

<b>00 Using The Construction Task Catalog®</b>	<b>1</b>
<hr/>	
<b>01 General Requirements</b>	<b>1</b>
01 20 Price and Payment Procedures	1
01 22 Unit Prices	1
01 30 Administrative Requirements	40
01 35 Special Procedures	40
01 40 Quality Requirements	40
01 41 Regulatory Requirements	40
01 42 References	40
01 45 Quality Control	41
01 50 Temporary Facilities and Controls	44
01 51 Temporary Utilities	44
01 52 Construction Facilities	44
01 53 Temporary Construction	46
01 54 Construction Aids	46
01 55 Vehicular Access and Parking	48
01 56 Temporary Barriers and Enclosures	54
01 57 Temporary Controls	63
01 58 Project Identification	64
01 60 Product Requirements	64
01 66 Product Storage and Handling Requirements	64
01 70 Execution and Closeout Requirements	65
01 71 Examination and Preparation	65
01 74 Cleaning and Waste Management	67
<hr/>	
<b>02 Existing Conditions</b>	<b>1</b>
02 20 Assessment	1
02 25 Existing Material Assessment	1
02 30 Subsurface Investigation	1
02 32 Geotechnical Investigations	1
02 40 Demolition and Structure Moving	2
02 41 Demolition	2
02 42 Removal and Salvage of Construction Materials	20
02 43 Structure Moving	20
02 50 Site Remediation	20
02 58 Snow Control	20
02 60 Contaminated Site Material Removal	21
02 61 Removal and Disposal of Contaminated Soils	21
02 65 Underground Storage Tank Removal	21
02 80 Facility Remediation	25
02 81 Transportation and Disposal of Hazardous Materials	25
02 82 Asbestos Remediation	25
02 83 Lead Remediation	32
02 84 Polychlorinated Biphenyl Remediation	37
02 86 Hazardous Waste Drum Handling	37
02 87 Bio-Hazard Material Remediation	39
02 89 Hazmat Ancillary Tasks and Support	47
02 90 Disaster Recovery	48
02 90 50 Cleaning and Disaster Clean-up	48
02 90 55 Emergency Clean-up	52
<hr/>	
<b>03 Concrete</b>	<b>1</b>
03 01 Maintenance of Concrete	1
03 01 30 Maintenance of Cast-In-Place Concrete	1
03 05 Common Work Results For Concrete	3
03 05 13 Concrete Admixtures	3
03 10 Concrete Forming and Accessories	3
03 11 Concrete Forming	3
03 15 Concrete Accessories	7
03 20 Concrete Reinforcing	16
03 21 Reinforcement Bars	16
03 22 Fabric and Grid Reinforcing	45

## Table of Contents

03 30 Cast-In-Place Concrete.....	46
03 30 53 Miscellaneous Cast-in-Place Concrete .....	46
03 31 Structural Concrete .....	47
03 35 Concrete Finishing .....	63
03 37 Specialty Placed Concrete .....	66
03 39 Concrete Curing .....	67
03 40 Precast Concrete .....	67
03 41 Precast Structural Concrete .....	68
03 48 Precast Concrete Specialties .....	77
03 50 Cast Decks and Underlayment .....	80
03 51 Cast Roof Decks .....	80
03 53 Concrete Topping.....	80
03 54 Cast Underlayment.....	81
03 60 Grouting .....	81
03 61 Cementitious Grouting.....	81
03 62 Non-Shrink Grouting.....	81
03 63 Epoxy Grouting.....	82
03 64 Injection Grouting .....	82
03 80 Concrete Cutting and Boring.....	82
03 81 Concrete Cutting .....	82
03 82 Concrete Boring .....	83

## 04 Masonry 1

04 01 Maintenance of Masonry.....	1
04 01 20 Maintenance of Unit Masonry.....	1
04 01 50 Maintenance of Refractory Masonry .....	10
04 05 Common Work Results for Masonry .....	10
04 05 13 Masonry Mortaring .....	10
04 05 16 Masonry Grouting.....	11
04 05 19 Masonry Anchorage and Reinforcing .....	11
04 05 23 Masonry Accessories .....	37
04 20 Unit Masonry.....	39
04 21 Clay Unit Masonry .....	39
04 22 Concrete Unit Masonry.....	42
04 23 Glass Unit Masonry .....	47
04 40 Stone Assemblies .....	47
04 41 Dry-Placed Stone .....	47
04 42 Exterior Stone Cladding .....	47
04 43 Stone Masonry .....	48
04 50 Refractory Masonry.....	49
04 51 Flue Liner Masonry.....	49
04 70 Manufactured Masonry .....	49
04 72 Cast Stone Masonry.....	50

## 05 Metals 1

05 05 Common Work Results for Metals .....	1
05 05 19 Post-Installed Concrete Anchors.....	1
05 05 21 Fastening Methods for Metal.....	12
05 05 23 Metal Fastenings.....	13
05 10 Structural Metal Framing.....	78
05 12 Structural Steel Framing.....	78
05 13 Structural Stainless-Steel Framing .....	134
05 14 Structural Aluminum Framing.....	134
05 15 Wire Rope Assemblies .....	135
05 20 Metal Joists .....	141
05 21 Steel Joist Framing.....	141
05 30 Metal Decking .....	141
05 31 Steel Decking .....	141
05 36 Composite Metal Decking .....	145
05 40 Cold-Formed Metal Framing .....	148
05 41 Structural Metal Stud Framing.....	148
05 42 Cold-Formed Metal Joist Framing .....	150
05 43 Slotted Channel Framing.....	150
05 45 Metal Support Assemblies.....	152
05 50 Metal Fabrications.....	152
05 51 Metal Stairs .....	152
05 52 Metal Railings.....	154

05 53 Metal Gratings.....	162
05 54 Metal Floor Plates.....	170
05 55 Metal Stair Treads and Nosings.....	170
05 56 Metal Castings.....	172
05 58 Formed Metal Fabrications.....	172
05 59 Metal Specialties.....	173
05 70 Decorative Metal.....	181
05 71 Decorative Metal Stairs.....	181
05 73 Decorative Metal Railings.....	182
05 75 Decorative Formed Metal.....	183

**06 Wood, Plastics, and Composites 1**

06 01 Maintenance of Wood, Plastics, and Composites.....	1
06 01 20 Maintenance of Finish Carpentry.....	1
06 01 40 Maintenance of Architectural Woodwork.....	1
06 05 Common Work Results for Wood, Plastics, and Composites.....	1
06 05 23 Wood, Plastic, and Composite Fastenings.....	1
06 05 73 Wood Treatment.....	23
06 10 Rough Carpentry.....	24
06 11 Wood Framing.....	24
06 13 Heavy Timber Construction.....	29
06 15 Wood Decking.....	30
06 16 Sheathing.....	33
06 17 Shop-Fabricated Structural Wood.....	39
06 18 Glued-Laminated Construction.....	45
06 20 Finish Carpentry.....	46
06 22 Millwork.....	46
06 25 Prefinished Paneling.....	47
06 40 Architectural Woodwork.....	48
06 41 Architectural Wood Casework.....	48
06 42 Wood Paneling.....	63
06 43 Wood Stairs and Railings.....	66
06 44 Ornamental Woodwork.....	67
06 46 Wood Trim.....	69
06 48 Wood Frames.....	86
06 49 Wood Screens and Exterior Wood Shutters.....	87
06 50 Structural Plastics.....	88
06 51 Structural Plastic Shapes and Plates.....	88
06 52 Plastic Structural Assemblies.....	94
06 53 Plastic Decking.....	95
06 60 Plastic Fabrications.....	95
06 65 Plastic Trim.....	95
06 70 Structural Composites.....	96
06 74 Composite Gratings.....	96
06 80 Composite Fabrications.....	97
06 82 Composite Trim.....	97
06 83 Composite Paneling.....	99

**07 Thermal And Moisture Protection 1**

07 01 Operation and Maintenance of Thermal and Moisture Protection.....	1
07 01 50 Maintenance of Membrane Roofing.....	1
07 05 Common Work Results for Thermal and Moisture Protection.....	1
07 05 13 Mobilization Of Crew For Small Quantity Of Roof Work.....	1
07 10 Dampproofing and Waterproofing.....	1
07 11 Dampproofing.....	1
07 13 Sheet Waterproofing.....	2
07 14 Fluid-Applied Waterproofing.....	3
07 16 Cementitious and Reactive Waterproofing.....	4
07 19 Water Repellents.....	4
07 20 Thermal Protection.....	4
07 21 Thermal Insulation.....	4
07 22 Roof and Deck Insulation.....	16
07 24 Exterior Insulation and Finish Systems.....	44
07 25 Weather Barriers.....	46
07 26 Vapor Retarders.....	46
07 27 Air Barriers.....	46
07 30 Steep Slope Roofing.....	47

**Table of Contents**

07 31 Shingles and Shakes.....	47
07 32 Roof Tiles.....	52
07 34 Roofing Underlayment.....	54
07 40 Roofing and Siding Panels.....	55
07 41 Roof Panels.....	55
07 42 Wall Panels.....	58
07 46 Siding.....	60
07 50 Membrane Roofing.....	64
07 51 Built-Up Bituminous Roofing.....	64
07 52 Modified Bituminous Membrane Roofing.....	72
07 53 Elastomeric Membrane Roofing.....	82
07 54 Thermoplastic Membrane Roofing.....	85
07 56 Fluid-Applied Roofing.....	90
07 57 Coated Foamed Roofing.....	90
07 58 Roll Roofing.....	92
07 59 Membrane Roofing Termination Bar.....	92
07 60 Flashing and Sheet Metal.....	92
07 61 Sheet Metal Roofing.....	92
07 62 Sheet Metal Flashing and Trim.....	95
07 63 Sheet Metal Roofing Specialties.....	100
07 65 Flexible Flashing.....	101
07 70 Roof and Wall Specialties and Accessories.....	102
07 71 Roof Specialties.....	102
07 72 Roof Accessories.....	130
07 73 Roof Protection Board.....	153
07 76 Roof Pavers.....	154
07 80 Fire and Smoke Protection.....	155
07 81 Applied Fireproofing.....	155
07 84 Firestopping.....	156
07 90 Joint Protection.....	162
07 91 Preformed Joint Seals.....	162
07 92 Joint Sealants.....	165
07 95 Expansion Control.....	168

**08 Openings 1**

08 01 Operation and Maintenance of Openings.....	1
08 01 10 Operation and Maintenance of Doors and Frames.....	1
08 01 50 Operation and Maintenance of Windows.....	1
08 01 80 Maintenance of Glazing.....	1
08 05 Common Work Results for Openings.....	1
08 05 13 Door Options and Modifications.....	1
08 10 Doors and Frames.....	3
08 11 Metal Doors and Frames.....	3
08 12 Metal Frames.....	3
08 13 Metal Doors.....	25
08 14 Wood Doors.....	48
08 15 Plastic Doors.....	107
08 16 Composite Doors.....	107
08 17 Integrated Door Opening Assemblies.....	112
08 18 Glass Doors.....	115
08 30 Specialty Doors and Frames.....	116
08 31 Access Doors and Panels.....	116
08 33 Coiling Doors and Grilles.....	117
08 34 Special Function Doors.....	154
08 36 Panel Doors.....	162
08 38 Traffic Doors.....	170
08 40 Entrances, Storefronts, and Curtain Walls.....	186
08 42 Entrances.....	186
08 43 Storefronts.....	191
08 44 Curtain Wall and Glazed Assemblies.....	195
08 45 Translucent Wall and Roof Assemblies.....	197
08 50 Windows.....	197
08 51 Metal Windows.....	197
08 52 Wood Windows.....	212
08 53 Plastic Windows.....	250
08 56 Special Function Windows.....	278
08 60 Roof Windows and Skylights.....	282
08 62 Unit Skylights.....	282

08 63 Metal-Framed Skylights .....	287
08 66 Wood-Framed Skylights.....	292
08 70 Hardware .....	293
08 71 Door Hardware.....	293
08 72 Weatherstripping, Thresholds and Seals.....	376
08 75 Window Hardware.....	388
08 78 Special Function Hardware.....	388
08 79 Hardware Accessories.....	388
08 80 Glazing .....	389
08 81 Glass Glazing.....	389
08 83 Mirrors.....	401
08 84 Plastic Glazing .....	402
08 85 Glazing Accessories .....	403
08 87 Glazing Surface Films.....	403
08 88 Special Function Glazing .....	404
08 90 Louvers and Vents .....	406
08 91 Louvers .....	406
08 95 Vents.....	438

**09 Finishes 1**

09 01 Maintenance of Finishes .....	1
09 01 20 Maintenance of Plaster and Gypsum Board .....	1
09 01 30 Maintenance of Tiling .....	1
09 01 60 Maintenance of Flooring .....	1
09 01 80 Maintenance of Acoustic Treatment .....	2
09 01 90 Maintenance of Painting and Coating .....	2
09 05 Common Work Results for Finishes.....	7
09 05 61 Common Work Results for Flooring Preparation.....	7
09 05 71 Acoustic Underlayment.....	7
09 20 Plaster and Gypsum Board .....	8
09 22 Supports for Plaster and Gypsum Board .....	8
09 23 Gypsum Plastering.....	17
09 24 Cement Plastering .....	18
09 28 Backing Boards and Underlayments .....	19
09 29 Gypsum Board .....	20
09 30 Tiling .....	28
09 30 13 Ceramic Tiling.....	28
09 30 16 Quarry Tiling .....	29
09 30 33 Stone Tiling.....	29
09 31 Thin-Set Tiling.....	34
09 32 Mortar-Bed Tiling .....	34
09 34 Waterproofing-Membrane Tiling .....	34
09 35 Chemical-Resistant Tiling .....	35
09 39 Tiling Transitions.....	35
09 50 Ceilings.....	36
09 51 Acoustical Ceilings.....	36
09 53 Acoustical Ceiling Suspension Assemblies .....	50
09 54 Specialty Ceilings.....	53
09 57 Special Function Ceilings .....	54
09 60 Flooring .....	54
09 61 Flooring Treatment.....	54
09 63 Masonry Flooring .....	54
09 64 Wood Flooring .....	55
09 65 Resilient Flooring .....	58
09 66 Terrazzo Flooring.....	65
09 67 Fluid-Applied Flooring.....	68
09 68 Carpeting .....	69
09 69 Access Flooring .....	81
09 70 Wall Finishes .....	81
09 72 Wall Coverings.....	81
09 73 Wall Carpeting .....	82
09 74 Flexible Wood Sheets.....	82
09 78 Interior Wall Paneling.....	82
09 80 Acoustic Treatment .....	83
09 81 Acoustic Insulation.....	83
09 84 Acoustic Room Components .....	83
09 90 Painting and Coating .....	84
09 91 Painting.....	85

## Table of Contents

09 93 Staining and Transparent Finishing.....	195
09 96 High-Performance Coatings.....	197
09 97 Special Coatings.....	200

## 10 Specialties 1

10 01 Operation and Maintenance of Specialties.....	1
10 01 40 Operation and Maintenance of Safety Specialties.....	1
10 01 50 Operation and Maintenance of Storage Specialties.....	1
10 10 Information Specialties.....	1
10 11 Visual Display Units.....	1
10 12 Display Cases.....	8
10 13 Directories.....	8
10 14 Signage.....	11
10 20 Interior Specialties.....	41
10 21 Compartments and Cubicles.....	41
10 22 Partitions.....	66
10 26 Wall and Door Protection.....	70
10 28 Toilet, Bath, and Laundry Accessories.....	81
10 40 Safety Specialties.....	91
10 41 Emergency Access And Information Cabinets.....	91
10 44 Fire Protection Specialties.....	91
10 45 Photoluminescent Exit Specialties.....	97
10 50 Storage Specialties.....	97
10 51 Lockers.....	97
10 55 Postal Specialties.....	112
10 56 Storage Assemblies.....	112
10 57 Wardrobe And Closet Specialties.....	115
10 70 Exterior Specialties.....	115
10 71 Exterior Protection.....	115
10 73 Protective Covers.....	125
10 75 Flagpoles.....	126
10 80 Other Specialties.....	129
10 81 Pest Control Devices.....	129
10 86 Security Mirrors And Domes.....	130

## 11 Equipment 1

11 01 Operation and Maintenance of Equipment.....	1
11 01 10 Operation and Maintenance of Vehicle and Pedestrian Equipment.....	1
11 10 Vehicle and Pedestrian Equipment.....	1
11 11 Vehicle Service Equipment.....	1
11 12 Parking Control Equipment.....	2
11 13 Loading Dock Equipment.....	3
11 14 Pedestrian Control Equipment.....	8
11 20 Commercial Equipment.....	10
11 21 Retail and Service Equipment.....	10
11 22 Banking Equipment.....	11
11 30 Residential Equipment.....	11
11 30 13 Residential Appliances.....	11
11 30 33 Retractable Stairs.....	14
11 32 Unit Kitchens.....	15
11 40 Foodservice Equipment.....	16
11 41 Foodservice Storage Equipment.....	16
11 42 Food Preparation Equipment.....	36
11 44 Food Cooking Equipment.....	38
11 46 Food Dispensing Equipment.....	47
11 48 Foodservice Cleaning and Disposal Equipment.....	52
11 50 Educational and Scientific Equipment.....	53
11 52 Audio-Visual Equipment.....	53
11 60 Entertainment and Recreation Equipment.....	61
11 66 Athletic Equipment.....	61
11 68 Play Field Equipment and Structures.....	61
11 80 Facility Maintenance and Operation Equipment.....	64
11 81 Maintenance Equipment.....	64
11 82 Facility Solid Waste Handling Equipment.....	65
11 90 Other Equipment.....	66
11 97 Security Equipment.....	66
11 98 Detention Equipment.....	66

<b>12 Furnishings</b>	<b>1</b>
12 01 Operation and Maintenance of Furnishings .....	1
12 01 60 Operation and Maintenance of Multiple Seating .....	1
12 20 Window Treatments .....	1
12 21 Window Blinds .....	1
12 22 Curtains and Drapes .....	1
12 23 Interior Shutters .....	3
12 24 Window Shades .....	5
12 25 Window Treatment Operating Hardware .....	5
12 30 Casework .....	5
12 31 Manufactured Metal Casework .....	5
12 36 Countertops .....	10
12 40 Furnishings and Accessories .....	11
12 41 Office Accessories .....	12
12 48 Rugs and Mats .....	12
12 50 Furniture .....	12
12 55 Detention Furniture .....	12
12 59 Systems Furniture .....	14
12 60 Multiple Seating .....	18
12 61 Fixed Audience Seating .....	18
12 62 Portable-Audience Seating .....	20
12 66 Telescoping Stands .....	20
<b>13 Special Construction</b>	<b>1</b>
13 10 Special Facility Components .....	1
13 11 Swimming Pools .....	1
13 12 Fountains .....	1
13 20 Special Purpose Rooms .....	2
13 21 Controlled Environment Rooms .....	2
13 30 Special Structures .....	2
13 34 Fabricated Engineered Structures .....	2
13 40 Integrated Construction .....	22
13 42 Building Modules .....	22
13 46 Lightning Protection Systems .....	22
13 47 Facility Protection .....	23
13 48 Sound, Vibration, and Seismic Control .....	24
<b>14 Conveying Equipment</b>	<b>1</b>
14 01 Operation and Maintenance of Conveying Equipment .....	1
14 01 20 Operation and Maintenance of Elevators .....	1
14 01 30 Operation and Maintenance of Escalators and Moving Walks .....	3
14 20 Elevators .....	3
14 21 Electric Traction Elevators .....	3
14 24 Hydraulic Elevators .....	5
14 26 Limited-Use/Limited-Application Elevators .....	10
14 27 Custom Elevator Cabs and Doors .....	10
14 28 Elevator Equipment and Controls .....	10
14 30 Escalators and Moving Walks .....	11
14 31 Escalators .....	11
14 32 Moving Walks .....	11
14 40 Lifts .....	11
14 42 Wheelchair Lifts .....	11
14 90 Other Conveying Equipment .....	12
14 91 Facility Chutes .....	12
<b>21 Fire Suppression</b>	<b>1</b>
21 01 Operation and Maintenance of Fire Suppression .....	1
21 01 10 Operation and Maintenance of Water-Based Fire-Suppression Systems .....	1
21 01 30 Operation and Maintenance of Fire-Suppression Equipment .....	1
21 05 Common Work Results for Fire Suppression .....	1
21 05 13 Common Motor Requirements for Fire-Suppression Equipment .....	1
21 05 16 Expansion Fittings and Loops for Fire-Suppression Piping .....	1
21 05 17 Sleeves and Sleeve Seals for Fire-Suppression Piping .....	2
21 05 19 Meters and Gages for Fire-Suppression Systems .....	2
21 05 23 General-Duty Valves for Water-Based Fire-Suppression Piping .....	2

## Table of Contents

21 05 29 Hangers and Supports for Fire-Suppression Piping and Equipment.....	4
21 05 48 Vibration and Seismic Controls for Fire-Suppression Piping and Equipment.....	4
21 05 53 Identification for Fire-Suppression Piping and Equipment.....	4
21 07 Fire-Suppression Systems Insulation.....	4
21 07 16 Fire-Suppression Equipment Insulation.....	4
21 07 19 Fire-Suppression Piping Insulation.....	4
21 10 Water-Based Fire-Suppression Systems.....	4
21 11 Facility Fire-Suppression Water-Service Piping.....	4
21 12 Fire-Suppression Standpipes.....	5
21 13 Fire-Suppression Sprinkler Systems.....	6
21 20 Fire-Extinguishing Systems.....	34
21 21 Carbon-Dioxide Fire-Extinguishing Systems.....	34
21 22 Clean-Agent Fire-Extinguishing Systems.....	34
21 23 Wet-Chemical Fire-Extinguishing Systems.....	43
21 24 Dry-Chemical Fire-Extinguishing Systems.....	46
21 30 Fire Pumps.....	48
21 31 Centrifugal Fire Pumps.....	48
21 34 Fire Pump Accessories.....	49

## 22 Plumbing 1

22 01 Operation and Maintenance of Plumbing.....	1
22 01 10 Operation and Maintenance of Plumbing Piping and Pumps.....	1
22 01 40 Operation and Maintenance of Plumbing Fixtures.....	1
22 05 Common Work Results for Plumbing.....	2
22 05 13 Common Motor Requirements for Plumbing Equipment.....	2
22 05 16 Expansion Fittings and Loops for Plumbing Piping.....	2
22 05 17 Sleeves and Sleeve Seals for Plumbing Piping.....	2
22 05 19 Meters and Gages for Plumbing Piping.....	2
22 05 23 General-Duty Valves for Plumbing Piping.....	2
22 05 29 Hangers and Supports for Plumbing Piping and Equipment.....	5
22 05 48 Vibration and Seismic Controls for Plumbing Piping and Equipment.....	5
22 05 53 Identification for Plumbing Piping and Equipment.....	5
22 05 76 Facility Drainage Piping Cleanouts.....	5
22 07 Plumbing Insulation.....	8
22 07 16 Plumbing Equipment Insulation.....	8
22 07 19 Plumbing Piping Insulation.....	8
22 10 Plumbing Piping.....	39
22 11 Facility Water Distribution.....	39
22 12 Facility Potable-Water Storage Tanks.....	104
22 13 Facility Sanitary Sewerage.....	106
22 14 Facility Storm Drainage.....	154
22 15 General Service Compressed-Air Systems.....	163
22 30 Plumbing Equipment.....	167
22 31 Domestic Water Softeners.....	167
22 32 Domestic Water Filtration Equipment.....	168
22 33 Electric Domestic Water Heaters.....	170
22 34 Fuel-Fired Domestic Water Heaters.....	172
22 35 Domestic Water Heat Exchangers.....	176
22 40 Plumbing Fixtures.....	176
22 41 Residential Plumbing Fixtures.....	176
22 42 Commercial Plumbing Fixtures.....	177
22 43 Healthcare Plumbing Fixtures.....	192
22 45 Emergency Plumbing Fixtures.....	193
22 46 Security Plumbing Fixtures.....	197
22 47 Drinking Fountains and Water Coolers.....	198
22 50 Pool and Fountain Plumbing Systems.....	202
22 51 Swimming Pool Plumbing Systems.....	202
22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities.....	209
22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities.....	209
22 67 Processed Water Systems for Laboratory and Healthcare Facilities.....	223

## 23 Heating, Ventilating, and Air-Conditioning (HVAC) 1

23 01 Operation and Maintenance of HVAC Systems.....	1
23 01 10 Operation and Maintenance of Facility Fuel Systems.....	1
23 01 20 Operation and Maintenance of HVAC Piping and Pumps.....	1
23 01 30 Operation and Maintenance of HVAC Air Distribution.....	3
23 01 50 Operation and Maintenance of Central Heating Equipment.....	4



23 01 60 Operation and Maintenance of Central Cooling Equipment .....	5
23 05 Common Work Results for HVAC .....	5
23 05 13 Common Motor Requirements for HVAC Equipment .....	5
23 05 16 Expansion Fittings and Loops for HVAC Piping .....	8
23 05 17 Sleeves and Sleeve Seals for HVAC Piping .....	9
23 05 19 Meters and Gages for HVAC Piping .....	10
23 05 23 General-Duty Valves For HVAC Piping .....	13
23 05 29 Hangers and Supports for HVAC Piping and Equipment .....	34
23 05 48 Vibration and Seismic Controls for HVAC .....	63
23 05 53 Identification for HVAC Piping and Equipment .....	67
23 05 66 Anti-Microbial Ultraviolet Emitters for HVAC Ducts and Equipment .....	68
23 05 93 Testing, Adjusting, and Balancing for HVAC .....	70
23 07 HVAC Insulation .....	72
23 07 13 Duct Insulation .....	72
23 07 16 HVAC Equipment Insulation .....	74
23 07 19 HVAC Piping Insulation .....	74
23 09 Instrumentation and Control for HVAC .....	77
23 09 23 Direct-Digital Control System for HVAC .....	77
23 09 43 Pneumatic Control System For HVAC .....	94
23 10 Facility Fuel Systems .....	95
23 11 Facility Fuel Piping .....	95
23 12 Facility Fuel Pumps .....	107
23 13 Facility Fuel-Storage Tanks .....	108
23 20 HVAC Piping and Pumps .....	116
23 21 Hydronic Piping and Pumps .....	116
23 22 Steam and Condensate Piping and Pumps .....	206
23 23 Refrigerant Piping .....	211
23 25 HVAC Water Treatment .....	216
23 30 HVAC Air Distribution .....	216
23 31 HVAC Ducts and Casings .....	216
23 33 Air Duct Accessories .....	306
23 34 HVAC Fans .....	352
23 35 Special Exhaust Systems .....	367
23 36 Air Terminal Units .....	370
23 37 Air Outlets and Inlets .....	372
23 38 Ventilation Hoods .....	387
23 40 HVAC Air Cleaning Devices .....	389
23 41 Particulate Air Filtration .....	389
23 42 Gas-Phase Air Filtration .....	396
23 43 Electronic Air Cleaners .....	396
23 50 Central Heating Equipment .....	396
23 51 Breechings, Chimneys, and Stacks .....	396
23 52 Heating Boilers .....	418
23 53 Heating Boiler Feedwater Equipment .....	436
23 54 Furnaces .....	437
23 55 Fuel-Fired Heaters .....	439
23 57 Heat Exchangers for HVAC .....	440
23 60 Central Cooling Equipment .....	442
23 61 Refrigerant Compressors .....	442
23 62 Packaged Compressor and Condenser Units .....	443
23 63 Refrigerant Condensers .....	444
23 64 Packaged Water Chillers .....	446
23 65 Cooling Towers .....	451
23 70 Central HVAC Equipment .....	456
23 71 Thermal Storage .....	456
23 72 Air-To-Air Energy Recovery Equipment .....	457
23 73 Indoor Central-Station Air-Handling Units .....	457
23 74 Packaged Outdoor HVAC Equipment .....	476
23 76 Evaporative Air-Cooling Equipment .....	483
23 80 Decentralized Unitary HVAC Equipment .....	484
23 81 Decentralized Unitary HVAC Equipment .....	484
23 82 Convection Heating and Cooling Units .....	497
23 84 Humidity Control Equipment .....	513

**26 Electrical**

**1**

26 01 Operation and Maintenance of Electrical Systems .....	1
26 01 10 Operation and Maintenance of Medium-Voltage Electrical Distribution .....	1
26 01 20 Operation and Maintenance of Low-Voltage Electrical Distribution .....	2

**Table of Contents**

26 01 30 Operation and Maintenance of Facility Electrical Power Generating and Storing Equipment ..... 2

26 01 50 Operation and Maintenance of Lighting ..... 2

26 05 Common Work Results for Electrical ..... 29

26 05 13 Medium-Voltage Cables ..... 29

26 05 19 Low-Voltage Electrical Power Conductors and Cables ..... 34

26 05 23 Control-Voltage Electrical Power Cables ..... 51

26 05 26 Grounding and Bonding for Electrical Systems ..... 51

26 05 29 Hangers and Supports for Electrical Systems ..... 55

26 05 33 Raceway and Boxes for Electrical Systems ..... 77

26 05 36 Cable Trays for Electrical Systems ..... 304

26 05 39 Underfloor Raceways for Electrical Systems ..... 392

26 05 43 Underground Ducts and Raceways for Electrical Systems ..... 393

26 05 46 Utility Poles for Electrical Systems ..... 395

26 05 53 Identification for Electrical Systems ..... 400

26 05 83 Wiring Connections ..... 400

26 09 Instrumentation and Control for Electrical Systems ..... 404

26 09 23 Lighting Control Devices ..... 404

26 10 Medium-Voltage Electrical Distribution ..... 427

26 11 Substations ..... 427

26 12 Medium-Voltage Transformers ..... 434

26 13 Medium-Voltage Switchgear ..... 438

26 18 Medium-Voltage Circuit Protection Devices ..... 441

26 19 High-Voltage Circuit Protection ..... 441

26 20 Low-Voltage Electrical Distribution ..... 443

26 21 Low-Voltage Electrical Service Entrance ..... 443

26 22 Low-Voltage Transformers ..... 445

26 24 Switchboards and Panelboards ..... 452

26 25 Enclosed Bus Assemblies ..... 497

26 27 Low-Voltage Distribution Equipment ..... 500

26 28 Low-Voltage Circuit Protective Devices ..... 518

26 29 Low-Voltage Controllers ..... 548

26 30 Facility Electrical Power Generating and Storing Equipment ..... 565

26 31 Photovoltaic Collectors ..... 565

26 32 Packaged Generator Assemblies ..... 569

26 33 Battery Equipment ..... 574

26 35 Power Filters and Conditioners ..... 577

26 36 Transfer Switches ..... 577

26 40 Electrical And Cathodic Protection ..... 580

26 43 Surge Protective Devices ..... 580

26 50 Lighting ..... 584

26 51 Interior Lighting ..... 584

26 52 Safety Lighting ..... 630

26 54 Classified Location Lighting ..... 635

26 55 Special Purpose Lighting ..... 638

26 56 Exterior Lighting ..... 651

**27 Communications 1**

27 05 Common Work Results for Communications ..... 1

27 05 26 Grounding and Bonding for Communications Systems ..... 1

27 05 29 Hangers and Supports for Communications Systems ..... 1

27 05 33 Conduits and Backboxes for Communications Systems ..... 4

27 05 36 Cable Trays for Communications Systems ..... 4

27 05 39 Surface Raceways for Communications Systems ..... 4

27 05 43 Underground Ducts and Raceways for Communications Systems ..... 4

27 05 46 Utility Poles for Communications Systems ..... 4

27 05 53 Identification for Communications Systems ..... 4

27 10 Structured Cabling ..... 4

27 11 Communications Equipment Room Fittings ..... 4

27 13 Communications Backbone Cabling ..... 11

27 15 Communications Horizontal Cabling ..... 13

27 16 Communications Connecting Cords, Devices, and Adapters ..... 54

27 20 Data Communications ..... 56

27 21 Data Communications Network Equipment ..... 56

27 22 Data Communications Hardware ..... 60

27 24 Data Communications Peripheral Data Equipment ..... 60

27 30 Voice Communications ..... 60

27 31 Voice Communications Switching and Routing Equipment ..... 61

27 32 Voice Communications Terminal Equipment ..... 61

27 40 Audio-Video Communications .....	62
27 41 Audio-Video Systems.....	62
27 50 Distributed Communications and Monitoring Systems .....	63
27 51 Distributed Audio-Video Communications Systems .....	63
27 53 Distributed Systems.....	64

**28 Electronic Safety and Security 1**

28 05 Common Work Results for Electronic Safety and Security .....	1
28 05 26 Grounding and Bonding for Electronic Safety and Security.....	1
28 05 53 Identification for Electronic Safety and Security .....	1
28 10 Access Control .....	1
28 15 Integrated Access Control Hardware Devices .....	1
28 16 Access Control Interfaces .....	1
28 18 Security Access Detection Equipment.....	7
28 20 Video Surveillance.....	7
28 21 Surveillance Cameras.....	8
28 40 Life Safety .....	26
28 42 Gas Detection and Alarm.....	26
28 43 Fuel Oil Detection and Alarm.....	26
28 46 Fire Detection and Alarm .....	26
28 47 Mass Notification.....	72
28 49 Electronic Personal Protection Systems.....	75

**31 Earthwork 1**

31 01 Maintenance of Earthwork.....	1
31 01 20 Maintenance of Earth Moving .....	1
31 05 Common Work Results for Earthwork.....	1
31 05 13 Soils for Earthwork.....	1
31 05 16 Aggregates for Earthwork .....	2
31 05 36 Equipment Delivery, Pickup, Mobilization and Demobilization .....	4
31 10 Site Clearing.....	4
31 11 Clearing and Grubbing.....	4
31 13 Selective Tree and Shrub Removal and Trimming .....	4
31 20 Earth Moving .....	6
31 22 Grading .....	7
31 23 Excavation and Fill.....	7
31 24 Embankments .....	14
31 25 Erosion and Sedimentation Controls .....	15
31 30 Earthwork Methods .....	19
31 31 Soil Treatment.....	19
31 32 Soil Stabilization.....	19
31 35 Slope Protection.....	29
31 36 Gabions.....	29
31 37 Riprap .....	29
31 40 Shoring and Underpinning.....	29
31 41 Shoring.....	29
31 43 Concrete Raising .....	30
31 45 Vibroflotation and Densification .....	30
31 60 Special Foundations and Load-bearing Elements.....	30
31 62 Driven Piles.....	30
31 63 Bored Piles.....	34

**32 Exterior Improvements 1**

32 01 Operation and Maintenance of Exterior Improvements.....	1
32 01 11 Paving Cleaning.....	1
32 01 13 Flexible Paving Surface Treatment.....	1
32 01 16 Flexible Paving Rehabilitation.....	3
32 01 17 Flexible Paving Repair .....	5
32 01 26 Rigid Paving Rehabilitation .....	6
32 01 29 Rigid Paving Repair .....	7
32 01 90 Operation and Maintenance of Planting .....	7
32 05 Common Work Results for Exterior Improvements .....	11
32 05 33 Common Work Results for Planting.....	11
32 10 Bases, Ballasts, and Paving.....	11
32 11 Base Courses .....	11
32 12 Flexible Paving.....	12

**Table of Contents**

32 13 Rigid Paving ..... 19  
 32 14 Unit Paving ..... 23  
 32 15 Aggregate Surfacing ..... 26  
 32 16 Curbs, Gutters, Sidewalks, and Driveways ..... 26  
 32 17 Paving Specialties ..... 33  
 32 18 Athletic and Recreational Surfacing ..... 45  
 32 30 Site Improvements ..... 52  
 32 31 Fences and Gates ..... 52  
 32 32 Retaining Walls ..... 133  
 32 33 Site Furnishings ..... 139  
 32 35 Screening Devices ..... 148  
 32 39 Manufactured Site Specialties ..... 149  
 32 80 Irrigation ..... 151  
 32 84 Planting Irrigation ..... 151  
 32 90 Planting ..... 167  
 32 91 Planting Preparation ..... 168  
 32 92 Turf and Grasses ..... 171  
 32 93 Plants ..... 176  
 32 94 Planting Accessories ..... 206  
 32 96 Transplanting ..... 208

**33 Utilities 1**

33 01 Operation and Maintenance of Utilities ..... 1  
 33 01 10 Operation and Maintenance of Water Utilities ..... 1  
 33 01 30 Operation and Maintenance of Sewer Utilities ..... 4  
 33 01 34 Operation and Maintenance of Onsite Wastewater Disposal Systems ..... 71  
 33 01 70 Operation and Maintenance of Electrical Utilities ..... 71  
 33 05 Common Work Results for Utilities ..... 73  
 33 05 07 Trenchless Installation of Utility Piping ..... 73  
 33 05 09 Piping Specials for Utilities ..... 75  
 33 05 16 Cast-Iron Utility Pipe ..... 75  
 33 05 17 Copper Utility Pipe and Tubing ..... 75  
 33 05 19 Ductile-Iron Utility Pipe ..... 76  
 33 05 24 Steel Utility Pipe ..... 76  
 33 05 27 Corrugated Metal Utility Pipe ..... 76  
 33 05 31 Thermoplastic Utility Pipe ..... 76  
 33 05 33 Polyethylene Utility Pipe ..... 76  
 33 05 39 Concrete Pipe ..... 77  
 33 05 41 Vitrified Clay Utility Pipe ..... 77  
 33 05 61 Concrete Manholes ..... 77  
 33 05 63 Concrete Vaults and Chambers ..... 78  
 33 05 81 Metallic Castings for Utility Structures ..... 87  
 33 05 83 Non-Metallic Accessories for Utility Structures ..... 88  
 33 05 84 Accessories for Utility Structures ..... 88  
 33 05 97 Identification and Signage for Utilities ..... 92  
 33 10 Water Utilities ..... 92  
 33 11 Groundwater Sources ..... 92  
 33 14 Water Utility Transmission and Distribution ..... 101  
 33 16 Water Utility Storage Tanks ..... 188  
 33 19 Water Utility Metering Equipment ..... 188  
 33 30 Sanitary Sewerage Utilities ..... 189  
 33 31 Sanitary Sewerage Piping ..... 189  
 33 32 Sanitary Sewerage Equipment ..... 195  
 33 34 Onsite Wastewater Disposal ..... 195  
 33 40 Stormwater Utilities ..... 196  
 33 41 Subdrainage ..... 196  
 33 42 Stormwater Conveyance ..... 199  
 33 44 Storm Utility Water Drains ..... 259  
 33 46 Stormwater Management ..... 260  
 33 50 Hydrocarbon Utilities ..... 262  
 33 52 Hydrocarbon Transmission and Distribution ..... 262  
 33 53 Hydrocarbon Utility Pressure Regulation ..... 264  
 33 56 Hydrocarbon Storage ..... 265  
 33 59 Hydrocarbon Utility Metering ..... 265  
 33 60 Hydronic and Steam Energy Utilities ..... 265  
 33 61 Hydronic Energy Distribution ..... 265  
 33 70 Electrical Utilities ..... 285  
 33 71 Electrical Utility Transmission and Distribution ..... 285

<b>34 Transportation</b>	<b>1</b>
34 01 Operation and Maintenance of Transportation.....	1
34 01 23 Operation and Maintenance of Railways.....	1
34 01 43 Operation and Maintenance of Bridges.....	1
34 05 Common Work Results for Transportation.....	1
34 05 43 Common Work Results for Bridges.....	1
34 40 Transportation Signaling and Control Equipment.....	19
34 41 Roadway Signaling and Control Equipment.....	19
34 70 Transportation Construction and Equipment.....	28
34 71 Roadway Construction.....	28
34 80 Bridges.....	35
34 82 Bridge Specialties.....	35
<b>35 Waterway and Marine Construction</b>	<b>1</b>
35 05 Common Work Results for Waterway and Marine Construction.....	1
35 05 70 Common Work Results for Dams.....	1
<b>40 Process Interconnections</b>	<b>1</b>
40 05 Common Work Results For Process Interconnections.....	1
40 05 19 Ductile Iron Process Pipe.....	1
40 05 23 Stainless Steel Process Pipe and Tubing.....	231
<b>41 Material Processing and Handling Equipment</b>	<b>1</b>
41 01 Operation and Maintenance of Material Processing and Handling Equipment.....	1
41 01 20 Operation and Maintenance of Piece Material Handling Equipment.....	1
41 20 Piece Material Handling Equipment.....	1
41 22 Cranes and Hoists.....	1
<b>43 Process Gas and Liquid Handling, Purification, and Storage Equipment</b>	<b>1</b>
43 20 Liquid Handling Equipment.....	1
43 23 Dry Location Liquid Pumps.....	1
43 24 Suspended Liquid Pumps.....	1
43 40 Gas and Liquid Storage.....	1
43 42 Pressurized Tanks And Vessels.....	1
<b>50 Custom Standards And Assemblies</b>	<b>1</b>
50 89 CALTRANS Custom Standards And Assemblies.....	1
50 89 80 CALTRANS Construction Performance Requirements.....	1

**THIS PAGE INTENTIONALLY LEFT BLANK**