sprayed Fire-Resistive Materials includes materials that are applied primarily to a building's framework (columns, beams, bracing, metal decking) to prevent structural failure.			
			C103013	**RAISED ACCESS FLOORING**	SF	M2	Area of flooring
				Assemblies include all types of raised flooring, pedestal access floors and other types of access flooring.			
			C103014	**CASEWORK**	EA	EA	Each unit
				Assemblies would include built-in pre-manufactured cabinetry for specialized functions such as laboratories, libraries, medical, and dental facilities.			
			C103099	**OTHER INTERIOR SPECIALTIES**	XX	XX	
				Interior specialties not described by the assembly categories listed above.			
	C20	**STAIRS**			FLT	FLT	Number of flights
				Work includes interior stair construction.			
		C2010	**STAIR CONSTRUCTION**		FLT	FLT	Number of flights
				All work items associated with interior stairs. A flight of stairs is considered to be all the treads and risers with landings required to travel from one floor to the next.			
			C201001	**INTERIOR STAIR CONSTRUCTION**	FLT	FLT	Number of flights
				Assemblies include interior stairs. Handrails, finishes, and all associated work items are included in this assembly.			
			C201002	**EXTERIOR STAIR CONSTRUCTION**	VLF	VM	Total vertical linear distance
				Assemblies include exterior stairs which are in unheated spaces and exposed to the weather. Handrails, finishes, and all associated work items are included in the assembly.			
			C201099	**OTHER STAIR CONSTRUCTION**	XX	XX	
				Stair construction not described by the assembly categories listed above.			
		C2020	**STAIR FINISHES**		SF	M2	Area of finished landings, treads, risers
				Includes finishes to treads, risers, landings, and soffits, and finishes to handrails and guardrails.			
			C202001	**INTERIOR STAIR FINISH**	SF	M2	Area of finished landings, treads, risers
				Includes finishes to treads, risers, landings, and soffits, and finishes to handrails and guardrails.			
	C30	**INTERIOR FINISHES**			SF	M2	Area of finishing
				Includes wall finishes, floor finishes, and ceiling finishes.			
		C3010	**WALL FINISHES**		SF	M2	Area of finished walls
				Finishes which are applied to interior wall surfaces, including basement walls.			
			C301001	**CONCRETE WALL FINISHES**	SF	M2	Area of finished walls
				This assembly would include a concrete finish applied directly to an interior wall surface. This assembly does not include items that directly apply to wall finishes covered elsewhere in this subsystem.			
			C301002	**PLASTER WALL FINISHES**	SF	M2	Area of finished walls
				This assembly includes plaster or stucco applied directly to an interior wall surface. Lath and associated work would be included in this assembly. This assembly does not include items that directly apply to wall finishes covered elsewhere in this subsystem.			
			C301003	**GYPSUM WALLBOARD FINISHES**	SF	M2	Area of finished walls
				This assembly includes gypsum wallboard applied directly to an interior wall surface. Furring strips or channels are included in this assembly. This assembly also includes taping, sanding, finishing, and sheetrock accessories. This assembly does not include items that directly apply to wall finishes covered elsewhere in this subsystem.			
			C301004	**TILE AND TERRAZZO WALL FINISHES**	SF	M2	Area of finished walls
				This assembly includes tile and terrazzo applied directly to an interior wall surface. Each type of tile would be a separate assembly.			
			C301005	**PAINTING TO WALLS**	SF	M2	Area of painted walls
				This assembly includes painting, spackling and sealant applied directly to an interior wall surface.			
			C301006	**WALL COVERINGS**	SF	M2	Area of wall coverings
				This assembly includes wall coverings and protective strips applied directly to an interior wall surface.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			C301007	**ACOUSTICAL PANELS ADHERED TO WALLS**	SF	M2	Area of acoustical tiles and panels
				This assembly includes acoustical tiles and panels with associated work applied directly to an interior wall surface.			
			C301008	**SPECIAL COATINGS TO WALLS**	SF	M2	Area of special coatings
				Assemblies include any special coatings not included in assembly Categories C301001 through C301007, which are applied to interior wall surfaces.			
			C301099	**OTHER WALL FINISHES**	XX	XX	
				Assemblies include finishes to wall types not included above. These include, but are not limited to, different types of shielding and the work and materials associated with each.			
		C3020		**FLOOR FINISHES**	SF	M2	Area of finished floors
				All flooring and floor finishes applied to interior floors.			
			C302001	**TILE FLOOR FINISHES**	SF	M2	Area of tile floors
				Assemblies include ceramic, quarry, and other non-resilient tile floors.			
			C302002	**TERRAZZO FLOOR FINISHES**	SF	M2	Area of terrazzo floors
				Assemblies include terrazzo floors.			
			C302003	**WOOD FLOORING**	SF	M2	Area of wood floors
				Assemblies include wood floors.			
			C302004	**RESILIENT FLOOR FINISHES**	SF	M2	Area of resilient floors
				Assemblies include resilient floors.			
			C302005	**CARPETING**	SF	M2	Area of carpeting
			C302006	**MASONRY AND STONE FLOORING**	SF	M2	Area of masonry or stone flooring
				Assemblies include masonry and stone flooring.			
			C302007	**PAINTING AND STAINING FLOORS**	SF	M2	Area of painted or stained flooring
				Assemblies include painted and stained floor surfaces.			
			C302008	**WALL BASE FINISHES**	LF	M	Length of wall base
				Assemblies include wall base, consisting of various materials such as vinyl, ceramic tile, etc.			
			C302009	**FLOOR TOPPINGS AND TRAFFIC MEMBRANES**	SF	M2	Area of coverage
			C302010	**HARDENERS AND SEALERS**	SF	M2	Area of coverage
			C302099	**OTHER FLOORING AND FLOOR FINISHES**	XX	XX	
				Assemblies include floor finishes not described by the assembly categories listed above, such as conductive, armored, etc.			
		C3030		**CEILING FINISHES**	SF	M2	Area of ceilings
				All ceilings and ceiling finishes for interior applications.			
			C303001	**EXPOSED CONCRETE FINISHES**	SF	M2	Area of exposed concrete finish
				Assemblies include concrete finishes applied to interior ceilings. This assembly does not include items that directly apply to ceiling finishes covered elsewhere in this subsystem.			
			C303002	**PLASTER CEILING FINISHES**	SF	M2	Area of plaster ceiling finish
				Assemblies include plaster or stucco finishes applied to interior ceilings. Lath and associated work would apply to this assembly. This assembly does not include items that directly apply to ceiling finishes covered elsewhere in this subsystem.			
			C303003	**GYPSUM WALLBOARD CEILING FINISHES**	SF	M2	Area of gypsum ceilings
				Assemblies include gypsum wallboard applied to interior ceilings. Furring strips or channels are included in this assembly if they are applied directly to the ceiling surface. If the gypsum board is applied to a suspended ceiling system, the suspended system would be in Assembly Category C303007. This assembly does not include items that directly apply to ceiling finishes covered elsewhere in this subsystem.			
			C303004	**ACOUSTICAL CEILING TILES AND PANELS**	SF	M2	Area of acoustical ceilings
				Assemblies include acoustical ceiling tiles and panels. The suspension system, if required, is in Assembly Category C303007. This assembly does not include items that directly apply to ceiling finishes covered elsewhere in this subsystem.			
			C303005	**WOOD CEILINGS**	SF	M2	Area of wood ceilings
				Assemblies include wood ceilings. Different types of wood ceilings should be separated into different assemblies. If the wood ceiling is applied to a suspended ceiling system, the suspended system would be in Assembly Category C303007. This assembly does not include items that directly apply to ceiling finishes covered elsewhere in this subsystem.			
			C303006	**PAINTING AND STAINING CEILINGS**	SF	M2	Area of painted or stained ceilings
				Assemblies include painted and stained finished interior ceiling surfaces.			
			C303007	**SUSPENSIONS SYSTEMS**	SF	M2	Area of suspension system
				This assembly includes any suspension system which is suspended or hung from the structure for the purpose of fastening a ceiling.			
			C303008	**METAL STRIP CEILINGS**	SF	M2	Area of metal ceiling

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Assemblies include all metal strip materials applied to ceilings.			
			C303099	**OTHER CEILING AND CEILING FINISHES**	XX	XX	
				Special ceilings and ceiling finishes not described by the assembly categories listed above.			
D	**SERVICES**				EA	EA	Number of services
				Includes all methods of conveying, plumbing, HVAC, fire protection, and electrical.			
	D10	**CONVEYING**			STY	STY	Number of stories
				This system includes elevators, escalators, pneumatic tube systems, conveyors, chutes, etc. Foundations for these systems are included in System A, Substructure.			
		D1010		**ELEVATORS AND LIFTS**	STP	STP	Number of stops
				Includes passenger elevators and freight elevators.			
			D101001	**GENERAL CONSTRUCTION ITEMS**	EA	EA	Number of items
				Includes construction work, other than conveying system work, which must be performed in conjunction with this type of work to complete the system.			
			D101002	**PASSENGER ELEVATORS**	STP	STP	Number of stops
				The unit measure at the assembly level is each stop.			
			D101003	**FREIGHT ELEVATORS**	STP	STP	Number of stops
				The unit measure at the assembly level is each stop.			
			D101004	**WHEELCHAIR LIFT**	STP	STP	Number of stops
				Pre-manufactured lift to gain wheelchair access.			
			D101099	**OTHER ELEVATORS**	XX	XX	
				This includes elevators not described by the assembly categories listed above, such as people lifts.			
		D1020		**ESCALATORS AND MOVING WALKS**	LF	M	Length of stairs or walks
				The length of stair or walk is calculated by the length of moving stair or walk plus lift (vertical floor to floor).			
			D102001	**MOVING STAIRS**	LF	M	Length of stairs
			D102002	**MOVING WALKS**	LF	M	Length of walks
			D102099	**OTHER MOVING STAIRS AND WALKS**	XX	XX	
				Moving stairs or walks not described by the assembly categories listed above.			
		D1090		**OTHER CONVEYING SYSTEMS**	EA	EA	Number of systems
				Other conveying systems includes pneumatic tube systems, conveyor belts, chutes, and transportation systems.			
			D109001	**PNEUMATIC TUBE SYSTEMS**	EA	EA	Number of systems
			D109002	**CONVEYORS**	EA	EA	Number of material handling systems
			D109003	**LINEN, TRASH, AND MAIL CHUTES**	LF	M	Length of chutes
			D109004	**TURNTABLES**	EA	EA	Number of turntables
			D109005	**OPERABLE SCAFFOLDING**	SF	M2	Area of scaffolding
			D109006	**TRANSPORTATION SYSTEMS**	EA	EA	Number of systems
				This assembly includes baggage handling and aircraft loading systems.			
			D109007	**OVERHEAD CRANES**	EA	EA	Number of overhead cranes
			D109099	**OTHER MATERIAL HANDLING SYSTEMS**	XX	XX	
				Material or handling systems not described by the assembly categories			
	D20	**PLUMBING**			EA	EA	Number of fixtures
				The plumbing system's primary function is the transfer of liquids and gases. This system includes all water supply and waste items within the building.			
		D2010		**PLUMBING FIXTURES**	EA	EA	Number of fixtures
				All terminal devices on the domestic plumbing system which have water supplied to the fixture. Hot water heaters, hose bibbs, and special equipment are not counted as a fixture.			
			D201001	**WATERCLOSETS**	EA	EA	Number of fixtures
			D201002	**URINALS**	EA	EA	Number of fixtures
			D201003	**LAVATORIES**	EA	EA	Number of fixtures
			D201004	**SINKS**	EA	EA	Number of fixtures
			D201005	**SHOWERS/TUBS**	EA	EA	Number of fixtures
			D201006	**DRINKING FOUNTAINS AND COOLERS**	EA	EA	Number of fixtures
			D201007	**BIDETS**	EA	EA	Number of fixtures
			D201099	**EMERGENCY FIXTURES**	XX	XX	
				Emergency fixtures not described by the assembly categories listed above.			
		D2020		**DOMESTIC WATER DISTRIBUTION**	EA	EA	Number of fixtures
				This system provides for human health and comfort. The water supply needed is determined by the number of fixtures attached. Hot water heaters, hose bibbs, and special equipment are not counted as a fixture.			
			D202001	**PIPES AND FITTINGS**	EA	EA	Number of fixtures

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Assemblies include all pipe, fittings, and associated work with regard to domestic water supply. The unit of measure at the assembly level is number of fixtures.			
			D202002	**VALVES AND HYDRANTS**	EA	EA	Number of valves and hydrants
				Assemblies include all valves and hydrants. Hose bibbs are included in this assembly. The unit of measure at the assembly level is number of valves and hydrants.			
			D202003	**DOMESTIC WATER EQUIPMENT**	EA	EA	Number of fixtures
				This assembly includes equipment associated with the domestic water supply, including fittings, and specialties required for hook-up. Assemblies include hot water heaters, water treatment plant, that is, water softeners, filters, distillers, etc.; pumps directly associated with domestic water supply; and tanks for the potable hot or cold water system. The unit of measure at the assembly level is pieces of equipment.			
			D202004	**INSULATION AND IDENTIFICATION**	EA	EA	Number of fixtures
				Assemblies include insulation used in association with domestic water supply. The unit of measure at the assembly level is number of fixtures.			
			D202005	**SPECIALTIES**	EA	EA	Pieces of equipment
				Any other special items associated with domestic water supply. All associated work items, including pipes, fittings, valves, insulation, and hookup should be included in this assembly. The unit of measure at the assembly level is pieces of special equipment.			
			D202099	**OTHER DOMESTIC WATER SUPPLY**	XX	XX	
				Domestic water supply not described by the assembly categories listed above.			
		D2030		**SANITARY WASTE**	EA	EA	Number of fixtures
				This system provides for human health and comfort. Fixtures include all terminal devices which have a water supply (except water supply equipment and specialties), and also devices that transfer fluids into the sanitary waste system that do not have a water supply. Floor drains (not drain hubs) are included as a sanitary waste fixture.			
			D203001	**WASTE PIPE AND FITTINGS**	EA	EA	Number of fixtures
				Assemblies include all pipe, fittings, and associated work with regard to sanitary waste pipe and fittings. The unit of measure at the assembly level is number of fixtures.			
			D203002	**VENT PIPE AND FITTINGS**	EA	EA	Number of fixtures
				Assemblies include all pipe, fittings, and associated work with regard to sanitary vent pipe and fittings. The unit of measure at the assembly level is number of fixtures.			
			D203003	**FLOOR DRAINS**	EA	EA	Number of floor drains
				Assemblies include all floor drains. Hub drains are considered to be pipe and are not included in this category. The unit of measure at the assembly level is number of drains.			
			D203004	**SANITARY AND VENT EQUIPMENT**	EA	EA	Number of fixtures
				This is equipment associated with the sanitary waste system, including fittings and specialties required for hook-up. Assemblies include waste treatment equipment, that is, sluice gates, incinerators, etc.; pumps for sewage injection; and holding tanks for the domestic water system. The unit of measure at the assembly level is pieces of equipment.			
			D203005	**INSULATION AND IDENTIFICATION**	EA	EA	Number of fixtures
				Assemblies include insulation used in association with sanitary waste and vent system. The unit of measure at the assembly level is number of fixtures.			
			D203099	**OTHER SANITARY WASTE**	XX	XX	
				Sanitary waste and vent not described by the assembly categories listed above.			
		D2040		**RAIN WATER DRAINAGE**	SF	M2	Area of roof
				Roof drainage system. Gutter and downspouts are not included in this subsystem.			
			D204001	**PIPE AND FITTINGS**	LF	M	Length of pipe
				Assemblies include pipe and fittings from the roof drains to the discharge points, including supports and other associated work.			
			D204002	**ROOF DRAINS**	EA	EA	Number of roof drains
				Assemblies include roof drains. The unit of measure at the assembly level is number of drains.			
			D204003	**RAINWATER DRAINAGE EQUIPMENT**	EA	EA	Pieces of equipment
				This is equipment associated with the rain water drainage, including fittings and specialties required for hook-up. Assemblies include pumps and other associated items for drainage of rain water.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			D204004	**INSULATION AND IDENTIFICATION**	LF	M	Length of pipe insulation
				Assemblies include insulation used in association with rain water drainage system.			
			D204099	**OTHER RAIN WATER DRAINAGE SYSTEM**	XX	XX	
				Rain water drainage system not described by the assembly categories			
		D2090		**OTHER PLUMBING SYSTEMS**	EA	EA	Number of special fixtures, etc.
				This subsystem includes all special plumbing systems which are not included in Systems D2010 through D2040.			
			D209001	**SPECIAL PIPING SYSTEMS**	EA	EA	Number of special fixtures, interceptors, etc.
				Assemblies include all special pipe and fittings, excluding acid waste pipe and work with regard to special pipe. Medical gas and vacuum fittings, and associated systems piping are included in this category. The unit of measure at the assembly level is the number of special fixtures, interceptors, outlets, or systems.			
			D209002	**ACID WASTE SYSTEMS**	EA	EA	Number of special fixtures, interceptors, etc.
				Assemblies include all pipe, fittings, special acid waste equipment, and other associated work items with regard to acid waste systems. The unit of measure at the assembly level is the number of special fixtures, interceptors, outlets, or systems.			
			D209003	**INTERCEPTORS**	EA	EA	Number of interceptors
				Assemblies include all interceptors. The unit of measure at the assembly level is number of interceptors.			
			D209004	**POOL PIPING AND EQUIPMENT**	GPM	M3/S	Gallons per minute
				Assemblies include pumps and associated equipment with pools, including specialties required for hook-up. The unit of measure at the assembly level is each.			
			D209005	**COMPRESSED AIR SYSTEM (NON-BREATHING)**	PS I	KG/M2	Pounds per square inch
			D209099	**OTHER SPECIAL PLUMBING SYSTEMS**	XX	XX	
				This system includes special plumbing systems not described by the assembly categories listed above, such as fountain piping systems and devices.			
	D30			**HVAC**	MBH	KW	Power
				This system includes all equipment, distribution systems, controls, and energy supply systems required by the heating, ventilating, and air conditioning system.			
		D3010		**ENERGY SUPPLY**	MBH	KW	Power
				The energy input to the facility (other than electrical) in the form of fuels or hot and cold water distributed from a central base facility. Energy received from wind or solar power is included in this subsystem.			
			D301001	**OIL SUPPLY SYSTEM**	MBH	KW	Power
				Assemblies include storage equipment, transfer equipment, and distribution piping. The unit of measure at the assembly level is each system.			
			D301002	**GAS SUPPLY SYSTEM**	MBH	KW	Power
				This category includes both natural gas and LPG. Assemblies include metering and regulation equipment, storage equipment, transfer equipment, and distribution piping. The unit of measure at the assembly level is each system.			
			D301003	**COAL SUPPLY SYSTEM**	MBH	KW	Power
				This category includes storage equipment, transfer equipment, processing equipment, and distribution piping. The unit of measure at the assembly level is each system.			
			D301004	**STEAM SUPPLY SYSTEM (FROM CENTRAL PLANT)**	MBH	KW	Power
				Assemblies include meters, valves, heat exchangers, fittings, and specialties required for hook-up and distribution piping, including supports, sleeves, and insulation. The unit of measure at the assembly level is each system.			
			D301005	**HOT WATER SUPPLY SYSTEM (FROM CENTRAL PLANT)**	MBH	KW	Power
				Assemblies include meters, valves, heat exchangers, fittings, and specialties required for hook-up and distribution piping, including supports, sleeves, and insulation. The unit of measure at the assembly level is each system.			
			D301006	**SOLAR ENERGY SUPPLY SYSTEMS**	MBH	KW	Power
				Assemblies include collector panels, heat exchangers, storage tanks, pumps, etc., including pipe and fittings required for hook-up. The unit of measure at the assembly level is each system.			
			D301007	**WIND ENERGY SUPPLY SYSTEM**	MBH	KW	Power
				Wind is used to turn a generator which generates electricity. This energy is either stored in a battery or used to generate hot water in an electric boiler. Assemblies would include the required devices to make this a total electromechanical system. The unit of measure at the assembly level is each system.			
			D301099	**OTHER ENERGY SUPPLY**	XX	XX	

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Energy supply not described by the assembly categories listed above.			
		D3020		**HEAT GENERATING SYSTEMS**	MBH	KW	Power
				This subsystem includes steam, hot water, furnace, and unit heater systems. Fuels include coal, oil, gas, and electric unless otherwise noted.			
			D302001	**STEAM BOILERS**	MBH	KW	Power
				Assemblies include boilers, expansion tanks, chemical feeders, air separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of measure at the assembly level is each system.			
			D302002	**HOT WATER BOILERS**	MBH	KW	Power
				Assemblies include boilers, expansion tanks, chemical feeders, air separators, pumps, heat exchangers, boiler feed units, etc. This assembly would also include fittings and specialties and the flue stack. The unit of measure at the assembly level is each system.			
			D302003	**FURNACES**	MBH	KW	Power
				This is a system that heats air. Assemblies would include furnace and necessary fittings and specialties required for hook-up, including flue and stack. The unit of measure at the assembly level is each.			
			D302004	**FUEL-FIRED UNIT HEATERS**	MBH	KW	Power
				Assemblies would include unit heaters and the energy supply system hookup (other than electrical), including all necessary pipe, fittings, and specialties required for hook-up. Flue and stack, if required, are included in this assembly. The unit of measure at the assembly level is each.			
			D302005	**AUXILIARY EQUIPMENT**	MBH	KW	Power
				Assemblies would include any other equipment associated with heat generating systems. The unit of measure at the assembly level is each.			
			D302006	**EQUIPMENT THERMAL INSULATION**	SF	M2	Area of insulation
				Assemblies would include insulation of any component in this subsystem. The unit of measure at the assembly level is each.			
			D302099	**OTHER HEAT GENERATING SYSTEMS**	XX	XX	
				Heat generating systems not described in the assembly categories listed			
		D3030		**COOLING GENERATING SYSTEMS**	TON	KW	Total power of cooling capacity
				Cooling generating equipment of the absorption, centrifugal, reciprocating, and direct expansion types.			
			D303001	**CHILLED WATER SYSTEMS**	TON	KW	Power
				Assemblies include condensers, compressors, chillers, pumps, cooling towers, etc., including fittings and specialties required for hook-up. The unit of measure at the assembly level is each.			
			D303002	**DIRECT EXPANSION SYSTEMS**	TON	KW	Power
				Assemblies include condensers, compressors, heat pumps, and refrigerant piping. The unit of measure at the assembly level is each.			
			D303099	**OTHER COOLING GENERATING SYSTEMS**	XX	XX	
				Cooling generating systems not described by the assembly categories			
		D3040		**DISTRIBUTION SYSTEMS**	MBH	KW	Power
				This includes systems that distribute heated and cooled air, ventilating and exhaust air, hot and chilled water, steam, and glycol heating.			
			D304001	**AIR DISTRIBUTION, HEATING, AND COOLING**	CF/M	L/S	Volume of air flow
				Assemblies include heating coils, cooling coils, and fittings and specialties required for water hook-up. This assembly also includes duct heaters, filters, humidifiers, supply and return ductwork, dampers, fire dampers, supply and return grilles, registers and diffusers, turning vanes, sound traps, and all associated insulation. The unit of measure at the assembly level is CF/M.			
			D304002	**STEAM DISTRIBUTION SYSTEMS**	MBH	KW	Power
				Assemblies include pipe and fittings, supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is MBH.			
			D304003	**HOT WATER DISTRIBUTION SYSTEMS**	MBH	KW	Power
				Assemblies include pipe and fittings, supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is MBH.			
			D304004	**CHANGE OVER DISTRIBUTION SYSTEMS**	MBH	KW	Power
			D304005	**GLYCOL DISTRIBUTION SYSTEMS**	MBH	KW	Power

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Assemblies include pipe and fittings, supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is MBH.			
			D304006	**CHILLED WATER DISTRIBUTION SYSTEMS**	TON	KW	Power
				Assemblies include pipe and fittings, supports, wall and floor sleeves, and pipe insulation. The unit of measure at the assembly level is tons.			
			D304007	**EXHAUST SYSTEMS**	CF/M	L/S	Volume of air flow
				Assemblies include ductwork grilles, registers, diffusers, fans, and all associated work. The unit of measure at the assembly level is each system.			
			D304008	**AIR HANDLING UNITS**	CF/M	L/S	Volume of air flow
			D304099	**OTHER DISTRIBUTION SYSTEMS**	XX	XX	
				Distribution systems not described by the assembly categories listed above.			
		D3050		**TERMINAL AND PACKAGE UNITS**	MBH	KW	Power
				This category includes self-contained heating and cooling units.			
			D305001	**UNIT VENTILATORS**	EA	EA	Number of units
				Assemblies include the complete terminal unit and wall sleeve with all controls.			
			D305002	**UNIT HEATERS**	EA	EA	Number of units
				Assemblies include the complete terminal unit and wall sleeve with all controls.			
			D305003	**FAN COIL UNITS**	EA	EA	Number of units
				Assemblies include the complete terminal unit and wall sleeve with all controls.			
			D305004	**FIN TUBE RADIATION**	EA	EA	Number of units
				Assemblies include the complete terminal unit and wall sleeve with all controls.			
			D305005	**ELECTRIC HEATING**	EA	EA	Number of units
				Assemblies include the complete terminal unit and wall sleeve with all controls.			
			D305006	**PACKAGE UNITS**	EA	EA	Number of units
				Assemblies include complete package units, with integral roof top curbs and all associated devices. A heating system can be selected from hot water, steam coil, or gas furnace and can be a single or multi-zone system. The unit of measure at the assembly level is each.			
			D305099	**OTHER TERMINAL AND PACKAGE UNITS**	XX	XX	
				Terminal and package units not described by the assembly categories listed above.			
		D3060		**CONTROLS AND INSTRUMENTATION**	MBH	KW	Power
				Includes devices such as thermostats, timers, sensors, control valves, etc., necessary to operate the system as designed.			
			D306001	**HVAC CONTROLS**	EA	EA	Power
				Includes devices such as thermostats, timers, sensors, control valves, etc., necessary to operate the total system. The unit of measure at the assembly level is each system.			
			D306002	**ELECTRONIC CONTROLS**	EA	EA	Number of devices
			D306003	**PNEUMATIC CONTROLS**	EA	EA	Number of devices
				Assemblies includes ball and butterfly valves, actuators, high pressure chokes, valve positioners, sensors, regulators, etc.			
			D306004	**INSTRUMENT AIR COMPRESSORS**	EA	EA	Number of compressors
				Assemblies include air compressors, dryers, and distribution tubing, (only used with pneumatic control systems). The unit of measure at the assembly level is each.			
			D306005	**GAS PURGING SYSTEMS**	EA	EA	Number of systems
				Assemblies include the removal of contaminated or unwanted gases from a structure or pipe.			
			D306099	**OTHER CONTROLS INSTRUMENTATION**	XX	XX	
				Controls and instrumentation not described by the assembly categories listed above.			
		D3070		**SYSTEMS TESTING AND BALANCING**	MBH	KW	Power
				This includes operation of all systems to determine capacity and adjustment of water flow in chilled water and hot water systems, air flow of air handling units, supply and exhaust fans, and supply and return, and exhaust registers.			
			D307001	**WATER SIDE TESTING AND BALANCING—HEATING AND COOLING**	EA	EA	Number of devices
				Includes operating and testing of pumps, setting of all control valves, and determining system capacity. The unit of measure at the assembly level is each device, that is, boiler, chiller, fan coil, and unit heater.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			D307002	**AIR SIDE TESTING AND BALANCING—HEATING, COOLING, AND EXHAUST**	EA	EA	Number of devices
				Includes operating and testing of all air handling devices, adjusting of all fans to set rate of air flow, setting all fan motors at desired operation, setting of air flow at all registers, grilles, diffusers, and louvers to deliver design CFM, and testing and calibrating of thermostats to achieve desired space temperature. The unit of measure at the assembly level is each device.			
			D307003	**HVAC COMMISSIONING**	LS	LS	Lump sum
				Final testing of operational system.			
			D307099	**OTHER SYSTEMS TESTING AND BALANCING**	XX	XX	
				Systems testing and balancing not described by the assembly categories listed above.			
		D3090		**OTHER HVAC SYSTEMS AND EQUIPMENT**	EA	EA	Number of special mechanical systems
				This subsystem includes special mechanical systems that are not normally included as part of standard HVAC systems.			
			D309001	**GENERAL CONSTRUCTION ITEMS**	SF	M2	Area of special system
				Includes construction work other than mechanical which must be performed in conjunction with the special mechanical system to make the system complete.			
			D309002	**REFRIGERATION SYSTEMS**	TON	KW	Power
				Includes equipment for refrigeration in a cold storage facility. Both low and medium temperature equipment are included. Assemblies include: condensing and compressor units, evaporator blowers, refrigerant piping, and specialties, heat recovery systems (liquid or gas), heat recovery distribution systems (liquid or gas), and system testing and balancing.			
			D309099	**OTHER SPECIAL MECHANICAL SYSTEMS**	XX	XX	
				Any other mechanical system not defined in other categories. Assemblies would include special systems and special devices. The unit of measure at the assembly level is each system or device.			
	D40			**FIRE PROTECTION**	SF	M2	Gross floor area
				This system includes standard and special fire protection systems. Fire alarm systems are included in D503001.			
		D4010		**SPRINKLERS**	EA	EA	Number of sprinkler heads
				This subsystem includes the water supply equipment and related piping from the equipment to the sprinkler head.			
			D401001	**SPRINKLERS AND RELEASING DEVICES**	EA	EA	Number of sprinkler heads
				The fixture, device, or sprinkler head that releases the water to suppress the fire. The unit of measure at the assembly level is each sprinkler head.			
			D401002	**SPRINKLER WATER SUPPLY EQUIPMENT AND PIPING**	EA	EA	Number of sprinkler heads
				Assemblies include alarm valves, flow control valves, pipe and fittings from equipment to sprinkler heads, including all supports and wall or floor sleeves. All equipment including tanks, pumps, and other associated equipment, fittings, and specialties required for hook-up are in this assembly. The unit of measure at the assembly level is each sprinkler head.			
		D4020		**STANDPIPE SYSTEMS**	EA	EA	Number of sprinkler heads
				This subsystem includes the complete standpipe system.			
			D402001	**STANDPIPE EQUIPMENT AND PIPING**	EA	EA	Number of sprinkler heads
				Assemblies include standpipe risers and all other piping, fittings, and supports associated with this category. Siamese connections, roof manifolds, cabinets, hoses, racks, and other fire department connections are included in this assembly. All equipment including pumps, tanks, etc., with all required fittings and specialties for hook-up are included in this assembly.			
		D4030		**FIRE PROTECTION SPECIALTIES**	EA	EA	Number of extinguishers
				This subsystem includes fire extinguishing devices.			
			D403001	**FIRE EXTINGUISHING DEVICES**	EA	EA	Number of extinguishers
				Assemblies include all types of fire extinguishers, that is, water, dry chemical, carbon dioxide, soda acid, etc. The brackets, sleeves, and supporting devices are included in this assembly.			
		D4090		**OTHER FIRE PROTECTION SYSTEMS**	EA	EA	Each system
				Requirements for all other suppression systems. Water based systems (for example, foam systems) specified from water supply onwards, complete specification for gas systems, incidental systems such as kitchen hood systems.			
			D409001	**CARBON DIOXIDE SYSTEMS**	EA	EA	Number of systems
			D409002	**FOAM GENERATING EQUIPMENT**	EA	EA	Pieces of equipment
			D409003	**CLEAN AGENT SYSTEMS**	EA	EA	Number of systems
			D409005	**HOOD AND DUCT FIRE PROTECTION**	EA	EA	Pieces of equipment
			D409099	**OTHER SPECIAL FIRE PROTECTION SYSTEMS**	XX	XX	

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Assemblies includes other fire protection systems such as halon systems, exhaust hood systems, and special chemical suppression systems.			
	D50	**ELECTRICAL**			KVA	KVA	Rated Capacity
				This system is defined by the electric current used or regarded as a source of power.			
		D5010	**ELECTRICAL SERVICE AND DISTRIBUTION**		KVA	KVA	Rated Capacity
				This subsystem provides for all electrical devices that are required to deliver the main source of power to the facility and to distribute this power to subpanels.			
			D501001	**MAIN TRANSFORMERS**	KVA	KVA	Rated Capacity
				Overhead or underground transformers used for primary electrical service. Assemblies include transformers, pad, trenching, and backfill.			
			D501002	**SECONDARY**	KVA	KVA	Rated Capacity
				Transformers fed from protection equipment on the building side of primary transformer. Assemblies include transformers, conduit, conduit support, and wire.			
			D501003	**MAIN SWITCHBOARDS**	KVA	KVA	Rated Capacity
				This includes the protection equipment and metering devices for main distribution. Assemblies include main distribution panel, breaker, fuses, and meters.			
			D501004	**INTERIOR DISTRIBUTION TRANSFORMERS**	KVA	KVA	Rated Capacity
				This includes the interior step-down or back boost transformers.			
			D501005	**PANELS**	AMP	AMP	Rated Capacity
				Branch circuit panelboards. Assemblies include panelboards, breakers ,conduit, and wire.			
			D501006	**ENCLOSED CIRCUIT BREAKERS**	AMP	AMP	Rated Capacity
				Over-current protection device enclosed in its own housing. Assemblies include enclosed circuit breaker, conduit, and wire.			
			D501007	**MOTOR CONTROL CENTERS**	AMP	AMP	Rated Capacity
				This is a cabinet in which motor starters and operation devices are contained. Assemblies include the motor control center cabinet, motor starters, contacts, switches, conduit, wire, and all associated items.			
			D501099	**OTHER SERVICE AND DISTRIBUTION**	XX	XX	
				Service and distribution not described by the assembly categories listed above.			
		D5020	**LIGHTING AND BRANCH WIRING**		SF	M2	Floor area
				Lighting systems including light fixtures and devices, that is, switches, receptacles, and equipment connections.			
			D502001	**BRANCH WIRING**	SF	M2	Floor area
				This assembly includes switches, receptacles, equipment connections, conduit, and wire.			
			D502002	**LIGHTING EQUIPMENT**	SF	M2	Floor area
				This assembly includes fixtures, conduit, wire, and switching devices.			
			D502099	**OTHER LIGHTING AND BRANCH WIRING**	XX	XX	
				Lighting and branch wiring not described by the assembly categories listed			
		D5030	**COMMUNICATIONS AND SECURITY**		SF	M2	Floor area
				This subsystem includes provisions for communication devices and alarm protection systems.			
			D503001	**FIRE ALARM SYSTEMS**	EA	EA	Number of outlets
				Assemblies include wire, conduit, conduit support or fastening systems, fire alarm devices, fire detection devices, safety switches, all electrical connections, and other associated items.			
			D503002	**TELECOMMUNICATIONS SYSTEMS**	EA	EA	Number of outlets
				This system would include central switchboards, telephone sets, underground ducts, and manholes. Assemblies include wire, conduit, backboards, cabinets, outlets, and power supply connections.			
			D503003	**NURSE CALL SYSTEMS**	EA	EA	Number of outlets
				Assemblies include wire, conduit, speakers, monitoring devices, amplifiers, switches, power system tie-in devices, and detection devices.			
			D503004	**PUBLIC ADDRESS SYSTEMS**	SF	M2	Floor area
				Assemblies include wire, conduit, speakers, monitoring devices, amplifiers, switches, power system tie-in devices, and detection devices.			
			D503005	**INTERCOMMUNICATIONS SYSTEMS**	SF	M2	Floor area
				Assemblies include wire, conduit, speakers, monitoring devices, amplifiers, switches, power system tie-in devices, and detection devices.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			D503006	**CLOCK AND PROGRAM SYSTEMS**	EA	EA	Number of clocks
				Assemblies include wire, conduit, power systems tie-in, safety switches, control panels, battery back-up devices, clocks and outlets.			
			D503007	**TELEVISION SYSTEMS**	EA	EA	Number of outlets
				Assemblies include wire, conduit, grounding amplifiers, receivers, video equipment, and outlets grouped according to use.			
			D503008	**SECURITY SYSTEMS**	EA	EA	Number of system control panels
				Assemblies include wire, conduit, conduit support or fastening systems, security alarm devices, all electrical connections, and other associated items. Intrusion Detection Systems (IDS) are included in this category.			
			D503099	**OTHER COMMUNICATIONS AND ALARM SYSTEMS**	XX	XX	
				Communication and alarm systems not described by the assembly categories listed above.			
		D5090		**OTHER ELECTRICAL SERVICES**	SF	M2	Gross Floor area
				Systems not described in System D5030, Communications and Security.			
			D509001	**GENERAL CONSTRUCTION ITEMS (ELECTRICAL)**	SF	M2	Gross Floor area
				Includes construction other than electrical which must be performed in conjunction with the special electrical system to make the system complete.			
			D509002	**EMERGENCY LIGHTING AND POWER**	SF	M2	Gross Floor area
				Assemblies include fixtures, motors used for power generation, connection and testing, transfer switches, conduit, wire, battery chargers, batteries, and solar panels.			
			D509003	**GROUNDING SYSTEMS**	EA	EA	Number of systems
				This assembly includes grounding protection systems.			
			D509004	**LIGHTNING PROTECTION**	SF	M2	Gross Floor area
				Assemblies include lightning protection devices (air terminals, mounting devices), clamps, ground rods, cadwells, conductors, trenching, backfill, and any other items used to ground metal structural frames with conduit and wire.			
			D509005	**ELECTRIC HEATING**	SF	M2	Gross Floor area
				Items could include baseboard heaters and wall and ceiling heaters. Assemblies include safety switches, control devices, heaters, conduit, and wire.			
			D509006	**ENERGY MANAGEMENT CONTROL SYSTEM**	EA	EA	Number of systems
				Assemblies include wire, conduit, conduit support or fastening systems, sensor devices, and all electrical connections.			
			D509099	**OTHER SPECIAL SYSTEMS AND DEVICES**	XX	XX	
				Special systems and devices not described by the assembly categories			
E	**EQUIPMENT AND FURNISHINGS**				SF	M2	Gross Floor area
				The types of equipment included in this assembly consist of the following: commercial, institutional, and vehicular. The types of furnishings found here include artwork, window treatments, seating, furniture, rugs etc.			
	E10	**EQUIPMENT**			SF	M2	Gross Floor area
				This system refers to equipment not found in System C1030, Fittings.			
		E1010		**COMMERCIAL EQUIPMENT**	SF	M2	Gross Floor area
				This equipment is not likely to be used in every building type. System C1030, Fittings, includes those items likely to be found in every building type.			
			E101001	**CHECKROOM EQUIPMENT**	EA	EA	Number of coat hanging devices
				All associated work items including keys, tags, and storage cabinets would be included in this assembly.			
			E101002	**REGISTRATION EQUIPMENT**	EA	EA	Pieces of equipment
			E101003	**VENDING EQUIPMENT**	EA	EA	Pieces of equipment
			E101004	**LAUNDRY EQUIPMENT**	EA	EA	Pieces of equipment
			E101005	**SECURITY AND VAULT EQUIPMENT**	EA	EA	Pieces of equipment
			E101006	**TELLER AND SERVICE EQUIPMENT**	EA	EA	Pieces of equipment
			E101007	**MERCANTILE EQUIPMENT**	EA	EA	Pieces of equipment
			E101008	**OFFICE EQUIPMENT**	EA	EA	Pieces of equipment
		E1020		**INSTITUTIONAL EQUIPMENT**	SF	M2	Gross Floor area
				Institutional equipment includes items that are normally found in hospitals, laboratories, auditoriums, and libraries.			
			E102001	**MISCELLANEOUS COMMON FIXED AND MOVEABLE EQUIPMENT**	EA	EA	Pieces of equipment
			E102002	**MEDICAL EQUIPMENT**	EA	EA	Pieces of equipment
			E102003	**LABORATORY EQUIPMENT**	EA	EA	Pieces of equipment
			E102004	**MORTUARY EQUIPMENT**	EA	EA	Pieces of equipment

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			E102005	**AUDITORIUM AND STAGE EQUIPMENT**	EA	EA	Pieces of equipment
			E102006	**LIBRARY EQUIPMENT**	EA	EA	Pieces of equipment
			E102007	**ECCLESIASTICAL EQUIPMENT**	EA	EA	Pieces of equipment
			E102008	**INSTRUMENTAL EQUIPMENT**	EA	EA	Pieces of equipment
			E102009	**AUDIO-VISUAL EQUIPMENT**	EA	EA	Pieces of equipment
			E102010	**DETENTION EQUIPMENT**	EA	EA	Pieces of equipment
		E1030		**VEHICULAR EQUIPMENT**	EA	EA	Pieces of equipment
				Vehicular equipment includes for parking, loading docks, and warehouses.			
			E103001	**PARKING CONTROL EQUIPMENT**	EA	EA	Pieces of equipment
			E103002	**LOADING DOCK EQUIPMENT**	EA	EA	Number of docks
			E103003	**WAREHOUSE EQUIPMENT**	EA	EA	Pieces of equipment
		E1090		**OTHER EQUIPMENT**	SF	M2	Gross Floor area
				The type of equipment found in his category include items for maintenance, food service, and waste handling.			
			E109001	**BUILT-IN MAINTENANCE EQUIPMENT**	SF	M2	Gross Floor area
				The unit of measure at the assembly level is each.			
			E109002	**FOOD SERVICE EQUIPMENT**	EA	EA	Seating capacity
				The unit of measure at the assembly level is the total set of equipment needed in the particular functional space area.			
			E109003	**WASTE HANDLING EQUIPMENT**	EA	EA	Pieces of equipment
			E109004	**RESIDENTIAL EQUIPMENT**	EA	EA	Pieces of equipment
			E109005	**UNIT KITCHENS**	EA	EA	Pieces of equipment
			E109006	**DARKROOM EQUIPMENT**	EA	EA	Pieces of equipment
			E109007	**ATHLETIC, RECREATIONAL, AND THERAPEUTIC EQUIPMENT**	EA	EA	Pieces of equipment
			E109008	**PLANETARIUM EQUIPMENT**	EA	EA	Pieces of equipment
			E109009	**OBSERVATORY EQUIPMENT**	EA	EA	Pieces of equipment
			E109010	**AGRICULTURAL EQUIPMENT**	EA	EA	Pieces of equipment
			E109099	**OTHER SPECIALIZED FIXED AND MOVEABLE EQUIPMENT**	XX	XX	
				Specialized fixed and moveable equipment not described by the assembly categories listed above.			
	E20			**FURNISHINGS**	SF	M2	Gross Floor area
				The types of furnishings found here include artwork, window treatments, seating, furniture, rugs, etc.			
		E2010		**FIXED FURNISHINGS**	SF	M2	Gross Floor area
				The types of furnishings found here include artwork, window treatments, and seating.			
			E201001	**FIXED ARTWORK**	EA	EA	Pieces of art work
			E201002	**WINDOW TREATMENTS**	SF	M2	Area of window treatment
			E201003	**SEATING (FIXED)**	EA	EA	Number of seats
			E201004	**FIXED FLOOR GRILLES AND MATS**	EA	EA	Number of items
			E201005	**FIXED INTERIOR LANDSCAPING**	EA	EA	Number of items
			E201099	**OTHER FIXED INTERIOR FURNISHINGS**	XX	XX	
		E2020		**MOVEABLE FURNISHINGS**	SF	M2	Gross Floor area
				The types of furnishings found here include moveable artwork, furniture, rugs, etc.			
			E202001	**MOVEABLE ART WORK**	EA	EA	Pieces of art work
			E202002	**MODULAR PREFABRICATED FURNITURE**	SF	M2	Pieces of prefabricated furniture
			E202003	**FREESTANDING FURNITURE**	EA	EA	Pieces of furniture
			E202004	**RUGS AND ACCESSORIES**	EA	EA	Number of items
				Assemblies include rugs and accessories.			
			E202005	**MOVEABLE MULTIPLE SEATING**	EA	EA	Number of items
			E202006	**MOVEABLE INTERIOR LANDSCAPING**	EA	EA	Number of items
			E202099	**OTHER MOVEABLE FURNISHINGS**	XX	XX	
F				**SPECIAL CONSTRUCTION AND DEMOLITION**	LS	LS	Lump sum
				Special construction includes air-supported structures; pre-engineered structures; special purpose rooms; sound, vibration, and seismic construction; radiation protection; special security systems; aquatic facilities; ice rinks, site constructed incinerators; kennels and animal shelters; liquid and gas storage tanks; recording instrumentation; and building automation systems. Selective building demolition includes demolition of existing buildings, and site demolition.			
	F10			**SPECIAL CONSTRUCTION**	SF	M2	Gross Floor area
				Special construction includes air-supported structures; pre-engineered structures; special purpose rooms; sound, vibration, and seismic construction; radiation protection; special security systems; aquatic facilities; ice rinks, site constructed incinerators; kennels and animal shelters; liquid and gas storage tanks; recording instrumentation; and building automation systems.			
		F1010		**SPECIAL STRUCTURES**	SF	M2	Gross Floor area
				Special structures includes air-supported structures, and pre-engineered structures.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			F101001	**METAL BUILDING SYSTEMS**	SF	M2	Floor area of exterior building
			F101002	**EXTERIOR UTILITY BUILDINGS**	SF	M2	Floor area of exterior building
			F101003	**AIR-SUPPORTED STRUCTURES**	SF	M2	Floor area of exterior building
			F101099	**OTHER SPECIAL CONSTRUCTION**	XX	XX	
		F1020		**INTEGRATED CONSTRUCTION**	SF	M2	Floor area
				Integrated construction includes integrated assemblies and special purpose rooms.			
			F102001	**SPECIAL PURPOSE ROOMS**	SF	M2	Area of room
			F102002	**INTEGRATED ASSEMBLIES**	SF	M2	Area of room
			F102099	**OTHER INTEGRATED CONSTRUCTION**	XX	XX	
		F1030		**SPECIAL CONSTRUCTION SYSTEMS**	SF	M2	Area of room
				Special construction systems includes sound, vibration, and seismic construction; radiation protection; special security systems; and built-in place vaults.			
			F103001	**VAULTS**	SF	M2	Area of vault
				This is a built-in-place vault. Prefabricated safes are not included in this assembly. The unit of measure at the assembly level is each.			
			F103002	**SOUND, VIBRATION, AND SEISMIC CONSTRUCTION**	SF	M2	Area of room
			F103003	**RADIATION PROTECTION**	SF	M2	Area of room
			F103099	**OTHER SPECIAL CONSTRUCTION SYSTEMS**	XX	XX	
		F1040		**SPECIAL FACILITIES**	SF	M2	Area of room
				Special facilities includes aquatic facilities; ice rinks, site constructed incinerators; kennels and animal shelters; and liquid and gas storage tanks.			
			F104001	**INTERIOR SWIMMING POOLS**	SF	M2	Area of pool
			F104002	**LIQUID AND GAS STORAGE TANKS**	EA	EA	Number of storage tanks
			F104003	**KENNELS AND ANIMAL SHELTERS**	SF	M2	Area of kennel or animal shelter
			F104004	**SITE CONSTRUCTED INCINERATORS**	EA	EA	Number of incinerators
			F104005	**ICE RINKS**	SF	M2	Area of ice rink
			F104099	**OTHER SPECIAL FACILITIES**	XX	XX	
		F1050		**SPECIAL CONTROLS AND INSTRUMENTATION**	EA	EA	Number of systems
				Special controls and instrumentation includes recording instrumentation and building automation systems.			
			F105001	**RECORDING INSTRUMENTATION**	EA	EA	Number of instruments
			F105002	**BUILDING AUTOMATION SYSTEMS**	EA	EA	Number of systems
			F105099	**OTHER SPECIAL CONTROLS AND INSTRUMENTATION**	XX	XX	
	F20			**SELECTIVE BUILDING DEMOLITION**	LS	LS	Lump sum
				Selective building demolition includes demolition of existing buildings, site demolition, and hazardous components abatement.			
		F2010		**BUILDING ELEMENTS DEMOLITION**	LS	LS	Lump sum
				Selective building demolition includes demolition of existing buildings, and site demolition.			
			F201001	**SUBSTRUCTURE AND SUPERSTRUCTURE**	LS	LS	Lump sum
			F201002	**EXTERIOR CLOSURE**	LS	LS	Lump sum
			F201003	**ROOFING**	LS	LS	Lump sum
			F201004	**INTERIOR CONSTRUCTION AND FINISHES**	LS	LS	Lump sum
			F201005	**CONVEYING SYSTEMS**	LS	LS	Lump sum
			F201006	**MECHANICAL SYSTEMS**	LS	LS	Lump sum
			F201007	**ELECTRICAL SYSTEMS**	LS	LS	Lump sum
			F201008	**EQUIPMENT AND FURNISHINGS**	LS	LS	Lump sum
			F201099	**OTHER NON-HAZARDOUS SELECTIVE BUILDING DEMOLITION**	XX	XX	
				Non-hazardous selective building demolition not described by the assembly categories listed above.			
		F2020		**HAZARDOUS COMPONENTS ABATEMENT**	LS	LS	Lump sum
				Hazardous components abatement includes the removal or encapsulation of hazardous building materials and components.			
			F202001	**SUBSTRUCTURE AND SUPERSTRUCTURE**	LS	LS	Lump sum
			F202002	**EXTERIOR CLOSURE**	LS	LS	Lump sum
			F202003	**ROOFING**	LS	LS	Lump sum
			F202004	**INTERIOR CONSTRUCTION AND FINISHES**	LS	LS	Lump sum
			F202005	**CONVEYING SYSTEMS**	LS	LS	Lump sum
			F202006	**MECHANICAL SYSTEMS**	LS	LS	Lump sum
			F202007	**ELECTRICAL SYSTEMS**	LS	LS	Lump sum
			F202008	**EQUIPMENT AND FURNISHINGS**	LS	LS	Lump sum
			F202099	**OTHER HAZARDOUS SELECTIVE BUILDING DEMOLITION**	XX	XX	
				Hazardous selective building demolition not described by the assembly categories listed above.			
G	**BUILDING SITEWORK**				ACR	Hectare	Total area of site

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Building sitework includes site preparations, site improvements, site civil/mechanical utilities, site electrical utilities, service and pedestrian tunnels, and other site construction, such as bridges, and railroad spurs.			
	G10			**SITE PREPARATIONS**	ACR	Hectare	Total area of site
				This system includes assemblies for miscellaneous sitework such as clearing and grubbing, demolition and relocation, various earthwork tasks, and other site preparation and cleanup requirements. Hazardous cleanup is not included but is the subject of another WBS.			
		G1010		**SITE CLEARING**	ACR	Hectare	Area to be cleared
				This covers the different assemblies and options available for clearing of a site, tree and stump removal, burning, grubbing, chipping, and load and haul assemblies for removal of the cleared material.			
			G101001	**CLEARING**	ACR	Hectare	Area to be cleared
				This is the removal of above ground vegetation including stumps. For a wet site, Low Ground Pressure (LGP) equipment is used.			
			G101002	**TREE REMOVAL**	EA	EA	Number of trees to be removed
				This is the selective removal of trees on the site. Various options exist for different sizes of trees to be removed.			
			G101003	**STUMP REMOVAL**	EA	EA	Number of stumps to be removed
				This is the selective removal of stumps on the site. Various options exist for different sizes of stumps to be removed.			
			G101004	**CHIPPING**	ACR	Hectare	Area of brush to chip
				Chipping is the process of cutting brush into small pieces. This process reduces the bulking factor of the debris or brush that is to be removed from the site. Assemblies exist for various brush densities.			
			G101005	**GRUBBING**	ACR	Hectare	Area to be grubbed
				Grubbing is the removal of sod and other topsoil that contains unsuitable organic material. Various equipment types and size choices are available. Wet grubbing utilizes Low Ground Pressure (LGP) equipment. Haul-off of grubbed material is also included.			
			G101006	**SELECTIVE THINNING**	ACR	Hectare	Area to be thinned
				This is the selective removal of trees and underbrush without requiring extensive clearing or grubbing of the site, or both.			
			G101007	**DEBRIS DISPOSAL**	CY	M3	Volume of material
				This is the disposal of the material that has been cleared and grubbed. Loading, hauling, and dump charges are included.			
			G101099	**OTHER SITE CLEARING**	XX	XX	
				Site clearing not described by the assembly categories listed above.			
		G1020		**SITE DEMOLITION AND RELOCATIONS**	SY	M2	Area to be demolished
				This includes the demolition or relocation, or both, of structures, pavements, fencing, and underground utilities. Disposal of debris or demolished material, including loading and hauling, is also included.			
			G102001	**BUILDING MASS DEMOLITION**	CF	M3	Interior volume of building
				This is the complete demolition of buildings or structures. Options include steel, concrete, masonry, and wood structures.			
			G102002	**ABOVE GROUND SITE DEMOLITION**	SY	M2	Area to be demolished
				This is the demolition of pavements, fencing, and other non-building structures on a site. Pavement include roads, sidewalks, driveways, and curbs. Fencing types include chain link, barbed wire, and wood.			
			G102003	**UNDERGROUND SITE DEMOLITION**	SY	M2	Area to be demolished
				This is the demolition of underground utilities such as piping, manholes, and other non-building underground structures. The unit of measure at the assembly level for piping is LF and for manholes is CY.			
			G102004	**BUILDING RELOCATION**	SF	M2	Area of building to be relocated
				This is the process of dismantling a structure, and reassembling it on a different site.			
			G102005	**UTILITY RELOCATION**	LF	M	Length of pipe run
				To remove and reset. This is the removal and relocation of underground utilities such as steel and concrete pipe.			
			G102006	**FENCING RELOCATION**	LF	M	Length of fencing
			G102007	**SITE CLEANUP**	SY	M2	Area of site to clean
				Covered in this assembly category are items for site and area cleanup and pavement sweeping. Disposal of the debris is also included.			
			G102099	**OTHER SITE DEMOLITION AND RELOCATIONS**	XX	XX	

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Site demolition and relocation not described by the assembly categories			
		G1030		**SITE EARTHWORK**	CY	M3	Volume of material
				Included are assemblies and options for site work such as grading, excavation, filling, compaction, stabilization, etc.			
			G103001	**GRADING**	SY	M2	Area to be graded
				Grading is leveling or flattening of the site in preparation for landscaping or other site construction. Includes unlined stormwater collection ponds.			
			G103002	**COMMON EXCAVATION**	CY	M3	Volume of material to be excavated
				This is excavation for roads, sidewalks, curbs, and trenching for underground utilities. Excavation may be carried out by a variety of equipment sizes and types. Disposal of the excavated material is also included.			
			G103003	**ROCK EXCAVATION**	CY	M3	Volume of rock to be excavated
				This is excavation of rock by explosives. Different equipment selections and load and haul are included.			
			G103004	**FILL AND BORROW**	CY	M3	Volume of material to place
				This is filling or replacing the material that was removed during excavation. Either the excavated material may be used or soil and sand may be hauled in from off-site. Filling to basements and foundations is not included in the subsystem.			
			G103005	**COMPACTION**	CY	M3	Volume of material to compact
				Compaction is the process of packing the fill material once it is in place. This may be done by machine or hand. Assemblies exist for both hand and machine compaction of soil, sand, and the excavated material.			
			G103006	**SOIL STABILIZATION**	CY	M3	Volume of soil to stabilize
				This is stabilization of the soil-in-place by the addition of lime or cement.			
			G103007	**SLOPE STABILIZATION**	SY	M2	Area of slope
				This is stabilization of the soil-in-place through the use of rip rap, gabions, slope paving, or other forms of soil armoring.			
			G103008	**SOIL TREATMENT**	SY	M2	Area of soil to treat
				Treatment of soil prior to final construction for insect protection or other purposes.			
			G103009	**SHORING**	SF	M2	Area requiring shoring
				Shoring is the temporary support for existing structures or excavation during construction.			
			G103010	**TEMPORARY DEWATERING**	SF	M2	Area to dewater
				This is the dewatering of the site by wellpoints to lower the groundwater table. This will facilitate excavation in areas with high water tables.			
			G103011	**TEMPORARY EROSION AND SEDIMENT CONTROL**	SF	M2	Area to be protected
				Interim measures to minimize erosion during construction.			
			G103099	**OTHER SITE EARTHWORK**	XX	XX	
				Site earthwork not described by the assembly categories listed above.			
		G1040		**HAZARDOUS WASTE REMEDIATION**	CY	M3	Volume of contaminated soil
				Hazardous waste remediation removal and restoration of contaminated soil.			
			G104001	**REMOVAL OF CONTAMINATED SOIL**	CY	M3	Volume of contaminated soil
			G104002	**SOIL RESTORATION AND TREATMENT**	CY	M3	Volume of soil
			G104099	**OTHER HAZARDOUS WASTE REMEDIATION**	XX	XX	
				Hazardous waste remediation not described by the assembly categories listed above.			
	G20			**SITE IMPROVEMENTS**	LS	LS	Lump sum
				This includes improvements such as parking lots, sidewalks, roadways, fencing, retaining walls, and landscaping.			
		G2010		**ROADWAYS**	SY	M2	Area of roadway
				This subsystem includes options for access, arterial, or interstate roadways. A variety of pavement types and thickness are available.			
			G201001	**BASES AND SUBBASES**	SY	M2	Area of roadway
				These are the compacted and prepared gravel or soil layers that are placed prior to the installation of the final surface. The subbase is placed and compacted before the base layer is applied.			
			G201002	**CURBS AND GUTTERS**	LF	M	Length of drainage pipe
				This is the drainage system for the selected roadway type. Options include curb and gutter drains or area drains with grates.			
			G201003	**PAVED SURFACES**	SY	M2	Area of roadway

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				This is material that is placed atop the base layer to provide the driving surface.			
			G201004	**MARKING AND SIGNAGE**	SY	M2	Area of roadway
				This includes roadway signage and pavement painting. Assemblies are included for traffic signs and posts and intersection, crosswalk, or other pavement painting or striping.			
			G201005	**GUARDRAILS AND BARRIERS**	LF	M	Length of guardrail or barrier
				This is any associated guardrails or barriers that are required for the selected roadway type.			
			G201006	**RESURFACING**	SY	M2	Area of roadway
				This is the placement of an asphalt wearing course over the existing pavement surface. Assemblies exist for resurfacing of gravel, concrete, and asphalt roadways.			
			G201099	**OTHER ROADWAYS**	XX	XX	
				Roadways not described by the assembly categories listed above.			
		G2020		**PARKING LOTS**	EA	EA	Number of spaces
				These are the areas required of vehicles parking and include different surfaces and drainage options.			
			G202001	**BASES AND SUBBASES**	SY	M2	Area of parking lot
				These are the compacted and prepared gravel or soil layers that are placed prior to the installation of the final surface. The subbase is placed and compacted before the base layer is applied.			
			G202002	**CURBS AND GUTTERS**	LF	M	Length of curbs and gutters
				This is the curb and gutter drains or area drains with grates.			
			G202003	**PAVED SURFACES**	SY	M2	Area of parking lot
				This is material that is placed atop the base layer to provide the driving surface.			
			G202004	**MARKING AND SIGNAGE**	EA	EA	Number of spaces
				This includes painting of the parking stalls, signage, etc.			
			G202005	**GUARDRAILS AND BARRIERS**	LF	M	Length of guardrail or barrier
				Guardrails, barriers, parking stops and other similar devices.			
			G202006	**RESURFACING**	SY	M2	Area of parking lot
				This is the placement of an asphalt wearing course over the existing parking surface.			
			G202007	**MISCELLANEOUS STRUCTURES AND EQUIPMENT**	EA	EA	Number of structures or equipment, or both
			G202099	**OTHER PARKING LOTS**	XX	XX	
				Parking areas not described by the assembly categories listed above.			
		G2030		**PEDESTRIAN PAVING**	SY	M2	Area of pavement
				This subsystem includes options for sidewalks and other small paved areas.			
			G203001	**BASES AND SUBBASES**	SY	M2	Area of pavement
				These are the compacted and prepared gravel or soil layers that are placed prior to the installation of the final surface. The subbase is placed and compacted before the base layer is applied.			
			G203002	**CURBS AND GUTTERS**	LF	M	Length of curbs and gutters
				This is the curb and gutter drains or area drains with grates.			
			G203003	**PAVED SURFACES**	SY	M2	Area of pavement
				This is material that is placed atop the base layer to provide the walking or driving surface.			
			G203004	**GUARDRAILS AND BARRIERS**	LF	M	Length of guardrail or barrier
				This is any associated guardrails or barriers that are required.			
			G203005	**RESURFACING**	SY	M2	Area of pavement
				This is the placement of an asphalt wearing course over the existing pavement surface.			
			G203099	**OTHER WALKS, STEPS, AND TERRACES**	XX	XX	
				Walks, steps, ramps, terraces not described by the assembly categories listed above.			
		G2040		**SITE DEVELOPMENT**	LS	LS	Lump sum
				Included are assemblies for on-site construction of fences, retaining walls, playing fields, fountains, and other site improvements.			
			G204001	**FENCING AND GATES**	LF	M	Length of fence
				This includes installation or construction of security, boundary, or barbed wire fencing and all required gates.			
			G204002	**RETAINING WALLS**	SF	M2	Area of wall
				These are structures used to prevent the flow or lateral movement of soil. Assemblies exist for cast-in-place concrete retaining walls. Includes waterfront bulkheads that are not related to pier and wharf construction.			
			G204003	**EXTERIOR FURNISHINGS**	EA	EA	Number of furnishings

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				This includes the addition of such exterior furnishings as benches, planters, etc.			
			G204004	**SECURITY STRUCTURES**	EA	EA	Number of security structures
				This includes the construction or addition of security structures such as guard houses.			
			G204005	**SIGNAGE**	EA	EA	Number of signs
				Signs displayed to convey direction or information such as building function or tenant except for signs included in G201004 and G202004.			
			G204006	**FOUNTAINS AND POOLS**	EA	EA	Number of fountains or pools
				This includes assemblies for swimming pools and decorative fountains.			
			G204007	**PLAYING FIELDS**	EA	EA	Number of playing fields
				Playing fields such as baseball or tennis courts as well as back stops, bleachers, and other playing field requirements are included.			
			G204008	**TERRACE AND PERIMETER WALLS**	SF	M2	Area of wall
			G204009	**FLAGPOLES**	EA	EA	Number of flagpoles
			G204099	**OTHER SITE IMPROVEMENTS**	XX	XX	
				This includes any other miscellaneous structures, such as a car wash, banking system, and theatre equipment located on the site.			
		G2050		**LANDSCAPING**	SY	M2	Area to be landscaped
				Assemblies are included that improve the appearance of the site by planting, seeding, and sodding.			
			G205001	**FINE GRADING AND SOIL PREPARATION**	SY	M2	Area of site
				Fine grading of the site by hand or machine is required to prepare the soil for planting, seeding, or sodding.			
			G205002	**EROSION CONTROL MEASURES**	SY	M2	Area of erosion
				Soil erosion or deterioration due to wind, rain or other factors can be controlled or remedied in different ways. This includes slope protection by planting or vegetation or grass or placement of manmade geotextiles, or both.			
			G205003	**TOPSOIL AND PLANTING BEDS**	SY	M2	Area of planting bed
				Topsoil is placed to provide the nutritious soil bed which is required for plants or grass to grow.			
			G205004	**SEEDING, SPRIGGING, AND SODDING**	SY	M2	Area of site
				This includes the seeding, sodding, fertilizing, watering, and mowing for the grass required on site.			
			G205005	**PLANTINGS**	EA	EA	Number of plants
				This includes the planting of trees, shrubs, and other vegetation for site beautification or improvement.			
			G205006	**PLANTERS**	EA	EA	Number of planters
				Planters are exterior decorative containers that contain plants or trees.			
			G205007	**IRRIGATION SYSTEMS**	SY	M2	Area of site to be watered
				This includes the installation of underground irrigation systems required for watering of trees, shrubs, and grass or other vegetation.			
			G205099	**OTHER LANDSCAPING**	XX	XX	
				Landscaping not described by the assembly categories listed above.			
	G30			**SITE CIVIL/MECHANICAL UTILITIES**	EA	EA	Each utility
				Site mechanical utilities includes water supply, sanitary sewer, storm sewer, heating distribution, cooling distribution, fuel distribution, and other site mechanical utilities, such as industrial waste systems.			
		G3010		**WATER SUPPLY**	LF	M	Length of system
				This includes installation or construction of water distribution systems and facilities.			
			G301001	**WELL SYSTEMS**	EA	EA	Each system
				This includes all the components necessary to install a well, including drilling, installing casings, pumps, valves, etc.			
			G301002	**POTABLE WATER DISTRIBUTION**	LF	M	Length of system
				This includes construction and installation of underground piping, valve.			
			G301003	**POTABLE WATER STORAGE**	GAL	LITER	Amount stored
				This includes construction and installation of tanks, both at grade and elevated.			
			G301004	**FIRE PROTECTION WATER DISTRIBUTION**	LF	M	Length of system
				This includes construction and installation of piping for fire protection only.			
			G301005	**FIRE PROTECTION WATER STORAGE**	GAL	LITER	Amount stored

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				This includes tanks on grade and elevated for storage of water for fire.			
			G301006	**NON-POTABLE WATER DISTRIBUTION**	LF	M	Length of system
				This includes construction and installation of water distribution system not for consumption, such as irrigation or hydro-electric power generation and from reservoirs to treatment facilities.			
			G301007	**PUMPING STATIONS**	GPM	L/S	Operating capacity
				This includes construction and installation of pumps, valves, and piping.			
			G301008	**PACKAGED WATER TREATMENT PLANTS**	GPD	L/S	Operating capacity
				This includes installation of completely assembled water treatment plants.			
			G301099	**OTHER WATER SUPPLY**	XX	XX	
				Water supply not described by the assembly categories listed above.			
		G3020		**SANITARY SEWER**	LF	M	Length of system
				This includes all assemblies necessary for sewage collection systems.			
			G302001	**SANITARY SEWER PIPING**	LF	M	Length of piping
				This includes installation of piping for collection of sewage.			
			G302002	**SANITARY SEWER MANHOLES AND CLEANOUTS**	EA	EA	Each manhole or cleanout
				This includes construction and installation of manholes and cleanouts in sewage collection systems.			
			G302003	**LIFT STATIONS AND PUMPING STATIONS**	GPM	L/S	Operating capacity
				This includes construction and installation of piping and equipment in lift stations.			
			G302004	**PACKAGED SANITARY SEWER TREATMENT PLANTS**	GPD	L/S	Operating capacity
				This includes installation of pre-assembled sewage treatment plants.			
			G302005	**SEPTIC TANKS**	GAL	LITER	Volume of tank
				This includes installation of prefabricated septic tanks or the construction of septic tanks.			
			G302006	**DRAIN FIELDS**	LF	M	Length of field
				This includes installation of drain fields for disposal of effluent from septic tanks.			
			G302099	**OTHER SANITARY SEWER**	XX	XX	
				Sanitary sewers not described by the assembly categories listed above.			
		G3030		**STORM SEWER**	LF	M	Length of system
				This includes construction of storm water collection systems.			
			G303001	**STORM SEWER PIPING**	LF	M	Length of piping
				This includes installation of piping for collection of storm water.			
			G303002	**STORM SEWER STRUCTURES**	EA	EA	Each manhole or cleanout
				This includes construction and installation of manholes for storm water collection systems.			
			G303003	**LIFT STATIONS**	GPM	L/S	Operating capacity
				This includes construction of lift stations including piping, pumps, and controls.			
			G303004	**CULVERTS**	LF	M	Length of culvert
				This includes construction and installation of culverts for storm water systems.			
			G303005	**HEADWALLS**	EA	EA	Each structure
				This includes construction of headwalls and installation of catch basins for storm water systems.			
			G303006	**EROSION AND SEDIMENT CONTROL MEASURES**	SY	M2	Area to control
				This includes construction to control erosion due to runoff.			
			G303007	**STORMWATER MANAGEMENT**	GAL	LITER	Volume of collection area
			G303099	**OTHER STORM SEWER**	XX	XX	
				Storm sewers not described by the assembly categories listed above.			
		G3040		**HEATING DISTRIBUTION**	LF	M	Length of system
				This includes overhead and underground hot water, steam, and condensate piping.			
			G304001	**OVERHEAD HOT WATER SYSTEMS**	LF	M	Length of system
				This includes installation of overhead hot water supply and return piping.			
			G304002	**OVERHEAD STEAM SYSTEMS**	LF	M	Length of system
				This includes installation of overhead steam supply and condensate return piping.			
			G304003	**UNDERGROUND HOT WATER SYSTEMS**	LF	M	Length of system
				This includes installation of underground hot water supply and return piping.			
			G304004	**UNDERGROUND STEAM DISTRIBUTION SYSTEMS**	LF	M	Length of system

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				This includes installation of underground steam supply and condensate return piping.			
			G304005	**REINFORCED CONCRETE MANHOLES AND VALVE BOXES**	EA	EA	Each structure
				This includes installation of prefabricated trench boxes for shoring during installation of piping.			
			G304006	**PUMPING STATIONS**	EA	EA	Each pumping station
			G304099	**OTHER HEATING DISTRIBUTION**	XX	XX	
				Heating distribution not described by the assembly categories listed above.			
		G3050		**COOLING DISTRIBUTION**	LF	M	Length of system
				This includes construction and installation of chilled water distribution systems.			
			G305001	**OVERHEAD COOLING SYSTEMS**	LF	M	Length of system
				This includes installation of overhead chilled water supply and return piping.			
			G305002	**UNDERGROUND COOLING SYSTEMS**	LF	M	Length of system
				This includes installation of underground chilled water supply and return piping.			
			G305003	**TRENCHBOXES**	LF	M	Length of trench
				This includes installation of prefabricated trench boxes for shoring during installation of piping.			
			G305004	**WELLS FOR COOLING**	EA	EA	Each well
			G305005	**PUMPING STATIONS**	EA	EA	Each pumping station
			G305006	**ON-SITE COOLING TOWERS**	EA	EA	Each cooling tower
			G305099	**OTHER COOLING DISTRIBUTION**	XX	XX	
				Cooling distribution not described by the assembly categories listed above.			
		G3060		**FUEL DISTRIBUTION**	GAL	LITER	Volume of storage tank
				This includes installation of piping and storage tanks for building and aviation fuels.			
			G306001	**LIQUID FUEL DISTRIBUTION PIPING**	LF	M	Length of piping
				This includes installation of piping for fuel oil distribution. This includes equipment related to piping, system leak detection, and tightness testing.			
			G306002	**AVIATION FUEL DISTRIBUTION PIPING SYSTEM**	LF	M	Length of piping
				This includes installation of piping for aviation fuel distribution and equipment related to the piping. This includes system leak detection and tightness testing.			
			G306003	**LIQUID FUEL DISPENSING EQUIPMENT**	GAL	LITER	Volume of storage tank
				This includes installation of buried or above ground fuel tanks.			
			G306004	**LIQUID FUEL STORAGE TANKS**	EA	EA	Each tank
			G306005	**LIQUID FUEL SYSTEM TRENCHBOXES**	LF	M	Length of trench
				This includes installation of prefabricated trench boxes for shoring during installation of piping.			
			G306006	**GAS DISTRIBUTION PIPING (NATURAL AND PROPANE)**	LF	M	Length of piping
				This includes piping for distribution of natural or propane gas.			
			G306007	**GAS STORAGE TANKS**	GAL	LITER	Volume of storage tank
				This includes installation of tanks for natural or propane gas.			
			G306008	**GAS SYSTEM TRENCHBOXES**	LF	M	Length of trench
				This includes installation of prefabricated trench boxes for shoring during installation of piping.			
			G306098	**OTHER GAS DISTRIBUTION**	XX	XX	
				Gas distribution not described by the assembly categories listed above.			
			G306099	**OTHER FUEL DISTRIBUTION**	XX	XX	
				Fuel not described by the assembly categories listed above.			
		G3090		**OTHER SITE MECHANICAL UTILITIES**	LF	M	Length of system
				This includes all systems for collection of contaminated waste requiring special treatment.			
			G309001	**INDUSTRIAL WASTE PIPE**	LF	M	Length of piping
				This includes construction and installation of all piping for collection of industrial waste.			
			G309002	**INDUSTRIAL WASTE MANHOLES AND CLEANOUTS**	EA	EA	Each manhole or cleanout
				This includes construction of manholes and cleanouts for industrial waste.			
			G309003	**INDUSTRIAL WASTE LIFT STATIONS**	GPM	L/S	Operating capacity
				This includes construction and installation of industrial waste lift stations and equipment.			
			G309004	**INDUSTRIAL WASTE HOLDING TANKS AND SEPARATORS**	EA	EA	Number of tanks
				This includes construction or installation of special tanks such as silver recovery tanks or separators such as oil water separators.			
			G309005	**INDUSTRIAL WASTE TRENCHBOXES**	LF	M	Length of trench
				This includes installation of prefabricated trench boxes for shoring during installation of piping.			

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
			G309099	**OTHER INDUSTRIAL WASTE**	XX	XX	
				Industrial waste not described by the assembly categories listed above, such as petroleum oil and lubricant distribution systems.			
	G40			**SITE ELECTRICAL UTILITIES**	EA	EA	Systems total
				This system includes exterior electrical systems and equipment including substations, overhead and underground distribution systems, metering systems and equipment, exterior lighting, lightning protection systems, communication and alarm systems, and cathodic protection.			
		G4010		**ELECTRICAL DISTRIBUTION**	KVA	KVA	Rated capacity
				Electrical distribution includes the following: substations; transformers; switches, controls and devices; overhead electric conductors; towers, poles, crossarms and insulators; underground electric conductors; ductbanks, manholes, handholes and raceways; grounding systems; and metering.			
			G401001	**SUBSTATIONS**	KVA	KVA	Rated capacity
				This system includes substation equipment and materials required from the primary power source.			
			G401002	**TRANSFORMERS**	KVA	KVA	Rated capacity
				Electrical power transformers used in conjunction with electrical substations. May include pole/tower or pad-mounted transformers.			
			G401003	**SWITCHES, CONTROLS AND DEVICES**	EA	EA	Number of separate components
				Includes all components of switchgear, voltage regulators and busbars used with electrical substations.			
			G401004	**OVERHEAD ELECTRIC CONDUCTORS**	LF	M	Length of conductor
				Includes conductors used in conjunction with substations.			
			G401005	**TOWERS, POLES, CROSSARMS AND INSULATORS**	EA	EA	Number of towers and poles
				Towers, poles, crossarms, and insulators used in conjunction with substations.			
			G401006	**UNDERGROUND ELECTRIC CONDUCTORS**	LF	M	Length of conductor
				Includes conductors used in conjunction with substations.			
			G401007	**DUCTBANKS, MANHOLES, HANDHOLES, AND RACEWAYS**	EA	EA	Number of ductbanks and access points
				Components used in conjunction with electrical substations.			
			G401008	**GROUNDING SYSTEMS**	EA	EA	Number of systems
				Grounding systems used in conjunction with substations. Grounding systems for buildings, power distribution, and other electrical systems and subsystems are included with those other systems.			
			G401009	**METERING**	EA	EA	Number of meters
				Includes components used in conjunction with exterior electrical distribution.			
			G401099	**OTHER ELECTRIC TRANSMISSION AND DISTRIBUTION**	XX	XX	
				Substations not described by the assembly categories listed above.			
		G4020		**SITE LIGHTING**	LF	M	Length of distribution
				Exterior electrical transmission and distribution systems including transformers, conductors, switches, controls and other devices, supporting structures, grounding systems, metering and all other equipment required to support electrical power distribution projects.			
			G402001	**TRANSFORMERS**	KVA	KVA	Rated capacity
				Electric power transformers used in conjunction with exterior electrical distribution. May include pole/tower or pad-mounted transformers.			
			G402002	**OVERHEAD ELECTRIC CONDUCTORS**	LF	M	Length of conductor
				Includes conductors for overhead exterior electrical distribution.			
			G402003	**TOWERS, POLES, CROSSARMS, AND INSULATORS**	EA	EA	Number of towers and poles
				Towers, poles, crossarms, and insulators used in exterior electrical			
			G402004	**UNDERGROUND ELECTRIC CONDUCTORS**	LF	M	Length of conductor
				Includes conductors for underground electrical distribution.			
			G402005	**DUCTBANKS, MANHOLES AND HANDHOLES**	EA	EA	Number of ductbanks and access points
				Includes all components used in conjunction with exterior electrical			
			G402006	**EXTERIOR LIGHTING FIXTURES AND CONTROLS**	EA	EA	Number of fixtures
				Includes fixtures, controls, and all components used in conjunction with			
			G402007	**GROUNDING SYSTEMS**	EA	EA	Number of systems
				Grounding systems used in conjunction with exterior electrical distribution.			
			G402008	**SPECIAL SECURITY LIGHTING SYSTEMS**	EA	EA	Number of systems
				Includes all components used for special security lighting.			
			G402099	**OTHER AREA LIGHTING**	XX	XX	

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Includes components and equipment used for area lighting.			
		G4030		**SITE COMMUNICATION AND SECURITY**	LF	M	Length of distribution
				This system includes cables, ductbanks, manholes, and all other equipment required to support exterior communication and alarm systems.			
			G403001	**TELECOMMUNICATIONS SYSTEMS**	LF	M	Length of distribution
				Includes all components, cables, and equipment used in conjunction with exterior telephone systems.			
			G403002	**SOUND SYSTEMS**	LF	M	Length of distribution
				Includes all components, cables, and equipment used in conjunction with exterior sound systems.			
			G403003	**FIRE ALARM SYSTEMS**	LF	M	Length of distribution
				Includes all components, cables, and equipment used in conjunction with exterior fire alarm systems.			
			G403004	**CABLE TV SYSTEMS (CATV)**	LF	M	Length of distribution
				Includes all components, cables, and equipment used in conjunction with exterior cable TV systems.			
			G403005	**CABLES AND WIRING**	LF	M	Length of conductor
				Includes cables, wiring, and equipment used in conjunction with exterior security systems.			
			G403006	**DUCTBANKS, MANHOLES AND HANDHOLES**	EA	EA	Number of ductbanks and access points
				Includes ductbank, manholes, and handholes used in conjunction with			
			G403007	**TOWERS, POLES, AND STANDS**	EA	EA	Number of towers, poles and stands
				Includes towers, poles, stands, and equipment used in conjunction with exterior security systems.			
			G403008	**TV CAMERAS AND MONITORS**	EA	EA	Number of cameras and monitors
				Includes cameras, monitors, and components used in conjunction with exterior security systems.			
			G403009	**GROUNDING SYSTEMS**	EA	EA	Number of systems
				Includes grounding systems used in conjunction with exterior security systems.			
			G403098	**OTHER COMMUNICATION AND ALARM**	XX	XX	
				Includes all components, cables, and equipment used in conjunction with other special communication and alarm systems not defined above.			
			G403099	**OTHER SECURITY SYSTEMS**	XX	XX	
				Includes all components and equipment used in conjunction with special security systems not defined above.			
		G4090		**OTHER SITE ELECTRICAL UTILITIES**	LF	M	Length of conductor
				This system includes alternate energy sources. This system also includes sacrificial anodes, induced current conductors, and components used in conjunction with cathodic protection.			
			G409001	**SACRIFICIAL ANODE CATHODIC PROTECTION SYSTEM**	EA	EA	Number of anodes
				Includes all components required in conjunction with sacrificial anode system.			
			G409002	**INDUCED CURRENT CATHODIC PROTECTION SYSTEM**	LF	M	Length of conductor
				Includes conductors and termination required for cathodic protection.			
			G409003	**EMERGENCY POWER GENERATION**	KVA	KVA	Rated capacity
			G409099	**OTHER CATHODIC PROTECTION**	XX	XX	
				Includes components and equipment used in conjunction with other cathodic protection systems not defined above.			
	G90			**OTHER SITE CONSTRUCTION**	LS	LS	Lump sum
				Other site construction includes service and pedestrian tunnels, bridges, railroad spurs, and snow melting systems.			
		G9010		**SERVICE AND PEDESTRIAN TUNNELS**	LF	M	Length of tunnel
				This assembly includes service and pedestrian tunnels.			
			G901001	**CONSTRUCTION OF SERVICE AND PEDESTRIAN TUNNELS**	LF	M	Length of tunnel
				This assembly includes construction of service and pedestrian tunnels.			
			G901002	**PREFABRICATED SERVICE AND PEDESTRIAN TUNNELS**	LF	M	Length of tunnel
				This assembly includes prefabricated service and pedestrian tunnels.			
		G9090		**OTHER SITE CONSTRUCTION**	LS	LS	Lump sum
				Other site construction includes bridges, railroad spurs and snow melting systems.			
			G909001	**BRIDGES**	SY	M2	Area of structure
				Bridges included here are typically small spans or overpasses that are not meant to be used to estimate spans over large bodies of water. Options exist for cast-in-place concrete T-beam, precast I-beam, precast box, concrete and steel composite, laminated timber deck bridge structures.			
			G909002	**RAILROAD SPURS**	LF	M	Length of track

TABLE X1.1 *Continued*

Level 1	Level 2	Level 3	Level 4	Definition	E UOM	M UOM	Quantity Definition
				Railroad assemblies exist for 110, 115, and 132 lb. tracks and ties. Turnouts, roadway crossings, derailleurs, stops, and bumpers are also included.			
			G909003	**SNOW MELTING SYSTEMS**	EA	EA	Number of systems
			G909099	**OTHER SPECIAL CONSTRUCTION**	XX	XX	
				Any special construction not covered in the above categories.			

X2. UNIFORMAT II ELEMENTAL ESTIMATING

X2.1 This classification applies to physical elements only. For the purposes of elemental estimating and cost analysis, additional items of classification need to be included. These additional, and necessary, cost items are classified in two separate ASTM standards: Classifications E2083 and E2168. Reference to these two standards should be made to fully understand their content, arrangement, and specific intent.

X2.2 An additional ASTM standard provides a practice for presenting elemental cost figures in a clear, logical, and consistent manner: Practice E2514. A short excerpt from E2514, Fig. X2.1 and Fig. X2.2, is included here. This excerpt is intended solely as an indicator of what can be found in that standard, reference to which is recommended.

X2.3 Using these four standards together provides a valuable, tried, and tested tool for use in pre-contract Cost Management. When applied consistently this process of cost planning, cost control, and cost analysis provides meaningful planning and continuing oversight opportunities through the design stages of any building project.

Title:	Renovation of Existing Building					Dates			Main Parameter			Reference:	Office - Low Rise	
Location:	No Place in Particular					Estimate Date:	2001.02.15		Quantity:	290		Estimate	Class 3 (Preliminary Design)	
						Bid Date:	2005.03.25		UoM:	m2 (GFA)				

CODE	LEVEL 2 GROUP ELEMENT	Element & ELEMENT				Estimate Sums			Main Parameter			Percentage		
Code	Level 3 Element	Ratio	Quantity	UoM	Unit Rate	Element	ELEMENT	MJR GROUP	Element	ELEMENT	MJR GROUP	Element	ELEMENT	MJR GROUP
A. SUBSTRUCTURE								$41,700			$143.79			5.9%
A10	FOUNDATIONS						$41,700			$143.79			5.9%	
A1010	Standard Foundations	1.000	290	m2	103.10	29900			103.10			4.3%		
A1020	Special Foundations					0			0.00			0.0%		
A1030	Slab on Grade	1.000	290	m2	40.69	11800			40.69			1.7%		
A20	BASEMENT CONSTRUCTION						$0			$0.00			0.0%	
A2010	Basement Excavation					0			0.00			0.0%		
A2020	Basement Walls					0			0.00			0.0%		
B. SHELL								$138,200			$476.55			19.7%
B10	SUPERSTRUCTURE						$41,700			$143.79			5.9%	
B1010	Floor Construction					0			0.00			0.0%		
B1020	Roof Construction	1.000	290	m2	143.79	41700			143.79			5.9%		
B20	EXTERIOR ENCLOSURE						$66,300			$228.62			9.4%	
B2010	Exterior Walls	0.583	169	m2	289.35	48900			168.62			7.0%		
B2020	Exterior Windows	0.100	29	m2	351.72	10200			35.17			1.5%		
B2030	Exterior Doors	0.014	4	ea	1800.00	7200			24.83			1.0%		
B30	ROOFING						$30,200			$104.14			4.3%	
B3010	Roof Coverings	1.000	290	m2	104.14	30200			104.14			4.3%		
B3020	Roof Openings					0			0.00			0.0%		
C. INTERIORS								$45,100			$155.52			6.4%
C10	INTERIOR CONSTRUCTION						$27,500			$94.83			3.9%	
C1010	Partitions	0.469	136	m2	172.79	23500			81.03			3.3%		
C1020	Interior Doors	0.010	3	ea	1333.33	4000			13.79			0.6%		
C1030	Fittings					0			0.00			0.0%		
C20	STAIRS						$0			$0.00			0.0%	
C2010	Stair Construction					0			0.00			0.0%		
C2010	Stair Finishes					0			0.00			0.0%		
C30	INTERIOR FINISHES						$17,600			$60.69			2.5%	
C3010	Wall Finishes	1.221	354	m2	7.91	2800			9.66			0.4%		
C3020	Floor Finishes	0.948	275	m2	29.09	8000			27.59			1.1%		
C3030	Ceiling Finishes	0.862	250	m2	27.20	6800			23.45			1.0%		
D. SERVICES								$253,000			$872.41			36.0%
D10	CONVEYING						$45,000			$155.17			6.4%	
D1010	Elevators & Lifts	0.003	1	ea	45000.00	45000			155.17			6.4%		
D1020	Escalators & Moving Walks					0			0.00			0.0%		
D1090	Other Conveying Systems					0			0.00			0.0%		
D20	PLUMBING						$6,400			$22.07			0.9%	
D2010	Plumbing Fixtures					0			0.00			0.0%		
D2020	Domestic Water Distribution					0			0.00			0.0%		
D2030	Sanitary Waste					0			0.00			0.0%		
D2040	Rain Water Drainage	1.000	290	m2	22.07	6400			22.07			0.9%		
D2090	Other Plumbing Systems					0			0.00			0.0%		

FIG. X2.1 UNIFORMAT II Elemental Cost Analysis for Buildings

CODE	LEVEL 2 GROUP ELEMENT	Element & ELEMENT				Estimate Sums			Main Parameter			Percentage		
Code	Level 3 Element	Ratio	Quantity	UoM	Unit Rate	Element	ELEMENT	MJR GROUP	Element	ELEMENT	MJR GROUP	Element	ELEMENT	MJR GROUP
D30	HVAC						$135,100			$465.86			19.2%	
D3010	Energy Supply					0			0.00			0.0%		
D3020	Heat Generating Systems					0			0.00			0.0%		
D3030	Cooling Generating Systems	0.069	20	Kw	2000.00	40000			137.93			5.7%		
D3040	Distribution Systems	1.000	290	m2	267.59	77600			267 59			11.1%		
D3050	Terminal & Package Units	0.034	10	Kw	550.00	5500			18.97			0.8%		
D3060	Controls and Instrumentation	0.148	43	ea	279.07	12000			41.38			1.7%		
D3070	Systems Testing & Balancing					0			0.00			0.0%		
D3090	Other HVAC Systems & Equipment					0			0.00			0.0%		
D40	FIRE PROTECTION						$0			$0.00			0.0%	
D4010	Sprinklers					0			0.00			0.0%		
D4020	Standpipes					0			0.00			0.0%		
D4030	Fire Protection Specialties					0			0.00			0.0%		
D4090	Other Fire Protection Systems					0			0.00			0.0%		
D50	ELECTRICAL						$66,500			$229.31			9.5%	
D5010	Electrical Service & Distribution	1.000	290	m2	53.10	15400			53.10			2.2%		
D5020	Lighting & Branch Wiring	0.393	114	ea	220.18	25100			86.55			3.6%		
D5030	Communication & Security	1.000	290	m2	42.07	12200			42.07			1.7%		
D5090	Other Electrical Systems	1.000	290	m2	47.59	13800			47.59			2.0%		
E. EQUIPMENT & FURNISHINGS								$7,300			$25.17			1.0%
E10	EQUIPMENT						$0			$0.00			0.0%	
E1010	Commercial Equipment					0			0.00			0.0%		
E1020	Institutional Equipment					0			0.00			0.0%		
E1030	Vehicular Equipment					0			0.00			0.0%		
E1090	Other Equipment					0			0.00			0.0%		
E20	FURNISHINGS						$7,300			$25.17			1.0%	
E2010	Fixed Furnishings	1.000	290	m2	25.17	7300			25.17			1.0%		
E2020	Movable Furnishings					0			0.00			0.0%		
F. SPECIAL CONSTRUCTION & DEMOLITION								S3,800			$13.10			0.5%
F10	SPECIAL CONSTRUCTION						$0			$0.00			0.0%	
F1010	Special Structures					0			0.00			0.0%		
F1020	Integrated Construction					0			0.00			0.0%		
F1030	Special Construction Systems					0			0.00			0.0%		
F1040	Special Facilities					0			0.00			0.0%		
F1050	Special Controls and Instrumentation					0			0.00			0.0%		
F20	SELECTIVE BUILDING DEMOLITION						$3,800			$13.10			0.5%	
F2010	Building Elements Demolition	0.003	1	sum	3800.00	3800			13.10			0.5%		
F2020	Hazardous Components Abatement					0			0.00			0.0%		
X&Z. BUILDING FIELD REQUIREMENTS, OFFICE OVERHEAD & PROFIT, AND ALLOWANCES								$212,900			$734.14			30.3%
X	FIELD REQUIREMENTS, OFFICE OVERHEAD & PROFIT						$63,600			219.31			9.1%	
X10	Field Requirements		8.0%			39,100			134.83			5.6%		
X20	Office Overhead & Profit		5.0%			24,500			84.48			3.5%		
Z	ALLOWANCES						$149,300			514.83			21.3%	
Z10	Design Development Allowance		15.0%			82,900			285.86			11.8%		
Z20	Inflation Allowance		12.0%			66,400			228.97			9.5%		
TOTAL - BUILDING CONSTRUCTION								**$702,000**			**2420.69**			**100.0%**

FIG. X2.2 UNIFORMAT II Elemental Cost Analysis for Buildings (Cont'd)

X3. PRELIMINARY PROJECT DESCRIPTION (PPD)

X3.1 Fig. X3.1, a sample schematic phase PPD, is taken from NIST report 6389 on UNIFORMAT II[5] and Construction Specification Institute Practice FF/180, Preliminary Project Descriptions and Outline Specifications.

X3.2 The PPD improves communications and coordination amongst all stakeholders early on in the building design process.

B SHELL

B10 SUPERSTRUCTURE

B1010 FLOOR CONSTRUCTION

A. Floor System: Two-hour fire-rated, composite steel beam, steel deck, and concrete slab system in 20-foot by 25-foot bay dimensions capable of supporting 75 PSF live load.

B1020 ROOF CONSTRUCTION

A. Roof System: Two-hour fire-rated, composite steel beam, steel deck, and concrete slab system in 20-foot by 25-foot bay dimensions capable of supporting 30 PSF live load.

B20 EXTERIOR CLOSURE.

B2010 EXTERIOR WALLS

A. Masonry Cavity Wall Construction:
   1. Modular face brick installed in running bond with tooled concave joints.
   2. Extruded polystyrene board installed between horizontal masonry reinforcing.
   3. Bituminous dampproofing applied over concrete masonry units.
   4. Load-bearing concrete masonry units with galvanized horizontal joint reinforcement.
   5. Concrete masonry unit lintel units over openings; concrete masonry unit bond beams at top of wall.

B. Loose galvanized steel lintels over brick openings with 8-inch minimum bearing on each side of opening

C. Elastomeric masonry flashing at sills, lintels, and other cavity interruptions.

D. Open weep holes in brick masonry at flashing locations on 24-inch centers.

B2020 EXTERIOR WINDOWS

A. Windows: Commercial-grade, aluminum double-hung windows with clear anodized finish and clear insulating glass.

B2030 EXTERIOR DOORS

A. Doors and frames: Insulated, exterior flush steel doors set in steel frames.

B. Hardware: Ball bearing butts, closers, locksets, thresholds, and weather-stripping.

[1] Construction Specification Institute. Practice FF/180, p. 5.

FIG. X3.1 Preliminary Project Description (PPD)[1]