



DSA 152 INSPECTION CARD MANUAL

A GUIDE FOR COMPLETING THE
PROJECT INSPECTION CARD DSA 152

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TABLE OF CONTENTS

PREFACE	1
1 ADMINISTRATION	4
1.1 Project Inspection Card (IC) Correlation Matrix	5
1.2 Jobsite Documents	32
1.2.1 Required Prior to Construction	32
1.2.2 Required During Construction	32
1.2.2.1 Deferred Submittals	35
1.2.2.2 Construction Change Documents, Type A.....	35
1.2.2.3 Notice of Deviations/Resolution of Deviations.....	36
1.2.2.4 Interim Verified Reports	36
1.2.3 Required After Construction Completion	37
1.2.4 Codes and Referenced Standards	38
1.3 Proprietary Products	40
1.4 DSA Links	42
2 STRUCTURAL SAFETY INSPECTION ITEMS	43
2.1 Soils	45
2.1.1 Grading	45
2.1.1.1 Site.....	45
2.1.1.2 Building Pad	49
2.1.1.3 Underground Utilities	50
2.1.2 Soil Remediation	52
2.1.2.1 Clay	53
2.1.2.2 Soil Densification	53
2.1.2.3 Stone Columns	53
2.1.3 Earth Retaining Structures	53
2.1.3.1 Segmental Retaining Walls	54

TABLE OF CONTENTS

2.1.3.2 Masonry Retaining Wall	57
2.1.3.3 Concrete Retaining Wall	58
2.1.4 Anchors.....	58
2.1.4.1 Soil Nails	59
2.1.4.2 Tie Backs.....	59
2.1.4.3 Prestressed Rock and Soil Foundation Anchors	59
2.2 Foundation Systems	62
2.2.1 Shallow Foundations.....	62
2.2.1.1 Concrete Foundations.....	62
2.2.1.1.1 Footings	63
2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings	64
2.2.1.1.3 Concrete Mat	64
2.2.1.1.4 Pile Caps	64
2.2.2 Deep Foundations	64
2.2.2.1 Driven Deep Foundations (Piles).....	65
2.2.2.1.1 Steel Piles	67
2.2.2.1.1.1 Helical Piles.....	67
2.2.2.1.2 Composite Steel Piles	68
2.2.2.1.3 Concrete Piles	68
2.2.2.1.3.1 Concrete Filled Piles.....	68
2.2.2.1.3.2 Prestressed Piles	68
2.2.2.1.3.3 Precast.....	68
2.2.2.2 Cast-In-Place Deep Foundations (Piers)	69
2.2.2.3 Micropiles	71
2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns.....	72
2.3 Gravity Framing Systems.....	74
2.3.1 Concrete.....	74

TABLE OF CONTENTS

2.3.1.1 Cast In Place (CIP) Concrete	74
2.3.1.2 Prestressed/Post-tension Concrete	83
2.3.1.3 Precast Concrete	84
2.3.1.4 Concrete Walls	85
2.3.1.4.1 CIP.....	85
2.3.1.4.2 Tilt-up	85
2.3.1.4.3 Shotcrete	86
2.3.1.5 Concrete Columns	87
2.3.1.5.1 CIP.....	87
2.3.1.5.2 Prestressed/Post-tension	87
2.3.1.5.3 Precast.....	87
2.3.1.6 Concrete Beams	87
2.3.1.6.1 CIP.....	87
2.3.1.6.2 Prestressed/Post-tension	87
2.3.1.6.3 Precast.....	87
2.3.1.7 Concrete Floor/Roof.....	88
2.3.1.7.1 CIP.....	88
2.3.1.7.2 Prestressed/Post-tension	88
2.3.1.7.3 Precast.....	88
2.3.2 Masonry	89
2.3.2.1 Masonry Walls	95
2.3.2.2 Masonry Columns/Pilasters.....	95
2.3.2.3 Masonry Piers.....	95
2.3.3 Wood	96
2.3.3.1 Walls	112
2.3.3.2 Floor/Roof.....	115
2.3.4 Steel	116
2.3.4.1 Structural Steel	116

TABLE OF CONTENTS

2.3.4.1.1 Beams.....	122
2.3.4.1.1.1 Composite	122
2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses	123
2.3.4.1.2 Columns	125
2.3.4.1.2.1 Composite	125
2.3.4.2 Cold Formed Steel	125
2.3.4.2.1 Cold Formed Steel Light Frame Construction	130
2.3.4.2.1.1 Walls.....	132
2.3.4.2.2 Floor/Roof.....	135
2.3.4.2.2.1 Studs, Joists, Rafters, Trusses	135
2.3.4.2.2.2 Steel Deck.....	136
2.4 Lateral Force Resisting Systems	140
2.4.1 Concrete.....	140
2.4.1.1 Special Reinforced Shear Wall.....	140
2.4.1.2 Intermediate Precast Shear Wall	141
2.4.1.3 Special Reinforced Moment Frame	141
2.4.2 Masonry	141
2.4.2.1 Special Reinforced Shear Wall.....	141
2.4.3 Wood	142
2.4.3.1 Wood Structural Panel	142
2.4.3.1.1 Light Wood Framing	142
2.4.3.1.2 Cold Formed Steel Light Frame Construction.....	148
2.4.4 Steel	148
2.4.4.1 Structural Steel	148
2.4.4.1.1 Moment Frame	149
2.4.4.1.1.1 Special Moment Frame (SMF)	151
2.4.4.1.1.2 Intermediate Moment Frame (IMF)	154
2.4.4.1.1.3 Ordinary Moment Frame (OMF)	154

TABLE OF CONTENTS

2.4.4.1.1.4 Special Truss Moment Frame (STMF)	154
2.4.4.1.2 Braced Frame	154
2.4.4.1.2.1 Special Concentric Braced Frame (SCBF)	155
2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF)	156
2.4.4.1.2.3 Eccentric Braced Frame (EBF)	156
2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF)	156
2.4.4.1.3 Special Plate Shear Wall (SPSW).....	156
2.4.4.1.4 Cantilever Column Systems	156
2.4.4.2 Cold Formed Steel Light Frame Construction	156
2.4.4.2.1 Steel Sheet	157
2.4.4.2.2 Steel Flat Strap Bracing	158
2.5 Non-Structural Component Support/Bracing/Anchorage	159
2.5.1 Mechanical/Electrical/Plumbing Equipment	159
2.5.1.1 Floor/Roof Mounted	160
2.5.1.2 Wall Mounted.....	160
2.5.1.3 Suspended/Hung	160
2.5.2 Architectural Items	161
2.5.2.1 Walls	161
2.5.2.1.1 Interior.....	161
2.5.2.1.1.1 Casework/Lockers	161
2.5.2.1.1.2 Glass Panel Railing	162
2.5.2.1.2 Exterior	162
2.5.2.1.2.1 Veneer OR Glass Block	162
2.5.2.1.2.2 Screen Walls	163
2.5.2.1.2.3 Casework/Lockers	163
2.5.2.2 Floors	164
2.5.2.2.1 Computer Access Floors	164
2.5.2.3 Ceilings	164

TABLE OF CONTENTS

2.5.2.3.1 Metal Suspension Systems for Lay-In Panel Ceilings	164
2.5.2.3.2 Soffits	164
2.5.2.4 Roofs	167
2.5.2.4.1 Roof Tile	167
2.5.2.4.2 Standing Seam Roofing	167
2.5.2.4.3 Solar Photovoltaic and Thermal Systems	168
2.6 Non-Structural Requirements.....	169
2.6.1 Weather Protection	169
2.6.1.1 Roofing.....	169
2.6.1.2 Exterior Walls	171
2.6.1.3 Ventilation.....	172
2.7 Specialty Structures and Items	174
2.7.1 Steel Storage Racks	174
2.7.2 Walk-In Freezers and Cold Storage Boxes	175
2.7.3 Remotely Fabricated Structures or Structural Elements	175
2.7.3.1 Elevators	176
2.7.3.2 Relocatable Buildings	176
2.7.3.2.1 Single Story Buildings	177
2.7.3.2.2 Multi-Level Buildings	177
2.7.3.3 Reviews Stands, Grandstands, and Bleachers	177
2.7.4 Wind Turbines.....	177
3 FIRE/LIFE SAFETY INSPECTION ITEMS	178
3.1 Site Issues	179
3.2 General Building Characteristics	181
3.2.1 Use/Occupancy.....	181
3.2.2 Type of construction	183
3.2.3 Setbacks and Yards	184

TABLE OF CONTENTS

- 3.3 Fire/Smoke Protection 185**
 - 3.3.1 Fire/Smoke Alarms 185**
 - 3.3.2 Automatic Fire Suppression Systems 187**
 - 3.3.3 Other Extinguishing Systems 194**
 - 3.3.4 Smoke Control Systems 196**
 - 3.3.5 Fire-Rated Assemblies 197**
 - 3.3.5.1 Walls 197
 - 3.3.5.2 Horizontal Projections 199
 - 3.3.5.3 Horizontal Assemblies – Floor/Ceiling and Roof/Ceiling..... 200
 - 3.3.5.4 Shaft Enclosures..... 201
 - 3.3.5.4.1 Elevators.....202
 - 3.3.5.5 Penetrations of Assemblies 204
 - 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) 205
 - 3.3.6 Fire Proofing of Structural Members 207**
 - 3.3.7 Concealed Spaces 208**
- 3.4 Hazardous Materials..... 210**
- 3.5 Means of Egress 212**
 - 3.5.1 Fire/Smoke Protection of Means of Egress 212**
- 4 ACCESS COMPLIANCE INSPECTION ITEMS 216**
 - 4.1 Site 218**
 - 4.1.1 Parking 219**
 - 4.1.2 Signage 219**
 - 4.1.3 Walks..... 220**
 - 4.1.4 Curb Ramps 221**
 - 4.1.5 Ramps and Landings..... 221**
 - 4.1.6 Stairs and Landings..... 222**
 - 4.1.7 Gates 223**

TABLE OF CONTENTS

4.2 Building	224
4.2.1 Signage	224
4.2.2 Hallways, Corridors, Vestibules	225
4.2.3 Ramps and Landings	225
4.2.4 Stairs and Landings	226
4.2.5 Elevators and Lifts	226
4.2.6 Doors and Hardware	227
4.2.7 Plumbing Fixtures	228
4.2.7.1 Drinking Fountains	229
4.2.8 Cabinets and Counters	229
4.2.9 Alarms and Fire Extinguishers	230
4.2.10 Public Telephones	231
4.2.11 Restrooms	232
4.2.11.1 Water Closet and Water Closet Compartments	232
4.2.11.2 Grab Bars	233
4.2.11.3 Accessories	233
4.2.11.4 Lavatories.....	234
4.2.11.5 Urinals	234
4.2.11.6 Showers and Locker Areas	235
5 OTHER BUILDING COMPONENTS AND SYSTEMS	236
5.1 Mechanical	241
5.2 Plumbing (Including Wet-Side Mechanical)	250
5.3 Gas	255
5.4 Electrical	257
5.4.1 Emergency and Standby Power Systems	265
5.5 Signal	267
APPENDIX A – DSA 103 CORRELATION MATRIX	268

TABLE OF CONTENTS
APPENDIX B – REFERENCED DSA FORMS 313

LIST OF FIGURES

Figure 2-1: Sand Cone	48
Figure 2-2: Nuclear Density Gage	49
Figure 2-3: Improper Trench Location Due To Column Footing Proximity	51
Figure 2-4: Commonly Specified Pipe and Trench Locations At Or Near Footings	51
Figure 2-5: Adjacent Footings Having Different Depths	62
Figure 2-6: Pipe Through/Below Footing	63
Figure 2-7: Damaged Reinforcement From Grading Operations	71
Figure 2-8: Slump Test	75
Figure 2-9: Proper Concrete Cylinder Storage	76
Figure 2-10: Improper Storage of Concrete Cylinders	76
Figure 2-11: Example of a Common Pull Test Apparatus	76
Figure 2-12: Lack of Tight Formwork; Wood Stake in Concrete Problems	78
Figure 2-13: Common Conduit and Anchor Bolt Problems	80
Figure 2-14: Extreme Reinforcing Congestion	81
Figure 2-15: Poor Consolidation and Honeycomb Problems	81
Figure 2-16: Poor Consolidation & Ensuing Repairs	82
Figure 2-17: Poor Layout for Chord Steel Connection	85
Figure 2-18: Verify Weld Lengths Per Requirements	85
Figure 2-19: Coordination Problems in Masonry for Conduits/Pipes	93
Figure 2-20: CMU Clearance at Bolt	93
Figure 2-21: Cleanouts at Bottoms of Cells	94
Figure 2-22: Lacking Full Head Joint; Mortar Fins Excessive	94
Figure 2-23: Incorrect Out-Of-Plane Strap Placement	95
Figure 2-24: Congested Reinforcing in Masonry	95
Figure 2-25: PT Label and explanation of labeling	96
Figure 2-26: Visually Graded Framing Grade Stamp Example	97
Figure 2-27: MSR/MEL Grade Stamp Example	97
Figure 2-28: SCL Markings Example	98
Figure 2-29: Glulam Special Inspection Stamp Example	98
Figure 2-30: Example Wood Structural Panel Grade Stamp	100
Figure 2-31: Moisture Meter	101
Figure 2-32: Unacceptable Notching	101
Figure 2-33: Improper Hanger Installation	106
Figure 2-34: Commonly Specified Bolt Placement Dimensions	108
Figure 2-35: Commonly Specified Pre-Drilling for Lag Screw	110
Figure 2-36: Toe Nailing Installation	112
Figure 2-37: Improper Oversized A.B. Hole	113
Figure 2-38: Common Sill Plate Construction Problems	113
Figure 2-39: Improper HSB Storage	121

LIST OF FIGURES

Figure 2-40: Skidmore / Wilhelm Machine	121
Figure 2-41: Twist-Off Type Tension Control Bolts	121
Figure 2-42: Improperly Match Marked/Torqued	121
Figure 2-43: Steel Joist Bridging.....	124
Figure 2-44: Field Splice of Steel Joists	125
Figure 2-45: Oversized Torch Cut Hole	129
Figure 2-46: Example of Corrosion Protection at Welded Studs	132
Figure 2-47: Single Jamb Supporting Header Insufficient - Multi-Stud Jamb Incorrect Location	133
Figure 2-48: Incorrect Gap for Stud Bearing.....	134
Figure 2-49: Additional Top Seam Weld Due To Burn-Through	137
Figure 2-50: Good Deck Button Punch.....	137
Figure 2-51: Skewed Deck Edge Modifies Perimeter Welding Requirements	138
Figure 2-52: Concrete Deck Insert	139
Figure 2-53: Conduit Causes Problems for Composite Action	139
Figure 2-54: Steel Reinforcing Mechanical Splices	140
Figure 2-55: Special A.B. Washer Plate Placement Requirements	145
Figure 2-56: Top Plate Splice Connection Problems	145
Figure 2-57: Hold-Down Construction Problems	146
Figure 2-58: Wind Uplift – Commonly Specified Nail Edge Distances at Wood Structural Panel	147
Figure 2-59: NDT Special Inspector Markings	149
Figure 2-60: Erection Bolt Closing HSS Gap.....	155
Figure 2-61: Concrete Slab at Gusset Plate	155
Figure 2-62: Pendant Lights Missing Safety Cables	160
Figure 2-63: Soffit Framing at Ducts and Primary Framing.....	165
Figure 2-64: Example of Soffit Bracing	166
Figure 2-65: Thermal System.....	168
Figure 2-66: Water Damage to Roof Framing	169
Figure 2-67: Attic Ventilation Holes	172
Figure 2-68: Enclosed Rafter Space Ventilation Holes at Ridge.....	173
Figure 3-1: Rejected Sprinkler Pipe Due To Separation At Welds	189
Figure 3-2: Examples of Fire/Smoke Rated Wall Identification	199
Figure 3-3: Fire Blocking At Floor Level & Curtain Wall	201
Figure 4-1: Path Of Travel at Site – Missing Items	218
Figure 4-2: Example Parking Signage	219
Figure 4-3: Incorrect Grating Type	220
Figure 4-4: Curb Ramp Examples	221
Figure 4-5: Gates	223

LIST OF FIGURES

Figure 4-6: Example of Stair and Directional Signage	224
Figure 4-7: Example of Restroom Signage	224
Figure 4-8: Elevator In-Car Controls	226
Figure 4-9: Door Handles	228
Figure 4-10: "Convenience" Drinking Fountain Causing Accessibility Violations	229
Figure 4-11: Drinking Fountains	229
Figure 4-12: Example Accessible Lab Equipment	230
Figure 4-13: Example of Visual Fire Alarm	231
Figure 4-14: Example Measurement of Maneuvering Clearances	232
Figure 4-15: Example Measurement of Water Closet Centerline From Adjacent Wall	233
Figure 4-16: Example Measurement of Lavatory Rim Height	234
Figure 4-17: Example Measurement of Lavatory Centerline From Adjacent Wall	234
Figure 4-18: Various Accessible Locker Types	235
Figure 5-1: Improper Piping Location at AC Switch.....	237

LIST OF TABLES

Table 1-1: Project Inspection Card Correlation Matrix31

Table 2-1: AWPAs Use Categories and Brief Description.....102

Table 2-2: Standard Hex Bolt Dimensions107

Table 2-3: Dimensions for Standard Hex Lag Screws110

Table 2-4: Dimensions for Standard Wood Screws.....111

Table 2-5: Minimum Nail Dimensions112

Table 2-6: Standard Cut Washer Dimensions144

Table 3-1: CBC Table 508.2.5 - Incidental Accessory Occupancies - Required Separations....182

Table 3-2: CBC Table 508.4 - Occupancy Separation Requirements183

Table 3-3: CBC Table 601 - Fire Rating Requirements for Building Elements184

Table 3-4: CBC Table 707.3.9 - Fire Barrier Ratings197

Table 3-5: CBC Table 706.4 - Fire Wall Ratings Based on Occupancy.....197

Table 3-6: CBC Table 602 - Exterior Wall Fire Rating Requirements198

Table A0-1: DSA 103 Correlation Matrix312

PREFACE

PREFACE

This manual provides detailed descriptions of documentation and inspection requirements to properly fill in the DSA 152 Project Inspection Card (IC). Proper inspection of construction work is a crucial component in the Division of the State Architect (DSA) certification process that ensures compliance with the DSA approved construction documents. Project inspectors play a significant role in construction inspection. Duties and responsibilities for inspectors and others involved in the construction process for projects under DSA jurisdiction are outlined in California Code of Regulations, Title 24, Part 1. Procedure [PR 13-01](#) provides specific required duties of the project inspector and others with respect to relevant portions of Title 24, Part 1, and the IC. The DSA has also issued [IR A-8](#), which provides further performance requirements of the project inspector. (Additional information regarding construction phase duties for others involved in the construction process is provided in [IR A-24](#).) For projects in which an assistant inspector is deemed necessary, refer to [IR A-7](#) and [IR A-12](#) for additional information and inspector approval requirements.

Construction projects under DSA jurisdiction require constant inspection of construction. To facilitate proper inspection and documentation for DSA construction projects, the DSA requires the use of the IC, similar in nature to many building department building inspection cards. The definitions provided in [PR 13-01](#) apply to this document.

Broadly speaking, building construction inspection entails: 1) building component verification, and 2) building component installation verification, both in accordance with the DSA approved construction documents. Building component verification ensures that the proper specified component is used in construction. Building component installation verification ensures that the specified component is properly installed. These lead to two categorical elements that are required prior to initialing the sections and blocks on the IC for a given building or site:

I. Receipt of documentation for constructed elements, including:

- I.A. Material/structural tests
- I.B. Special inspections or other observations

II. Inspection of items associated with constructed elements.

This document provides a detailed list of those documentation and inspection items based on the different DSA review disciplines of Structural Safety, Fire/Life Safety, and Accessibility. An additional category, Other Building Systems, is also provided, which captures other necessary inspections to ensure proper building functioning. All of these are broken up further into specific inspection areas frequently associated with construction projects under DSA jurisdiction. Based on the particular applicable elements for a given project, all of the applicable documentation items shall be collected and all applicable inspections listed shall be made by the project inspector.

PREFACE

If construction does not comply with the approved construction documents, DSA may issue a Stop Work Order, or similar type of action, to halt work on the construction ([IR A-13](#)).

Improper inspection or inspection related documentation can lead to rescinding of a project inspector's certification ([IR A-7](#)).

Authors

This manual was authored and compiled by Ryan Huxley, Senior Structural Engineer, with contributions from Tom Burke, Fire & Life Safety Officer, for the Fire/Life Safety Inspection Items and James Schaible, Senior Architect, for the Access Compliance Inspection Items.

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1 ADMINISTRATION

ADMINISTRATION

1.1 Project Inspection Card (IC) Correlation Matrix

The information that follows in the correlation matrix provides a link between the sign-off blocks in the IC and the documentation and inspection items in this manual. Prior to the project inspector initialing any of the IC blocks, the documentation and inspections associated with the topics listed in the correlation matrix must be received and occur, respectively.

The following provides a summary of typical construction components and systems that are associated with each section/block in the IC. While the listing is not comprehensive, it provides a good foundation for understanding of and consistency in the use of the IC.

Section 1 – Initial Site Work and Foundation Prep

Block 1 – Mass Grading:

- Rough Grading of Overall Site
- Cuts/Fills
- Soil Remediation
- Soil Stabilization
- Soil Nails, Tie Backs, Rock/Soil Anchors
- Horizontal/Vertical Controls

Block 2 – Building Pad:

- Soil Preparation Specific to Support of Structures
- Building Pad
- Soil Remediation
- Soil Densification
- Stone Columns

Block 3 – Drainage Devices:

- Storm Water Collection/Distribution systems
- On-Site Retention Systems
- Foundation Drain systems
- Retaining Wall Drain Systems

Block 4 – Utilities:

- FLS Utilities/Systems
- MEP Utilities/Systems
- MEP Vaults
- Thrust Blocks

Block 5 – Excavations:

- Foundation Systems
- Driven Piles

Block 6 – Forms:

- Formwork
- FLS Systems
- MEP Systems
- Waterproofing/Vapor Barrier

Block 7 – Steel Reinforcing:

- Reinforcing (bars, tendons, etc.)
- Embeds

ADMINISTRATION

Section 2 - Vertical and Horizontal Framing

Block 8 – Foundation Concrete:

- Verify Foundation Is Compliant (concrete 28 day strength, etc.)

Blocks 13 - 15 – Concrete, Wood, Steel:

- Floors
- Roofs

Blocks 9 - 12 – Concrete, Masonry Wood, Steel:

- Walls
- Columns
- Frames

Section 3 – Appurtenances

Block 16 – Ceilings:

- Ceilings
- Soffits
- Suspended Baffles

Block 18 – Rated Assemblies:

- Walls
- Shafts
- Floors
- Roofs
- Ceilings
- Doors
- Fire Doors
- Windows
- Penetrations
- Dampers
- Fire-Proofing

Block 17 – Exterior Cladding:

- Storefront/Window Walls
- Veneer
- Precast Concrete Panels
- Wall Finishes (stucco/plaster/wood/aluminum/etc.)
- Manufactured Systems (EFIS, GRFC, etc.)

Block 19 – Fire Alarms:

- Fire/Smoke Alarm System (includes support, anchorage, bracing, etc.)

Block 20 – Automatic Fire Suppression Systems:

- Sprinklers
- Chemical
- Deluge
- Water Curtains
- Extinguishers
- Support/Bracing/Anchorage of AFSS

Block 21 – MEP (Structural):

Support/Bracing/Anchorage for:

- MEP
- Equipment
- HVAC System
- Ducts
- Electrical
- Pendant Lights
- Transformers
- Switch Gears
- IDF/MDF/etc.
- Pipes
- Tanks

Block 22 – MEP (FLS):

- MEP Fire Suppression Systems (smoke and fire dampers)
- Kitchen Hoods
- Laboratory Hoods
- Dust Collection Systems
- Smoke Control Systems

Section 4 – Finish Site Work and Other Work**Block 23 – Fine Grading:**

- Finish Grades
- Grading for Accessible POT System
- Grading for Run-off (drainage)

Block 24 – Flatwork:

Accessible Path of Travel Systems such as:

- Stairs
- Ramps
- Walks
- Gates

Block 25 – Parking:

- Drop-off
- Accessible parking
- Stripping
- Signage
- Truncated Domes

Block 26 – Fire Lane:

- Fire Lane

Block 27 – Other Work Structural:

Support/Bracing/Anchorage for:

- Theater Systems (stage rigging, catwalks, speaker, lighting, curtains, etc...)
- Non-bearing partitions
- Operable partitions
- Casework
- Stairs
- Elevators
- Weather Protection

Block 28 – Other Work Fire Life Safety:

- Egress Components
- Doors
- Gates
- Emergency Lighting
- Building Signage
- Site Signage
- Elevators
- Hazardous Materials

Block 29 – Other Work Accessibility:

- Building Signage
- Site Signage
- Drinking Fountains
- Accessible POT Systems
- Stairs
- Ramps
- Walks
- Doors
- Gates
- Elevator
- Specialty Areas (restrooms, kitchens, casework, etc...)

Note that due to the nature of the items listed in the correlation matrix and extent over which they apply during construction, some items occur in multiple locations in the matrix. For example, in a concrete building, some of the same concrete sections in this manual apply to the foundation as well as the vertical and horizontal framing. In each case, while the type of documentation and inspections are similar, they are particular to the specific stage of construction occurring.

For projects consisting of large buildings with multiple phases, some method of acknowledgement for incremental inspection verification at certain locations within the building may be necessary, even though construction is not yet complete. How this is accomplished is left to the agreements made between individuals involved with the construction, observation, and inspection of the project. One possible method to address this issue is to use a copy of the approved construction documents for identification of specific areas that have been inspected, thereby allowing construction to progress in desired areas. It is important to note that the IC should **not** be initialed until **all** construction associated with a particular inspection item is complete.

There are abbreviations used in the correlation matrix, which are described below:

Comp. Cat.: Compliance Category

A: Administration

SS: Structural Safety Inspection Items

FLS: Fire/Life Safety Inspection Items

ACS: Access Compliance Inspection Items

ADMINISTRATION

Project Inspection Card Correlation Matrix				
Section	Block	Comp. Cat.	DSA 152 Manual Section	
Section 1 – Initial Site Work and Foundation Prep	1	Mass Grading	A <ul style="list-style-type: none"> 1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40 	
			SS <ul style="list-style-type: none"> 2.1 Soils on page 45 2.1.1 Grading on page 45 2.1.1.1 Site on page 45 2.1.2 Soil Remediation on page 52 2.1.4 Anchors on page 58 2.1.4.1 Soil Nails on page 59 2.1.4.2 Tie Backs on page 59 2.1.4.3 Prestressed Rock and Soil Foundation Anchors on page 59 	
			FLS	-
			ACS	-
	2	Building Pad	A <ul style="list-style-type: none"> 1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40 	
			SS <ul style="list-style-type: none"> 2.1 Soils on page 45 2.1.1 Grading on page 45 2.1.1.2 Building Pad on page 49 2.1.1.3 Underground Utilities on page 50 2.1.2 Soil Remediation on page 52 2.1.2.1 Clay on page 53 2.1.2.2 Soil Densification on page 53 2.1.2.3 Stone Columns on page 53 	
			FLS	-

ADMINISTRATION

Project Inspection Card Correlation Matrix				
Section	Block	Comp. Cat.	DSA 152 Manual Section	
			3.2.3 Setbacks and Yards on page 184	
		ACS	-	
	3	Drainage Devices	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40	
			SS	2.1 Soils on page 45 2.1.1.1 Site on page 45 2.1.1.2 Building Pad on page 49 2.1.1.3 Underground Utilities on page 50 2.1.3 Earth Retaining Structures on page 53 2.1.3.1 Segmental Retaining Walls on page 54 2.1.3.2 Masonry Retaining Wall on page 57 2.1.3.3 Concrete Retaining Wall on page 58
			FLS	-
			ACS	-
	4		Utilities	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
		SS		2.1.1.3 Underground Utilities on page 50 2.2.1.1 Concrete Foundations on page 62 5 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236 5.2 Plumbing (Including Wet-Side Mechanical) on page 250

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
			5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267
		FLS	3.1 Site Issues on page 179 3.3.2 Automatic Fire Suppression Systems on page 187
		ACS	-
	5	Excavations	A 1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
			SS 2.2 Foundation Systems on page 62 2.2.1 Shallow Foundations on page 62 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2 Deep Foundations on page 64 2.2.2.1 Driven Deep Foundations (Piles) on page 65 2.2.2.1.1 Steel Piles on page 67 2.2.2.1.1.1 Helical Piles on page 67 2.2.2.1.2 Composite Steel Piles on page 68 2.2.2.1.3 Concrete Piles on page 68 2.2.2.1.3.1 Concrete Filled Piles on page 68 2.2.2.1.3.2 Prestressed Piles on page 68 2.2.2.1.3.3 Precast on page 68 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns on page 72 5 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236

ADMINISTRATION

Project Inspection Card Correlation Matrix				
Section	Block	Comp. Cat.	DSA 152 Manual Section	
			5.2 Plumbing (Including Wet-Side Mechanical) on page 250 5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267	
		FLS	3.1 Site Issues on page 179 3.3.2 Automatic Fire Suppression Systems on page 187	
		ACS	-	
	6	Forms	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
			SS	2.2 Foundation Systems on page 62 2.2.1 Shallow Foundations on page 62 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2 Deep Foundations on page 64 2.2.2.1.2 Composite Steel Piles on page 68 2.2.2.1.3 Concrete Piles on page 68 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 5 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236 5.2 Plumbing (Including Wet-Side Mechanical) on page 250 5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267
			FLS	3.1 Site Issues on page 179 3.3.2 Automatic Fire Suppression Systems on page 187
			ACS	-

ADMINISTRATION

Project Inspection Card Correlation Matrix				
Section	Block	Comp. Cat.	DSA 152 Manual Section	
	7	Steel Reinforcement	A <ul style="list-style-type: none"> 1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40 	
			SS <ul style="list-style-type: none"> 2.2 Foundation Systems on page 62 2.2.1 Shallow Foundations on page 62 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2 Deep Foundations on page 64 2.2.2.1.2 Composite Steel Piles on page 68 2.2.2.1.3 Concrete Piles on page 68 2.2.2.1.3.1 Concrete Filled Piles on page 68 2.2.2.1.3.2 Prestressed Piles on page 68 2.2.2.1.3.3 Precast on page 68, 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 	
			FLS	-
			ACS	-
Section 2 - Vertical and Horizontal Framing	8	Foundation Concrete	A <ul style="list-style-type: none"> 1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40 	

ADMINISTRATION

Project Inspection Card Correlation Matrix				
Section	Block	Comp. Cat.	DSA 152 Manual Section	
		SS	2.2 Foundation Systems on page 62 2.2.1 Shallow Foundations on page 62 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2 Deep Foundations on page 64 2.2.2.1.2 Composite Steel Piles on page 68 2.2.2.1.3 Concrete Piles on page 68 2.2.2.1.3.1 Concrete Filled Piles on page 68 2.2.2.1.3.2 Prestressed Piles on page 68 2.2.2.1.3.3 Precast on page 68, 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69	
		FLS	-	
		ACS	-	
	9	Concrete	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
		SS	2.3.1 Concrete on page 74 2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.1.2 Prestressed/Post-tension Concrete on page 83 2.3.1.3 Precast Concrete on page 84 2.3.1.4 Concrete Walls on page 85 2.3.1.4.2 Tilt-up on page 85 2.3.1.4.3 Shotcrete on page 86 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.5.2 Prestressed/Post-tension on page 87 2.3.1.5.3 Precast on page 87 2.4 Lateral Force Resisting Systems on page 140 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141 2.4.1.3 Special Reinforced Moment Frame on page 141 2.5.2.1 Walls on page 161 2.5.2.1.1 Interior on page 161 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 <i>Refer to applicable items in Block 17 & 18.</i>
		FLS	3.2 General Building Characteristics on page 181 3.2.1 Use/Occupancy on page 181 3.2.2 Type of construction on page 183 3.3 Fire/Smoke Protection on page 185 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.1 Walls on page 197 3.3.5.2 Horizontal Projections on page 199 3.3.5.4 Shaft Enclosures on page 201 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
		ACS	4.2.2 Hallways, Corridors, Vestibules on page 225 4.2.3 Ramps and Landings on page 225 4.2.4 Stairs and Landings on page 226 4.2.6 Doors and Hardware subsection I.B on page 227 4.2.7.1 Drinking Fountains subsection I.B on page 229 4.2.8 Cabinets and Counters subsection I.B on page 230
	10	Masonry	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
		SS	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141 2.5.2.1 Walls on page 161 2.5.2.1.1 Interior on page 161 <i>Refer to applicable items in Block 17 & 18.</i>
		FLS	3.2 General Building Characteristics on page 181 3.2.1 Use/Occupancy on page 181 3.2.2 Type of construction on page 183 3.3 Fire/Smoke Protection on page 185 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.1 Walls on page 197 3.3.5.2 Horizontal Projections on page 199 3.3.5.4 Shaft Enclosures on page 201 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
			3.5.1 Fire/Smoke Protection of Means of Egress on page 212
		ACS	4.2.2 Hallways, Corridors, Vestibules on page 225 4.2.3 Ramps and Landings on page 225 4.2.4 Stairs and Landings on page 226 4.2.6 Doors and Hardware subsection I.B on page 227 4.2.7.1 Drinking Fountains subsection I.B on page 229 4.2.8 Cabinets and Counters subsection I.B on page 230
	11	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
		SS	2.3.3 Wood on page 96 2.3.3.1 Walls on page 112 2.4.3.1 Wood Structural Panel on page 142 2.4.3.1.1 Light Wood Framing on page 142 2.5.2.1 Walls on page 161 2.5.2.1.1 Interior on page 161 <i>Refer to applicable items in Block 17 & 18.</i>
		FLS	3.2 General Building Characteristics on page 181 3.2.1 Use/Occupancy on page 181 3.2.2 Type of construction on page 183 3.3 Fire/Smoke Protection on page 185 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.1 Walls on page 197 3.3.5.2 Horizontal Projections on page 199 3.3.5.4 Shaft Enclosures on page 201 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
		ACS	4.2.2 Hallways, Corridors, Vestibules on page 225 4.2.3 Ramps and Landings on page 225 4.2.4 Stairs and Landings on page 226 4.2.6 Doors and Hardware subsection I.B on page 227 4.2.7.1 Drinking Fountains subsection I.B on page 229 4.2.8 Cabinets and Counters subsection I.B on page 230
		A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
	12	Steel	2.3.4.1 Structural Steel on page 116 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156
		SS	

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
			2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.5.2.1 Walls on page 161 2.5.2.1.1 Interior on page 161 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177 <i>Refer to applicable items in Block 17 & 18.</i>
			3.2 General Building Characteristics on page 181 3.2.1 Use/Occupancy on page 181 3.2.2 Type of construction on page 183 3.3 Fire/Smoke Protection on page 185 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.1 Walls on page 197 3.3.5.2 Horizontal Projections on page 199 3.3.5.4 Shaft Enclosures on page 201 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212
			4.2.2 Hallways, Corridors, Vestibules on page 225 4.2.3 Ramps and Landings on page 225 4.2.4 Stairs and Landings on page 226 4.2.6 Doors and Hardware subsection I.B on page 227 4.2.7.1 Drinking Fountains subsection I.B on page 229 4.2.8 Cabinets and Counters subsection I.B on page 230
	13	Concrete	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35

ADMINISTRATION

Project Inspection Card Correlation Matrix				
Section	Block	Comp. Cat.	DSA 152 Manual Section	
				1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
			SS	2.3.1 Concrete on page 74 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.6.2 Prestressed/Post-tension on page 87 2.3.1.6.3 Precast on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.3.1.7.2 Prestressed/Post-tension on page 88 2.3.1.7.3 Precast on page 88 2.5.1.1 Floor/Roof Mounted on page 160 2.5.1.3 Suspended/Hung on page 160 2.5.2.2 Floors on page 164 2.5.2.2.1 Computer Access Floors on page 164 <i>Refer to applicable items in Block 16 & 18.</i>
			FLS	3.2 General Building Characteristics on page 181 3.2.1 Use/Occupancy on page 181 3.2.2 Type of construction on page 183 3.3 Fire/Smoke Protection on page 185 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.3 Horizontal Assemblies – Floor/Ceiling and Roof/Ceiling on page 200 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212
			ACS	-
	14	Wood	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35

ADMINISTRATION

Project Inspection Card Correlation Matrix					
Section	Block	Comp. Cat.	DSA 152 Manual Section		
				1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40	
				SS	2.3.3 Wood on page 96 2.3.3.2 Floor/Roof on page 115 2.4.3.1 Wood Structural Panel on page 142 2.4.3.1.1 Light Wood Framing on page 142 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.5.1.1 Floor/Roof Mounted on page 160 2.5.1.3 Suspended/Hung on page 160 <i>Refer to applicable items in Block 16 & 18.</i>
				FLS	3.2 General Building Characteristics on page 181 3.2.1 Use/Occupancy on page 181 3.2.2 Type of construction on page 183 3.3 Fire/Smoke Protection on page 185 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.3 Horizontal Assemblies – Floor/Ceiling and Roof/Ceiling on page 200 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212
				ACS	-
	15	Steel	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38	

ADMINISTRATION

Project Inspection Card Correlation Matrix					
Section	Block	Comp. Cat.	DSA 152 Manual Section		
				1.3 Proprietary Products on page 40	
				SS	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.5.1.1 Floor/Roof Mounted on page 160 2.5.1.3 Suspended/Hung on page 160 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 <i>Refer to applicable items in Block 16 & 18.</i>
				FLS	3.2 General Building Characteristics on page 181 3.2.1 Use/Occupancy on page 181 3.2.2 Type of construction on page 183 3.3 Fire/Smoke Protection on page 185 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.3 Horizontal Assemblies – Floor/Ceiling and Roof/Ceiling on page 200 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212
				ACS	-
Section 3 – Appurtenances	16	Ceilings	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36	

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
			1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
		SS	2.5 Non-Structural Component Support/Bracing/Anchorage on page 159 2.5.1 Mechanical/Electrical/Plumbing Equipment on page 159 2.5.2.3 Ceilings on page 164 2.5.2.3.1 Metal Suspension Systems for Lay-In Panel Ceilings on page 164 2.5.2.3.2 Soffits on page 164 5 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236 5.1 Mechanical on page 241 5.2 Plumbing (Including Wet-Side Mechanical) on page 250 5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267
		FLS	3.3 Fire/Smoke Protection on page 185 3.3.1 Fire/Smoke Alarms on page 185 3.3.2 Automatic Fire Suppression Systems on page 187 3.3.3 Other Extinguishing Systems on page 194 3.3.4 Smoke Control Systems 196 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.3 Horizontal Assemblies – Floor/Ceiling and Roof/Ceiling on page 200 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212 5 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236 5.1 Mechanical on page 241 5.2 Plumbing (Including Wet-Side Mechanical) on page 250 5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267
		ACS	-

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
	17	Exterior Cladding	<p>A</p> <p>1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40</p> <p>SS</p> <p>2.5.2.1 Walls on page 161 2.5.2.1.2 Exterior on page 162 2.5.2.1.2.1 Veneer OR Glass Block on page 162 2.5.2.1.2.2 Screen Walls on page 163 2.5.2.1.2.3 Casework/Lockers on page 163 2.5.2.4.1 Roof Tile on page 167 2.5.2.4.2 Standing Seam Roofing on page 167</p> <p>FLS</p> <p>3.3.5 Fire-Rated Assemblies on page 197 3.3.5.1 Walls on page 197 3.3.5.2 Horizontal Projections on page 199 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212 5 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236 5.1 Mechanical on page 241 5.2 Plumbing (Including Wet-Side Mechanical) on page 250 5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267</p> <p>ACS</p> <p>-</p>
	18	Rated Assemblies	<p>A</p> <p>1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35</p>

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
			1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
		SS	2.3.4.1 Structural Steel on page 116
		FLS	3.3 Fire/Smoke Protection on page 185 3.3.1 Fire/Smoke Alarms on page 185 3.3.2 Automatic Fire Suppression Systems on page 187 3.3.3 Other Extinguishing Systems on page 194 3.3.4 Smoke Control Systems on page 196 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.1 Walls on page 197 3.3.5.2 Horizontal Projections on page 199 3.3.5.3 Horizontal Assemblies – Floor/Ceiling and Roof/Ceiling on page 200 3.3.5.4 Shaft Enclosures on page 201 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.3.6 Fire Proofing of Structural Members on page 207 3.3.7 Concealed Spaces on page 208 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236 5.1 Mechanical on page 241 5.2 Plumbing (Including Wet-Side Mechanical) on page 250 5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267
		ACS	-

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
	19	Fire Alarms	A <ul style="list-style-type: none"> 1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
			SS <ul style="list-style-type: none"> 2.5 Non-Structural Component Support/Bracing/Anchorage on page 159 2.5.1 Mechanical/Electrical/Plumbing Equipment on page 159 2.5.1.2 Wall Mounted on page 160
			FLS <ul style="list-style-type: none"> 3.3.1 Fire/Smoke Alarms on page 185 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.5 Penetrations of Assemblies on page 204 3.3.5.6 Openings in Rated Assemblies (Opening Protectives) on page 205 3.5.1 Fire/Smoke Protection of Means of Egress on page 212
			ACS <ul style="list-style-type: none"> 4.2.9 Alarms and Fire Extinguishers on page 230
	20	Fire Suppression	A <ul style="list-style-type: none"> 1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
			SS <ul style="list-style-type: none"> 2.5 Non-Structural Component Support/Bracing/Anchorage on page 159 2.5.1 Mechanical/Electrical/Plumbing Equipment on page 159 2.5.1.1 Floor/Roof Mounted on page 160 2.5.1.2 Wall Mounted on page 160 2.5.1.3 Suspended/Hung on page 160

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
		FLS	3.3 Fire/Smoke Protection on page 185 3.3.2 Automatic Fire Suppression Systems on page 187 3.3.5 Fire-Rated Assemblies on page 197 3.3.5.5 Penetrations of Assemblies on page 204 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212
		ACS	-
	21	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
		SS	2.5 Non-Structural Component Support/Bracing/Anchorage on page 159 2.5.1 Mechanical/Electrical/Plumbing Equipment on page 159 2.5.1.1 Floor/Roof Mounted on page 160 2.5.1.2 Wall Mounted on page 160 2.5.1.3 Suspended/Hung on page 160 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 5 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236 5.1 Mechanical on page 241 5.2 Plumbing (Including Wet-Side Mechanical) on page 250 5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267
		FLS	-
		ACS	4.2.7 Plumbing Fixtures on page 228 4.2.7.1 Drinking Fountains on page 229 4.2.11 Restrooms on page 232 4.2.11.1 Water Closet and Water Closet Compartments on page 232 4.2.11.4 Lavatories on page 234 4.2.11.5 Urinals on page 234

ADMINISTRATION

Project Inspection Card Correlation Matrix			
Section	Block	Comp. Cat.	DSA 152 Manual Section
			4.2.11.6 Showers and Locker Areas on page 235
	22	M/E/P (FLS)	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
		SS	-
		FLS	5 OTHER BUILDING COMPONENTS AND SYSTEMS on page 236 5.1 Mechanical on page 241 5.2 Plumbing (Including Wet-Side Mechanical) on page 250 5.3 Gas on page 255 5.4 Electrical on page 257 5.5 Signal on page 267
		ACS	-
Section 4 – Finish Site Work and Other Work	23	Fine Grading	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
		SS	2.1.1 Grading on page 45 2.1.1.2 Building Pad on page 49
		FLS	-
		ACS	4.1 Site on page 218 4.1.3 Walks on page 220 4.1.4 Curb Ramps on page 221 4.1.5 Ramps and Landings on page 221

ADMINISTRATION

Project Inspection Card Correlation Matrix				
Section	Block	Comp. Cat.	DSA 152 Manual Section	
				4.1.6 Stairs and Landings on page 222
	24	Flatwork	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
			SS	-
			FLS	-
			ACS	4.1.3 Walks on page 220 4.1.4 Curb Ramps on page 221 4.1.5 Ramps and Landings on page 221 4.1.6 Stairs and Landings on page 222
	25	Parking	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
			SS	2.1.1 Grading on page 45 2.1.1.1 Site on page 45 2.1.1.3 Underground Utilities on page 50
			FLS	-
			ACS	4.1.1 Parking on page 219 4.1.4 Curb Ramps on page 221
	26	Fire Lane	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35

ADMINISTRATION

Project Inspection Card Correlation Matrix					
Section	Block	Comp. Cat.	DSA 152 Manual Section		
			1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40		
		SS	-		
		FLS	3.1 Site Issues on page 179		
		ACS	-		
	27	Structural	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40	
			SS	2.5.1.2 Wall Mounted on page 160 2.5.2.1 Walls on page 161 2.5.2.1.1 Interior on page 161 2.5.2.1.1.1 Casework/Lockers on page 161 2.5.2.1.1.2 Glass Panel Railing on page 162 2.5.2.1.2 Exterior on page 162 2.5.2.1.2.3 Casework/Lockers on page 163 2.6.1 Weather Protection on page 169 2.6.1.1 Roofing on page 169 2.6.1.2 Exterior Walls on page 171 2.6.1.3 Ventilation on page 172	
			FLS	3.3.5 Fire-Rated Assemblies on page 197 3.3.5.1 Walls on page 197 3.4 Hazardous Materials on page 210	
			ACS	-	
		28	FLS	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32

ADMINISTRATION

Project Inspection Card Correlation Matrix						
Section	Block	Comp. Cat.	DSA 152 Manual Section			
			1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40			
			SS	-		
			FLS	3.4 Hazardous Materials on page 210 3.3.5.4.1 Elevators on page 202 3.5 Means of Egress on page 212 3.5.1 Fire/Smoke Protection of Means of Egress on page 212		
			ACS	4.1.2 Signage on page 219 4.1.7 Gates on page 223 4.2.1 Signage on page 224		
			29	ACS	A	1.2 Jobsite Documents on page 32 1.2.1 Required Prior to Construction on page 32 1.2.2 Required During Construction on page 32 1.2.2.1 Deferred Submittals on page 35 1.2.2.2 Construction Change Documents, Type A on page 35 1.2.2.3 Notice of Deviations/Resolution of Deviations on page 36 1.2.2.4 Interim Verified Reports on page 36 1.2.3 Required After Construction Completion on page 37 1.2.4 Codes and Referenced Standards on page 38 1.3 Proprietary Products on page 40
					SS	-
					FLS	-
		ACS			All of Section 4.	

Table 1-1: Project Inspection Card Correlation Matrix

ADMINISTRATION

1.2 Jobsite Documents

There are many documents that must be present at the jobsite during construction. The next several subsections provide a brief list of those documents that must be on site during the construction process.

1.2.1 Required Prior to Construction

Prior to commencement of construction work, there are several items that the inspector must have in his or her possession at the jobsite. The items below must be present at the jobsite throughout construction.

I. DSA approved construction documents:

- I.A. Drawings/Plans
- I.B. Specifications
- I.C. Addenda/Revisions
- I.D. [DSA 103 Statement of Structural Tests and Special Inspections Form](#) (Refer to [IR 17-4](#) for additional clarification of structural testing and special inspection. Refer to [APPENDIX A – DSA 103 CORRELATION MATRIX](#) on page 268 for a correlation matrix identifying the different items in the [DSA 103](#) with the corresponding section in this manual.)
- I.E. DSA Documents Required List
- I.F. Product Data Sheets for various equipment and components. There are exceptions for products and components that are installed after primary and/or secondary framing is in place; all product data sheets must be received prior to product installation.

II. [DSA 102-IC](#) Construction Start Notice/Inspection Card Request

III. DSA 152 Project Inspection Card

IV. **1.2.4 Codes and Referenced Standards** – Refer to page 38 for required referenced standards.

1.2.2 Required During Construction

Once construction has begun, there are documents that must present at the jobsite at all times once they have been issued. “DSA approved construction document” items listed below must be obtained *prior to commencing* construction for those items.

I. Material/Structural Test Documentation:

- I.A. Verify laboratory of record providing material/structural testing is accepted by DSA to provide such services. (See <https://www.apps.dgs.ca.gov/tracker/ApprovedLabs.aspx> for a list of DSA approved testing laboratories.)

ADMINISTRATION

I.B. Test reports indicate if tests performed show compliance with requirements given in the DSA construction documents. While there is no required format for test reports (suggested formats can be found in the following forms based on the type of material and structural test performed), the information noted in these shall be provided (refer to *APPENDIX B – REFERENCED DSA FORMS* on page 313 or <http://www.dgs.ca.gov/dsa/Forms.aspx> for these forms):

- I.B.1. [DSA 201: Soil Compaction](#)
- I.B.2. [DSA 202: Sieve Analysis](#)
- I.B.3. [DSA 203: Tension/Bend](#)
- I.B.4. [DSA 204: Compression](#)
- I.B.5. [DSA 205: Concrete Masonry Unit](#)
- I.B.6. [DSA 206: Anchor Load](#)
- I.B.7. [DSA 207: Masonry Core Shear/Compression](#)
- I.B.8. [DSA 208: High Strength Bolt](#)
- I.B.9. [DSA 209: Fireproofing Density](#)
- I.B.10. [DSA 210: Ultrasonic \(NDT\)](#)
- I.B.11. [DSA 211: Additional Comments](#)

I.C. For additional information on structural testing, refer to the following IRs (additional information related to some of these IRs and others not shown will be provided later in this document at appropriate locations):

- I.C.1. [IR A-15: Testing and Inspection of Remotely Fabricated Structural Elements](#)
- I.C.2. [IR 17-1: Sampling and Testing of Structural Materials](#)
- I.C.3. [IR 17-2: Nondestructive Testing](#)
- I.C.4. [IR 17-4: Basics of Structural Tests and Special Inspections](#)
- I.C.5. [IR 17-5: Structural Testing Laboratory Responsibilities](#)
- I.C.6. [IR 17-7: Soils and Foundations Testing and Inspection](#)
- I.C.7. [IR 17-8: Sampling and Testing of High Strength Bolts, Nuts, and Washers](#)
- I.C.8. [IR 17-10: Sampling, Testing and Tagging of Reinforcing Bars](#)

II. Special Inspection Documentation:

II.A. Verify current certification for **all** special inspectors working on the jobsite **prior to commencing** construction that requires special inspection.

II.A.1. Concrete:

II.A.1.1. Verify ACI certification for shotcrete. (See <https://www.apps.dgs.ca.gov/Tracker/InspByCategory.aspx?Id=10> for a list of DSA approved shotcrete special inspectors.)

II.A.2. Masonry:

II.A.2.1. Verify certification for masonry special inspectors. (See <https://www.apps.dgs.ca.gov/Tracker/InspByCategory.aspx?Id=04> for a list of DSA approved masonry special inspectors.)

II.A.3. Wood:

II.A.3.1. Verify certification for glulam special inspectors. (See <https://www.apps.dgs.ca.gov/Tracker/InspByCategory.aspx?Id=02> for a list of DSA approved glulam special inspectors.)

II.A.4. Steel:

ADMINISTRATION

- II.A.4.1. Verify Structural Steel and Bolting ICC certification (S1) (refer to [IR 17-9](#) for additional information).
- II.A.4.2. Verify American Welding Society (AWS) certified welding inspector (CWI) or senior certified welding inspector (SCWI) for welding inspectors (welding certification can be verified by going to <http://www.aws.org/w/a/certification/search.html>).
- II.A.4.2.1. AWS-CAWI (Certified Associate Welding Inspector) is not acceptable – AWS-CWI is the minimum requirement.

II.A.5. In-Plant constructed items:

- II.A.5.1. Verify certification for in-plant inspectors. (See <https://www.apps.dgs.ca.gov/Tracker/InspByCategory.aspx?Id=03> for a list of DSA approved in-plant inspectors.)

II.B. Verify special inspectors have a copy of the appropriate portion of the DSA approved construction documents. (Note: While shop drawings are often used for fabrication, if any conflicts or uncertainties occur, the DSA approved construction documents govern, **not** the design professional reviewed shop drawings.)

II.C. Special inspection reports:

- II.C.1. While DSA does not have a required format, certain pieces of information are required. Refer to [DSA 250: Special Inspection Report](#) for a suggested general format and required content (refer to *APPENDIX B – REFERENCED DSA FORMS* on page 313 for forms). While special inspections are provided by the special inspectors, **oversight** and **verification** of such inspections by the project inspector is required. The project inspector must become familiar with the required testing and special inspection program for the project. For additional information regarding special inspector duties and responsibilities, refer to [IR 17-6: Structural Special Inspector Duties and Responsibilities](#).

III. Project Inspector Documents

- III.A. In addition to the items noted above and below, the project inspector must also keep a job file containing various documents at the jobsite. Refer to [IR A-8](#) and [PR 13-01](#) for additional information.
- III.B. Project Inspector Notifications (see DSA 151)
- III.C. Refer to *1.2.2.3 Notice of Deviations/Resolution of Deviations* on page 36 (see DSA 154).
- III.D. Completed semi-monthly reports (see DSA 155).
- III.E. Additional documents required when the project inspector performs any special inspections or aspects of structural testing:
 - III.E.1. Special Inspection:
 - III.E.1.1. The [DSA 103](#) form provides direction for which special inspections shall be performed by the project inspector or special inspector. It is permitted for the project inspector to provide special inspection if they have prior written approval by DSA. (Refer to *1.2.3 Required After Construction Completion* below for additional required documentation related to special inspections performed by the project inspector.)

ADMINISTRATION

III.E.2. Structural Testing:

III.E.2.1. For a minor scope of work, if the project inspector provides any sampling, protection, handling, transporting, and/or storage of test specimens for the project (note: prior written permission by the DSA Field Engineer is required), such tasks must be specifically identified on the [DSA 6-PI](#) form. (See [IR 17-1](#) for additional information.)

IV. Other Documents

IV.A. Contractor submittals (e.g. construction schedules, design professional approved shop drawings, certificates, product labels, concrete trip tickets, etc.).

IV.A.1. Notification to Project Inspector for the completion of construction at appropriate phases of construction consistent with DSA 152 sections and as indicated in [PR 13-01](#) (see [DSA 156](#)).

IV.B. Refer to the following for additional information:

IV.B.1. *1.2.2.1 Deferred Submittals* on page 35

IV.B.2. *1.2.2.2 Construction Change Documents, Type A* on page 35

IV.B.3. *1.2.2.4 Interim Verified Reports* on page 36.

IV.C. Proprietary Product Documents

IV.C.1. Refer to *1.3 Proprietary Products* on page 40 for additional information.

V. Depending on the nature of the construction work, portions of the work may be complete and documents associated with construction completion may be required even though overall construction is ongoing. Refer to *1.2.3 Required After Construction Completion* on page 37 for additional information.

1.2.2.1 Deferred Submittals

A deferred submittal (DS) represents a portion of the construction that cannot be fully detailed on the originally approved drawings because of variations in product design and manufacture. Approval of plans for such a portion may be deferred until the material suppliers are selected. All DS documents are listed on the DSA approved drawings. Any modifications to the approved list of DS documents must be reviewed and approved by DSA prior to commencing construction.

1.2.2.2 Construction Change Documents, Type A

In November 2012, a significant change occurred in the requirements for submitting and approving construction changes to DSA approved projects. (Refer to [IR A-6](#) and bulletin [BU 12-03](#) for additional information.)

After a contract for the work has been let, changes to the approved construction documents shall be made by means of Construction Change Documents (CCD). It is the responsibility of the design professional in general responsible charge to determine if changes affect the Structural, Access or Fire & Life Safety portions of the project. The CCD process replaces the

ADMINISTRATION

need to submit change orders. Thus for projects subject to the CCD process, change orders are not required to be submitted to DSA.

Changes to or affecting the Structural, Access or Fire-Life Safety Portions of the Project:

- These changes shall be classified as CCD Category A.
- CCD Category A are required to be submitted to and approved by the DSA prior to commencement of the affected work.
- CCD Category A must be submitted to the DSA using the CCD Category A form, [DSA 140](#).

Changes not affecting the Structural Safety, Access Compliance or Fire & Life Safety portions are classified as CCD Category B. These are not required to be submitted to the DSA unless specifically required, in writing, by DSA.

1.2.2.3 Notice of Deviations/Resolution of Deviations

When the Project Inspector or DSA district field engineer identifies deviations from the DSA approved construction documents the inspector must verbally notify the contractor.

(Deviations include both construction deviations and material deficiencies.) If the deviation is not immediately corrected, the inspector is required to promptly issue a written notice of deviation to the contractor, with a copy sent to the responsible design professional(s) and the DSA on form DSA 154. Deviations must be resolved prior to commencement of work that will cover up the deviant work.

When the noticed deviation is corrected, the inspector is required to promptly issue a written notice of resolution to the contractor, with a copy sent to the responsible design professional(s) and the DSA. The notice of resolution of deviations must be made using the original form DSA 154 that reported the deviation.

1.2.2.4 Interim Verified Reports

Prior to the Project Inspector initialing some blocks and any section of the Inspection Card (Form DSA 152), Interim Verified Reports (IVR) are required noted in [PR 13-01](#) and as follows:

I. Interim Verified Reports (IVR)

I.A. Architect/Engineer IVR (form [DSA 6-AE](#)):

I.A.1. Architect IVR is required for all sections.

I.A.2. Structural, electrical, mechanical engineers IVR required for any sections containing work for which, in the plans, the engineer has affixed his/her seal (stamped).

ADMINISTRATION

- I.B. Geotechnical engineer IVR (form [DSA 293](#)):
 - I.B.1. Geotechnical engineer IVR is required for any block and/or section relative to geotechnical work.
- I.C. In-plant inspector IVR (form [DSA 6-PI](#))
 - I.C.1. For relocatable buildings constructed in the plant and being delivered to the job site, the in-plant inspector IVR (or final verified report) is required for each separate building for any sections affected by the siting of the relocatable buildings.
- I.D. Special inspectors IVR (form [DSA 292](#) or [DSA 291](#)).
 - I.D.1. Special inspectors contracting directly and individually with the school board IVR (form [DSA 292](#)) is required for any block or section requiring special inspection work.
 - I.D.2. Special inspectors provided by the laboratory of record IVR (form [DSA 291](#)) is required for any block or section requiring special inspection work.
- I.E. Laboratory of record IVR (form [DSA 291](#)).
 - I.E.1. Laboratory of record IVR is required for any block and/or section containing required testing.

1.2.3 Required After Construction Completion

Once construction is complete, there are several documents that must be provided to the project inspector, as appropriate.

- I. Verified Reports(VR)
 - I.A. Architect/Engineer VR (form [DSA 6-AE](#))
 - I.B. Contractor VR (form [DSA 6-C](#))
 - I.C. Project Inspector VR (form [DSA 6-PI](#))
 - I.D. Geotechnical engineer VR (form [DSA 293](#))
 - I.E. Laboratory Verified Report (form [DSA 291](#))
 - I.E.1. If the project inspector has performed any aspect of structural testing (e.g. sampling, protection, handling, transporting, and/or storage of test specimens) for the project it must be indicated in the [DSA 291](#). Refer to [IR 17-1](#) for additional information.
 - I.F. Special Inspection Verified Report (form [DSA 292](#))
 - I.F.1. If the project inspector performs any special inspections not specifically assigned to them in the [DSA 103](#), a separate [DSA 292](#) (in addition to the typical [DSA 6](#)) is required for those inspections. Refer to [IR 17-6](#) for additional information.
 - I.G. Geotechnical Verified Report (form [DSA 293](#))

ADMINISTRATION

1.2.4 Codes and Referenced Standards

The following is a partial list of applicable codes that the inspector must have available at the jobsite (many are also available online, such as the 2010 versions at <http://publicecodes.cyberregs.com/st/ca/st/CA-P-2010-000008.htm>) – refer to the approved construction documents for the applicable codes and reference standards:

I. Codes:

I.A. 2013 Versions:

I.A.1. 2013 Building Standards Administrative Code, Part 1, Title 24 C.C.R.

I.B. 2010 Versions:

I.B.1. [2010 Building Standards Administrative Code, Part 1, Title 24 C.C.R.](#)

I.B.2. [2010 California Building Code \(CBC\), Part 2, Title 24 C.C.R.](#)

I.B.3. 2010 California Electrical Code (CEC), Part 3, Title 24 C.C.R.

I.B.4. 2010 California Mechanical Code (CMC) Part 4, Title 24 C.C.R.

I.B.5. 2010 California Plumbing Code (CPC), Part 5, Title 24 C.C.R.

I.B.6. [2010 California Energy Code \(CEC\), Part 6, Title 24 C.C.R.](#)

The following is a list of codes and standards that the project inspector should have access to if needed for the project:

I. Codes:

I.A. 2010 Versions:

I.A.1. [2010 California Fire Code, Part 9, Title 24 C.C.R.](#)

I.A.2. [2010 California Green Building Standards Code \(CALGreen\), Part 11, Title 24 C.C.R.](#)

I.A.3. [2010 California Referenced Standards, Part 12, Title 24 C.C.R.](#)

I.A.4. Title 19 C.C.R., Public Safety, State Fire Marshal Regulations.

II. Standards

II.A. NFPA (these standards are available online for reading only, but do require a free registration: http://www.nfpa.org/aboutthecodes/list_of_codes_and_standards.asp; frequently the CBC amends portions of the NFPA standards referenced below – for example, refer to [2010 CBC \(SFM\) Chapter 35](#) where noted below; additional reference standards will be referenced later in this manual at appropriate locations):

II.A.1. 2010 Versions:

II.A.1.1. 2010 NFPA 13 Automatic Sprinkler Systems (CA Amended)

II.A.1.2. 2007 NFPA 14 Standpipe Systems (CA Amended)

II.A.1.3. 2002 NFPA 17A Wet Chemical Systems

II.A.1.4. 2007 NFPA 20 Stationary Pumps

II.A.1.5. 2010 NFPA 24 Private Fire Mains (CA Amended)

II.A.1.6. 2010 NFPA 72 National Fire Alarm Code (CA Amended)

II.A.1.7. 2007 NFPA 80 Fire Door and Other Opening Protectives

ADMINISTRATION

II.A.1.8. 2008 NFPA 2001 Clean Agent Fire Extinguishing Systems (CA Amended)

II.B. Structural Standards will be referenced in applicable sections later in this document.

It is important to note that with the publication of the 2010 CBC, unlike kindergarten through twelfth grade projects, Community Colleges now have an option for which chapters of the building code will be the basis of design for a given project. These are primarily related to structural items and, thus, will be discussed further in the Structural Safety Items portion of this manual.

ADMINISTRATION

1.3 Proprietary Products

Frequently, proprietary products and assemblies are specified for use on projects. These may have an International Code Council Evaluation Service (ICC ES), Underwriters Laboratory, Factory Mutual (FM) or some other recognized agency report which may provide proper use and installation requirements. (Refer to [IR A-5](#), section 3 for a listing of DSA recognized agencies beyond those listed here.) Each of these recognized product testing groups provide information on the reports noted, which are listed below:

- ICC ES
 - How to read an ICC ES report: http://www.icc-es.org/Evaluation_Reports/read.shtml
 - Link to a searchable database of ICC ES reports: <http://www.icc-es.org/reports/index.cfm?search=search>
- UL
 - Quick guide on using their searchable listing database: <http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/quickguide.html>
 - Interactive listing lookup: <http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.html>
- FM
 - Approval Guide (this does require registration, but it is free): http://www.approvalguide.com/CC_host/pages/public/custom/FM/login.cfm

When such products are used, the following documentation and inspection items apply.

I. Receipt of documentation for constructed elements

- I.A. When applicable, receipt of design professional approved shop drawings.
- I.B. When applicable, receipt of special inspection documentation for product fabrication.
- I.C. Products with an ICC ES report:
 - I.C.1. ICC ES report for the product.
 - I.C.2. Manufacturer's product installation manual.
 - I.C.3. Product identification is per the ICC ES report (refer to Section 3 and 7 of the report).
 - I.C.4. The intended end use and any special conditions for the products must comply with the ICC ES report (refer to Section 2 and 5 in the ICC ES report).
- I.D. Products or assemblies with an UL listing:
 - I.D.1. If information is not contained on the contract documents, obtain information from the supplier or from the online UL directory previously noted.
- I.E. Products or assemblies approved by FM:

ADMINISTRATION

I.E.1. If information is not contained on the contract documents, obtain information from the supplier or from the online FM Approval Guide previously noted.

I.F. Products or assemblies approved by other DSA recognized agencies

I.F.1. If information is not contained in the contract documents, obtain information from the supplier or from the referenced report.

II. Inspection of the following items:

II.A. Proprietary Products:

II.A.1. Confirm product complies with approved construction documents.

II.A.2. Proper storage and care for product.

II.A.3. Products with an ICC ES report:

II.A.3.1. Product used complies with the manufacturer's and ICC ES report installation guidelines (refer to Section 4 and 5 of the ICC ES report). Where conflicts occur, the ICC ES report governs (refer to Section 5 in the ICC ES report).

II.A.3.1.1. Surrounding construction complies with requirements (i.e. ICC ES reports frequently indicate minimum member, fastener, and/or material requirements for products attached to the structure).

II.A.4. Products or assemblies with an UL listing:

II.A.4.1. Product used complies with UL listing requirements and be installed as indicated in the listing.

II.A.4.1.1. Surrounding construction complies with requirements (i.e. UL listings frequently indicate minimum member, fastener, and/or material requirements for products attached to the structure).

II.A.5. Products or assemblies approved by FM:

II.A.5.1. Product used complies with FM listing requirements and be installed as indicated in the listing.

II.A.6. Products or assemblies approved by other DSA recognized agencies:

II.A.6.1. Product used complies with referenced report requirements and be installed as indicated in the report.

ADMINISTRATION

1.4 DSA Links

Throughout this document will be many links to DSA documents. The list below provides links to the main page for each item.

- DSA Publications: <http://www.dgs.ca.gov/dsa/Resources/pubs.aspx>
 - DSA's Interpretation of Regulations Manual (Individual IRs): <http://www.dgs.ca.gov/dsa/Resources/IRManual.aspx>
 - DSA Bulletins: <http://www.dgs.ca.gov/dsa/Resources/pubs.aspx#bulletins>
 - DSA Policies: <http://www.dgs.ca.gov/dsa/Resources/pubs.aspx#policies>
- DSA Forms: <http://www.dgs.ca.gov/dsa/Forms.aspx>
- DSA Fire / Life Safety page: <http://www.dgs.ca.gov/dsa/Programs/progProject/planreview/fls.aspx>
- DSA Access Compliance page: <http://www.dgs.ca.gov/dsa/Programs/progAccess.aspx>
- DSA Certified Inspectors page: <http://www.dgs.ca.gov/dsa/Programs/programCert/inspector.aspx>

2 STRUCTURAL SAFETY INSPECTION ITEMS

STRUCTURAL SAFETY INSPECTION ITEMS

Since the passage of the Field Act in 1933, structural safety, with a seismic emphasis, has been a primary concern in public school construction. The Division of the State Architect has been charged with providing regulatory authority of public school and other state interest building construction projects. A key component of the Field Act is construction oversight and continuous inspection. Seismic performance of buildings constructed under the Field Act requirements is often markedly better than those buildings not governed by it. One of the reasons cited for this better performance has been the continuous inspection provided for such projects. It is in this particular way that project inspectors play a key role.

Another item noted for better performance was the additional and, frequently, more restrictive building code requirements applicable to projects under DSA jurisdiction. With the development of building codes over time, many of those restrictions have eventually been adopted by model building codes.

As noted in the ADMINISTRATION portion of this manual, Community College projects have an option for which building code chapters apply to a particular project. The approved construction documents will indicate which of the building code options were used. Those options are listed below:

- Compliance with the DSA-SS (regular) provisions of the Field Act per Chapters 16A, 19A, 20, 21A, 22A and 23, or
- Compliance with the DSA-SS/CC provisions specifically developed for Community Colleges per Chapters 16, 19, 20, 21, 22, and 23.

Note that Chapter 17A and 18A and Title 24, Part 1 apply to both DSA-SS and DSA-SS/CC projects. For the DSA-SS/CC adoption, all amendments are grouped in new sections at the end of Chapters 16, 19, 21, and 22. For other chapters, college amendments are identified by the [DSA-SS/CC] banner.

STRUCTURAL SAFETY INSPECTION ITEMS

2.1 Soils

In addition to the California Building Code, classification and testing of site soils are generally governed by several referenced standards issued by the [American Society for Testing and Materials, International](#) (ASTM; see <http://www.astm.org>). The primary references for classification and testing requirements are:

- Standard Test Method for Particle Size Analysis of Soils, ASTM D422
- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft lbf/ft³ (2,700 kN m/m³)), ASTM D1557
- Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487
- Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D4318
- Standard Test Method for Expansion Index of Soils, ASTM D4829

Depending on the scope of a given project, testing of soils is necessary for various portions of construction associated with the site soils. When such testing is necessary as dictated by the construction documents, certain information must be included, depending on the type of test that is being performed. While there are no format requirements, [DSA 201: Soil Compaction](#) and [DSA 202: Sieve Analysis](#) provide a suggested format (see *APPENDIX B – REFERENCED DSA FORMS* on page 313 for forms).

While site soils inspections are generally covered by the geotechnical engineer or their representative, oversight and verification by the project inspector of several broad categorical items are important. As noted previously, the project inspector must become familiar with the required testing and special inspection program for the project site and building soils related work.

2.1.1 Grading

There are many items that must be inspected during the grading phase of a project. Those are listed below based on their applicability to site work and building work.

2.1.1.1 Site

I. Receipt of documentation for constructed elements:

I.A. Receipt of project soils report, when part of the approved construction documents.

STRUCTURAL SAFETY INSPECTION ITEMS

I.B. Material/Structural Test Documentation:

I.B.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed (by DSA approved laboratory) and/or daily special inspection reports and/or grading report:

I.B.1.1. Approval of qualification testing of fill materials.

I.B.1.2. Acceptance of fill materials used at site.

I.B.1.2.1. Where controlled low strength material (CLSM) is used as controlled fill, refer to [IR 18-1](#).

I.B.1.3. Compaction approval of soil.

I.B.1.4. Materials below footings are adequate to achieve the design bearing capacity. (**NOTE:** This may not occur until after foundation excavations have occurred.)

I.B.2. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).

I.C. Special Inspection Documentation:

I.C.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports and/or grading report (refer to [IR 17-7](#) for additional information regarding geotechnical engineer responsibilities and progress report requirements):

I.C.1.1. Proper Site Preparation:

I.C.1.1.1. Clearing of all hazardous materials, such as:

I.C.1.1.1.1 Asbestos

I.C.1.1.1.2 Lead

I.C.1.1.1.3 Serpentine Rock

I.C.1.1.1.4 Gaseous Contaminated Items

I.C.1.1.2. Site has been prepared properly prior to placement of controlled fill and/or excavations for foundations.

I.C.1.1.2.1 Drainage Devices

I.C.1.1.2.2 Shoring

I.C.1.1.3. Foundation excavations extend to proper depth and have reached proper material.

I.C.1.1.4. Specified elevations achieved

I.C.1.2. Compaction Report - The geotechnical engineer or their qualified representative shall indicate the following:

I.C.1.2.1. Use of proper:

I.C.1.2.1.1 Fill Materials

I.C.1.2.1.2 Lift Thicknesses

I.C.1.2.1.3 Placement

I.C.1.2.1.4 Compaction

I.C.1.2.2. Approval of compaction test of fill.

I.C.2. Upon completion of the site grading, provided there are no other soils related items of construction, receipt of the [DSA 293](#) Geotechnical Verified Report is required.

STRUCTURAL SAFETY INSPECTION ITEMS

II. Inspection of the following items:

- II.A. Note water table elevation, if observable.
- II.B. Note condition (photograph, videotape, digital camera recommended) of off-site and on-site improvements to remain, such as paving, curbs, gutters, and walks before work begins.
- II.C. Proper site preparation:
 - II.C.1. Job survey is reviewed.
 - II.C.1.1. Monuments and stakes are located.
 - II.C.1.2. Limits of work are established.
 - II.C.1.3. Job surveyor is on-site as specified.
 - II.C.1.3.1. Verify whether owner or contractor supplied surveyor.
 - II.C.1.3.2. Verify scope of survey work (building lines, elevations, pad certification, etc.).
 - II.C.2. Removal of hazardous materials (see subsection *I.C.1.1.1* above for further information).
 - II.C.3. Stripping of site, preservation and depth of removal of topsoil and location of stockpile are established.
 - II.C.3.1. Observe that topsoil is not contaminated with subsoil and is free from roots, stones and other deleterious materials per requirements.
 - II.C.3.1.1. Check that satisfactory materials are used and unsuitable materials are disposed of in waste areas. Do not allow contamination.
 - II.C.4. Observe removal of material and note unusual conditions.
 - II.C.4.1. Subsoil conditions are observed for irregularities such as soft spots, springs, previous debris, etc.
 - II.C.5. Existing Items
 - II.C.5.1. Adjacent Property
 - II.C.5.1.1. Adjacent property is protected.
 - II.C.5.1.2. Verify whether adjacent property owner is notified as required by work or code.
 - II.C.5.1.3. Shoring and underpinning is provided as specified.
 - II.C.5.2. Removal of any existing buildings and foundations.
 - II.C.5.3. Existing Vegetation
 - II.C.5.3.1. Any existing vegetation identified to remain is protected.
 - II.C.5.3.1.1. Spillage of ash, oil, slurry, etc., is prevented in areas to be planted or near existing vegetation to be retained.
 - II.C.5.3.2. Extent of grubbing and removal of stumps and matted roots is performed as shown.
 - II.C.5.3.2.1. Depressions are properly filled and compacted.
 - II.C.5.4. Existing utility lines to remain are located, staked, and protected.
 - II.C.5.4.1. Observe conditions of uncovered lines.

STRUCTURAL SAFETY INSPECTION ITEMS

II.C.5.4.2. Verify that utility companies and U.S.A. (Underground Service Alert) have been notified.

II.C.5.4.3. All lines to be removed or abandoned are property capped.

II.C.5.4.4. If unknown lines are encountered, notify architect of the existing lines.

II.C.6. Excavations

II.C.6.1. Excavation does not cause unusual rutting and appears adequate for work to be performed.

II.C.6.1.1. Corrective measures are performed where over-excavation occurs.

II.C.6.1.2. Drainage is provided continuously as excavation progresses.

II.C.6.1.2.1 Other de-watering methods such as well points are provided.

II.C.6.1.2.2 Drainage ditches are maintained.

II.C.6.1.2.3 Ponding does not occur.

II.C.7. Fill materials and placement (any special conditions, such as requirements in flood zones, lime treatment, soil densification, etc.).

II.C.7.1. Verify special inspector or geotechnical representative has either a sand cone (see Figure 2-1) or nuclear density gage (see Figure 2-2) for compaction testing.

II.C.8. Specified elevations and slopes achieved.

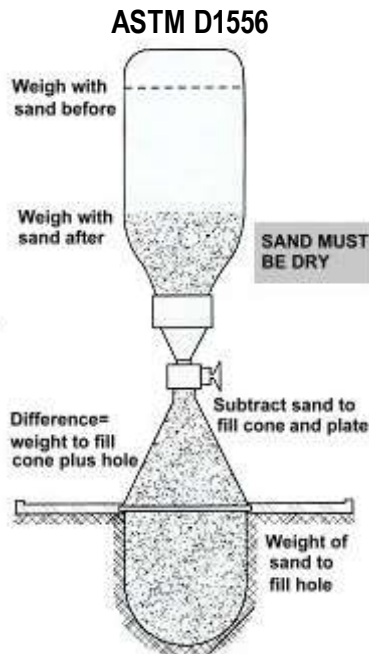


Figure 2-1: Sand Cone

STRUCTURAL SAFETY INSPECTION ITEMS

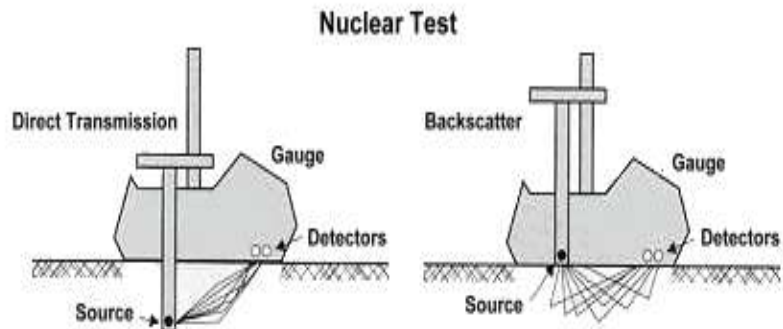


Figure 2-2: Nuclear Density Gage

II.C.9. Best Management Practice

- II.C.9.1. Contractor provides public safety methods such as protective comers, fences, barricades, lighting, warning devices, signs, etc., as required.
- II.C.9.2. Verify that erosion control measures are implemented in accordance with approved plans.
- II.C.9.3. Dust control is provided as required.
- II.C.9.4. Deleterious material is removed from site and/or otherwise disposed of properly.
- II.C.9.5. Spillage of materials or soil on streets and sidewalks is promptly removed for public safety.

II.C.10. Preservation of monuments and markers is observed.

- II.C.10.1. Record survey of site is performed if required.

2.1.1.2 Building Pad

I. Receipt of documentation for constructed elements:

- I.A. Receipt of project soils report, when part of the approved construction documents.
- I.B. Material/Structural Test Documentation:
 - I.B.1. Refer to 2.1.1.1 Site on page 45 for documentation requirements.
- I.C. Special Inspection Documentation
 - I.C.1.1. Refer to 2.1.1.1 Site on page 45 for documentation requirements.

II. Inspection of the following items:

- II.A. Removal of hazardous materials (see I.C.1.1 Proper Site Preparation: above for further information)
- II.B. Proper site preparation
 - II.B.1. Building layout is properly established
 - II.B.1.1. Set-backs are observed
 - II.B.1.2. Batterboards and elevations are established.
 - II.B.2. Compacted material extends beyond foundation line as required.

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.3. Excavations

II.B.3.1. Foundation excavation has adequate bracing, form clearances, type of soil, etc.

II.B.3.1.1. Corrective measures are performed where over-excavation occurs.

II.B.3.2. Footing beds are not disturbed or softened.

II.B.3.3. Drainage

II.B.3.4. Observe methods of de-watering foundation excavations.

II.B.3.5. Methods for surface drainage are provided.

II.B.4. Fill materials and placement

II.B.5. Soil Poisoning, performed if required, uses approved method and materials.

II.B.6. Presence of specified:

II.B.6.1. Dampproofing

II.B.6.2. Waterproofing

II.B.6.3. Drainage devices

II.B.6.4. Dampproof/Waterproof membranes are protected against damage during backfilling operations.

2.1.1.3 Underground Utilities

In addition to the items noted below, refer to the following sections for documentation and inspection requirements associated with underground utilities construction work:

- 2.1.1.1 *Site* on page 45.
- 2.1.1.2 *Building Pad* on page 49.
- 3.3.2 *Automatic Fire Suppression Systems*, subsection *II.A* on page 188.
- 5 *OTHER BUILDING COMPONENTS AND SYSTEMS* starting on page 236.

I. Receipt of documentation for constructed elements:

I.A. Material/Structural Test Documentation:

I.A.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed (by DSA approved laboratory) and/or daily special inspection reports and/or grading report:

I.A.1.1. Approval of qualification testing of fill materials.

I.A.1.2. Acceptance of fill materials used at site.

I.A.1.2.1. Where controlled low strength material (CLSM) is used as controlled fill, refer to [IR 18-1](#).

I.A.1.3. Compaction approval of soil.

I.B. Special Inspection Documentation:

STRUCTURAL SAFETY INSPECTION ITEMS

I.B.1. Compaction Report - The geotechnical engineer or their qualified representative shall indicate the following:

- I.B.1.1. Use of proper:
 - I.B.1.1.1. Fill Materials
 - I.B.1.1.2. Lift Thicknesses
 - I.B.1.1.3. Placement
 - I.B.1.1.4. Compaction

I.B.1.2. Approval of compaction test of fill.

I.B.2. Upon completion of backfilling of the utility trenches, provided there are no other soils related items of construction, receipt of the [DSA 293](#) Geotechnical Verified Report is required.

II. Inspection of the following items:



Figure 2-3: Improper Trench Location Due To Column Footing Proximity

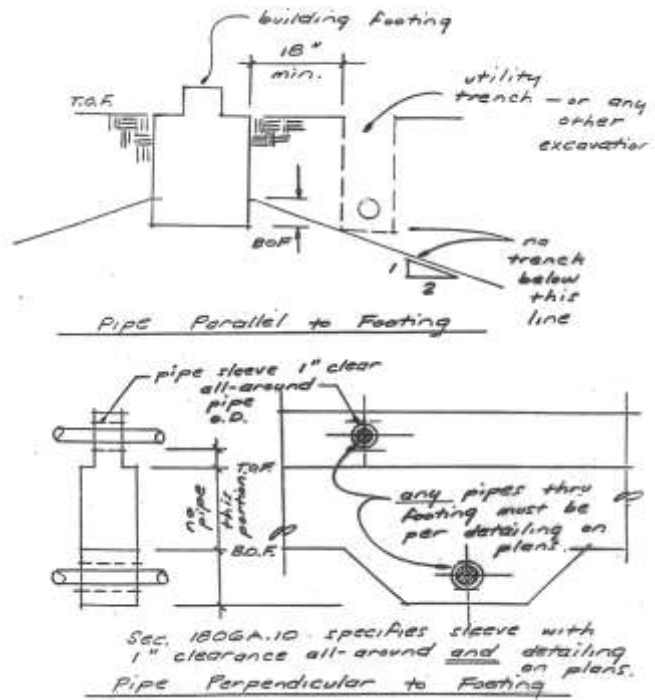


Figure 2-4: Commonly Specified Pipe and Trench Locations At Or Near Footings

II.A. Specified placement restrictions when adjacent to or through a footing for underground utilities (see Figure 2-3 for an example of improper trench placement – it is too close to the column footing and undermines it; refer to Figure 2-4 for an example of commonly specified requirements for pipes and trenches adjacent to and through footings):

- II.A.1. Pipes
- II.A.2. Conduits
- II.A.3. Trenches

II.B. Underground utility systems

STRUCTURAL SAFETY INSPECTION ITEMS

- II.B.1. Mechanical
 - II.B.1.1. Heating
 - II.B.1.2. Air Conditioning
 - II.B.1.3. Refrigeration
- II.B.2. Plumbing
 - II.B.2.1. Thrust blocks per requirements.
 - II.B.2.2. Water
 - II.B.2.3. Soil/Waste/Sewer
 - II.B.2.4. Storm Drain
 - II.B.2.5. Methane
 - II.B.2.6. Gas
- II.B.3. Fire Sprinklers
 - II.B.3.1. Thrust blocks per requirements.
 - II.B.3.2. Underground Hydro
 - II.B.3.3. Underground Flush
- II.B.4. Electrical:
 - II.B.4.1. Cables
 - II.B.4.2. Conduits
 - II.B.4.3. Grounding
- II.B.5. All underground systems are in place and properly stubbed.
 - II.B.5.1. At building locations, stub-outs at grade are at appropriate height above finish floor elevation to ensure proper coupling after foundation and floor placement.
 - II.B.5.1.1. Exposed conduit should be installed so that bent portion will not extend above floor level.
 - II.B.5.1.2. Future Work
 - II.B.5.1.2.1 Stub-Ups
 - II.B.5.1.2.2 Sleeves

2.1.2 Soil Remediation

Similar to the Grading section, the majority of the documentation and inspection items frequently defer to the geotechnical engineer. Therefore, refer to *2.1.1 Grading* on page 45 for applicable items that may be associated with soil remediation efforts. In addition to those applicable items, for all soil remediation efforts, the following information applies:

I. Receipt of documentation for constructed elements:

I.A. Material/Structural Test Documentation:

- I.A.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports and/or grading report:

STRUCTURAL SAFETY INSPECTION ITEMS

I.A.1.1. Any testing specified in the approved construction documents based on the soil remediation method used.

I.B. Special Inspection Documentation:

I.B.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports and/or grading report:

I.B.1.1. Any special inspections specified in the approved construction documents based on the soil remediation method used.

II. Inspection of the following items:

II.A. Observe the required testing and special inspection.

2.1.2.1 Clay

In addition to the above noted items, the following applies specifically to remediation of clay soils:

I. Inspection of the following items:

I.A. Specified clay remediation must occur per the approved construction documents, which may include one or more of the following (this is not an exhaustive list):

I.A.1. Chemical treatment (e.g. lime treatment, etc.).

I.A.2. Overexcavation, replacement fill and compaction.

2.1.2.2 Soil Densification

In addition to the above noted items, the following applies specifically to soil densification:

I. Inspection of the following items:

I.A. Specified soil densification must occur per the approved construction documents which may include one or more of the following (this is not an exhaustive list):

I.A.1. Overexcavation, replacement fill and compaction.

I.A.2. Special compaction or densification methods (e.g. dynamic, pressure grouting, etc.).

2.1.2.3 Stone Columns

2.1.3 Earth Retaining Structures

Depending on the type of earth retaining structure, there are certain inspections or documents that must be obtained prior to backfilling. Following is a list of the items requiring inspection based on the type of earth retaining structure.

STRUCTURAL SAFETY INSPECTION ITEMS

2.1.3.1 Segmental Retaining Walls

In addition to the approved construction documents, refer to [IR 16-3](#) for documentation and inspection requirements.

Prior to placing first unit, the following must occur:

I. Receipt of documentation for constructed elements:

I.A. Material/Structural Tests Documentation:

I.A.1. Units

I.A.1.1. Manufacturer's certification letter must include the following:

I.A.1.1.1. Manufacturer's name and address

I.A.1.1.2. Product name

I.A.1.1.3. Unit Type

I.A.1.1.4. Lab test reports for the following:

I.A.1.1.4.1 Compressive Strength

I.A.1.1.4.2 Absorption

I.A.2. Soil reinforcement (geogrid)

I.A.2.1. Manufacturer's certification letter includes the following:

I.A.2.1.1. Manufacturer's name and address

I.A.2.1.2. Product name

I.A.2.1.3. Product designation meeting the requirements of the project's design

I.A.2.1.4. Roll number

I.A.2.1.5. Identification procedures

I.A.2.1.6. Sampling procedures

I.A.2.1.7. Lab test results of quality control tests for each batch of resin and each shift's production used

I.A.2.1.7.1 Flexural Rigidity

I.A.2.1.7.2 Tensile Strength

I.A.2.1.7.3 Modulus

I.A.2.1.7.4 Junction Strength

I.A.3. Fill/Backfill Materials

I.A.3.1. Reinforced Fill

I.A.3.2. Retained Fill

I.A.3.3. Drainage Fill

I.A.3.4. Foundation Fill

I.A.3.5. For all fill/backfill, lab reports include the following information at a minimum frequency dictated by the maximum of [IR 16-3](#), part 6.3 or as directed by the geotechnical engineer:

I.A.3.5.1. Soil Type

I.A.3.5.2. Soil Classification

I.A.3.5.3. Moisture Content

I.A.3.5.4. Density

STRUCTURAL SAFETY INSPECTION ITEMS

I.A.3.5.5. Compaction

I.A.3.5.6. Shear Strength

I.A.3.5.7. Gradation

I.A.4. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).

I.B. Special Inspection Documentation:

I.B.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports:

I.B.1.1. Proper site preparation

I.B.1.1.1. Excavations

I.B.1.1.2. Subgrade

I.B.1.1.3. Leveling pad

I.B.1.1.4. Drainage pipes/devices

I.B.1.1.5. Front & Back Slope conditions

I.B.1.2. Proper units

I.B.1.2.1. Type and Identification

I.B.1.2.2. Manufacturer's Certification

I.B.1.3. Proper soil reinforcement (geogrid)

I.B.1.3.1. Type and Identification

I.B.1.3.2. Manufacturer's Certification:

II. Inspection of the following items:

II.A. Proper storage and damage prevention of the following, per approved construction documents:

II.A.1. Units

II.A.2. Geogrid

II.B. Minimum horizontal setback distance from building foundation to the anticipated location of the back of the units.

Prior to backfilling or lift installation for each subsequent run, the following must occur:

I. Receipt of documentation for constructed elements:

I.A. Refer to *I.A Material/Structural Tests Documentation*: above on page 54 for documentation requirements

I.B. Special Inspection Documentation:

I.B.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports:

I.B.1.1. Units

I.B.1.1.1. First course requirements:

I.B.1.1.1.1 Unit type

I.B.1.1.1.2 Alignment

I.B.1.1.1.3 Inclination

STRUCTURAL SAFETY INSPECTION ITEMS

I.B.1.1.1.4 Leveling of leveling pad for intimate contact with units and aggregate.

I.B.1.1.2. Remaining courses

I.B.1.1.2.1 (Same as for first course, except for leveling pad)

I.B.1.2. Placement of block fill and wall embedment

I.B.1.3. Soil reinforcement (geogrid)

I.B.1.3.1. Type

I.B.1.3.2. Identification

I.B.1.3.3. Manufacturer's Certification

I.B.1.3.4. Placement

I.B.1.3.4.1 Connection To Block

I.B.1.3.4.1.1 Mechanical Device

I.B.1.3.4.1.2 Overlap Length

I.B.1.3.4.2 Elevation

I.B.1.3.4.3 Length

I.B.1.3.4.4 Strong Direction Orientation

I.B.1.4. Proper Fill Materials and Lift Thickness for:

I.B.1.4.1. Reinforced Fill

I.B.1.4.2. Retained Fill

I.B.1.4.3. Drainage Fill

I.B.1.4.4. Foundation Fill

I.B.1.5. Proper Compaction of:

I.B.1.5.1. Reinforced Fill

I.B.1.5.2. Retained Fill

I.B.1.5.3. Drainage Fill

I.B.1.5.4. Foundation Fill

I.B.1.6. Overall Wall

I.B.1.6.1. Wall Elevations

I.B.1.6.2. Front and Back Slope Conditions

I.C. Upon completion of the segmental retaining wall, provided there are no other soils related items of construction, receipt of the [DSA 293](#) Geotechnical Verified Report is required.

II. Inspection of the following items:

II.A. Proper drainage devices.

II.B. Proper units and soil reinforcement.

II.C. Special or unusual conditions associated with wall construction:

II.C.1. Corners or bends

II.C.1.1. Staggering of geogrid layers between adjacent walls to avoid overlap and permit planar installation.

II.C.2. Location and size of holes or openings cut into geogrid, along with any additional reinforcing requirements.

II.C.3. Pipes exiting through wall face or at wall base.

II.C.4. Compliance with restrictions on construction equipment based on:

II.C.4.1. Proximity to wall.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.C.4.2. Lift height required prior to travel over lift/geogrid.
- II.C.4.3. Tracked or rubber wheel type of equipment.
- II.C.4.4. Travel Speed
- II.C.4.5. Braking
- II.C.4.6. Turning
- II.D. At end of each day of construction, final lift and adjacent grade areas are sloped away from wall to direct run-off away from wall.

2.1.3.2 Masonry Retaining Wall

See 2.3.1.4 *Concrete Walls* on page 85 and 2.3.2.1 *Masonry Walls* on page 95 for relevant documentation to be received or items to be in place prior to backfill installation.

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

I.A.1. In addition to the shop drawings associated with the masonry wall (when applicable), the following items need to be shown on the design professional reviewed shop drawings:

I.A.1.1. Type and location of drainage devices.

I.A.1.2. Soil reinforcing (when applicable) – refer to 2.1.3.1 *Segmental Retaining Walls* on page 17 for additional information.

I.B. Material/Structural Tests Documentation

I.B.1. Lab reports include the following information:

I.B.1.1. For all fill/backfill:

I.B.1.1.1. Soil Type

I.B.1.1.2. Soil Classification

I.B.1.1.3. Moisture Content

I.B.1.1.4. Density

I.B.1.1.5. Compaction Requirements

I.B.1.1.6. Compaction tests of backfill during its installation

I.B.1.2. Minimum design strength requirements: For retaining walls that do not have shoring provided during back fill installation:

I.B.1.2.1. Retaining wall has achieved minimum required strength specified prior to back filling.

I.B.2. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).

I.C. Special Inspection Documentation:

I.C.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports:

I.C.1.1. Drainage devices

I.C.1.2. Soil Reinforcement

STRUCTURAL SAFETY INSPECTION ITEMS

I.C.2. Compaction Report - The geotechnical engineer or their qualified representative shall indicate the following:

I.C.2.1. Use of proper:

I.C.2.1.1. Fill Materials

I.C.2.1.2. Lift Thicknesses

I.C.2.1.3. Placement

I.C.2.1.4. Compaction

I.C.2.2. Approval of compaction test of fill

I.C.3. Upon completion of the masonry retaining wall, provided there are no other soils related items of construction, receipt of the [DSA 293](#) Geotechnical Verified Report is required.

II. Inspection of the following items:

II.A. Inspection of back fill of retaining walls is generally covered by the geotechnical engineer or their representative. However, verification of several broad categorical items is important:

II.A.1. Prior to back filling the retaining wall:

II.A.1.1. Proper shoring of wall, when applicable.

II.A.1.2. For walls without shoring, refer to 2.1.3.2 Masonry Retaining Wall, subsection *I.B.1.2 Minimum design strength requirements* on page 57.

II.A.1.3. Presence of specified:

II.A.1.3.1. Dampproofing

II.A.1.3.2. Waterproofing

II.A.1.3.3. Drainage devices

II.A.2. Presence of specified soil reinforcement.

II.A.3. Lift heights comply with requirements.

II.A.4. Compaction testing occurs.

2.1.3.3 Concrete Retaining Wall

See 2.3.1.2 *Concrete Walls* items on page 83 for relevant items to be in place prior to backfill installation based on the kind of wall being constructed. For shotcrete walls, refer to 2.3.1.2 *Concrete Walls* items on page 83 as well as 2.3.1.4.3 *Shotcrete* items on page 86.

For documentation and inspection requirements refer to 2.1.3.2 *Masonry Retaining Walls* on page 57.

2.1.4 Anchors

Similar to the Grading section, the majority of the documentation and inspection items frequently defer to the geotechnical engineer. Therefore, refer to 2.1.1 *Grading* on page 45 for

STRUCTURAL SAFETY INSPECTION ITEMS

applicable items that may be associated with soil remediation efforts. In addition to those applicable items, for all soil anchor efforts, the following information applies:

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

I.A.1. When applicable, receipt of design professional reviewed anchor shop drawings.

I.A.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents must be submitted to DSA for review and approval prior to installation of modified elements.

I.A.1.2. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.B. Material/Structural Test Documentation:

I.B.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports and/or grading report:

I.B.1.1. Any anchor testing specified in the approved construction documents.

I.C. Special Inspection Documentation:

I.C.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports and/or grading report:

I.C.1.1. Any anchor special inspections specified in the approved construction documents.

II. Inspection of the following items:

II.A. Proper storage and handling of materials.

II.B. Observe required testing and special inspection.

2.1.4.1 Soil Nails

There are no additional items for soil nails beyond those noted for anchors in general.

2.1.4.2 Tie Backs

There are no additional items for tie backs beyond those noted for anchors in general.

2.1.4.3 Prestressed Rock and Soil Foundation Anchors

In addition to the California Building Code, projects using prestressed rock and soil foundation anchors are generally governed by a referenced standard issued by the [Post-Tensioning](#)

STRUCTURAL SAFETY INSPECTION ITEMS

[Institute](#) (PTI; see <http://www.post-tensioning.org>). The primary reference for general design, construction or installation, and testing requirements is:

- Recommendations for Prestressed Rock and Soil Anchors (4th Edition), PTI DC35.1-04

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

I.A.1. When applicable, receipt of design professional reviewed tie back shop drawings.

I.A.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents must be submitted to DSA for review and approval prior to installation of modified elements.

I.A.1.2. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.B. Material/Structural Test Documentation:

I.B.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports and/or grading report:

I.B.1.1. Tendons are thread-bar anchors conforming to specified requirements.

I.B.1.2. Approval of anchor corrosion protection.

I.B.1.3. Load testing:

I.B.1.3.1. Preproduction Tests

I.B.1.3.2. Performance Tests

I.B.1.3.3. Creep Test

I.B.2. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).

I.C. Special Inspection Documentation

I.C.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports:

I.C.1.1. Approval of drilling methods.

I.C.1.2. Approval of anchor installation.

I.C.2. Upon completion of the building pad grading, provided there are no other soils related items of construction, receipt of the [DSA 293](#) Geotechnical Verified Report is required.

II. Inspection of the following items:

II.A. Proper storage and handling of materials.

II.B. Observe required testing of anchors.

STRUCTURAL SAFETY INSPECTION ITEMS

STRUCTURAL SAFETY INSPECTION ITEMS

2.2 Foundation Systems

Prior to any foundation item being inspected, generally speaking, all soils related items applicable to a given building or portion thereof (refer to *2.1 Soils* on page 45 for further information) must be inspected for compliance with the approved construction documents by the project inspector. Refer to form [DSA 151](#) for requirements associated with advance notification to DSA for various foundation related construction items (e.g. trenching complete, foundation forms, concrete placement, etc.).

2.2.1 Shallow Foundations

2.2.1.1 Concrete Foundations

For documentation and inspection requirements, refer to *2.3.1.1 Cast In Place (CIP) Concrete* on page 74 applicable to all projects using concrete.

In addition to the just noted items, the following applies to all shallow concrete foundations, unless noted otherwise:

I. Inspection of the following items:

- I.A. No foreign material enters the foundation excavation during concrete placement.
- I.B. Foundation must be level within specified tolerances or steps are required per the approved drawings.
- I.C. Bottom of footing extends beyond locally defined frost line.
- I.D. Proximity and location of adjacent footing bottoms meet requirements. See Figure 2-5 for an example of commonly specified location requirements for adjacent footings having different depths.

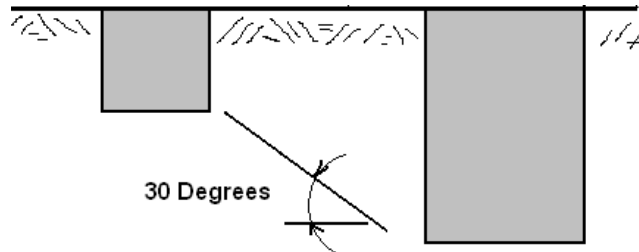


Figure 2-5: Adjacent Footings Having Different Depths

- I.E. Embedded items per requirements.
 - I.E.1. Materials

STRUCTURAL SAFETY INSPECTION ITEMS

I.E.1.1. Depending on material, additional material or structural testing documentation and/or special inspections may be required (e.g. steel embeds may have welding and require both material and welding special inspection documentation – see the appropriate subsections in 2.3.4 **Steel** beginning on page 116 for additional information).

I.E.2. Location

I.E.3. Type

I.E.3.1. Anchor Bolts

I.E.3.1.1. Embedment Length

I.E.3.1.2. Embedded head type.

I.E.3.2. Embed Plates

I.F. Where underground utilities are adjacent to or through a foundation (see Figure 2-6 for an example of a pipe through or just below a footing), refer to 2.1.1.3 *Underground Utilities* on page 50 for additional information.



Figure 2-6: Pipe Through/Below Footing

I.G. When portions of the foundation types below may qualify as ‘deep foundation elements,’ refer to 2.2.2.2 *Cast-In-Place Deep Foundations (Piers)* subsection 1.B.2 on page 69 for additional information.

2.2.1.1.1 Footings

For footings acting as a pile cap, refer to 2.2.1.1.4 *Pile Caps* on page 64 for information. For other requirements, refer to the general requirements specified in 2.2.1.1 *Concrete Foundations*.

STRUCTURAL SAFETY INSPECTION ITEMS

2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings

For grade beams or combined concrete footings acting as a pile cap, refer to 2.2.1.1.4 *Pile Caps* on page 64 for information. For other requirements, refer to the general requirements specified in 2.2.1.1 *Concrete Foundations*.

2.2.1.1.3 Concrete Mat

For portions of mats acting as a pile cap, refer to 2.2.1.1.4 *Pile Caps* on page 64 for information. For other information, refer to the general requirements specified in 2.2.1.1 *Concrete Foundations*.

2.2.1.1.4 Pile Caps

I. Inspection of the following items:

I.A. Tops of piles per requirements for the following:

I.A.1. Embedment into pile cap.

I.A.1.1. During grading operations after piles have been installed, verify proper protection of tops of piles is provided (see Figure 2-7 on page 71 for an example of the kinds of damage that could occur to tops of piles).

I.A.2. Pile cap extent beyond edge of pile.

I.A.3. Pile top roughening.

2.2.2 Deep Foundations

The following applies to all deep foundations.

I. Receipt of documentation for constructed elements:

I.A. Where adjacent existing structures could be adversely affected by deep foundation installation procedures, receipt of documentation of mitigation procedures, as dictated by DSA approved documents.

I.B. Placement plan for elements and installation record corresponds to the placement plan identification.

I.B.1. This plan must be submitted to DSA prior to installing deep foundations.

I.C. Refer to the individual sections for each type of pier/pile below for a description of the types of documents that must be received.

II. Inspection of the following items:

II.A. Where adjacent existing structures could be adversely affected by deep foundation installation procedures, mitigation procedures, as dictated by DSA approved documents, are followed.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.B. Once deep foundations have been installed, proper protection procedures for those elements must be put in place for any remaining fill placement operations.
- II.C. Placement tolerances do not exceed specified limits.
- II.D. Embedded items per requirements.
 - II.D.1. Materials
 - II.D.1.1. Depending on material, additional material or structural testing documentation and/or special inspections may be required (e.g. steel embeds may have welding and require both material and welding special inspection documentation – see the appropriate subsections in 2.3.4 **Steel** beginning on page 116 for additional information).
 - II.D.2. Location
 - II.D.3. Type
 - II.D.3.1. Anchor Bolts
 - II.D.3.1.1. Embedment Length
 - II.D.3.1.2. Embedded head type.
 - II.D.3.2. Embed Plates

2.2.2.1 Driven Deep Foundations (Piles)

The following items apply to all driven piles.

I. Receipt of documentation for constructed elements:

- I.A. Shop Drawings:
 - I.A.1. When applicable, receipt of design professional reviewed pile shop and erection drawings.
 - I.A.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents must be submitted to DSA for review and approval prior to installation of modified elements.
- I.B. Material/Structural Test Documentation
 - I.B.1. For the following items, verification for each pile by **both** the project inspector and the geotechnical engineer or their qualified representative in the form of daily special inspection reports and/or reports of tests performed:
 - I.B.1.1. Pile materials
 - I.B.1.1.1. Steel Piles (refer to 2.2.2.1.1 *Steel Piles* on page 67 for additional information)
 - I.B.1.1.2. Concrete Piles (refer to 2.2.2.1.3 *Concrete Piles* on page 68 for additional information)
 - I.B.2. Capacities of test piles and additional load tests as required.
 - I.B.3. Testing of mechanical couplers.

STRUCTURAL SAFETY INSPECTION ITEMS

I.B.4. See *I.C.1.2 Pile load testing* below on page 66 for additional structural tests.

I.C. Special Inspection Documentation:

I.C.1. During installation procedures, the geotechnical engineer or their qualified representative shall provide approval for the following in the form of daily special inspection reports and/or reports of tests performed:

I.C.1.1. Driving operations

I.C.1.1.1. Physical characteristics of the foundation-driving equipment.

I.C.1.1.1.1 Hammer Type

I.C.1.1.1.2 Hammer Size

I.C.1.1.2. Pile identifying marks and location

I.C.1.1.3. Pile Plumbness

I.C.1.1.4. Number of Blows per Foot of Penetration

I.C.1.1.5. Required Penetrations to achieve Design Capacity (see *I.C.1.2.1 Dynamic procedure* below on page 66 for additional information)

I.C.1.1.6. Tip & Butt Elevations

I.C.1.1.7. Any Pile Damage

I.C.1.1.7.1 The design professional shall dictate any repairs to damaged piles or usage of damaged piles, subject to the review and approval by DSA.

I.C.1.2. Pile load testing

I.C.1.2.1. Dynamic procedure

I.C.1.2.1.1 Dynamic formula used.

I.C.1.2.1.2 Permanent penetration under last 10 blows.

I.C.1.2.2. Where vibratory driving occurs, load testing per requirements.

I.C.1.2.3. Where heaving occurs due to adjacent driving operations, heaved elements are tested per requirements.

I.C.2. Once installation is complete, the geotechnical engineer provides their verified report ([DSA 293](#)).

II. Inspection of the following items:

II.A. Prior to pile driving adjacent to cased and uncased concrete piers, sufficient wait time since concrete pier placement must occur (see *2.2.2.2 Cast-In-Place Deep Foundations (Piers)* subsection *II.F* on page 70 for additional information).

II.B. For the following items, verification for each pile by **both** the project inspector and the geotechnical engineer or their qualified representative in the form of daily special inspection reports and/or reports of tests performed:

II.B.1. Sizes

II.B.2. Lengths

II.B.3. Locations

II.C. Proper storage of piles, including level, equally spaced transverse supports.

II.D. Piles are not damaged during lifting operations or other erection techniques.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.D.1. The design professional shall dictate any repairs to damaged piles or usage of damaged piles, subject to the review and approval by DSA.
- II.D.2. Testing of piles complies with limitations specified in approved construction documents.
- II.E. For specialty piles, additional inspections by qualified individuals as determined by the registered design professional in responsible charge and dictated by the DSA approved documents.

2.2.2.1.1 Steel Piles

The following provides additional information specific to steel piles:

For documentation and inspection requirements, refer to *2.3.4.1 Structural Steel* on page 116 (however, steel may be required to comply with different ASTM requirements, such as those listed in CBC [1810A.3.2.3](#) – verify requirements with approved construction documents) and *2.2.2.1 Driven Deep Foundations (Piles)* on page 65.

I. Inspection of the following items:

- I.A. Where steel core elements are spliced, milling of contact surfaces and welding is required per the approved construction documents (refer to *2.3.4.1 Structural Steel* on page 116 for welding documentation and inspection requirements).

2.2.2.1.1.1 Helical Piles

The following provides additional information specific to helical piles:

I. Receipt of documentation for constructed elements:

- I.A. Special Inspection Documentation:
 - I.A.1. Project specific testing occurs to verify allowable loads per pile.
 - I.A.2. Special inspection reports include information noted in the requirements. Commonly specified information to be included in such reports is often based on the requirements given in CBC [1704A.10](#):
 - I.A.2.1. Installation equipment used.
 - I.A.2.2. Pile Dimensions
 - I.A.2.3. Tip Elevations
 - I.A.2.4. Final Depth
 - I.A.2.5. Final installation torque
 - I.A.2.6. Other pertinent installation data as required by the registered design professional in responsible charge.

II. Inspection of the following items:

- II.A. Installation depth and torque per requirements, including not exceeding specified limits.

STRUCTURAL SAFETY INSPECTION ITEMS

2.2.2.1.2 Composite Steel Piles

The following provides additional information specific to composite steel piles:

I. Receipt of documentation for constructed elements:

- I.A. Refer to section 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 for concrete documentation and inspection requirements.
- I.B. For steel, refer to 2.3.4.1 *Structural Steel* on page 116.

II. Inspection of the following items:

- II.A. Refer to section 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 for applicable concrete documentation and inspection requirements.
- II.B. For steel, refer to 2.3.4.1 *Structural Steel* on page 116.
- II.C. When concrete is cast in a steel pipe, verify the aggregate size and slump comply with requirements.

2.2.2.1.3 Concrete Piles

Refer to the following subsections for additional information specific to the noted pile:

2.2.2.1.3.1 Concrete Filled Piles

Refer to 2.2.2.1.2 *Composite Steel Piles* on page 68 for documentation and inspection requirements.

2.2.2.1.3.2 Prestressed Piles

The following provides additional information specific to prestressed piles:

I. Receipt of documentation for constructed elements:

- I.A. Refer to 2.3.1.2 *Prestressed/Post-tension Concrete* on page 83 for concrete requirements (e.g. Shop Drawings; Material/Structural Test Documentation; etc.).
- I.B. Material/Structural Test Documentation:
 - I.B.1. Prestressing Tendons

II. Inspection of the following items:

- II.A. Refer to 2.3.1.2 *Prestressed/Post-tension Concrete* on page 83 for applicable concrete requirements.

2.2.2.1.3.3 Precast

The following provides additional information specific to precast piles:

I. Receipt of documentation for constructed elements:

STRUCTURAL SAFETY INSPECTION ITEMS

- I.A. Refer to section 2.3.1.3 *Precast Concrete* on page 84 for concrete requirements (e.g. Shop Drawings; Material/Structural Test Documentation; etc.).
- I.B. For prestressed piles, refer to 2.2.2.1.3.2 *Prestressed Piles* on page 68 for additional requirements.
- I.C. Material/Structural Test Documentation:
 - I.C.1. Precast member has achieved required design strength for driving operations.

II. Inspection of the following items:

- II.A.1. Refer to 2.3.1.3 *Precast Concrete* on page 84 for applicable concrete requirements.

2.2.2.2 Cast-In-Place Deep Foundations (Piers)

The following provides additional information specific to CIP piers:

I. Receipt of documentation for constructed elements:

- I.A. Refer to section 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 for CIP concrete requirements.
- I.B. Material/Structural Test Documentation:
 - I.B.1. Adequate end strata bearing capacity at the bottom of excavations/drillings.
 - I.B.2. Slump limitations (i.e. maximum/minimum).
 - I.B.3. Load testing per requirements.
 - I.B.3.1. For elements having an enlarged base that have heaved during construction procedures, verify testing per requirements.
- I.C. Approval from geotechnical engineer or their qualified representative is required for the following in the form of reports of tests performed and/or daily special inspection reports:
 - I.C.1. For each pier excavation:
 - I.C.1.1. Drilling Operations
 - I.C.1.2. Diameters
 - I.C.1.3. Plumbness
 - I.C.1.4. Lengths
 - I.C.1.4.1. Where uncased pier lengths exceed 30 times the diameter, an installation report must be provided.
 - I.C.1.5. Bell Diameters
 - I.C.1.6. Embedment into bedrock
 - I.C.2. For each pier:
 - I.C.2.1. Record of concrete or grout volumes.
 - I.C.2.1.1. For hollow-stem augered CIP elements, installation per requirements.

II. Inspection of the following items:

- II.A. Refer to section 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 for CIP concrete requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.B. **Both** the project inspector and the geotechnical engineer or their qualified representative shall verify locations of piers.
- II.C. For socketed drilled shafts with steel casing, suitable steel driving shoe is welded to the base per requirements.
- II.D. Ends of hoops, ties, spirals have seismic hooks per requirements.
- II.E. Placement of concrete
 - II.E.1. Reinforcement is properly held in place prior to concrete placement, unless specific exceptions are noted in approved construction documents.
 - II.E.2. For hollow stem augered CIP elements, minimum wait times between installation of adjacent elements complies with requirements.
 - II.E.3. Measures are taken to ensure exclusion of foreign material during concrete placing per the approved documents.
 - II.E.3.1. Piers with diameter less than 30 inches and where free fall of concrete is permitted during placing operations may be more prone to foreign material contamination (e.g. from concrete hitting sides of earth forms).
 - II.E.3.2. Where unstable soils exist within any extent of pier depth and foreign material may slough into concrete during placement in those regions, protective casing is provided and concrete is placed in manner to counteract instability of soils as specified in the approved construction documents.
 - II.E.3.3. For socketed drilled pier elements, shaft within casing must be free of foreign materials.
 - II.E.4. When concrete is compacted to provide an enlarged base:
 - II.E.4.1. Confirm aggregate size and slump per requirements.
 - II.E.4.2. Load testing per requirements (this also applies for driven precast base).
- II.F. Where driven piles are installed adjacent to uncased or cased concrete piers, sufficient wait time since pier concrete placement occurs as indicated in the approved construction documents.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.G. Proper protection of exposed reinforcing at top of piers after pier construction complete (see Figure 2-7 for example of damage associated with grading operations occurring after completion of pier construction).



Figure 2-7: Damaged Reinforcement From Grading Operations

2.2.2.3 Micropiles

The following provides additional information specific to micropiles:

I. Receipt of documentation for constructed elements:

- I.A. Refer to section 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 for requirements applicable to grouting.
- I.B. Material/Structural Test Documentation:
 - I.B.1. Steel materials meet or exceed requirements.
 - I.B.1.1. Where no mill certification is provided, coupon testing must comply with requirements.
 - I.B.2. Micropile load capacity testing.

II. Inspection of the following items:

- II.A. Refer to section 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 for requirements applicable to grouting.
- II.B. Grout Installation

STRUCTURAL SAFETY INSPECTION ITEMS

2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns

Compacted aggregate piers (CAP), rammed aggregate piers (RAP), and vibro stone columns (VSC) are sometimes used for site soil improvement. Because their beneficial effect on the site soil is usually verified in situ, it provides some additional requirements unique to these kinds of soil improvement solutions.

I. Receipt of documentation for constructed elements:

I.A. Material/Structural Test Documentation:

I.A.1. Refer to approved construction documents for required testing, inspection, and observation program for the CAP/RAP/VSC.

I.A.2. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed (by a DSA approved laboratory) and/or daily special inspection reports and/or grading report:

I.A.2.1. Requirements for CAPs/RAPs:

I.A.2.1.1. For each area of uniform subsoil conditions, preconstruction testing per requirements.

I.A.2.1.2. When specified, full lateral load test with concrete footing per requirements to verify increased sliding friction values.

I.A.2.1.3. Specialized testing per requirements

I.A.2.1.3.1 Bottom Stabilization Verification Tests

I.A.2.1.3.2 Dynamic Cone Penetrometer Tests

I.A.2.2. Requirements for VSCs:

I.A.2.2.1. Soil compaction meets additional requirements specified in California Geological Survey (CGS) Special Publication 117A (SP-117A).

I.A.2.2.2. Cone Penetration Test (CPT) per requirements.

I.A.2.2.3. Standard Penetration Test (SPT) per requirements, when specified.

I.B. Special Inspection Documentation:

I.B.1. Approval from geotechnical engineer or their qualified representative for the following in the form of reports of tests performed and/or daily special inspection reports and/or grading report:

I.B.1.1. Proper testing, including any acceptance criteria for testing, as noted above.

I.B.1.2. Confirmation that the ground improvement acceptance criteria has been met.

I.B.1.3. Upon completion of the ground improvement system, provided there are no other soils related items of construction, receipt of the [DSA 293](#) Geotechnical Verified Report is required.

I.C. CGS final approval based on ground improvement data.

STRUCTURAL SAFETY INSPECTION ITEMS

I.D. If during the course of testing, modifications are required affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents, the changes must be submitted to DSA for review and approval.

II. Inspection of the following items:

II.A. Observe required testing.

II.B. **No foundation concrete construction may occur prior to:**

II.B.1. CGS final approval.

II.B.2. DSA review and approval of any construction change directives affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved documents associated with required ground improvement modifications resulting from field testing.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3 Gravity Framing Systems

Prior to any gravity framing system item being inspected, generally speaking, all foundation system related items applicable to a given building or portion thereof (refer to 2.2 Foundation Systems on page 62 for further information) must be inspected for compliance with the approved construction documents by the project inspector. Refer to form [DSA 151](#) for requirements associated with advance notification to DSA for various foundation related construction items (e.g. concrete placement, etc.).

2.3.1 Concrete

In addition to the California Building Code, projects using concrete are generally governed by a referenced standard issued by the [American Concrete Institute](#) (ACI; see <http://www.concrete.org>). The primary reference for general design and construction requirements is:

- Building Code Requirements for Structural Concrete, ACI 318

ACI 318 has both gravity and seismic requirements; unlike some other material reference standards (e.g. steel or wood), no additional reference is necessary for the seismic lateral resisting systems (SLRS).

Frequently, testing of concrete or steel reinforcement is necessary for various portions of concrete construction associated with the project. When such testing is necessary as dictated by the construction documents, certain information must be included, depending on the type of test that is being performed. While there are no format requirements, [DSA 203: Tension/Bend](#) and [DSA 204: Compression](#) provide a suggested format. For some projects, post-installed anchors may also be used and require testing; [DSA 206: Anchor Load](#) provides a suggested format for such tests (refer to *APPENDIX B – REFERENCED DSA FORMS* on page 313 for these forms).

Refer to form [DSA 151](#) for requirements associated with advance notification to DSA for various concrete related construction items.

2.3.1.1 Cast In Place (CIP) Concrete

For all CIP concrete work, the following items apply (note: CBC Chapter 19A applies to K-12 and Community College projects and Chapter 19 applies to Community College projects in

STRUCTURAL SAFETY INSPECTION ITEMS

which that was the chosen governing code; the list below is based primarily on 19A, but locations are noted where 19 does not have similar requirements).

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

I.A.1. When applicable, receipt of design professional reviewed anchorage, embed, and steel reinforcing shop drawings.

I.A.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents must be approved by the design professional in responsible charge and submitted to and approved by DSA.

I.A.1.2. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.B. Material/Structural Test Documentation:

I.B.1. **Both** the project inspector and special inspector (e.g. batch-plant special inspector) shall verify the use of the required design mix.

I.B.1.1. For concrete mixes using more than 15% of fly ash or other natural pozzolans, refer to [IR 19-3](#) for additional information (NOT APPLICABLE to DSA-SS/CC projects).

I.B.1.2. For concrete mixes using recycled concrete aggregates, refer to [IR 19-4](#) for additional information.

I.B.2. Materials comply with requirements for the following:

I.B.2.1. Reinforcing steel

I.B.2.1.1. Tags of reinforcing steel meet requirements noted in [IR 17-10](#). Where no tags exist, additional testing is required as noted in [IR 17-10](#).

I.B.2.2. Concrete

I.B.2.2.1. Slump (see Figure 2-8)

I.B.2.2.2. Temperature

I.B.2.2.3. Air Content (where applicable)

I.B.2.2.4. Concrete compression tests (periodically throughout construction).

I.B.2.2.4.1 Based on ASTM test specified in approved documents, ensure sampling occurs within specified time period.



Figure 2-8: Slump Test

STRUCTURAL SAFETY INSPECTION ITEMS

I.B.2.2.4.2 Proper storage techniques for concrete samples, including ability to maintain required temperature ranges (e.g. through use of heaters or ice packs) for required time period after casting. See Figure



Figure 2-10: Improper Storage of Concrete Cylinders



Figure 2-9: Proper Concrete Cylinder Storage

2-10 and Figure 2-9 for examples of improper and proper concrete cylinder storage techniques, respectively.

I.B.2.3. Sampling frequency for concrete tests (recall “test” is average of two cylinders) per requirements.

I.B.2.4. Based on ASTM test specified in approved documents, ensure testing complies with requirements.

I.B.3. Post-installed anchors:

I.B.3.1. Testing per requirements. See Figure 2-11 for an example of a common type of pull test apparatus.



Figure 2-11: Example of a Common Pull Test Apparatus

STRUCTURAL SAFETY INSPECTION ITEMS

I.B.3.1.1. EXCEPTION: Not all post-installed anchors require testing – refer to approved construction documents for requirements.

I.B.4. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).

I.C. Special Inspection Documentation:

I.C.1. Approval from the concrete special inspector for the following in the form of reports of tests performed and/or daily special inspection reports:

I.C.1.1.1. Batching of concrete.

I.C.1.1.1.1 While there are exceptions to the required inspection of batching of concrete given in CBC [1704A.4.3](#), the information in the approved construction documents dictates the requirements for the project. If the exception is specified, additional documents and inspections by the project inspector are required, as indicated in the approved construction documents.

I.C.2. Upon completion of the concrete work, the concrete special inspector provides a verified report ([DSA 292](#)).

II. Inspection of the following items:

II.A. Proper storage and handling for reinforcing, embedded items, and other components part of the concrete elements.

II.B. The items provided below may be performed by a special inspector when specifically approved by DSA.

II.C. Prior to concrete placement, the following must be secured in proper location:

II.C.1. Formwork for the following based on the member being formed:

II.C.1.1. Shape

II.C.1.1.1. At footings, steps comply with requirements.

II.C.1.2. Location

II.C.1.3. Dimensions

II.C.1.4. Adequate bracing

II.C.1.5. Tight joints to prevent concrete leakage.

STRUCTURAL SAFETY INSPECTION ITEMS

II.C.1.6. No wood stakes allowed where concrete will be poured. (See Figure 2-12 for an example problems with both wood stakes in the concrete and formwork that is not tight enough to keep the concrete within the formwork.)



Figure 2-12: Lack of Tight Formwork; Wood Stake in Concrete Problems

II.C.1.7. Proper coordinate between trades to avoid conflicts and formwork provides accommodations for all required trades.

II.C.2. Reinforcing steel

II.C.2.1. For welding of reinforcing steel, refer to *I.C.1.2.2 Welding* on page 119 for additional documentation and inspection requirements.

II.C.2.2. Prestressing tendons

II.C.2.2.1. Placing tolerances (NOTE: there are code requirement differences between a DSA-SS versus DSA-SS/CC projects – verify with approved construction documents).

II.C.2.3. Spacing and clearances:

II.C.2.3.1. Clearance and spacing applies at splices and mechanical connections per requirements (NOTE: there are code requirement differences between a DSA-SS versus DSA-SS/CC projects – verify with approved construction documents).

II.C.2.3.2. If spacing and clearances do not comply, additional steel, increased splice lengths, or other items may be required – design professional and DSA approval is required for modifications affecting the Structural, Fire/Life Safety or Accessibility portions of the project.

STRUCTURAL SAFETY INSPECTION ITEMS

II.C.2.3.3. Field bending of reinforcing **not permitted**, unless specifically detailed on the approved drawings or authorized by the design professional and DSA prior to bending.

II.C.3. Embedded items

- II.C.3.1. **Prior to placing steel embedded items**, project inspector must receive documentation for any material/structural tests or special inspections (e.g. welding of embed plates, headed studs, etc.). Refer to *I.C.1.2.2 Welding* on page 119 for additional documentation and inspection requirements.
- II.C.3.2. Accurate and secure placement **prior** to concrete placement.
- II.C.3.3. Types and sizes of anchor bolts connecting steel to concrete (e.g. cut thread vs. rolled thread), including specified tolerances (see [IR 22-2](#)).
- II.C.3.3.1. Proper anchor bolt embedment and thread projection beyond anticipated concrete surface.
- II.C.3.4. All mechanical, electrical, and plumbing work is in place (see appropriate sections in *2.5 Non-Structural Component Support/Bracing/Anchorage* starting on page 159 and *5 OTHER BUILDING COMPONENTS AND SYSTEMS* starting on page 236 for additional information).
- II.C.3.5. Conduits and pipes
 - II.C.3.5.1. Openings larger than a certain size must be per approved plans.
 - II.C.3.5.2. Proper spacing between conduit/pipes.
 - II.C.3.5.3. Aluminum pipes/conduits/etc. have protection to prevent galvanic reaction as indicated.
 - II.C.3.5.4. Verify conduits and pipes in concrete do not exceed specified limits for displacing concrete or size relative to member:
 - II.C.3.5.4.1 Columns
 - II.C.3.5.4.2 Beams
 - II.C.3.5.4.3 Slabs
 - II.C.3.5.4.4 Walls
 - II.C.3.5.5. No liquid, gas, or vapor is allowed to flow through pipes until concrete has reached its specified design strength, unless specifically noted otherwise in approved construction documents.
 - II.C.3.5.6. Concrete cover over pipes and conduits.
 - II.C.3.5.7. Reinforcing normal to pipes/conduits per requirements.
 - II.C.3.5.8. No reinforcing shall be bent, cut, or displaced by pipes or conduits, unless specifically detailed on the approved drawings.

STRUCTURAL SAFETY INSPECTION ITEMS

II.C.3.5.9. Conduit/pipe stub-ups/outs do not conflict or cause congestion with anchor bolts (anchor bolt design usually does not include loss of concrete associated with conduits/pipes adjacent to anchor bolts – if minimum distance for conduits/pipes from anchors is not provided in the approved construction documents, contact the design professional for guidance on what is permissible). See Figure 2-13 for an example of common problems associated with conduit and anchor bolt placement.



Figure 2-13: Common Conduit and Anchor Bolt Problems

II.D. Concrete mixing, placement and curing (note: ACI 309R is a helpful resource):

II.D.1. Hot and cold weather special requirements. (Refer to form [DSA 151](#) for requirements associated with advance notification to DSA for various concrete related construction items.)

II.D.1.1. Based on ASTM referenced in approved construction documents (e.g. ASTM C94 or C685), mix times and revolutions are not exceeded during mixing operations (e.g. C94 limits mixing to 90 minutes and 300 revolutions).

II.D.2. Proper concrete placement at large or deep elements (e.g. additional placement tools, such as a pipe, hose, snout, etc. may be necessary to ensure concrete is placed as close to final position as possible).

STRUCTURAL SAFETY INSPECTION ITEMS

II.D.3. At congested reinforcing locations, design professional and DSA approved mix design with smaller aggregates is used (see Figure 2-14 for an example of severe reinforcing congestion in which a smaller aggregate mix



Figure 2-14: Extreme Reinforcing Congestion

would be very beneficial and is likely required). (NOTE: DSA-SS aggregate requirements may not be mirrored in DSA-SS/CC projects – verify with approved construction documents.)

II.D.4. Consolidation per requirements. See Figure 2-15 and Figure 2-16 for an example of poor consolidation and resulting “honeycomb” problems.



Figure 2-15: Poor Consolidation and Honeycomb Problems

STRUCTURAL SAFETY INSPECTION ITEMS



Figure 2-16: Poor Consolidation & Ensuing Repairs

- II.D.5. Water added at site to facilitate consolidation is not excessive.
- II.D.6. Proper sample testing frequency. (NOTE: DSA-SS testing requirements may not be mirrored in DSA-SS/CC projects – verify with approved construction documents.)
- II.D.7. Construction joint requirements.
 - II.D.7.1. For slabs-on-grade (SOG), only if it is identified as a structural slab, must construction joints be as shown in approved plans; most SOG do not require construction joints be shown on the approved drawings.
- II.E. After concrete placement:
 - II.E.1. Concrete curing, including any special cold or hot weather requirements. (NOTE: DSA-SS curing requirements may not be mirrored in DSA-SS/CC projects – verify with approved construction documents.)
 - II.E.2. Form removal
 - II.E.2.1. **Prior to form or shoring removal**, project inspector shall **verify concrete strength** complies with requirements based on test reports and minimum time passage.
- II.F. Post-installed anchors and connections:
 - II.F.1. Installation of post-installed anchors.
 - II.F.1.1. For projects approved under the 2001 CBC, refer to [IR 19-1](#) (this also applies to projects approved under the 2007 CBC when specifically referencing those requirements).
 - II.F.2. Testing per requirements. See Figure 2-11 on page 76 for an example of a common type of pull test apparatus.
 - II.F.2.1. EXCEPTION: Not all post-installed anchors require testing – refer to approved construction documents for requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.F.3. There are code limitations on the use of power actuated fasteners. Therefore, verify power actuated fasteners (e.g. shotpins) are used only where specifically shown on the approved construction documents.

2.3.1.2 Prestressed/Post-tension Concrete

I. Receipt of documentation for constructed elements:

- I.A. Refer to 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 for concrete documentation and inspection requirements.
- I.B. Shop Drawings
 - I.B.1. When applicable, receipt of design professional reviewed placement/erection shop drawings.
 - I.B.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents must be approved by the design professional in responsible charge and submitted to and approved by DSA.
 - I.B.1.2. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.
- I.C. Material/Structural Test Documentation:
 - I.C.1. Prestressing/Post-Tensioning Tendons
 - I.C.2. Prestressing/Post-Tensioning Tendon Anchorages
 - I.C.3. Prestressing/Post-Tensioning Tendon Couplers
 - I.C.4. In-situ concrete strength prior to stressing of tendons.
- I.D. Special Inspection Documentation:
 - I.D.1. Receipt of special inspection reports for the following:
 - I.D.1.1. Placement and tolerances of prestressing/post-tensioning tendons (placement of ducts for post-tension conditions).
 - I.D.1.2. Application of prestressing/post-tensioning force.
 - I.D.1.2.1. Special inspector shall verify concrete strength test reports prior to stressing of tendons.
 - I.D.1.3. Grouting of bonded prestressing/post-tensioning tendons.
 - I.D.2. Upon completion of the prestressed/post-tensioning concrete work, the prestressed/post-tensioning concrete special inspector provides a verified report ([DSA 292](#)).

II. Inspection of the following items:

- II.A. Refer to section 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 for applicable documentation and inspection concrete requirements.
- II.B. Proper storage and handling of members.
- II.C. Placement of members and/or post-tensioning ducts with placement/erection drawings.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.C.1. For post-tensioning duct placement, verify proper coordination amongst trades.
 - II.C.1.1. No “kinks” or shifts in duct profile beyond the tolerances noted in the approved construction documents.
 - II.C.1.2. Specified tolerances for tendon locations are maintained.
- II.D. Connections with placement/erection drawings:
 - II.D.1.1. For welded and bolted connections, see applicable subsections of *2.3.4.1 Structural Steel* on page 116.
 - II.D.1.2. For CIP connections, see *2.3.1.1 Cast In Place (CIP) Concrete* on page 74.

2.3.1.3 Precast Concrete

I. Receipt of documentation for constructed elements:

- I.A. Refer to *2.3.1.1 Cast In Place (CIP) Concrete* on page 74 for concrete documentation and inspection requirements.
- I.B. Shop Drawings
 - I.B.1. When applicable, receipt of design professional reviewed precast shop drawings.
 - I.B.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents must be approved by the design professional in responsible charge and submitted to and approved by DSA.
 - I.B.2. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.
- I.C. Material/Structural Test Documentation:
 - I.C.1. Precast member has achieved required design strength.
 - I.C.2. When noted on the approved construction documents, certification for members fabricated in a Precast Concrete Institute certified plant (for a list of certified plants, see <http://www.pci.org/find/manufacturer/index.cfm>).
- I.D. Special Inspection Documentation:
 - I.D.1. Fabrication of Precast Members
 - I.D.2. Erection of Precast Members – **ONLY** if special inspector is approved by DSA first.
 - I.D.3. Upon completion of the prestressed concrete work, the prestressed concrete special inspector provides a verified report ([DSA 292](#)).

II. Inspection of the following items:

- II.A. Refer *2.3.1.2 Prestressed/Post-tension Concrete*, subsection *II Inspection of the following items*: on page 83 for applicable concrete requirements (but replace “Prestressed” with “Precast”).

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.1.4 Concrete Walls

I. Inspection of the following items:

- I.A. Anchoring of walls to intersecting elements per the approved drawings.
 - I.A.1. Where dowels occur, field bending is not permitted, unless specifically shown on the approved drawings.

2.3.1.4.1 CIP

For documentation and inspection requirements, refer to 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 applicable to all CIP concrete walls. For walls forming part of the lateral system, refer to 2.4.1.1 *Special Reinforced Shear Wall* on page 140 and 2.4.1.2 *Intermediate Precast Shear Wall* on page 141, as applicable.

2.3.1.4.2 Tilt-up

For documentation and inspection requirements, refer to 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74 applicable to all CIP concrete walls and 2.3.1.3 *Precast Concrete* on page 84. For walls forming part of the lateral system, refer to 2.4.1.1 *Special Reinforced Shear Wall* on page 140 and 2.4.1.2 *Intermediate Precast Shear Wall* on page 141, as applicable.

In addition, the following apply to tilt-up walls:

I. Inspection of the following items:

- I.A. Prior to concrete placement, block-out locations, including, but not limited to:
 - I.A.1. Hold-downs
 - I.A.2. Chord steel connections (See Figure 2-17 for an example of problems associated with poor layout of chord reinforcing steel.)
 - I.A.3. Supports
 - I.A.4. Embeds.
- I.B. Welded connections including, but not limited to:



Figure 2-17: Poor Layout for Chord Steel



Figure 2-18: Verify Weld Lengths Per Requirements

STRUCTURAL SAFETY INSPECTION ITEMS

- I.B.1. Weld size and lengths for hold-downs, chord steel (see Figure 2-18).
- I.B.2. Chord steel connections.
- I.B.3. Supports

2.3.1.4.3 Shotcrete

Shotcrete entails use of a unique method for concrete placement pneumatically. Based on that method, there are additional requirements to ensure proper construction. Unlike many aspects of concrete construction, special inspection is required by a qualified individual (refer to *1 ADMINISTRATION* subsection *1.2.2 Required During Construction, II.A.1.1* on page 33 for a list of DSA approved shotcrete special inspectors). In addition to the concrete references noted in *2.3.1 Concrete*, there are two primary references associated with shotcrete, listed below:

- CBC [1913A](#) for K-12 projects; CBC [1913](#) for DSA-SS/CC projects.
- Guide to Shotcrete, ACI 506-05

I. Receipt of documentation for constructed elements:

I.A. Refer to *2.3.1.1 Cast In Place (CIP) Concrete, I Receipt of documentation for constructed elements*: on page 75 for documentation requirements.

I.B. Material/Structural Test Documentation:

I.B.1. For concrete shear walls, special requirements for concrete aggregate based on reinforcing. (NOTE: DSA-SS aggregate requirements may not be mirrored in DSA-SS/CC projects – verify with approved construction documents.)

I.B.2. Testing of shotcrete.

I.C. Special Inspection Documentation:

I.C.1. Preconstruction sample panel requirements.

I.C.2. “Test panel method” of testing shotcrete, when applicable.

I.C.3. Any additional shotcrete placement special inspection requirements.

I.C.4. Upon completion of the shotcrete work, the shotcrete special inspector provides a verified report ([DSA 292](#)).

II. Inspection of the following items:

II.A. Refer to *2.3.1 Concrete, II Inspection of the following items*: on page 77 for inspection requirements.

II.B. Prior to applying shotcrete:

II.B.1. Concrete or masonry surface receiving concrete.

II.B.2. Formwork.

II.C. Construction joints.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.1.5 Concrete Columns

2.3.1.5.1 CIP

For documentation and inspection requirements, refer to *2.3.1.1 Cast In Place (CIP) Concrete* on page 74 applicable to all CIP concrete columns.

2.3.1.5.2 Prestressed/Post-tension

For documentation and inspection requirements, refer to *2.3.1.2 Prestressed/Post-tension Concrete* on page 83 applicable to all prestressed/post-tension concrete columns.

2.3.1.5.3 Precast

For documentation and inspection requirements, refer to *2.3.1.3 Precast Concrete* on page 84 applicable to all precast concrete columns.

2.3.1.6 Concrete Beams

2.3.1.6.1 CIP

For documentation and inspection requirements, refer to *2.3.1.1 Cast In Place (CIP) Concrete* on page 74 applicable to all CIP concrete beams.

2.3.1.6.2 Prestressed/Post-tension

For documentation and inspection requirements, refer to *2.3.1.2 Prestressed/Post-tension Concrete* on page 83 applicable to all prestressed/post-tension concrete beams.

2.3.1.6.3 Precast

For documentation and inspection requirements, refer to *2.3.1.3 Precast Concrete* on page 84 applicable to all precast concrete beams.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.1.7 Concrete Floor/Roof

2.3.1.7.1 CIP

For documentation and inspection requirements, refer to *2.3.1.1 Cast In Place (CIP) Concrete* on page 74 applicable to all CIP concrete floors/roofs.

I. Inspection of the following items:

- I.A. For 'flat plate' or flat slab (i.e. no beam supports) construction, prior to placing concrete, no through penetrations occur adjacent to columns unless specifically shown on approved drawings.
 - I.A.1. Any penetrations not shown on the approved documents must be approved by the design professional and DSA prior to placing concrete.
 - I.A.2. Proper supplementary reinforcing, including any proprietary products, where indicated in slabs adjacent to column supports.
- I.B. Reinforcing clear cover at collector and boundary reinforcing at topping slabs over precast elements.
- I.C. Roofs
 - I.C.1. Where clay tile is installed over concrete roofs, if wire ties are specified for tile anchorage, confirm secured placement per requirements prior to placing concrete. Refer to *2.5.2.4.1 Roof Tile* on page 167 for additional information.

2.3.1.7.2 Prestressed/Post-tension

For documentation and inspection requirements, refer to *2.3.1.2 Prestressed/Post-tension Concrete* on page 83 applicable to all prestressed/post-tension concrete floors/roofs.

I. Inspection of the following items:

- I.A. Tendon/duct placement, banding, and supports.
- I.B. Refer to *2.3.1.7.1 CIP* on page 88 for additional documentation and inspection requirements.

2.3.1.7.3 Precast

For documentation and inspection requirements, refer to *2.3.1.3 Precast Concrete* on page 84 applicable to all precast concrete floors/roofs.

I. Inspection of the following items:

- I.A. Reinforcing clear cover at collector and boundary reinforcing for topping slabs over precast elements.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.2 Masonry

In addition to the California Building Code, projects using masonry are generally governed by a referenced standard issued by the Masonry Standards Joint Committee (MSJC; see <http://masonrystandards.org>), which consists of committee groups in [The Masonry Society](#) (TMS; see <http://www.masonrysociety.org>), [American Concrete Institute](#) (ACI; see <http://www.concrete.org>), and the [Structural Engineering Institute](#) (SEI; see <http://content.seinstitute.org>) of the [American Society of Civil Engineers](#) (ASCE; see <http://www.asce.org>). The primary reference for general design and construction requirements is:

- Building Code Requirements for Masonry Structures, TMS 402/ACI 530/ASCE 5 (note: TMS 402 will be the primary acronym used in this document when referenced)
- Specification for Masonry Structures, TMS 602/ACI 530.1/ASCE 6 (note: TMS 602 will be the primary acronym used in this document when referenced)

Special inspection by qualified individuals is required for masonry construction (refer to 1 *ADMINISTRATION* subsection 1.2.2 *Required During Construction, II.A.2* on page 33 for a list of DSA qualified masonry special inspectors). Frequently, testing of masonry units, its components, its composite structure, or steel reinforcement is necessary for various portions of masonry construction associated with the project. When such testing is necessary as dictated by the construction documents, certain information must be included, depending on the type of test that is being performed. While there are no format requirements, [DSA 203: Tension/Bend](#), [DSA 204: Compression](#), and [DSA 205: Concrete Masonry Unit](#) provide a suggested format. For some projects, post-installed anchors may also be used and require testing; [DSA 206: Anchor Load](#) provides a suggested format for such tests (refer to *APPENDIX B – REFERENCED DSA FORMS* on page 313 for these forms).

For all masonry work, the following apply:

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

I.A.1. When applicable, receipt of design professional reviewed anchorage, embed, and steel reinforcing shop drawings.

I.A.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents, they must be approved by the design professional in responsible charge and submitted to and approved by DSA prior to installation of modified elements.

STRUCTURAL SAFETY INSPECTION ITEMS

I.A.1.2. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.B. Material/Structural Test Documentation:

I.B.1. Materials comply with requirements for the following:

I.B.1.1. Reinforcing steel

I.B.1.2. For concrete masonry units, refer to [IR 21-4](#) for mandatory tests.

I.B.1.3. Unit strength method tests:

I.B.1.3.1. Masonry units

I.B.1.3.2. Mortar

I.B.1.3.3. Grout

I.B.1.3.3.1 NOTE: DSA-SS grout requirements are different than those in DSA-SS/CC projects – verify with approved construction documents.

I.B.1.4. Prism test method tests:

I.B.1.4.1. Masonry prisms

I.B.1.4.1.1 NOTE: DSA-SS prism test requirements are different than those in DSA-SS/CC projects – verify with approved construction documents.

I.B.1.5. Core-drill sample tests (see [DSA 207](#) for a suggested test report format – **NOTE:** The content items in the form must be included in the test report, regardless of the format used.).

I.B.1.5.1. Do not allow core-drilling through:

I.B.1.5.1.1 Reinforcing

I.B.1.5.1.2 At CMU block cross webs.

I.B.2. Post-installed anchors:

I.B.2.1.1. Refer to 2.3.1.1 *Cast In Place (CIP) Concrete* subsection *I.B.3 Post-installed anchors*: on page 76.

I.B.3. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).

I.C. Special Inspection Documentation

I.C.1. Masonry special inspector to provide documentation for the following in the form of reports of tests performed and/or daily special inspection reports.

I.C.1.1. Unit cell size, including any special limitations.

I.C.1.1.1. If high-lift grouting method is used, bond beam units have additional requirements given in [IR 21-2.10](#) ([IR 21-2](#) for 2001 and 2007 CBC projects).

I.C.1.1.2. NOTE: DSA-SS cell size requirements are different than those in DSA-SS/CC projects – verify with approved construction documents.

I.C.1.2. Proportions of site-prepared, premixed or preblended:

I.C.1.2.1. Mortar

I.C.1.2.2. Grout

STRUCTURAL SAFETY INSPECTION ITEMS

I.C.1.2.2.1 NOTE: DSA-SS grout requirements are different than those in DSA-SS/CC projects – verify with approved construction documents.

I.C.1.3. Preparation of prisms.

I.C.1.4. Size, location and condition of all dowels, construction supporting masonry, etc.

I.C.1.5. Steel reinforcing:

I.C.1.5.1. Size

I.C.1.5.2. Grade

I.C.1.5.3. Type of reinforcement

I.C.1.6. Welding of reinforcing steel.

I.C.1.6.1. For welding of reinforcing steel, refer to *I.C.1.2.2 Welding* on page 119 for additional documentation and inspection requirements.

I.C.1.7. Placement of:

I.C.1.7.1. Steel reinforcement

I.C.1.7.1.1 Spacing

I.C.1.7.1.2 Clearance

I.C.1.7.1.3 NOTE: DSA-SS spacing and clearance requirements are different than those in DSA-SS/CC projects in some conditions – verify with approved construction documents.

I.C.1.7.2. Connectors

I.C.1.7.3. Masonry units

I.C.1.8. Construction of mortar joints.

I.C.1.9. Protection of masonry during cold weather (i.e. less than 40° F) or hot weather (i.e. greater than 100° F or 90° F with wind greater than 8 mph).

I.C.1.10. Anchors and embedded items, including but not limited to those connecting masonry to other portions or elements of the structure:

I.C.1.10.1. Type

I.C.1.10.2. Size

I.C.1.10.3. Location

I.C.1.11. Grout space prior to grouting and placement of grout.

I.C.2. Upon completion of the masonry work, the masonry special inspector provides a verified report ([DSA 292](#)).

II. Inspection of the following items:

II.A. Proper storage and handling of materials.

II.B. While special inspection is required for masonry construction, the project inspector provides oversight of the masonry special inspector.

II.B.1. Level of special inspection per requirements.

II.B.2. Materials:

II.B.2.1. Testing Program

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.2.1.1. NOTE: DSA-SS prism test requirements are different than those in DSA-SS/CC projects – verify with approved construction documents.

II.B.2.2. Grout

II.B.2.2.1. NOTE: DSA-SS grout requirements are different than those in DSA-SS/CC projects – verify with approved construction documents.

II.B.2.3. Water

II.B.2.4. Aggregate

II.B.2.5. Proportions of constituent materials.

II.B.2.6. Admixtures

II.B.3. Installation

II.B.3.1. Tolerances

II.B.3.1.1. Element layout

II.B.3.1.2. Reinforcing

II.B.3.1.2.1 Size

II.B.3.1.2.2 Placement.

II.B.3.1.2.2.1 NOTE: DSA-SS spacing and clearance requirements are different than those in DSA-SS/CC projects in some conditions – verify with approved construction documents.

II.B.3.1.3. All mechanical, electrical, and plumbing work is in place (see appropriate sections in *2.5 Non-Structural Component Support/Bracing/Anchorage* starting on page 159 and *5 OTHER BUILDING COMPONENTS AND SYSTEMS* starting on page 236 for additional information).

II.B.3.1.4. Conduit and pipe locations per approved plans. See Figure 2-19 for coordination problems associated with conduits and pipes.

STRUCTURAL SAFETY INSPECTION ITEMS



Figure 2-19: Coordination Problems in Masonry for Conduits/Pipes

II.B.3.2. Any special construction requirements:

II.B.3.2.1. During hot (i.e. greater than 100° F or 90° F with wind greater than 8 mph) and cold (i.e. less than 40° F) weather.



Figure 2-20: CMU Clearance at Bolt

II.B.3.2.2. High- and low-lift grouting methods. Also see [IR 21-2.10](#) (applicable for both DSA-SS and DSA-SS/CC projects) ([IR 21-2](#) for 2001 and 2007 CBC projects).

II.B.3.2.2.1 NOTE: DSA-SS high- and low-lift requirements are different than those in DSA-SS/CC projects in some conditions – verify with approved construction documents.

II.B.3.2.2.2 Additional requirements for bond beam units if high-lift grouting occurs (see [IR 21-2.10](#) section 4.4 and 4.9.2; [IR 21-2](#) for 2001 and 2007 CBC projects).

II.B.3.2.3. Bolts:

II.B.3.2.3.1 Type

II.B.3.2.3.2 Size

II.B.3.2.3.3 Clearances. See Figure 2-20.

II.B.3.3. Post-installed anchors and connections:

II.B.3.3.1. Refer to the post-installed anchor section in 2.3.1.1 *Cast In Place (CIP) Concrete* subsection *II.F Post-installed anchors and connections*: on page 82.

II.B.3.4. Clean top of footing at first masonry course (concrete starter wall helps alleviate cleaning problems).

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.3.5. Clean-outs at bottom of each pour (sand layer frequently used to facilitate clean-out procedures). See Figure 2-21.



Figure 2-21: Cleanouts at Bottoms of Cells

II.B.3.6. Maximum mortar fin projection per requirements.

II.B.3.7. Full mortar head/bed joints. See Figure 2-22 for an example showing mortar not providing a full head joint and excessive mortar fins.



Figure 2-22: Lacking Full Head Joint; Mortar Fins Excessive

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.3.8. No wet setting of bolts/headed studs/embeds.

II.B.3.9. Out-of-plane wall ties/anchorage – proper location vertically and horizontally (see Figure 2-23).



Figure 2-24: Congested Reinforcing in Masonry

II.B.3.10. Congested reinforcing areas (e.g. piers, columns, boundary members in shear walls, wall corners and intersections, etc. – see Figure 2-24).

II.B.3.11. Grout consolidation, reconsolidation, and curing.

2.3.2.1 Masonry Walls

Refer to 2.3.2 *Masonry* on page 89 for documentation and inspection requirements.

2.3.2.2 Masonry Columns/Pilasters

Refer to 2.3.2 *Masonry* on page 89 for documentation and inspection requirements.

2.3.2.3 Masonry Piers

Refer to 2.3.2 *Masonry* on page 89 for documentation and inspection requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.3 Wood

In addition to the California Building Code, projects using wood products are generally governed by several referenced standards issued by the [American Forest and Paper Association](http://www.afandpa.org) (AF&PA; see <http://www.afandpa.org>) through their wood products division, the [American Wood Council](http://www.awc.org) (AWC; <http://www.awc.org>). The primary reference for general design and construction requirements is:

- National Design Specification (NDS) for Wood Construction, ANSI/AF&PA NDS

Additional standards apply for buildings using wood structural panel based SLRS, which are discussed in further detail in the section *2.4.3.1 Wood Structural Panel* on page 142.

The following items apply to all light wood frame construction.

I. Receipt of documentation for constructed elements:

While the items noted below are included as documentation items, the material/structural test documentation for wood materials are frequently on the actual wood member or panel. Documentation or markings is/are required for each type of wood product.

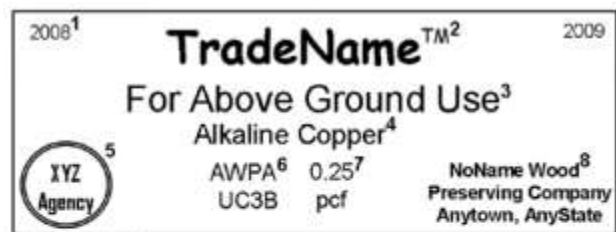
I.A. Pressure preservative-treated (PT) wood: PT wood (lumber and wood structural panel) is marked/labeled by an approved inspection agency per requirements (see Figure 2-25 for an example, taken from Figure 15-6 of [General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory: 15-1 - 15-28. Chapter 15.](#)).

I.B. Fire-retardant-treated (FRT) wood: FRT wood (lumber and wood structural panel) is marked/labeled by an approved agency with documentation per requirements. (Refer to CBC [2303.2](#) for commonly specified required markings and documentation):

I.C. Framing

I.C.1. Sawn Lumber

I.C.1.1. Framing is marked/labeled by a grade mark of an approved agency per requirements (see Figure 2-27 for an example of Machine Stress Rated (MSR) and Machine Evaluated Lumber



- ¹ Year(s) of treatment
- ² Tradename of preservative treatment
- ³ Intended end-use
- ⁴ Standard name of preservative
- ⁵ Third party inspection agency
- ⁶ AWWPA Use Category
- ⁷ Retention of Preservative in wood
- ⁸ Treating company

Figure 2-25: PT Label and explanation of labeling

STRUCTURAL SAFETY INSPECTION ITEMS

(MEL) and Figure 2-26 for an example of visually graded lumber).
Commonly specified minimum information includes:

- I.C.1.1.1. Grade
- I.C.1.1.2. Species



Figure 2-27: MSR/MEL Grade Stamp Example



Figure 2-26: Visually Graded Framing Grade Stamp Example

I.C.1.2. When specified for precut, remanufactured, rough-lumber, and sizes larger than the indicated limit, if no grade mark is present, a certification of inspection is provided by an approved agency.

I.C.2. I-Joists

I.C.2.1. Identified per requirements. (Refer to [IR 23-9.10](#) for additional information and [IR 23-9](#) for 2001 and 2007 CBC projects.)

I.C.2.1.1. Manufacturer's Name

I.C.2.1.2. Quality Assurance Agency's Name

I.C.2.1.3. Where in-service moisture content exceeds specified limits, manufacturer provides additional documentation indicating allowance for such conditions.

I.C.2.1.4. Commonly specified required markings often include the following (taken from ASTM D5055-05):

I.C.2.1.4.1 Product

I.C.2.1.4.2 Company Name

I.C.2.1.4.3 Plant Location or Number

I.C.2.1.4.4 Qualified Agency Name or Logo

I.C.2.1.4.5 Date of Manufacture

STRUCTURAL SAFETY INSPECTION ITEMS

I.C.3. Structural Composite Lumber (SCL)

I.C.3.1. Identified by a quality assurance agency per requirements. (See Figure 2-28 for an example).



Figure 2-28: SCL Markings Example

I.C.3.1.1. Manufacturer's Name

I.C.3.1.2. Quality Assurance Agency's Name

I.C.3.2. The SCL must comply with **all** requirements, including (but not limited to) (NOTE: Design values for both the member and fasteners could be reduced if the noted requirements are not provided.):

I.C.3.2.1. Type of Member (e.g. PSL, LVL, ML, etc.)

I.C.3.2.2. Wood Species (e.g. DF, SP, YP, etc.)

I.C.3.2.3. Grade (e.g. 2.1E, 2.0E, 1.9E, etc.)

I.C.3.2.4. Design values for both the member and fasteners could be reduced if the noted requirements are not provided.

I.C.3.3. Where in-service moisture content exceeds specified limits, manufacturer provides additional documentation indicating allowance for such conditions.

I.C.4. Glulams

I.C.4.1. Certificate of conformance issued by an accredited inspection agency.

I.C.4.2. Markings on glulam per requirements (for custom and non-custom members; refer to ANSI/AITC 190.1-07 for commonly specified required markings).

I.C.4.3. Special Inspection Documentation:

I.C.4.3.1. **Special inspector's stamp on each glulam** (see Figure 2-29 for an example; special inspector's stamp is usually specified to be required for fabrication of non-custom members exceeding 5¹/₈"x18" with span larger than 32'-0" and custom members of any size and span). (Refer to

<https://www.apps.dgs.ca.gov/Tracker/InspByCategory.aspx?ld=10> for a list of DSA approved Glulam inspectors.)

I.C.4.3.2. The special inspection report provides the following:



Figure 2-29: Glulam Special Inspection Stamp Example

STRUCTURAL SAFETY INSPECTION ITEMS

I.C.4.3.2.1 Verification of proper quality control procedures and tests on materials and during manufacturing process.

I.C.4.3.2.2 Indication of visual inspection of finished product.

I.C.4.3.3. Special inspector provides verified report for glulam fabrication ([DSA 292](#)).

I.C.5. Certified Glued Lumber (CGL)

I.C.5.1. Grade stamped by an American Lumber Standard Committee (ALSC) approved agency. (Refer to [IR 23-10](#) for additional information.)

I.C.5.2. NOTE: CGL does not qualify as structural glued-laminated timber (glulam) but can be used as an alternative to sawn lumber or timber. When used, CGL is designated as "Certified Glued Lumber."

I.D. Trusses

I.D.1. Receipt of design professional reviewed and DSA approved shop or design drawings and placement/erection drawings. (NOTE: Information commonly found in truss design drawings is given in CBC [2303.4.1](#) and [2303.4.3.1](#).)

I.D.1.1. Statement of General Conformance by design professional in general responsible charge is on the truss drawings per [IR A-18](#).

I.D.1.2. Seal and signature by the truss designer.

I.D.1.2.1. Truss placement diagrams that serve only as a guide for installation and do not deviate from the approved submittal drawings are not required to bear the seal or signature of the truss designer.

I.D.1.3. When the truss span is 60 feet or more, verify the design of temporary installation restraint/bracing is provided by a licensed design professional. (See *I.D.2.1.2* below for special inspection requirements.)

I.D.1.4. Metal Plate Connected Wood Trusses:

I.D.1.4.1. Unless specifically noted otherwise in the approved construction documents, when the clear span exceeds 60 feet, a registered design professional provides a special inspection report indicating that the temporary and permanent restraint/bracing are installed properly.

I.D.1.5. Manufactured Wood-Chord-Metal-Web Trusses (refer to [IR 23-8](#) for additional information):

I.D.1.5.1. Special inspection report must indicate whether the truss was fabricated in accordance with the ICC ES report.

I.D.1.5.2. For each truss, **project inspector** to verify special inspection mark, which must include at least the special inspector's initials and date.

I.D.2. Special Inspection Documentation:

STRUCTURAL SAFETY INSPECTION ITEMS

I.D.2.1. Special inspector's stamp on each truss inspected for proper fabrication.

I.D.2.1.1. Report includes following items:

I.D.2.1.1.1 List all inspected trusses

I.D.2.1.1.2 Indicate where inspected trusses comply with requirements

I.D.2.1.1.3 Any non-conforming items are noted

I.D.2.1.2. Metal-plate-connected wood trusses:

I.D.2.1.2.1 For trusses spanning 60 feet or more, indication that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

I.D.2.1.3. Special inspector's verified report for open-web wood truss fabrication ([DSA 292](#)).

I.E. Wood structural panels

I.E.1. Panels have panel markings by an approved testing and grading agency (refer to [IR 23-6](#) for a list of qualified testing and inspection agencies) per requirements (see Figure 2-30 for an example and p. 6 of APA's [Engineered Wood Construction Guide](#) for explanations of common panel markings).



Figure 2-30: Example Wood Structural Panel Grade Stamp

I.F. Fasteners

I.F.1. Supplier or producer certificate for compliance with requirements for nails, spikes, and staples.

I.F.1.1. When ASTM F1667 is specified, verify with requirements whether the minimum bending yield strengths indicated in the Supplementary Requirements to ASTM F1667 are also required to be included with the certificate.

I.F.2. Supplier or producer certificate for threaded, hardened-steel nails, and spikes consisting of high carbon steel wire, headed, pointed, annularly or helically threaded.

I.F.2.1. Verify with approved construction documents whether the certificate must indicate that these items are heat treated and tempered to provide greater yield strength than for common wire nails of corresponding size.

II. Inspection of the following items:

II.A. Proper site storage procedures for all lumber to prevent decay, moisture accumulation, and insect/pest attack per requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

II.B. Framing

II.B.1. Lumber

II.B.1.1. Species

II.B.1.2. Grade

II.B.1.2.1. **Both** the species **and** grade must comply with the requirements. For example, Douglas Fir/Larch #2, or Construction Grade is commonly specified, but Hem Fir “#1 and Better” is not an acceptable substitute since its density is less which reduces connection capacities.

II.B.1.2.2. Periodically re-verify wood products comply with requirements. Reject any material that may no longer comply with requirements (e.g. split ends) even though it may have initially complied when first received at the site.

II.B.1.2.3. **Do not allow substitution** of one grade ‘better’ than another without design professional and DSA approval. There are some situations in which the next grade ‘better’ is actually worse, depending on the loading direction on the member.



Figure 2-31: Moisture Meter

II.B.1.3. Moisture content (see Figure 2-31 for an example of a moisture meter that can be used to verify moisture content of wood products).

II.B.2. Glulam

II.B.2.1. Glulam protection during construction.

II.B.3. Framing Installation

II.B.3.1. Moisture content during framing **and** fastener installation.

II.B.3.2. Cuts, notches, countersinking, and holes

II.B.3.2.1. All cuts, notches, countersinking, and holes are shown on the DSA approved drawings; no cuts, notches, tapers, shaving, countersinking, holes or other alterations may be made in any wood products (e.g. lumber, trusses, glulams, structural composite lumber, I-joists, etc.) if not shown on the DSA approved drawings without prior written approval by the design professionals and DSA.

II.B.3.2.2. Limits provided in CBC [2308](#) are **NOT** to be used on the project unless specifically indicated in the approved construction documents.

II.B.3.2.3. Framing members at areas with multiple pipes and/or electrical conduits - multiple holes/notches (e.g.

Recommendation: *When the wood looks wet, especially at or near connections, use a moisture meter to determine if the wood meets requirements.*



Figure 2-32: Unacceptable Notching

STRUCTURAL SAFETY INSPECTION ITEMS

minimum spacing between holes/notches, etc. – see Figure 2-32).

II.B.3.3. Pressure-preservative treated (PT) wood

II.B.3.3.1. PT wood is provided where indicated on approved construction documents. (Refer to Table 2-1 and <http://www.awpa.com/references/official.asp> for commonly specified PT lumber use categories and corresponding descriptions.)

Table 2-1: AWPA Use Categories and Brief Description

Use Category	Brief Description
UC1	Interior Dry
UC2	Interior Damp
UC3A	Exterior Above Ground, Coated with Rapid Water Runoff
UC3B	Exterior Above Ground, Uncoated or Poor Water Runoff
UC4A	Ground Contact, General Use
UC4B	Ground Contact, Heavy Duty
UC4C	Ground Contact, Extreme Duty
UC5A	Marine Use, Northern Waters (Salt or Brackish Water)
UC5B	Marine Use, Central Waters (Salt or Brackish Water)
UC5C	Marine Use, Southern Waters (Salt or Brackish Water)
UCFA	Interior Above Ground Fire Protection
UCFB	Exterior Above Ground Fire Protection

II.B.3.3.2. Maximum incision parameters for pressure treated dimension lumber.

II.B.3.3.3. Proper treatment of any newly exposed PT lumber surfaces from any cut or notching.

II.B.3.3.4. Clearances to untreated wood meet requirements.

II.B.3.3.4.1 NOTE: DSA-SS untreated wood clearance requirements are more or less restrictive than those in DSA-SS/CC – verify with approved construction documents.

II.B.4. Beams

II.B.4.1. During construction, where members defined as Beams and Stringers (i.e. ≥5 inch nominal) are cut to length after being

STRUCTURAL SAFETY INSPECTION ITEMS

graded and the grading provisions are different for the middle third than the outer third, they are re-graded by an approved agency.

II.B.4.2. Where Beams and Stringers (i.e. ≥ 5 inch nominal) are continuous or cantilever, the grading provisions applicable to the middle 1/3 span apply to the entire beam length. Verify such grading procedures provide a member that complies with requirements.

II.B.5. I-Joists

II.B.5.1. Proper installation based on the more stringent of the manufacturer or ICC ES report. Refer to [IR 23-9.10](#) for additional information.

II.B.5.2. Bridging per requirements.

II.B.5.3. No splitting at connections (refer to ICC ES report for minimum permitted nail spacing based on size of nail and type of I-Joist). Common locations for splitting are:

II.B.5.3.1. Solid sawn lumber flange connections at bearing locations (e.g. wall top plates).

II.B.5.3.2. Tie strap or other connector hardware (end distance and spacing of nails).

II.B.5.3.3. Web stiffeners (comply with the manufacturer's requirements).

II.B.5.3.4. I-joist chord, or web filler, that is a part of a wall anchorage system.

II.B.5.3.5. I-Joist flange receiving diaphragm sheathing nails

II.B.5.3.5.1 Minimum thickness and width of the flange per requirements.

II.B.5.3.6. Shear transfer nailing at I-Joist blocking panels.

II.B.6. Structural Composite Lumber (SCL)

II.B.6.1. Proper installation based on the more stringent of the manufacturer's and ICC ES report requirements.

II.B.6.2. No splitting at connections occurs (refer to ICC ES report for minimum nail spacing based on size of nail and type of member). Common locations for splitting are:

II.B.6.2.1. Solid sawn lumber flange connections at bearing locations (e.g. wall top plates).

II.B.6.2.2. Tie strap or other connector hardware (end distance and spacing of nails).

II.B.6.2.3. When member is a part of a wall anchorage system.

II.B.6.2.4. Members receiving diaphragm sheathing.

II.B.6.2.5. Shear transfer nailing at SCL blocking panels.

II.B.6.2.6. At laminated veneer lumber (LVL) members with nails installed on member edges between plies.

II.B.7. Trusses

II.B.7.1. Pre-Installation Check

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.7.1.1. Refer to *I.C.5.1* on page 99 above for required documentation.

II.B.7.1.2. Truss Size

II.B.7.1.2.1 Verify members and connections are within fabrication tolerances specified by section 6.4.10 of ANSITPI 1-2007.

II.B.7.1.3. Cracked, dislodged, bent, or broken members.

II.B.7.1.4. Any other damage that could affect the structural integrity of the truss.

II.B.7.1.4.1 For Metal-Plate-Connected-Wood Trusses, check for dislodged or missing connectors.

II.B.7.2. Installation

II.B.7.2.1. Placement complies with DSA approved documents and truss placement diagram, including all details (e.g. bridging, bracing, connections, etc.).

II.B.7.2.1.1 Moisture content during truss **and** fastener installation.

II.B.7.2.1.2 Field placement for manufactured wood-chord-metal web trusses (see [IR 23-8](#)), including all details (e.g. bridging, bracing, connections, etc.).

II.B.7.3. Post-Installation Check

II.B.7.3.1. Cracked, dislodged, bent, or broken members.

II.B.7.3.2. Any other damage that could affect the structural integrity of the truss.

II.B.7.3.2.1 For Metal-Plate-Connected-Wood Trusses, check for dislodged or missing connectors.

II.C. Wood structural panels

II.C.1. Span rating

II.C.2. Nominal thickness

II.C.3. Exposure rating

II.C.4. Grade

II.C.5. Moisture content during wood structural panel **and** nailing installation.

II.C.6. Gaps between installed panels comply with the more restrictive of the manufacturer's and approved construction document documentation and inspection requirements.

II.C.7. Staggering of panel joints.

II.C.8. Where plaster is applied over wood-based sheathing, refer to *2.6.1.1 Roofing* on page 169 for additional requirements.

II.C.9. Fasteners

II.C.9.1. Refer to *2.4.3.1 Wood Structural Panel* on page 142 for additional documentation and inspection requirements at diaphragms and shear walls using wood structural panels.

II.C.9.1.1. Fastener Type

STRUCTURAL SAFETY INSPECTION ITEMS

II.C.9.1.1.1 Staples are **not permitted** at diaphragms and shear walls.

II.C.9.1.2. Shank dimension

II.C.9.1.3. Head size

II.C.9.1.4. Penetration

II.C.9.1.5. Spacing

II.C.9.1.6. Edge dimensions

II.C.9.2. Sheathing nails or other approved sheathing connectors are driven so that their head or crown is flush with the surface of the sheathing.

II.C.9.2.1. Approval of machine nailing requires both satisfactory jobsite demonstration and continual satisfactory performance.

II.C.9.3. Nail-to-panel edge distance. NOTE: In high-wind regions, $\frac{3}{4}$ inch may be required at wood shear walls where shown on DSA approved plans. Refer to section 2.4.3.1 *Wood Structural Panel* subsection II.B.4.8 *Special requirements at high-wind regions* on page 146 for additional information.

II.C.9.4. View sheathing from 'open framing' side to verify nailing engages framing (i.e. no 'shiners').

II.D. Connections

II.D.1. Connection Geometry:

II.D.1.1. Heavy or moderate loads are not supported by bolts/lags below the neutral axis without reinforcement to resist tension stresses perpendicular to grain.

II.D.1.2. Connections that cause tension stress perpendicular to grain have mechanical reinforcement to resist all such stresses.

II.D.1.3. Wood screws, nails, and spikes are not used in end grain withdrawal.

II.D.1.4. Where multiple fasteners occur:

II.D.1.4.1. Spacing is staggered whenever feasible.

II.D.1.4.1.1 NOTE: There may be some locations where it is required – refer to other sections (e.g. 2.4.3.1.1 *Light Wood Framing* on page 142) and DSA approved drawings for information.

II.D.1.4.2. Centroid of fastener group lines up with centroid of member, unless specifically detailed otherwise on DSA approved drawings.

II.D.1.5. Connection configuration does not cause bending in nails.

II.D.2. Fasteners

II.D.2.1. NOTE: 'Sinker' and 'box' nails are **not equivalent** to common nails with the same penny weight (i.e. 10d, 16d, etc.); such nails have lower capacities when compared to common nails.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.D.2.2. Moisture content of wood products during fastener installation (see II.B.3.1 on page 101 - significant reductions to fastener design values are required if the moisture content exceeds code limits).
- II.D.2.3. In preservative-treated or exterior/wet/damp fire-retardant-treated wood applications, fasteners have specified corrosion protection.
- II.D.2.4. Fasteners used for attachment of exterior wall coverings have corrosion protection in compliance with requirements. (NOTE: DSA-SS corrosion requirements are different than those in DSA-SS/CC – verify with approved construction documents.)
- II.D.2.5. Proprietary Connections

- II.D.2.5.1. Proper installation procedures for connections (see Figure 2-33 for an example of improper installation).

- II.D.2.5.2. Any special requirements (often dictated by manufacturers' recommendations) associated with fasteners used in proprietary connection components (see [IR 23-1](#) for additional requirements):

- II.D.2.5.2.1 Nail gauge and length.

- II.D.2.5.2.2 All nail holes filled.

- II.D.2.5.2.3 Corrosion resistant coatings

- II.D.2.5.2.3.1 Corrosion protection for exterior exposed fasteners.

- II.D.2.5.2.3.2 Compatibility of such coatings with preservative treatment chemicals in the wood when in contact with them per manufacturer's recommendations.

- II.D.2.6. Bolts, Nuts, Washers

- II.D.2.6.1. Dimensional requirements. Frequently specified requirements for bolts include reference to ANSI/ASME Standard B18.2.1 or B18.2.6 (refer to Table 2-2, taken from Table L1 in AF&PA 2005 NDS).

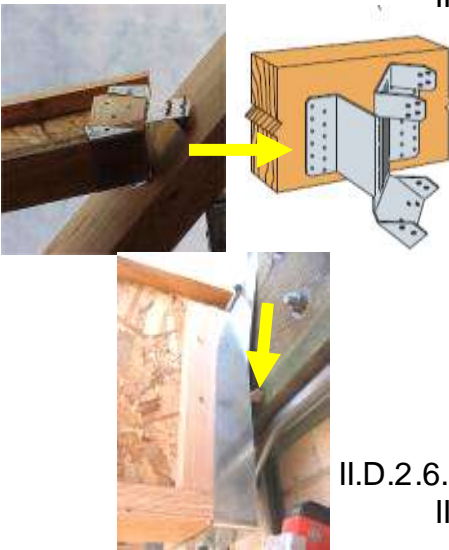
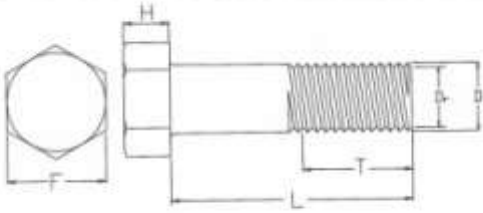


Figure 2-33: Improper Hanger

STRUCTURAL SAFETY INSPECTION ITEMS

Table L1 Standard Hex Bolts



D = diameter
 D_r = root diameter
 T = thread length
 L = bolt length
 F = width of head across flats
 H = height of head

		Diameter, D							
		1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	7/8"	1"
D _r		0.189"	0.245"	0.298"	0.406"	0.514"	0.627"	0.739"	0.847"
F		7/16"	1/2"	9/16"	3/4"	15/16"	1-1/8"	1-5/16"	1-1/2"
H		11/64"	7/32"	1/4"	11/32"	27/64"	1/2"	37/64"	43/64"
T	L ≤ 6 in.	3/4"	7/8"	1"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/4"
	L > 6 in.	1"	1-1/8"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/4"	2-1/2"

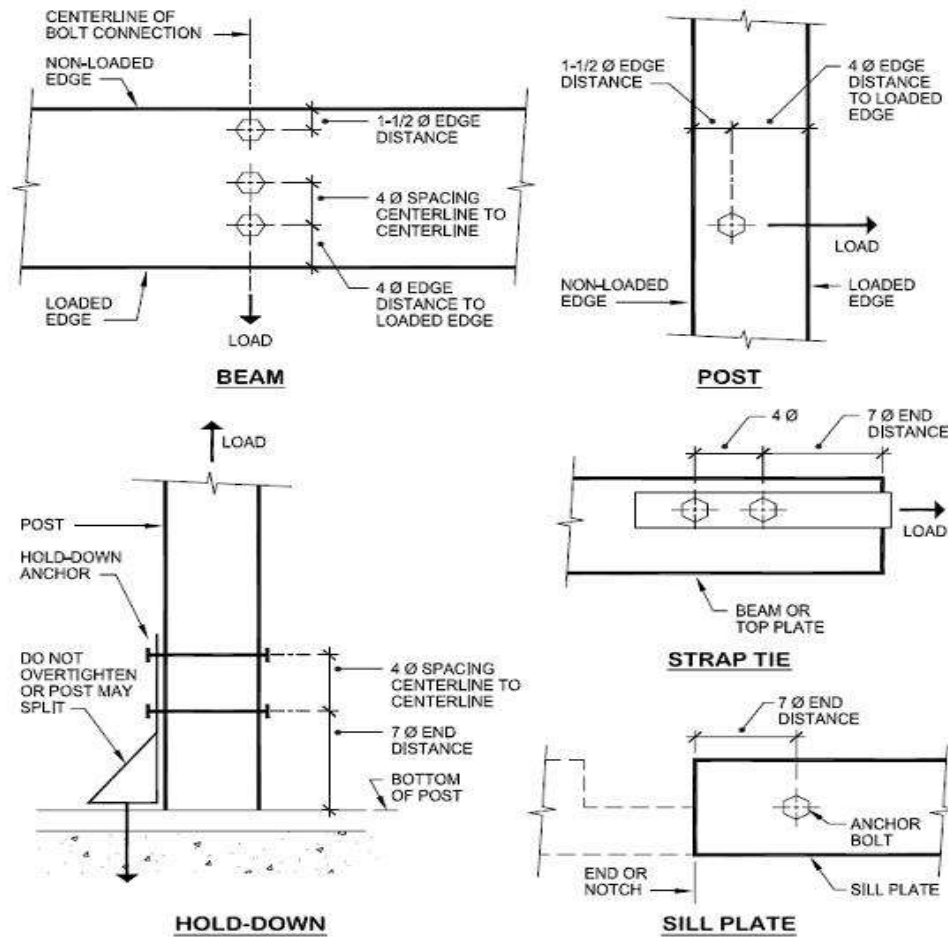
1. Tolerances specified in ANSI B 18.2.1. Full body diameter bolt is shown. Root diameter based on UNC (coarse) thread series (see ANSI B1.1).

Table 2-2: Standard Hex Bolt Dimensions

- II.D.2.6.2. Reduced body diameter bolts are not permitted; full body diameter bolts are required (refer to [IR 23-5](#) for additional information).
- II.D.2.6.3. Installation Requirements
 - II.D.2.6.3.1 Bolt hole tolerance.
 - II.D.2.6.3.1.1 All 'fixes' to oversized holes shall be approved by design professional and DSA.
 - II.D.2.6.3.2 Specified metal plate, strap, or washer (a commonly specified minimum is not less than a standard cut washer – see Table 2-6 on page 144 for standard cut washer dimensions) between wood and bolt heads.
 - II.D.2.6.3.2.1 Plate washers at sill plate anchor bolts. See *2.3.3.1 Walls* subsection *II.C.4* on page 104 and *2.4.3.1.1 Light Wood Framing* subsection *II.B.4.5.4.2 Anchor bolt requirements* on page 143 for additional information.
 - II.D.2.6.3.3 Placement of bolt (see Figure 2-34 for commonly specified dimensions, though dimensions shown are not absolute minimums allowed based on code allowances with engineering analysis).
 - II.D.2.6.3.3.1 Edge Distance
 - II.D.2.6.3.3.2 End Distance

STRUCTURAL SAFETY INSPECTION ITEMS

II.D.2.6.3.3 Fastener Spacing



GENERAL CONCEPTS - BOLT PLACEMENT

- ALL DIMENSIONS ARE TO CENTER OF BOLT
- FOR 3/4" Ø BOLT - 7 Ø = 5-1/4", 4 Ø = 3", 1.5 Ø = 1-1/8"
- Ø IS BOLT SIZE

Figure 2-34: Commonly Specified Bolt Placement Dimensions

II.D.2.6.3.4 Bolt thread length in bearing on wood member does not exceed specified limits.

II.D.2.6.3.5 Bolts are re-tightened prior to closing in.

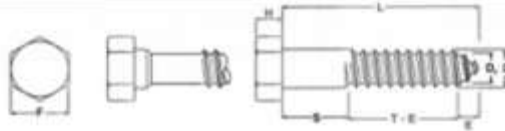
II.D.2.7. Lag screws

II.D.2.7.1. Dimensional requirements. Frequently specified requirements include reference to ANSI/ASME Standard B18.2.1 (refer to Table 2-3 taken from Table L2 in AF&PA 2005 NDS).

STRUCTURAL SAFETY INSPECTION ITEMS

Table L2 Standard Hex Lag Screws¹

D = diameter
 D_r = root diameter
 S = unthreaded shank length
 T = minimum thread length²



E = length of tapered tip
 N = number of threads/inch
 F = width of head across flats
 H = height of head

Length, L		Diameter, D										
		1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"	1-1/4"
	D _r	0.173"	0.227"	0.265"	0.328"	0.371"	0.471"	0.579"	0.683"	0.780"	0.887"	1.012"
	E	5/32"	3/16"	7/32"	9/32"	5/16"	13/32"	1/2"	19/32"	11/16"	25/32"	7/8"
	H	11/64"	7/32"	1/4"	19/64"	11/32"	27/64"	1/2"	37/64"	43/64"	3/4"	27/32"
	F	7/16"	1/2"	9/16"	5/8"	3/4"	15/16"	1-1/8"	1-5/16"	1-1/2"	1-11/16"	1-7/8"
	N	10	9	7	7	6	5	4-1/2	4	3-1/2	3-1/4	3-1/4
1"	S	1/4"	1/4"	1/4"	1/4"	1/4"						
	T	3/4"	3/4"	3/4"	3/4"	3/4"						
	T-E	19/32"	9/16"	17/32"	15/32"	7/16"						
1-1/2"	S	1/4"	1/4"	1/4"	1/4"	1/4"						
	T	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"						
	T-E	1-3/32"	1-1/16"	1-1/32"	31/32"	15/16"						
2"	S	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"					
	T	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"					
	T-E	1-11/32"	1-5/16"	1-9/32"	1-7/32"	1-3/16"	1-3/32"					
2-1/2"	S	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"					
	T	1-3/4"	1-3/4"	1-3/4"	1-3/4"	1-3/4"	1-3/4"					
	T-E	1-19/32"	1-9/16"	1-17/32"	1-15/32"	1-7/16"	1-11/32"					
3"	S	1"	1"	1"	1"	1"	1"	1"	1"	1"		
	T	2"	2"	2"	2"	2"	2"	2"	2"	2"		
	T-E	1-27/32"	1-13/16"	1-25/32"	1-23/32"	1-11/16"	1-19/32"	1-1/2"	1-13/32"	1-5/16"		
4"	S	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"
	T	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"
	T-E	2-11/32"	2-5/16"	2-9/32"	2-7/32"	2-3/16"	2-3/32"	2"	1-29/32"	1-13/16"	1-23/32"	1-5/8"
5"	S	2"	2"	2"	2"	2"	2"	2"	2"	2"	2"	2"
	T	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"
	T-E	2-27/32"	2-13/16"	2-25/32"	2-23/32"	2-11/16"	2-19/32"	2-1/2"	2-13/32"	2-5/16"	2-7/32"	2-1/8"
6"	S	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"
	T	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"
	T-E	3-11/32"	3-5/16"	3-9/32"	3-7/32"	3-3/16"	3-3/32"	3"	2-29/32"	2-13/16"	2-23/32"	2-5/8"
7"	S	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"
	T	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"
	T-E	3-27/32"	3-13/16"	3-25/32"	3-23/32"	3-11/16"	3-19/32"	3-1/2"	3-13/32"	3-5/16"	3-7/32"	3-1/8"
8"	S	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"	3-1/2"
	T	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"
	T-E	4-11/32"	4-5/16"	4-9/32"	4-7/32"	4-3/16"	4-3/32"	4"	3-29/32"	3-13/16"	3-23/32"	3-5/8"
9"	S	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"
	T	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"
	T-E	4-27/32"	4-13/16"	4-25/32"	4-23/32"	4-11/16"	4-19/32"	4-1/2"	4-13/32"	4-5/16"	4-7/32"	4-1/8"
10"	S	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"
	T	5-1/2"	5-1/2"	5-1/2"	5-1/2"	5-1/2"	5-1/2"	5-1/2"	5-1/2"	5-1/2"	5-1/2"	5-1/2"
	T-E	5-11/32"	5-5/16"	5-9/32"	5-7/32"	5-3/16"	5-3/32"	5"	4-29/32"	4-13/16"	4-23/32"	4-5/8"
11"	S	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"
	T	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
	T-E	5-27/32"	5-13/16"	5-25/32"	5-23/32"	5-11/16"	5-19/32"	5-1/2"	5-13/32"	5-5/16"	5-7/32"	5-1/8"
12"	S	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
	T	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"	6"
	T-E	5-27/32"	5-13/16"	5-25/32"	5-23/32"	5-11/16"	5-19/32"	5-1/2"	5-13/32"	5-5/16"	5-7/32"	5-1/8"

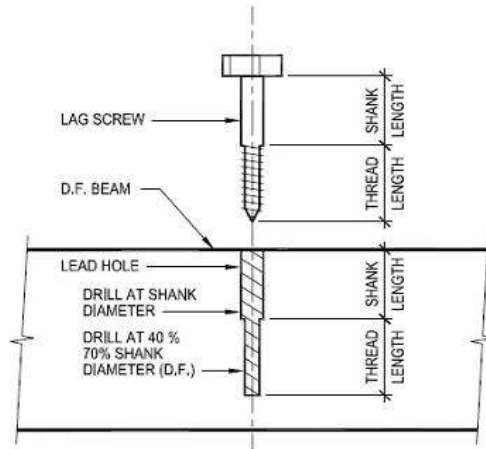
1. Tolerances specified in ANSI B18.2.1. Full body diameter and reduced body diameter lag screws are shown. For reduced body diameter lag screws, the unthreaded shank diameter may be reduced to approximately the root diameter, D_r.
 2. Minimum thread length (T) for lag screw lengths (L) is 6" or 1/2 the lag screw length plus 0.5", whichever is less. Thread lengths may exceed these minimums up to the full lag screw length (L).

STRUCTURAL SAFETY INSPECTION ITEMS

Table 2-3: Dimensions for Standard Hex Lag Screws

II.D.2.7.2. Installation Requirements

II.D.2.7.2.1 Predrilling for lead holes and thread length (see Figure 2-35 for commonly specified



EXAMPLE: A 3/4" Ø LAG SCREW HAS A 3/4" Ø SHANK - DRILL THREAD PORTION OF LEAD HOLES IN DOUGLAS FIR AT 5/16" Ø TO 1/2" Ø

LAG SCREW INSTALLATION

Figure 2-35: Commonly Specified Pre-Drilling for Lag Screw

requirements).

II.D.2.7.2.2 Specified lubricant is used to facilitate lag screw installation.

II.D.2.7.2.3 Specified penetration into main member.

II.D.2.7.2.4 Placement of lag screw:

II.D.2.7.2.4.1 Edge Distance

II.D.2.7.2.4.2 End Distance

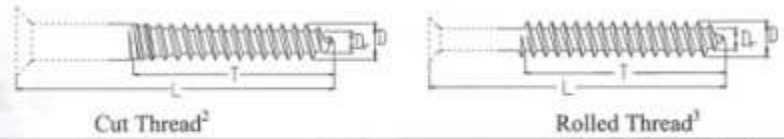
II.D.2.7.2.4.3 Fastener Spacing

II.D.2.8. Wood screws

II.D.2.8.1. Dimensional requirements. Frequently specified requirements include reference to ANSI/ASME Standard B18.6.1 (refer to Table 2-4 taken from Table L3 in AF&PA 2005 NDS) for further information).

STRUCTURAL SAFETY INSPECTION ITEMS

Table L3 Standard Wood Screws¹



D = diameter
 D_r = root diameter
 L = screw length
 T = thread length

	Wood Screw Number										
	6	7	8	9	10	12	14	16	18	20	24
D	0.138"	0.151"	0.164"	0.177"	0.19"	0.216"	0.242"	0.268"	0.294"	0.32"	0.372"
D _r ⁴	0.113"	0.122"	0.131"	0.142"	0.152"	0.171"	0.196"	0.209"	0.232"	0.255"	0.298"

1. Tolerances specified in ANSI B18.6.1
 2. Thread length on cut thread wood screws is approximately 2/3 of the screw length.
 3. Single lead thread shown. Thread length is at least four times the screw diameter or 2/3 of the screw length, whichever is greater. Screws which are too short to accommodate the minimum thread length, have threads extending as close to the underside of the head as practicable.
 4. Taken as the average of the specified maximum and minimum limits for body diameter of rolled thread wood screws.

Table 2-4: Dimensions for Standard Wood Screws

II.D.2.8.2. Installation Requirements

II.D.2.8.2.1 Lead holes per requirements.

II.D.2.8.2.2 Specified lubricant is used to facilitate lag screw installation.

II.D.2.8.2.3 Specified penetration into main member.

II.D.2.8.2.4 Placement of lag screw per requirements and does not cause splitting:

II.D.2.8.2.4.1 Edge Distance

II.D.2.8.2.4.2 End Distance

II.D.2.8.2.4.3 Fastener Spacing


II.D.2.9. Staples are **not permitted** for use in diaphragms nor shear walls.

II.D.2.10. Nails/Spikes

II.D.2.10.1. Dimensional requirements. Minimum specified nail dimensions often reference to those limits provided in ASTM F1667 (refer to Table 2-5, from Appendix A of AF&PA's SDPWS).

STRUCTURAL SAFETY INSPECTION ITEMS

Table A1 Standard Common, Box, and Sinker Nails¹



D = diameter
L = length
H = head diameter

Type		Pennyweight										
		6d	7d	8d	10d	12d	16d	20d	30d	40d	50d	60d
Common	L	2"	2-1/4"	2-1/2"	3"	3-1/4"	3-1/2"	4"	4-1/2"	5"	5-1/2"	6"
	D	0.113"	0.113"	0.131"	0.148"	0.148"	0.162"	0.192"	0.207"	0.225"	0.244"	0.263"
	H	0.266"	0.266"	0.281"	0.312"	0.312"	0.344"	0.406"	0.438"	0.469"	0.5"	0.531"
Box	L	2"	2-1/4"	2-1/2"	3"	3-1/4"	3-1/2"	4"	4-1/2"	5"		
	D	0.099"	0.099"	0.113"	0.128"	0.128"	0.135"	0.148"	0.148"	0.162"		
	H	0.266"	0.266"	0.297"	0.312"	0.312"	0.344"	0.375"	0.375"	0.406"		
Sinker	L	1-7/8"	2-1/8"	2-3/8"	2-7/8"	3-1/8"	3-1/4"	3-3/4"	4-1/4"	4-3/4"		5-3/4"
	D	0.092"	0.099"	0.113"	0.12"	0.135"	0.148"	0.177"	0.192"	0.207"		0.244"
	H	0.234"	0.250"	0.266"	0.281"	0.312"	0.344"	0.375"	0.406"	0.438"		0.5"

1. Tolerances specified in ASTM F 1667. Typical shape of common, box, and sinker nails shown. See ASTM F1667 for other nail types.

Table 2-5: Minimum Nail Dimensions

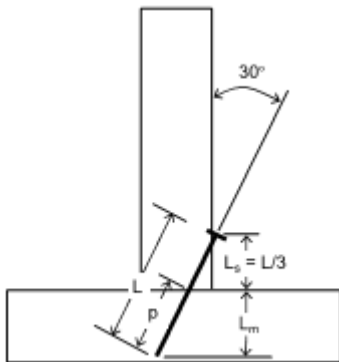


Figure 2-36: Toe Nailing Installation

2.3.3.1 Walls

I. Receipt of documentation for constructed elements: Refer to section 2.3.3 *Wood* on page 96 for documentation and inspection requirements.

II. Inspection of the following items:

- II.A. Refer to relevant sections in 2.2 *Foundation Systems* starting on page 62 for items to be inspected prior to wall framing inspections (e.g. concrete foundations, embeds, anchor bolt placement, etc.).
- II.B. Walls are plumb and true within specified tolerances.
- II.C. Wall sill plate

II.D.2.10.2. Installation Requirements

II.D.2.10.2.1 Toenails (see Figure 2-36 for commonly specified installation requirements)

II.D.2.10.2.2 Placement of nail and member splitting:

II.D.2.10.2.2.1 Edge Distance

II.D.2.10.2.2.2 End Distance

II.D.2.10.2.2.3 Fastener Spacing

II.D.2.10.2.2.4 Where splitting occurs, pre-drilling may be required per the approved construction documents.

STRUCTURAL SAFETY INSPECTION ITEMS

II.C.1. Size

II.C.2. Refer to 2.3.3 *Wood* subsection II.B.3.3 *Pressure-preservative treated (PT) wood* on page 102 for PT inspection information.

II.C.2.1. PT may not be needed if specified clear distances or other provisions between wood and slab on grade or exterior grade are provided. (NOTE: DSA-SS/CC requirements are more or less restrictive than DSA-SS requirements – verify with approved construction documents.)

II.C.3. Notching and holes per requirements. Refer to 2.3.3 *Wood* subsection II.B.3.2 on page 101 and II.C.4.2 below on page 113 for additional requirements.

II.C.4. Anchor bolts

II.C.4.1. Refer to 2.3.3 *Wood* subsection II.D.2.6 *Bolts* on page 106 for dimensional and installation inspection requirements, (see Figure 2-37).



Figure 2-37: Improper Oversized A.B. Hole

II.C.4.1.1. Where wood structural panels are part of light frame shear wall construction, refer to 2.4.3.1 *Wood Structural Panel* subsection II.B.4.5.4.2 *Anchor bolt requirements* on page 143 for anchor bolt inspection requirements.

II.C.4.2. Check that conduits, pipes, etc. passing through sill plate are at the specified distance from anchor bolts (see Figure 2-38).

II.C.4.2.1. Pipes through bottom plates have straps as indicated in approved drawings.

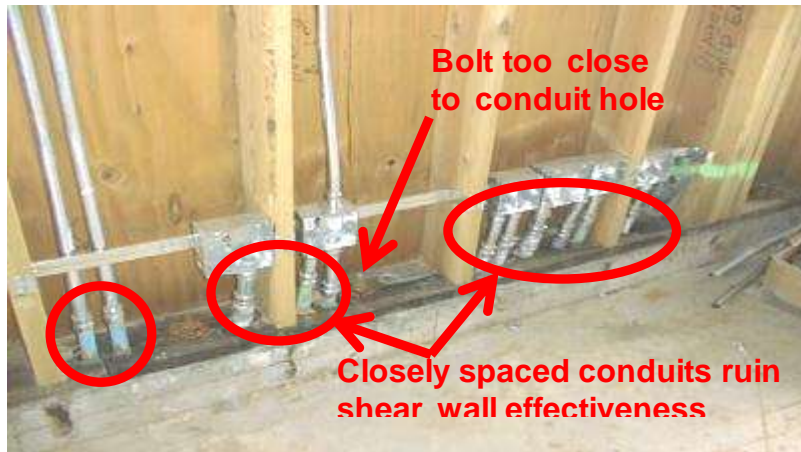


Figure 2-38: Common Sill Plate Construction Problems

II.C.5. Where post-installed anchors or shotpins/power-actuated pins are used, placement requirements are met (especially edge distances at curbs and edge of slab conditions). For both masonry and concrete construction, refer to the post-installed anchor section in 2.3.1.1 *Cast In Place (CIP) Concrete* subsection I.B.3 *Post-installed anchors*: on page 76 and subsection II.F *Post-installed anchors and connections*: on page 82 for additional information.

STRUCTURAL SAFETY INSPECTION ITEMS

II.D. Wall studs/posts

II.D.1. Stud/post

II.D.1.1. Size

II.D.1.2. Placement/Spacing

II.D.2. Wall corners and intersections.

II.D.3. Nailing of stud to sill plate and top plate (e.g. per typical nailing schedule provided in approved construction documents).

II.D.3.1. NOTE: 20d may need to be used at 3x sill plates to achieve required minimum penetration – verify with approved construction documents.

II.D.3.2. Special connections and framing requirements at openings and other special conditions (e.g. multiple trimmer/king studs; additional clips at top and bottom of king studs for large openings; etc.).

II.D.4. Cuts, holes, notches, and countersinking. See 2.3.3 *Wood* subsection *II.B.3.2* on page 101 for additional information.

II.D.5. Blocking Requirements

II.E. Top Plate

II.E.1. Size

II.E.2. Overlap at corners and intersections.

II.E.3. Minimum lap splice per requirements.

II.E.3.1. Special conditions which may indicate different sizes of double top plates.

II.E.3.2. At top plate splice, refer to 2.4.3.1 *Wood Structural Panel* subsection *II.B.4.5.5 Top plate* on page 145 for inspection requirements.

II.E.4. Check that conduits, pipes, etc. passing through top plate are at the specified distance from top plate splice.

II.E.4.1. Confirm specified straps at top plates where interrupted by pipes/conduit.

II.F. Walls are plumb and true within specified tolerances.

II.G. All mechanical, electrical, and plumbing work is in place (see appropriate sections in 2.5 *Non-Structural Component Support/Bracing/Anchorage* starting on page 159 and 5 *OTHER BUILDING COMPONENTS AND SYSTEMS* starting on page 236 for additional information).

II.H. Wall Sheathing

II.H.1. See 2.3.3 *Wood* subsection *II.C Wood structural panels* on page 104 for requirements.

II.H.2. At wood structural panel shear walls, refer to 2.4.3.1 *Wood Structural Panel* on page 142 for additional documentation and inspection requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.3.2 Floor/Roof

I. Receipt of documentation for constructed elements: Refer to section 2.3.3 *Wood* on page 96 for documentation and inspection requirements.

II. Inspection of the following items:

II.A. Framing

II.A.1. Refer to section 2.3.3 *Wood*, subsections *II.B.2 Glulams* on page 101, *II.B.4 Beams* on page 102, *II.B.5 I-Joists* on page 103, *II.B.6 Structural Composite Lumber (SCL)* on page 103, and *II.B.7 Trusses* on page 103, for inspection requirements.

II.A.2. Size

II.A.3. Framing Installation

II.A.3.1. Location and spacing.

II.A.3.2. Installation per ICC ES (or DSA recognized equivalent) report requirements for specified proprietary engineered framing (e.g. I-Joists, SCL, etc.).

II.A.3.3. Blocking/rotational restraint at bearing points (e.g. at platform framing conditions).

II.A.3.4. Bridging

II.A.3.5. Any special framing of joists below partitions with piping (e.g. often specified to be doubled and bridged).

II.A.3.6. Connections

II.A.3.6.1. Joist/beam/rafter connection to top plate/beam/wall.

II.A.3.6.2. Connection Hardware

II.A.3.6.3. Straps/ties/lap (sheathing is not permitted to act as a tie) connecting joists/beams when spliced over support.

II.A.3.6.4. For connections, refer to 2.3.3 *Wood* subsection *II.D Connections* on page 105 for additional inspection requirements.

II.B. All mechanical, electrical, and plumbing work is in place (see appropriate sections in 5 *OTHER BUILDING COMPONENTS AND SYSTEMS* starting on page 236 for additional information).

II.C. Floor/Roof Sheathing

II.C.1. See 2.3.3 *Wood* subsection *II.C Wood structural panels* on page 104 for inspection requirements.

II.C.2. For wood structural panel diaphragms, refer to 2.4.3.1 *Wood Structural Panel* on page 142 for additional documentation and inspection requirements.

II.C.3. Where overhang or cantilever conditions occur, diaphragm boundary nailing occurs at exterior wall – verify with approved construction documents.

II.C.3.1. Where overhang/cantilever is larger than a few feet, boundary nailing may be required at the edge framing/blocking beyond the exterior wall – verify with approved construction documents.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.4 Steel

2.3.4.1 Structural Steel

In addition to the California Building Code, projects using structural steel are generally governed by several referenced standards issued by the [American Institute of Steel Construction](http://www.aisc.org) (AISC; see <http://www.aisc.org>). Specifically, those are as listed below:

- Specification for Structural Steel Buildings, ANSI/AISC 360
- Code of Standard Practice for Steel Buildings and Bridges, ANSI/AISC 303

Additional standards apply for buildings using structural steel seismic force resisting systems, which are discussed in further detail in the *2.4.4.1 Structural Steel* on page 148.

The [Research Council on Structural Connections](http://www.boltcouncil.org) (RCSC; see <http://www.boltcouncil.org>) provides standards for high-strength fasteners in their reference standard, listed below:

- Specification for Structural Joints Using ASTM A325 or A490 Bolts

The [American Welding Society](http://www.aws.org) (AWS; see <http://www.aws.org>) provides standards for welding in several referenced standards, listed below:

- Structural Welding Code – Steel, AWS D1.1
- Structural Welding Code – Sheet Steel, AWS D1.3
- Structural Welding Code – Reinforcing Steel, AWS D1.4

Additional standards apply for buildings using structural steel seismic force resisting systems, which are discussed in further detail in the section *2.4.4.1 Structural Steel* on page 148.

Frequently, testing of structural steel connections is necessary for various portions of structural steel construction associated with the project. When such testing is necessary as dictated by the construction documents, certain information must be included, depending on the type of test that is being performed. While there are no format requirements, [DSA 208: High Strength Bolt](#), [DSA 209: Fireproofing Density](#), and [DSA 210: Ultrasonic \(NDT\)](#) provide a suggested format (refer to *APPENDIX B – REFERENCED DSA FORMS* on page 313 for these forms).

The following information applies to all structural steel items on a given project.

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

- I.A.1. Where applicable, receipt of design professional reviewed structural steel shop drawings (usually broken up into: 1. embedment drawings [often

STRUCTURAL SAFETY INSPECTION ITEMS

referred to as “anchor bolt layout drawings”) and 2. remaining structural steel shop and erection related [i.e. erection bracing and erection] drawings).

I.A.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents, they must be submitted to DSA for review and approval prior to installation of modified elements.

I.A.1.1. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.B. Material/Structural Test Documentation:

I.B.1. Framing Members

I.B.1.1. For **steel shipped directly to the site without welding or fabrication**, the **project inspector** shall check the following for compliance with requirements - **otherwise**, the **special inspector** shall check and report on the following in the form of reports of tests performed and/or daily special inspection reports:

I.B.1.1.1. All materials are appropriately marked.

I.B.1.1.2. Traceability of “chain of custody” from mill to fabricator to jobsite (e.g. mill identification mark or heat numbers on material).

I.B.1.1.3. Mill certificates provided for all materials.

I.B.1.1.3.1 Mill analysis or test report with chemical/mechanical test and material specification designation with heat numbers.

I.B.1.1.4. Material/member sizes

I.B.1.1.5. Material types

I.B.1.1.6. Material grades

I.B.1.1.6.1 For F_y greater than 36 ksi, ASTM or other specification designation is indicated near the erection mark on each piece (over shop paint, if occurs).

I.B.1.2. Lab tests for unidentified materials.

I.B.2. Connections

I.B.2.1. Test high-strength fasteners ([IR 17-8](#)):

I.B.2.1.1. Bolts

I.B.2.1.2. Nuts

I.B.2.1.3. Washers

I.B.2.1.4. Identification of fastener components as noted in [IR 17-8](#).

I.B.2.1.4.1 Manufacturer’s certification frequently includes:

I.B.2.1.4.1.1 Heat analysis and heat number.

I.B.2.1.4.1.2 Hardness test, tensile test, wedge test, and proof load test results.

STRUCTURAL SAFETY INSPECTION ITEMS

- I.B.2.1.4.1.3 Visual inspection for head burst.
- I.B.2.1.4.1.4 Statement of compliance with dimensional and thread fit requirements.
- I.B.2.1.4.1.5 Production lot number.
- I.B.2.1.4.1.6 Title and signature of person assigned certification responsibility.

I.B.2.2. Welding:

I.B.2.2.1. Weld filler material

- I.B.2.2.1.1 Identification markings per AWS designation listed on the DSA approved documents and the Welding Procedure Specifications (WPS).
- I.B.2.2.1.2 Manufacturer's certificate of compliance.

I.B.2.2.2. WPS

I.B.2.2.3. Welder qualifications

I.B.2.2.4. Equipment

- I.B.2.2.5. For Non-Destructive Testing (NDT) requirements (which are usually associated with structural steel seismic lateral force resisting systems), refer to *2.4.4.1 Structural Steel* subsection *I.A.2.1 Welding*: on page 149.

I.B.3. Spray Applied Fire-Proofing

I.B.3.1. Tests of bond strength

I.B.3.2. Tests of density

- I.B.4. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).

I.C. Special Inspection Documentation:

- I.C.1. Special inspector to provide documentation for the following in the form of reports of tests performed and/or daily special inspection reports.

I.C.1.1. Framing Members

- I.C.1.1.1. Examine seam welds of structural tubes and pipes (refer to [IR 17-3](#) and Bulletin [BU 07-03](#) for additional information).

I.C.1.1.2. Stiffener locations

I.C.1.1.3. Connection tab locations

I.C.1.1.4. All construction details fabricated in the shop.

I.C.1.2. Connections

I.C.1.2.1. High-Strength Bolts (HSB), nuts and washers.

- I.C.1.2.1.1 Refer to [IR 17-9](#) for HSB special inspection requirements.

I.C.1.2.1.2 Identification Markings.

- I.C.1.2.1.3 Manufacturer's certificates of compliance conform to ASTM standards specified in the DSA approved documents.

I.C.1.2.1.3.1 Reuse of ASTM A490 and galvanized A325 is **not permitted**.

STRUCTURAL SAFETY INSPECTION ITEMS

I.C.1.2.1.4 Bearing-type (“snug tight”) connections.

I.C.1.2.1.5 Slip-critical connections.

I.C.1.2.1.6 Upon completion of high-strength bolt installation, the special inspector provides a verified report ([DSA 292](#)).

I.C.1.2.2. Welding

I.C.1.2.2.1 Refer to [IR 17-3](#) for welding special inspection requirements.

I.C.1.2.2.2 Welding special inspectors have the following:

I.C.1.2.2.2.1 DSA Approved Documents

I.C.1.2.2.2.2 Applicable Welding Codes/Standards.

I.C.1.2.2.2.3 Welder Qualification Records

I.C.1.2.2.2.4 Temperature Sticks

I.C.1.2.2.2.5 Calibrated hand-held volt/amp meter

I.C.1.2.2.2.6 Fillet Weld Test Gages

I.C.1.2.2.2.7 Approved WPS

I.C.1.2.2.2.8 Report forms conforming to regulations.

I.C.1.2.2.3 Shop and Field Welding

I.C.1.2.2.3.1 Groove, multi-pass, and fillet welds greater than 5/16"

I.C.1.2.2.3.2 Single-pass fillet welds $\leq 5/16$ "

I.C.1.2.2.3.3 Stairs and railing systems

I.C.1.2.2.3.4 Verification of reinforcing steel weldability.

I.C.1.2.2.3.5 Welding of reinforcing steel

I.C.1.2.2.3.5.1 If no mill test reports are available, chemical analysis is required as specified in the approved construction documents. (NOTE: DSA-SS testing requirements are different than those in DSA-SS/CC projects – verify with approved construction document.)

I.C.1.2.2.4 Field Welding

I.C.1.2.2.4.1 Installation of end-welded studs.

I.C.1.2.2.4.1.1 Bend Test

I.C.1.2.2.4.2 For field welding of steel floor and roof deck, see 2.3.4.2.2 *Steel Deck*, subsection *I.C.1.1.1 Welding*: on page 137.

I.C.1.2.2.4.3 For field welding of structural cold formed steel, see 2.3.4.2 *Cold Formed*

STRUCTURAL SAFETY INSPECTION ITEMS

Steel, subsection *I.C.1.1.1 Welding* on page 127.

I.C.1.2.2.5 For NDT requirements (usually associated with structural steel seismic lateral resisting systems), refer to *2.4.4.1 Structural Steel* subsection *I.B.1.2 Welding*: on page 149.

I.C.1.2.2.6 Completed welds, parts, and joints have special inspector distinguishing mark, tag, or dye stamp as indicated in [IR 17-3](#).

I.C.1.2.2.7 Upon completion of shop and/or field welding work, special inspector provides verified report ([DSA 292](#)).

I.C.1.3. Spray Applied Fire-Proofing

I.C.1.3.1. Examine structural steel surface conditions.

I.C.1.3.2. Inspect application of fire-proofing.

I.C.1.3.2.1 Take samples of applied fire-proofing.

I.C.1.3.2.2 Measure thickness

I.C.1.3.3. All aspects of ICC ES (or equivalent DSA approved agency) report and DSA approved documents.

I.C.1.3.4. Upon completion of spray applied fire-proofing installation, the special inspector provides a verified report ([DSA 292](#)).

II. Inspection of the following items:

II.A. Proper storage and handling of materials.

II.B. Framing

II.B.1. Dimensional Requirements (e.g. size)

II.B.2. Installation Requirements

II.B.2.1. Bracing

II.B.2.2. Where corrosion protective coverings have been damaged (e.g. shop paint, etc.), repair of protective coverings as indicated in approved construction documents.

II.C. Connections

II.C.1. All details constructed in the field.

II.C.2. Bolts, Nuts, Washers

II.C.2.1. Dimensional Requirements

II.C.2.1.1. For anchor bolts connecting steel to concrete, types and sizes per requirements, including tolerances indicated in [IR 22-2](#).

II.C.2.1.2. Bolt length is sufficient for proper thread stick-out.

II.C.2.2. Installation requirements

II.C.2.2.1. Hole sizes per requirements.

II.C.2.2.1.1 For anchor bolts connecting steel to concrete, common oversized holes may not be allowed for some base connections of certain lateral force

STRUCTURAL SAFETY INSPECTION ITEMS

resisting systems, such as braced frames and moment frames. Verify requirements with approved construction documents.

II.C.2.2.2. Bolt type, such as HSB vs. machine bolts (e.g. ASTM A307).

II.C.2.2.2.1 HSB

II.C.2.2.2.1.1 Refer to RCSC 2004, Section 9 for background information on inspections associated with HSB.

II.C.2.2.2.1.2 Proper storage of bolts, nuts, and washers (marked sealed containers; kept clean; etc. – see Figure 2-39 for an example of improper storage).

II.C.2.2.2.1.3 For fully tensioned bolts, testing device is appropriate when used (e.g. Skidmore-Wilhelm Model M or L typically used; Model MS for short bolts – see Figure 2-40)

II.C.2.2.2.1.3.1 Alternative methods include direct tension indicators or twist-off bolts – see Figure 2-41.

II.C.2.2.2.1.4 Cleanliness of faying surfaces, especially at slip critical connections or other connections identified to meet certain faying surface requirements (i.e. no dirt, paint overspray, heavy mill scale, oil, etc.).

II.C.2.2.2.1.5 Slip-critical bolts:

II.C.2.2.2.1.5.1 Proper installation method (e.g. turn-of-the-nut method must be calibrated and often requires



Figure 2-39: Improper HSB Storage



Figure 2-40: Skidmore / Wilhelm Machine



Figure 2-41: Twist-Off Type Tension Control Bolts



Figure 2-42: Improperly Match Marked/Torqued

STRUCTURAL SAFETY INSPECTION ITEMS

120 degrees between match mark and torqued conditions – see Figure 2-42).

II.C.2.2.2.1.6 No field modifications of holes (e.g. no enlarging or torch cutting of holes is permitted).

II.C.3. Welding

II.C.3.1. Before welding occurs:

II.C.3.1.1. Proper coordination between the fabricator's and welding inspector's schedules as part of the welding inspection program.

II.C.3.1.2. Understand the QA/QC program for welding and what requires special inspection – understand the scope of welding special inspection.

II.C.3.1.3. While AWS-CWI monitors welders, project inspector monitors AWS-CWI.

II.C.3.1.4. WPS availability for each weld, including at location where welding occurs.

II.C.3.2. At fillet welds, proper fit-up – excessive gap between joined pieces requires increase in leg length of weld.

II.C.3.3. Field Welding

II.C.3.3.1. Special material requirements (which may be different than other common field weld materials) for demand critical welds.

II.C.3.3.2. Steel Deck – refer to 2.3.4.2.2.2 *Steel Deck* on page 136 for additional information.

II.D. All mechanical, electrical, and plumbing work is in place (see appropriate sections in 5 *OTHER BUILDING COMPONENTS AND SYSTEMS* starting on page 236 for additional information).

2.3.4.1.1 Beams

This section covers all types of steel beams.

Refer to 2.3.4.1 *Structural Steel* on page 116 for documentation and inspection requirements.

2.3.4.1.1.1 Composite

For composite beams, refer to 2.3.1 *Concrete* on page 74 and 2.3.4.1 *Structural Steel* on page 116 for documentation and inspection requirements. Additionally, where steel deck occurs, refer to 2.3.4.2.2.2 *Steel Deck* on page 136.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses

For structural steel joists, several referenced standards are issued by the [Steel Joist Institute](http://steeljoist.org/) (SJI; see <http://steeljoist.org/>):

- 2006 Standard Specifications for Composite Steel Joists, CJ-Series, SJI CJ-01–06
- 2005 Standard Specifications for Open Web Steel Joists, K Series, SJI K-1.1–05
- 2005 Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series, SJI LH/DLH-1.1–05
- 2005 Standard Specifications for Joist Girders, SJI JG-1.1–05

The following information applies to all structural steel beams on a given project.

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

I.A.1. Where applicable for projects having steel joists/joist girders, receipt of design professional reviewed and DSA approved structural steel joist drawings and placement/erection drawings.

I.A.1.1. Statement of General Conformance by design professional in general responsible charge is on the steel joist drawings per [IR A-18](#).

I.B. Material/Structural Test Documentation (for steel joists, see [IR 22-3.10](#)):

I.B.1. Receipt of certificate of compliance by joist manufacturer indicating joists fabricated in accordance with DSA approved construction documents and SJI standard specifications.

I.B.2. For both chord and web members:

I.B.2.1. Material size

I.B.2.2. Material type

I.B.2.3. Material grade

I.B.2.4. Connections

I.B.2.4.1. Fasteners per requirements.

I.B.2.4.2. Weld filler material.

I.C. Special Inspection Documentation:

I.C.1. For each joist/joist girder/truss, verification of the following:

I.C.1.1. Joist/truss profile

I.C.1.2. Dimensions

I.C.1.3. Camber

I.C.1.4. Mark or tag on joist/truss by special inspector. This is to remain intact throughout construction, up to and including erection.

I.C.1.5. Connections

I.C.1.5.1. Connections comply with requirements.

I.C.1.5.2. Welding

I.C.1.5.2.1 Locations

STRUCTURAL SAFETY INSPECTION ITEMS

I.C.1.5.2.2 Lengths

I.C.1.5.2.3 Profiles

I.C.1.6. Upon completion of steel joist fabrication, the special inspector provides a verified report ([DSA 292](#)).

II. Inspection of the following items:

II.A. For steel joists/joist girders ([IR 22-3.10](#)):

II.A.1. Joist Size

II.A.2. Special inspector tag or mark is visible throughout erection process.

II.A.3. Member Placement

II.A.4. Chord bracing:

II.A.4.1. Size

II.A.4.2. Location

II.A.4.3. Connections

II.A.5. Bridging (see Figure 2-43)

II.A.5.1. Size

II.A.5.2. Location



Figure 2-43: Steel Joist Bridging

II.A.5.3. Connections

II.A.5.4. Bridging termination connections to structure.

II.A.5.4.1. Where no terminus connection is possible due to construction phasing, temporary bracing is provided.

STRUCTURAL SAFETY INSPECTION ITEMS

II.A.5.5. For bottom chord bearing joists, bridging at supports is in place prior to hoisting cable release.

II.A.5.6. Where approved building design professional drawings indicate



Figure 2-44: Field Splice of Steel Joists

wind uplift design loads for joists, bottom chord bridging per requirements.

II.A.6. Field Splices (see Figure 2-44)

II.A.7. Seating Connections

II.A.7.1. Bearing Length

II.A.7.2. Anchorage Connection

2.3.4.1.2 Columns

Refer to 2.3.4.1 *Structural Steel* on page 116 for documentation and inspection requirements.

2.3.4.1.2.1 Composite

2.3.4.2 Cold Formed Steel

In addition to the California Building Code, projects using cold formed steel are generally governed by referenced standards issued by various groups, based on the type of product. The primary reference applicable to all cold formed steel is based on a standard produced by the American Iron and Steel Institute (AIS; see <http://www.steel.org/>). Specifically, the applicable reference for all cold formed steel is listed below:

STRUCTURAL SAFETY INSPECTION ITEMS

- 2007 North American Specification for the Design of Cold-Formed Steel Structural Members, with Supplement No. 2, AISI S100-07-S2-10

The [American Welding Society](http://www.aws.org) (AWS; see <http://www.aws.org>) provides the welding standard applicable to cold formed steel:

- 2008 Structural Welding Code – Sheet Steel, AWS D1.3

The following information applies to all cold formed steel items on given project.

I. Receipt of documentation for constructed elements:

I.A. For proprietary cold formed steel products, refer to *1.3 Proprietary Products* on page 40 for documentation and inspection requirements.

I.B. Material/Structural Test Documentation:

I.B.1. Framing Members

I.B.1.1. All materials are appropriately marked.

I.B.1.1.1. For light frame construction members, see *2.3.4.2.1 Cold Formed Steel Light Frame Construction* on page 130 for additional information.

I.B.1.1.2. For steel deck, see *2.3.4.2.2 Steel Deck* on page 136 for additional information.

I.B.1.2. Traceability of “chain of custody” from mill to fabricator to jobsite.

I.B.1.3. Mill certificates provided for all materials.

I.B.1.3.1. Mill analysis or test report with chemical/mechanical test and material specification designation with heat numbers.

I.B.1.4. Material/member sizes and thicknesses.

I.B.1.5. Material types

I.B.1.6. Material grades

I.B.2. Lab tests for unidentified materials per requirements.

I.B.3. Connections

I.B.3.1. Screws

I.B.3.2. Bolts

I.B.3.2.1. Where specified bolts do not comply with one of the noted ASTMs provided in AISI S100-07-S2-10 Section E3, testing documentation indicates bolts provided comply with specified nominal strength indicated on the approved construction documents.

I.B.3.3. Nuts

I.B.3.4. Washers

I.B.3.5. Welding:

I.B.3.5.1. Weld filler material

STRUCTURAL SAFETY INSPECTION ITEMS

- I.B.3.5.1.1 Identification markings per AWS designation listed on the DSA approved documents applicable to cold formed steel (e.g. AWS D1.3) and the Welding Procedure Specifications (WPS).
- I.B.3.5.1.2 Manufacturer's certificate of compliance.
- I.B.3.5.2. WPS in accordance with AWS D1.3.
- I.B.3.5.3. Welder qualifications in accordance with AWS D1.3.
- I.B.3.5.4. Equipment
- I.B.4. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).
- I.C. Special Inspection Documentation:
 - I.C.1. Special inspector to provide documentation for the following in the form of reports of tests performed and/or daily special inspection reports.
 - I.C.1.1. Connections
 - I.C.1.1.1. Welding
 - I.C.1.1.1.1 Refer to [IR 17-3](#) for welding special inspection requirements.
 - I.C.1.1.1.2 Verify welding special inspectors have the following:
 - I.C.1.1.1.2.1 DSA Approved Documents
 - I.C.1.1.1.2.2 Applicable Welding Codes/Standards.
 - I.C.1.1.1.2.3 Welder Qualification Records
 - I.C.1.1.1.2.4 Temperature Sticks
 - I.C.1.1.1.2.5 Calibrated hand-held volt/amp meter
 - I.C.1.1.1.2.6 Fillet Weld Test Gages
 - I.C.1.1.1.2.7 Approved WPS
 - I.C.1.1.1.2.8 Report forms conforming to regulations.
 - I.C.1.1.1.3 Shop and Field Welding
 - I.C.1.1.1.3.1 Arc spot welds.
 - I.C.1.1.1.3.1.1 Maximum / minimum steel thicknesses for connected parts.
 - I.C.1.1.1.3.1.2 Weld washer requirements.
 - I.C.1.1.1.3.1.3 Minimum edge and clear distance.
 - I.C.1.1.1.3.2 Arc seam welds.
 - I.C.1.1.1.3.2.1 Minimum edge and clear distance.
 - I.C.1.1.1.4 Field Welding
 - I.C.1.1.1.5 Completed welds, parts, and joints have special inspector distinguishing mark, tag, or dye stamp as indicated in [IR 17-3](#).
 - I.C.1.1.1.6 Upon completion of shop and/or field welding work, special inspector provides verified report ([DSA 292](#)).

STRUCTURAL SAFETY INSPECTION ITEMS

II. Inspection of the following items:

- II.A. For proprietary cold formed steel products, refer to *1.3 Proprietary Products* on page 40 for documentation and inspection requirements.
- II.B. Proper storage and handling of materials.
- II.C. Framing Members
 - II.C.1. Dimensional requirements within the specified tolerances:
 - II.C.1.1. Member sizes
 - II.C.1.2. Thicknesses
 - II.C.1.2.1. Delivered minimum of 95% of specified design thickness (for members with corrosion protective coatings, see below for additional information on thickness requirements).
 - II.C.2. Installation Requirements
 - II.C.2.1. Member locations and spacing.
 - II.C.2.2. Corrosion protective coverings
 - II.C.2.2.1. Based on the corrosion coating specified, verify sufficient thickness beyond minimum delivered base metal thickness. (Refer to [AISl's Design Guide 4: Durability Of Cold-Formed Steel Framing Members](#) and the American Galvanizer's Association publication [The Inspection of Hot-Dip Galvanized Steel Products](#) for additional information based on commonly specified corrosion coatings.)
 - II.C.2.2.2. For light frame construction members, see *2.3.4.2.1 Cold Formed Steel Light Frame Construction* on page 130 for additional information.
 - II.C.2.2.3. For steel deck, see *2.3.4.2.2 Steel Deck* on page 136 for additional information.
 - II.C.2.2.4. Where corrosion protective coverings have been damaged (e.g. galvanizing, galvannealing, shop paint, etc.), proper repair of protective coverings as indicated in approved construction documents. (NOTE: Repairs may not be required for small scratches for some coating treatments – verify with approved construction documents.)
 - II.C.2.2.5. Where dissimilar metals are in contact, specified separation method is provided (e.g. paint, grommet, etc.).
- II.D. Connections
 - II.D.1. All details constructed in the field.
 - II.D.2. Bolts, Nuts, Washers
 - II.D.2.1. Dimensional Requirements

STRUCTURAL SAFETY INSPECTION ITEMS

II.D.2.1.1. For anchor bolts connecting steel to concrete, types and sizes per requirements, including tolerances indicated in [IR 22-2](#).

II.D.2.2. Installation Requirements

II.D.2.2.1. Bolt locations

II.D.2.2.2. Hole size limitations (see Figure 2-45)



Figure 2-45: Oversized Torch Cut Hole

II.D.2.2.3. Washer requirements.

II.D.2.2.4. Placement (e.g. spacing and edge distance requirements).

II.D.3. Screws

II.D.3.1. Dimensional Requirements

II.D.3.2. Installation Requirements

II.D.3.2.1. Screws are installed and tightened per manufacturers recommendations.

II.D.3.2.2. Placement (e.g. spacing, edge, and end distances).

II.D.3.2.2.1 Where a larger than specified screws size is used, placement meets requirements for larger size.

II.D.3.2.3. Where screws carry tension, head and/or washers per requirements.

II.D.4. Welding

II.D.4.1. Before welding occurs:

II.D.4.1.1. Proper coordination between the fabricator's and welding inspector's schedules as part of the welding inspection program.

STRUCTURAL SAFETY INSPECTION ITEMS

II.D.4.1.2. Understand QA/QC program for welding and what requires special inspection – understand scope of welding special inspection.

II.D.4.1.3. While AWS-CWI monitors welders, project inspector monitors AWS-CWI.

II.D.4.1.4. WPS availability for each weld, including at location where welding occurs.

II.D.4.2. Field Welding

2.3.4.2.1 Cold Formed Steel Light Frame Construction

In addition to the information noted for 2.3.4.2 *Cold Formed Steel* on page 125, projects using cold formed steel light frame construction are generally governed by several referenced standards issued by the American Iron and Steel Institute (AISI; see <http://www.steel.org/>).

Specifically, those are listed below:

- 2007 North American Standard for Cold-Formed Steel Framing - General Provisions, AISI-S200-07
- 2007 North American Standard for Cold-Formed Steel Framing - Floor and Roof System Design, AISI-S210-07
- 2007 North American Standard for Cold-Formed Steel Framing - Wall Stud Design, AISI-S211-07
- 2007 AISI North American Standard for Cold-Formed Steel Framing - Header Design, AISI-S212-07
- 2007 AISI North American Standard for Cold-Formed Steel Framing - Truss Design, AISI S214-07

In addition to the information noted for 2.3.4.2 *Cold Formed Steel* on page 125, the following information applies to all cold formed steel light frame construction items on given project.

I. Receipt of documentation for constructed elements:

I.A. For proprietary cold formed steel products, refer to 1.3 *Proprietary Products* on page 40 for documentation and inspection requirements.

I.B. Material/Structural Test Documentation:

I.B.1. Framing Members

I.B.1.1. All materials are appropriately marked per requirements.

II. Inspection of the following items:

II.A. For proprietary cold formed steel products, refer to 1.3 *Proprietary Products* on page 40 for documentation and inspection requirements.

II.B. Framing Members

II.B.1. Dimensional requirements within specified tolerances.

II.B.2. Installation Requirements

STRUCTURAL SAFETY INSPECTION ITEMS

- II.B.2.1. Framing is not embedded within concrete unless specifically shown in the approved drawings and corresponding additional corrosion protection is provided.
- II.B.2.2. No field cutting, notching, boring, or patching of members is permitted, unless specifically shown on approved construction documents.
- II.B.2.3. Framing placement and spacing.
- II.B.2.4. Coordination with other trades:
 - II.B.2.4.1. Plumbing piping is provided with the specified isolative non-corrosive system to prevent galvanic reaction or abrasion between piping and framing.
 - II.B.2.4.2. Electrical wiring is in conduit or separated from framing with specified non-corrosive non-conductive materials or methods.
 - II.B.2.4.3. Where mineral fiber insulation is installed within framing depth, installation complies with requirements.

II.C. Connections:

- II.C.1. Fasteners' rust inhibitive coating per requirements.
- II.C.2. Screws
 - II.C.2.1. Dimensional Requirements
 - II.C.2.1.1. Size
 - II.C.2.1.2. Head (type and size)
 - II.C.2.1.3. Length
 - II.C.2.2. Installation Requirements
 - II.C.2.2.1. Placement
 - II.C.2.2.1.1 Screw extension through fastened pieces provides specified thread projection beyond joined piece surface (usually specified as a minimum of three (3) exposed threads), without causing separation between joined pieces.
 - II.C.2.3. Where stripped screws occur:
 - II.C.2.3.1. When in tension, they are **not permitted**.
 - II.C.2.3.2. When in shear, refer to approved construction documents for permitted usage of such fasteners.
 - II.C.2.4. Where gypsum board is applied to steel framing, bugle head style complies with requirements.

II.C.3. Welding

STRUCTURAL SAFETY INSPECTION ITEMS

II.C.3.1. Welded areas are treated as specified to provide specified corrosion resistance for original components (see Figure 2-46).



Figure 2-46: Example of Corrosion Protection at Welded Studs

2.3.4.2.1.1 Walls

For documentation requirements, refer to 2.3.4.2 *Cold Formed Steel* on page 125.

I. Inspection of the following items:

I.A. Bottom Track

I.A.1. Where walls occur, foundation at base track is level within specified tolerances.

I.A.2. Anchor bolts

I.A.2.1. Size

I.A.2.2. Embedment

I.A.2.3. Spacing

I.A.2.4. Placement

I.A.3. Work of other trades (e.g. mechanical/electrical/plumbing) does not alter (e.g. install notches, holes, etc.) bottom track unless specifically shown on approved drawings.

I.B. Studs

STRUCTURAL SAFETY INSPECTION ITEMS

I.B.1. Framing size and placement.

I.B.1.1. Header and jamb per requirements (see Figure 2-47 for an example of incorrect placement of multi-stud jamb leading to incorrect header support).



Figure 2-47: Single Jamb Supporting Header Insufficient - Multi-Stud Jamb Incorrect Location

I.B.2. End bearing/gap of studs per requirements, which may be different at curtain walls compared to other walls. Figure 2-48 shows an excessive gap for end bearing studs.

STRUCTURAL SAFETY INSPECTION ITEMS



Figure 2-48: Incorrect Gap for Stud Bearing

I.C. Top Track

I.C.1. Top track connection to stud and structure per requirements (e.g. at non-bearing walls, there is frequently an air gap specified to allow the floor/roof above to vertically deflect independent of the wall below).

I.C.2. Work of other trades (e.g. mechanical/electrical/plumbing) does not alter (e.g. install notches, holes, etc.) top track unless specifically shown on approved drawings.

I.D. All mechanical, electrical, and plumbing work is in place (see appropriate sections in *2.5 Non-Structural Component Support/Bracing/Anchorage* starting on page 159 and *5 OTHER BUILDING COMPONENTS AND SYSTEMS* starting on page 236 for additional information).

I.E. Wall Sheathing

I.E.1. Wood Structural Panels

I.E.1.1. See 2.3.3 *Wood* subsection *II.C Wood structural panels* on page 104 for requirements.

I.E.1.2. At wood structural panel shear walls, refer to 2.4.3.1 *Wood Structural Panel* on page 142 for additional documentation and inspection requirements.

I.E.2. Steel Sheet

I.E.2.1. At steel sheet shear walls, see 2.4.4.2.1 *Steel Sheet* on page 157 for additional requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

2.3.4.2.2 Floor/Roof

2.3.4.2.2.1 Studs, Joists, Rafters, Trusses

For documentation and inspection requirements, refer to *2.3.4.2 Cold Formed Steel* on page 125 and *2.3.4.2.1 Cold Formed Steel Light Frame Construction* on page 130.

I. Inspection of the following items:

I.A. Framing

I.A.1. Placement

I.A.2. Bearing per requirements.

I.A.3. Floor joist webs are not in direct contact with rim track webs unless specifically indicated as such in approved construction documents.

I.B. Trusses

I.B.1. Orientation for parallel chord members is per requirements indicated on the truss or approved drawings.

I.B.2. For trusses not bearing at the ends, bearing locations are marked on truss and visible during and after installation.

I.B.3. Where noted, truss bracing during and after installation is provided per approved drawings.

I.B.4. Locations of members within the truss assembly, including ends of adjacent members within the truss assembly, are within the specified limits per the requirements.

I.B.4.1. Where specified tolerances are exceeded or shop modification or repairs occurred, approval documentation is provided by the truss designer and reviewed and approved by DSA prior to truss installation.

I.B.5. Installation tolerances per approved construction documents.

I.B.5.1. Straightness

I.B.5.2. Plumbness

I.B.5.3. Top chord bearing trusses having a gap between the inside of the bearing and first diagonal or vertical within specified limits.

I.B.6. Field assembly per requirements.

I.B.7. Required repairs due to damage to trusses during shipping, storage, or installation procedures must be approved by the truss designer and reviewed and approved by DSA prior to repairing damaged trusses.

I.B.8. Where trusses, members, or connections were tested to determine their capability to support anticipated loads, test reports, stamped and signed by a licensed design professional, are provided and submitted to DSA for review and approval prior to truss installation.

I.C. All mechanical, electrical, and plumbing work is in place (see appropriate sections in *2.5 Non-Structural Component Support/Bracing/Anchorage* starting on page 159)

STRUCTURAL SAFETY INSPECTION ITEMS

and 5 OTHER BUILDING COMPONENTS AND SYSTEMS starting on page 236 for additional information).

2.3.4.2.2.2 Steel Deck

In addition to the information noted for 2.3.4.2 *Cold Formed Steel* on page 125, projects using steel deck are generally governed by the following referenced standards:

Referenced standards issued by the [Steel Deck Institute](http://www.sdi.org) (SDI; see <http://www.sdi.org>):

- 2006 [Standard for Non-Composite Steel Floor Deck, ANSI/SDI NC1.0-06](#)
- 2006 [Standard for Steel Roof Deck, ANSI/SDI RD1.0-06](#)

Referenced standard issued by ASCE:

- 1991 Standard for the Structural Design of Composite Slabs, ANSI/ASCE 3-91

A suggested reference for the inspection of composite slabs is issued by ASCE:

- 1991 Standard Practice for Construction and Inspection of Composite Slabs, ANSI/ASCE 9-91

The following information applies to all structural steel deck items on a given project.

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

I.A.1. When applicable, receipt of design professional reviewed structural steel deck shop drawings.

I.A.1.1. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents, they must be submitted to DSA for review and approval prior to installation of modified elements.

I.A.1.2. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.B. Material/Structural Test Documentation:

I.C. Special Inspection Documentation:

I.C.1. Special inspector to provide documentation for the following in the form of reports of tests performed and/or daily special inspection reports.

STRUCTURAL SAFETY INSPECTION ITEMS



Figure 2-49: Additional Top Seam Weld Due To Burn-Through

I.C.1.1. Connections

I.C.1.1.1. Welding:

I.C.1.1.1.1 Field Welding

I.C.1.1.1.1.1 End-welded stud installation (including bend test).

I.C.1.1.1.1.2 Floor and roof deck welds. See Figure



Figure 2-50: Good Deck Button Punch

STRUCTURAL SAFETY INSPECTION ITEMS

2-49 showing burn-through problems sometimes associated with deck welds top seam welds.

I.C.1.2. Upon completion of shop and/or field welding work, special inspector provides verified report ([DSA 292](#)).

II. Inspection of the following items:

II.A. Connections:

II.A.1. Deck puddle weld patterns per requirements.

II.A.2. Where button punch occurs, verify it engages both sides of seam – check indent and protrusion. See Figure 2-50.

II.A.3. Frequently, perimeter and corner connections are more tightly spaced at the perimeter and corners of the roof compared to the interior. Refer to approved construction documents for requirements.

II.B. Proper layout:

II.B.1. Proper welding at deck seam welds, especially where beams are parallel, based on requirements.

II.B.2. At skewed/non-parallel/non-perpendicular deck conditions, puddle welds per flute must be modified to match equivalent spacing along supporting member for non-skewed case (see Figure 2-51).



Figure 2-51: Skewed Deck Edge Modifies Perimeter Welding Requirements

II.B.3. Placement of welded studs, which can be affected by width of flute and location within flute, based on requirements.

II.B.4. If high flute occurs at welded studs where no detail is provided in the approved construction documents, a custom detail by the design

STRUCTURAL SAFETY INSPECTION ITEMS

professional will be required, which must be approved by DSA prior to installation.

II.C. Proper fit-up with support framing: check for weld burn-through where poor fit-up conditions occur (e.g. deck not flush on beam flange, etc.).

II.D. Proper coordination amongst trades:

II.D.1. All mechanical, electrical, and plumbing work is in place (see appropriate sections in *2.5 Non-Structural Component Support/Bracing/Anchorage* starting on page 159 and *5 OTHER BUILDING COMPONENTS AND SYSTEMS* starting on page 236 for additional information).

II.D.2. Conduit location in slab – if adjacent to studs reduces effective composite action (it negatively impacts ability to make a ‘T’ beam between steel beam and concrete slab – see Figure 2-53). Verify acceptability with design professional and DSA field engineer.

II.D.3. Proper locations for concrete inserts to avoid post-installed anchors into underside of deck. See Figure 2-52.



Figure 2-53: Conduit Causes Problems for Composite Action



Figure 2-52: Concrete Deck Insert

STRUCTURAL SAFETY INSPECTION ITEMS

2.4 Lateral Force Resisting Systems

While the lateral force resisting system has been separated from the gravity framing system in this manual, it is usually constructed simultaneously with it. Therefore, inspections for the lateral system must occur simultaneously with the gravity system. Prior to any lateral framing system item being inspected, generally speaking, all foundation system related items applicable to a given building or portion thereof (refer to 2.2 Foundation Systems on page 62 for further information) must be inspected for compliance with the approved construction documents by the project inspector. Refer to form [DSA 151](#) for requirements associated with advance notification to DSA for various foundation related construction items (e.g. concrete placement, etc.).

2.4.1 Concrete

For all concrete elements listed below, refer to appropriate section in 2.3.1 *Concrete*, starting on page 74 for documentation and inspection requirements.

2.4.1.1 Special Reinforced Shear Wall

I. Receipt of documentation for constructed elements:

I.A. Material/Structural Test Documentation:

I.A.1. Reinforcing steel per requirements.

I.A.2. Mechanical splices per requirements.

II. Inspection of the following items:

II.A. Proper installation of mechanical splices (see Figure 2-54).



Figure 2-54: Steel Reinforcing Mechanical Splices

STRUCTURAL SAFETY INSPECTION ITEMS

- II.A.1. Reinforcing clear cover is maintained at splices. (NOTE: DSA-SS clear cover requirements may not be mirrored in DSA-SS/CC projects – verify with approved construction documents.)
- II.B. At congested reinforcing areas (e.g. boundary elements), approved mix design with smaller aggregates is used. (NOTE: DSA-SS aggregate requirements may not be mirrored in DSA-SS/CC projects – verify with approved construction documents.)

2.4.1.2 Intermediate Precast Shear Wall

There are no additional requirements beyond those noted in other applicable sections.

2.4.1.3 Special Reinforced Moment Frame

I. Receipt of documentation for constructed elements:

- I.A. Material/Structural Test Documentation:
 - I.A.1. Reinforcing steel per requirements.
 - I.A.2. Mechanical splices per requirements.

II. Inspection of the following items:

- II.A. Proper installation of mechanical splices (see Figure 2-54).
 - II.A.1. Reinforcing clear cover is maintained at splices. (NOTE: DSA-SS clear cover requirements may not be mirrored in DSA-SS/CC projects – verify with approved construction documents.)
- II.B. At congested reinforcing areas (e.g. boundary elements), approved mix design with smaller aggregates is used. (NOTE: DSA-SS aggregate requirements may not be mirrored in DSA-SS/CC projects – verify with approved construction documents.)
- II.C. Reinforcing layout adjacent to moment frame members per requirements. “The more the better” does not necessarily apply to reinforcing in and nearby moment frame beams.
 - II.C.1. If approved drawings indicate non-moment frame beams framing into moment frame columns with hooked bars into the column, verify non-moment frame reinforcing does not extend into moment frame beam.
 - II.C.2. Slab reinforcing adjacent to moment frame beam complies with specified spacing and clearances.

2.4.2 Masonry

2.4.2.1 Special Reinforced Shear Wall

Refer to 2.3.2 *Masonry* on page 89 for documentation and inspection requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

2.4.3 Wood

2.4.3.1 Wood Structural Panel

In addition to the California Building Code, projects using wood structural panel based seismic force resisting systems are also governed by the seismic design reference standard issued by the AF&PA through the AWC:

- Special Design Provisions for Wind and Seismic (SDPWS), ANSI/AF&PA SDPWS

2.4.3.1.1 Light Wood Framing

I. Receipt of documentation for constructed elements: Refer to section 2.3.3 *Wood* on page 96 for documentation and inspection requirements.

II. Inspection of the following items:

II.A. Framing

II.A.1. Refer to section 2.3.3 *Wood* subsection *II Inspection of the following items:* on page 100 for wood framing inspection requirements.

II.B. Wood Structural Panel

II.B.1. Refer to section 2.3.3 *Wood* subsection *II.C Wood structural panels* on page 104 for inspection requirements.

II.B.2. Wood structural panels used for diaphragms or shear walls are attached directly to framing.

II.B.2.1. EXCEPTION: Panels can be applied over solid planking or laminated decking provided the panel joints do not coincide with the planking/decking joints.

II.B.3. Diaphragms

II.B.3.1. Framing and straps at openings per requirements.

II.B.3.2. Where drag lines or concrete/masonry wall out-of-plane anchorage occurs, framing and straps/connections comply with requirements.

II.B.3.2.1. At I-joists and SCL drag-line framing, verify nail spacing is not less than allowed in ICC ES report.

II.B.3.3. At diaphragm interior drag lines, two lines of boundary nailing may be required based on approved drawings.

II.B.3.4. Blocked diaphragms

II.B.3.4.1. Framing

II.B.3.4.1.1 Blocking/framing at all panel edges.

II.B.3.4.1.2 Minimum blocking/framing size at boundaries and adjoining panel edges where specified.

II.B.3.4.2. Nailing

II.B.3.4.2.1 Field nail spacing.

STRUCTURAL SAFETY INSPECTION ITEMS

- II.B.3.4.2.2 Staggered nailing at all panel edges when indicated in approved construction documents.
- II.B.3.5. Unblocked diaphragms
 - II.B.3.5.1. Minimum panel dimension per requirements.
 - II.B.3.5.2. All other requirements as for blocked diaphragms, except for blocking at panel edges.
- II.B.3.6. High Load Blocked Multi-Row Fastener Diaphragms
 - II.B.3.6.1. Framing
 - II.B.3.6.1.1 Blocking/framing at all panel edges.
 - II.B.3.6.1.2 Minimum blocking/framing size at boundary members and adjoining panel edges.
 - II.B.3.6.2. Nailing
 - II.B.3.6.2.1 Field Nail Spacing
 - II.B.3.6.2.2 Staggered nailing at all panel edges when indicated in approved construction documents.
 - II.B.3.6.2.3 Nail spacing and edge distances at multi-row fastener lines per requirements.
- II.B.4. Shear Walls
 - II.B.4.1. Length
 - II.B.4.2. Type
 - II.B.4.3. Panel orientation (panels may need to be oriented perpendicular to the stud framing to achieve necessary load capacities).
 - II.B.4.4. **All** openings or penetrations (e.g. electrical panel, fire extinguisher, ducts, windows, etc.) in shear wall are explicitly shown on DSA approved drawings. Any opening not shown must be approved by the design professional and DSA prior to installation.
 - II.B.4.5. Framing
 - II.B.4.5.1. Blocking/framing is required at all panel edges; unblocked shear walls are not permitted.
 - II.B.4.5.2. End studs/posts have full end bearing.
 - II.B.4.5.3. Minimum blocking/framing size at chord members and adjoining panel edges.
 - II.B.4.5.4. Sill plate
 - II.B.4.5.4.1 Refer to shear wall schedule for shear transfer information at bottom of wall. Verify fastener/connector:
 - II.B.4.5.4.1.1 Type
 - II.B.4.5.4.1.2 Size
 - II.B.4.5.4.1.3 Spacing
 - II.B.4.5.4.2 Anchor bolt requirements
 - II.B.4.5.4.2.1 Refer to 2.3.3.1 *Walls* subsection *II.C.4* on page 104 for inspection requirements.
 - II.B.4.5.4.2.2 Dimensional Requirements

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.4.5.4.2.3 Installation Requirements

II.B.4.5.4.2.3.1 Bolt hole tolerance

II.B.4.5.4.2.3.2 Plate washer dimensions per requirements.

Table A2 Standard Cut Washers

Nominal Washer Size (in.)	Dimensions of Standard Cut Washers ¹		
	A	B	C
	Inside Diameter (in.)	Outside Diameter (in.)	Thickness (in.)
	Basic	Basic	Basic
3/8	0.438	1.000	0.083
1/2	0.562	1.375	0.109
5/8	0.688	1.750	0.134
3/4	0.812	2.000	0.148
7/8	0.938	2.250	0.165
1	1.062	2.500	0.165

1. For other standard cut washers, see ANSI/ASME B18.22.1. Tolerances are provided in ANSI/ASME B18.22.1.

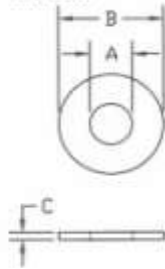


Table 2-6: Standard Cut Washer Dimensions

II.B.4.5.4.2.3.2.1 The exception noted in section 4.3.6.4.3 of 2008 SDPWS (i.e. allowance for standard cut washers in lieu of plate washers - see Table 2-6 taken from Table A2 on p. 42 of 2008 SDPWS) is **not permitted** (CBC [2305.1.2 #3](#)).

II.B.4.5.4.2.3.3 The anchor bolt plate washer edge is within specified limits of the sill edge having wall sheathing attachment when specifically noted (see Figure 2-55 for commonly specified requirements).

II.B.4.5.4.2.3.4 Anchor bolt placement with respect to concrete edge dimensions.

STRUCTURAL SAFETY INSPECTION ITEMS

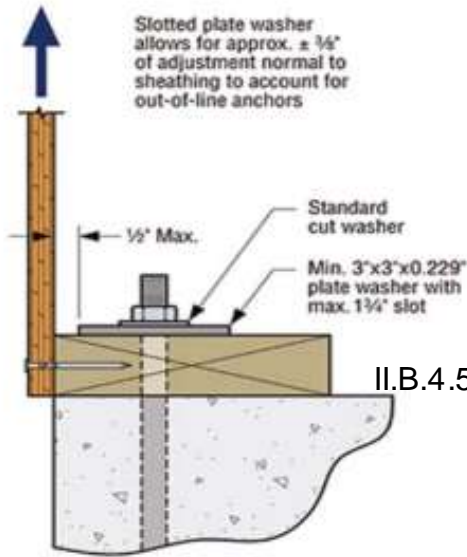


Figure 2-55: Special A.B. Washer Plate Placement Requirements

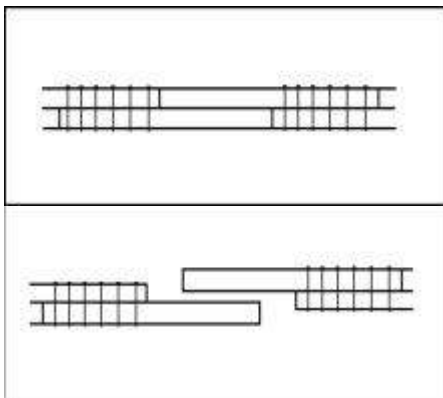


Figure 2-56: Top Plate Splice Connection Problems

II.B.4.5.4.2.4 If sill plate is split, repair must be provided by design professional and reviewed and approved by DSA.

II.B.4.5.4.3 At elevated floor levels, sill fasteners must penetrate framing/blocking below to meet requirements (e.g. if 3x sill is used with nails, 20d rather than 16d may be required to ensure proper penetration – pre-drilling may be required to avoid splits).

II.B.4.5.4.4 Other shear transfer connections.

II.B.4.5.5. Top plate

II.B.4.5.5.1 Refer to shear wall schedule in the approved construction documents for top-of-wall shear transfer connection requirements.

II.B.4.5.5.2 Top plate splice (see Figure 2-56 for example of improper splice causing load path problems).

II.B.4.5.5.2.1 Where proprietary connections are shown, installation complies with requirements (e.g. steel strap size, location with respect to splice, nail type and size, etc.).

II.B.4.5.5.2.2 Splice connections occur wherever top plate is interrupted by beams, perpendicular walls, etc. – these can occur away from shear wall locations along drag lines.

II.B.4.5.5.3 At floor/roof attic space, shear wall extends to underside of floor/roof sheathing above. Refer to approved plans for special shear transfer details at such conditions, for both framing parallel and perpendicular to wall.

II.B.4.5.5.4 Other shear transfer connections.

II.B.4.6. Nailing

II.B.4.6.1.1 Field nail spacing.

II.B.4.6.1.2 Placement of edge nailing around perimeter of each panel piece.

II.B.4.6.1.3 Edge nailing location at perimeter of wall.

II.B.4.6.1.3.1 Nailing to rim joist/blocking or upper top plate, unless double top plates nailed throughout length to transfer shear loads.

II.B.4.6.1.3.2 Top of wall shear transfer connections/nailing per requirements. Where proprietary clips occur, nailing and installation per requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.4.6.1.3.3 Full height edge nailing to posts/studs with hold-down devices.

II.B.4.6.1.3.4 Non-typical/special locations identified in the DSA approved structural drawings (e.g. drag strap and blocking conditions, etc.).

II.B.4.7. Hold-downs

II.B.4.7.1. Type

II.B.4.7.2. Location

II.B.4.7.3. Fastener type and size

II.B.4.7.4. Hold-off distance to sill pates

II.B.4.7.5. Installation complies with ICC ES report.

II.B.4.7.5.1 All nuts tightened (but not over-torqued based on ICC ES report) prior to closing in.

II.B.4.7.5.2 Surrounding framing has not been negatively impacted or altered to accommodate hold-down device (see Figure 2-57).

II.B.4.7.6. At floor-to-floor conditions with steel straps, strap location ensures equal distribution of nailing into top and bottom wall framing.

II.B.4.7.7. Anchor rod

II.B.4.7.7.1 Hold-down anchor rod does not replace anchor bolt.

II.B.4.7.7.2 Anchor rod is not bent.

II.B.4.7.7.3 Length of rod complies with maximum limits shown in drawings or specified in ICC ES (or other DSA recognized agency) report.

II.B.4.7.8. Where through-bolt hold-down devices are used:

II.B.4.7.8.1 No countersinking occurs unless specifically detailed on DSA approved drawings.

II.B.4.7.8.2 Hole tolerance

II.B.4.7.8.3 Washer between nut and wood on opposite side of hold-down.

II.B.4.7.9. Post/stud size and grade, which may be different than typical framing.

II.B.4.7.10. Panel edge nailing full height on post/studs with hold-down.

II.B.4.8. Special requirements at high-wind regions

II.B.4.8.1. Nailing spacing

II.B.4.8.2. Panel thickness

II.B.4.8.3. Panel strength orientation parallel to studs (rather than perpendicular).



Figure 2-57: Hold-Down Construction Problems

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.4.8.4. When openings interrupt wall sheathing, framing connections comply with requirements to transfer uplift around opening.

II.B.4.8.5. Sheathing extends to upper top plate and bottom sill with nailing at specified dimensions (see Figure 2-58 taken from Figure 4G of 2008 SDPWS for commonly specified nailing dimensions).

Figure 4G Panel Attachment

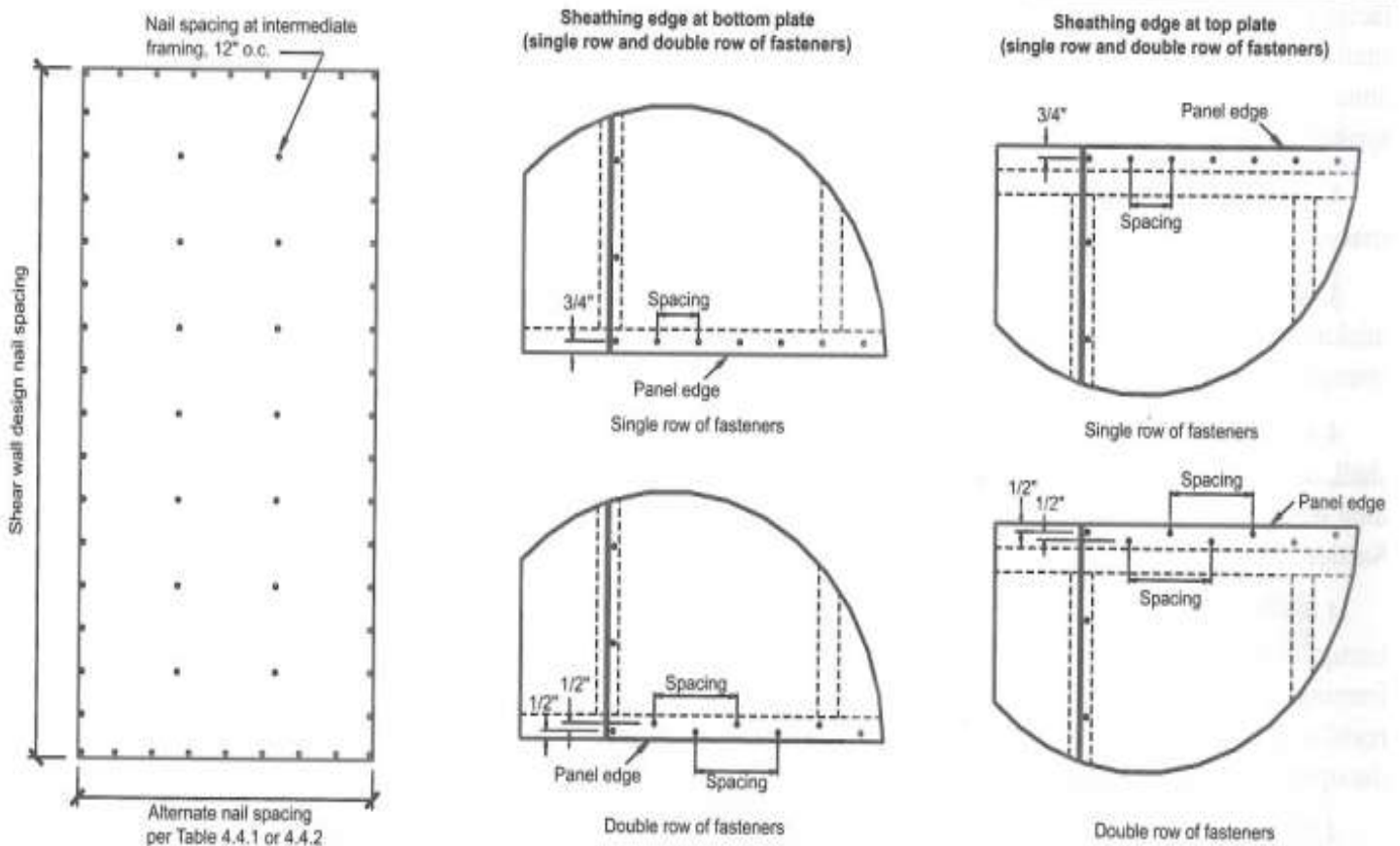


Figure 2-58: Wind Uplift – Commonly Specified Nail Edge Distances at Wood Structural Panel

II.B.4.8.6. Roof/upper floor uplift connections occur on the sheathed side unless approved details address twisting caused by eccentric load path.

II.B.4.8.7. Anchorage of sill plate per requirements.

II.B.4.8.7.1 Where anchor bolts are used, washer plates per subsection II.B.4.5.4.2.3.2 and II.B.4.5.4.2.3.3 on page 144 above are provided, regardless of wall loading or capacity.

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.4.8.7.2 Where other anchorage devices are used, they occur on the sheathed side.

2.4.3.1.2 Cold Formed Steel Light Frame Construction

The majority of requirements specific to light wood framing given in *2.4.3.1.1 Light Wood Framing* on page 142 also apply to cold formed steel light frame construction. In addition, refer to relevant portions contained in *2.4.4.2 Cold Formed Steel Light Frame Construction* on page 156. There are no additional requirements beyond those noted.

2.4.4 Steel

2.4.4.1 Structural Steel

In addition to the California Building Code, projects using structural steel as part of the seismic load resisting system are generally governed by the following referenced standard issued by the AISC:

- Seismic Provisions for Structural Steel Buildings, ANSI/AISC 341. When published, supplements to the Provisions become part of that recognized standard (e.g. there was Supplement No. 1 issued for ANSI/AISC 341-05: ANSI/AISC 341s1-05).

Another referenced standard for projects using a particular kind of seismic load resisting system, steel moment frames, is used. Refer to *2.4.4.1.1 Moment Frame* on page 149 for further information if the project has such systems.

For welding of components in seismic lateral force resisting systems, the following reference standard issued by AWS also applies:

- D1.8 – Structural Welding Code – Seismic Supplement

For all structural steel lateral force resisting systems, the following applies:

I. Receipt of documentation for constructed elements:

I.A. Material/Structural Test Documentation:

I.A.1. Weld filler metal for connections that are part of the SLRS comply with requirements.

I.A.1.1. At demand critical welds, weld filler metal complies with additional requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

I.A.2. Connections:

I.A.2.1. Welding:

I.A.2.1.1. Non-Destructive Testing (NDT)

I.A.2.1.1.1 Refer to [IR 17-2](#) for NDT requirements.

I.A.2.1.1.2 Ultrasonic

I.A.2.1.1.3 Magnetic Particle

I.B. Special Inspection Documentation:

I.B.1. Connections:

I.B.1.1. HSB

I.B.1.1.1. Documentation as prescribed in the Quality Control (QC) and Quality Assurance (QA) plan.

I.B.1.2. Welding:

I.B.1.2.1. Documentation as prescribed in the Quality Control (QC) and Quality Assurance (QA) plan.

I.B.1.2.2. Where Non-Destructive Testing (NDT) occurs, documentation as prescribed in the Quality Control (QC) and Quality Assurance (QA) plan. See Figure 2-59 for an example of a welding special inspector mark associated with NDT.

I.B.1.2.2.1 Testing personnel certification that meets or exceeds American Society for Non-destructive Testing SNT-TC-1A or CP-189.

I.B.1.2.2.2 Ultrasonic Testing (UT)

I.B.1.2.2.2.1 Verify certification of NDT level II or better for inspectors and of NDT level III for LEA Lab administrator (see [IR 17-2](#) for additional information).

I.B.1.2.2.2.2 Verify UT technicians have flaw detection certification.



Figure 2-59: NDT Special Inspector Markings

II. Inspection of the following items:

I.A. Where specifically noted, maintenance of protected zones throughout all phases of construction, including for work occurring after lateral frame installation, as shown on approved drawings.

I.B. Where continuity plates and stiffeners occur, geometry and fit-up per requirements.

2.4.4.1.1 Moment Frame

In addition to the California Building Code, projects using structural steel moment frames as part of the seismic load resisting system are generally governed by the following referenced standards issued by the AISC:

- 2005 Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications, ANSI/AISC 358-05

STRUCTURAL SAFETY INSPECTION ITEMS

- 2005 Supplement No. 1 to ANSI/AISC 358-05 Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications, ANSI/AISC 358-05s1-09

Some background to the fabrication and seismic performance of structural steel moment frames is worth noting. In the mid-1960s, the construction industry moved to the use of the semi-automatic, self-shielded, flux-cored arc welding process (FCAW-S) for making the joints of these connections. The welding consumables that building erectors most commonly used inherently produced welds with very **low toughness**. The toughness of this material could be further compromised by excessive deposition rates, which unfortunately were commonly employed by welders. As a result, brittle fractures could initiate in welds with large defects, at stresses approximating the yield strength of the beam steel, precluding the development of ductile behavior.

Early steel moment frames tended to be highly redundant and nearly every beam-column joint was constructed to behave as part of the lateral-force-resisting system. As a result, member sizes in these **early frames were small and much of the early acceptance testing of this typical detail was conducted with specimens constructed of small framing members**. As the cost of construction labor increased, the industry found that it was more economical to construct steel moment-frame buildings by moment-connecting a relatively small percentage of the beams and columns and by using larger members for these few moment-connected elements. The amount of strain demand placed on the connection elements of a steel moment frame is related to the span-to-depth ratio of the member. Therefore, as member sizes increased, strain demands on the welded connections also increased, making the connections more susceptible to brittle behavior.

In the 1960s and 1970s, when much of the initial research on steel moment-frame construction was performed, beams were commonly fabricated using A36 material. In the 1980s, many steel mills adopted more modern production processes, including the use of scrap-based production. Steels produced by these more modern processes tended to include micro-alloying elements that increased the strength of the materials so that despite the common specification of A36 material for beams, many beams actually had yield strengths that approximated or exceeded that required for grade 50 material. As a result of this increase in base metal yield strength, the weld metal in the beam-flange-to-column-flange joints became under-matched, potentially contributing to its vulnerability.

STRUCTURAL SAFETY INSPECTION ITEMS

2.4.4.1.1.1 Special Moment Frame (SMF)

I. Receipt of documentation for constructed elements:

I.A. Proprietary Products

I.A.1. For proprietary connections not recognized by AISC 358-05 or AISC 358-10, but do have approval by a recognized agency, refer to *1.3 Proprietary Products* on page 40.

I.B. Shop Drawings

I.B.1. Proprietary Connections: Some proprietary connections will include shop drawings from a fabricator other than the primary structural steel supplier. Receipt of all design professional reviewed shop drawings is required. The following is a list of some proprietary products that may have shop drawings for the moment frame connections that are separate from the primary structural steel supplier:

I.B.1.1.1. CONXL

I.B.1.1.2. Kaiser Bolted Bracket

I.B.1.1.3. SlottedWeb

I.B.1.1.4. SidePlate

I.B.2. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents must be approved by the design professional in responsible charge and submitted to and approved by DSA.

I.B.3. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.C. Material/Structural Testing Documentation:

I.C.1. Proprietary Connections

I.C.1.1. CONXL

I.C.1.1.1. Collar assembly component forging certification per AISC 358-10 Appendix B, Section B7.

I.C.1.1.2. Collar connection HSB per requirements.

I.D. Special Inspection Documentation:

I.D.1. Welder Qualifications:

I.D.1.1. Applicable to the following types of prequalified moment connections

I.D.1.1.1. Reduced Beam Section (RBS)

I.D.1.1.2. Welded Unreinforced Flange-Welded Web (WUF-W)

I.D.1.2. Supplemental welder qualification certification for Restricted Access Welding.

I.D.2. Prequalified Moment Connections:

I.D.2.1. Reduced Beam Section (RBS)

I.D.2.1.1. Flange cut smoothness

I.D.2.1.2. Proper repair of any gouges or notches in beam.

STRUCTURAL SAFETY INSPECTION ITEMS

I.D.2.2. Bolted Unstiffened and Stiffened Extended End-Plate (BUEEP, BSEEP)

I.D.2.2.1. Demand critical weld inspection of beam flange to end-plate.

I.D.2.2.2. End plate stiffener welds comply with requirements (e.g. either complete joint penetration (CJP) or fillet based on approved construction documents).

I.D.2.3. CONXL

I.D.2.3.1. HSB installation.

II. Inspection of the following items:

II.A. Maintenance of protected zone.

II.B. Testing and inspection of demand critical welds as specified in approved construction documents (e.g. column base, beam-to-column, etc.).

II.C. Where specified on approved construction documents, verify the following complies with requirements:

II.C.1. Beam top and bottom flange lateral bracing along beam length.

II.C.2. Continuity plate size, thickness, and welding to column.

II.C.3. Column web doubler plate size, thickness, and welding to column.

II.D. Prequalified Moment Connections:

II.D.1. Reduced Beam Section (RBS)

II.D.1.1. Reduced section dimensions (e.g. commonly specified in the drawings as dimensions "a," "b," and "c").

II.D.1.2. Weld access hole geometry.

II.D.1.3. CJP welds are special inspected according to demand critical requirements.

II.D.1.4. Steel Backing

II.D.1.4.1. Attached to column only.

II.D.1.4.2. Bottom flange steel backing is removed.

II.D.1.5. Weld tabs and end dams.

II.D.1.5.1. Weld tabs used for end dams during welding.

II.D.1.5.2. Upon welding completion, weld tabs and end dams removed.

II.D.2. Bolted Unstiffened and Stiffened Extended End-Plate (BUEEP, BSEEP)

II.D.2.1. No weld access hole is permitted in the beam web.

II.D.2.2. No backing is present for beam flange CJP welds to end plate.

II.D.2.3. High-strength bolts (HSB) at the connection (e.g. A325 or A490). Refer to 2.3.4.1 *Structural Steel* on page 116 for documentation and special inspection requirements for HSB.

II.D.2.3.1. Where used, verify finger shims between end plate and column flange comply with requirements.

II.D.2.4. At composite slab construction:

II.D.2.4.1. No headed shear stud connections within 1 ½ times the beam depth.

STRUCTURAL SAFETY INSPECTION ITEMS

II.D.2.4.2. Verify specified gap between concrete slab and both sides of column flanges is present.

II.D.2.4.2.1 EXCEPTION: This gap may be filled with a compressible material in compliance with requirements.

II.D.3. Bolted Flange Plate (BFP)

II.D.3.1. A490 bolts at the connection. Refer to 2.3.4.1 *Structural Steel* on page 116 for documentation and special inspection requirements for HSB.

II.D.4. Welded Unreinforced Flange-Welded Web (WUF-W)

II.D.4.1. Weld access hole geometry.

II.D.4.2. Where weld tabs are used, they are removed after welding.

II.D.4.3. Complete joint penetration (CJP) welds are special inspected according to demand critical requirements.

II.D.5. Kaiser Bolted Bracket (KBB)

II.D.5.1. A490 bolts at the connection. Refer to 2.3.4.1 *Structural Steel* on page 116 for documentation and special inspection requirements for HSB.

II.D.5.2. At concrete slab construction:

II.D.5.2.1. Specified gap between concrete slab and both sides of column flanges is present.

II.D.5.2.1.1 EXCEPTION: This gap may be filled with a compressible material in compliance with requirements.

II.D.5.2.2. No reinforcing may pass through the specified gap.

II.D.6. CONXL.

II.D.6.1. Though the CONXL connection is not listed as one of the connections in AISC 358-05, it is in AISC 358-10 and is accepted by DSA currently.

II.D.6.2. For concrete filled columns, refer to 2.3.1.1 *Cast In Place (CIP) Concrete* on page 74.

II.D.6.2.1. The approved construction documents may allow an exception for the concrete to free fall the full height of the column.

II.D.6.2.2. Confirm concrete fill per requirements:

II.D.6.2.2.1 Weight

II.D.6.2.2.2 Strength

II.D.6.3. Collar Connection

II.D.6.3.1. HSB installation per requirements

II.D.6.4. Beam does not have any web weld access holes.

II.D.6.5. At concrete slab construction:

II.D.6.5.1. Specified gap between concrete slab and both sides of column flanges is present.

STRUCTURAL SAFETY INSPECTION ITEMS

II.D.6.5.1.1 EXCEPTION: This gap may be filled with a compressible material in compliance with requirements.

II.D.6.5.2. No reinforcing may pass through the specified gap.

2.4.4.1.1.2 Intermediate Moment Frame (IMF)

I. Inspection of the following items:

- I.A. Maintenance of protected zone.
- I.B. Testing and inspection of demand critical welds.
- I.C. Where specified on the approved construction documents, verify the following complies with requirements:
 - I.C.1. Beam top and bottom flange lateral bracing along beam length.
 - I.C.2. Continuity plate size, thickness, and welding to column.
 - I.C.3. Column web doubler plate size, thickness, and welding to column.
- I.D. Prequalified Moment Connections:
 - I.D.1. Refer to requirements in SMF.

2.4.4.1.1.3 Ordinary Moment Frame (OMF)

I. Inspection of the following items

- I.A. Geometry of beam web weld access hole at beam-column connection.
- I.B. Testing and inspection of demand critical welds.
- I.C. Where specified on the approved construction documents, verify the following complies with requirements:
 - I.C.1. Beam top and bottom flange lateral bracing along beam length.
 - I.C.2. Continuity plate size, thickness, and welding to column.
 - I.C.3. Column web doubler plate size, thickness, and welding to column.

2.4.4.1.1.4 Special Truss Moment Frame (STMF)

I. Inspection of the following items:

- I.A. Maintenance of protected zone.

2.4.4.1.2 Braced Frame

For all braced frames, the following applies:

I. Receipt of documentation for constructed elements:

- I.A. Material/Structural Test Documentation:
 - I.A.1. Gusset material matches requirements (e.g. frequently gusset plate material strengths exceed typical steel plate requirements).

STRUCTURAL SAFETY INSPECTION ITEMS

II. Inspection of the following items:

II.A. For HSS braces:

II.A.1. Erection bolt does not “clamp” closed the slot at the gusset (see Figure 2-60).



Figure 2-60: Erection Bolt Closing HSS Gap

2.4.4.1.2.1 Special Concentric Braced Frame (SCBF)

I. Inspection of the following items:

I.A. For HSS braces:

I.A.1. Dimensions and location of brace slot and cover plate with respect to gusset.

I.B. Where gusset plates interact with concrete construction, gap between gusset plate (and brace, where applicable) and concrete construction complies with requirements. See Figure 2-61.



Figure 2-61: Concrete Slab at Gusset Plate

STRUCTURAL SAFETY INSPECTION ITEMS

I.C. Maintenance of protected zone.

2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF)

There are no additional requirements beyond that noted applicable to all braced frames.

2.4.4.1.2.3 Eccentric Braced Frame (EBF)

I. Inspection of the following items:

I.A. Maintenance of protected zone.

I.B. Testing and inspection of demand critical welds.

2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF)

I. Inspection of the following items:

I.A. Maintenance of protected zone.

2.4.4.1.3 Special Plate Shear Wall (SPSW)

I. Inspection of the following items:

I.A. Testing and inspection of demand critical welds.

2.4.4.1.4 Cantilever Column Systems

Based on the design methodology used (e.g. cantilever column system detailed to conform to the requirements for: special, intermediate, or ordinary steel moment frames; special reinforced concrete moment frames) for the cantilever columns system will dictate what requirements apply. Refer to the approved drawings for which system is applicable and then to the appropriate sections in this document.

2.4.4.2 Cold Formed Steel Light Frame Construction

In addition to the information noted for 2.3.4.2 *Cold Formed Steel* on page 125, projects using cold formed steel light frame construction are generally governed by several referenced standards issued by the American Iron and Steel Institute (AISI; see <http://www.steel.org/>). Specifically, those are listed below:

STRUCTURAL SAFETY INSPECTION ITEMS

- North American Standard for Cold-Formed Steel Framing - Lateral Design, with Supplement No. 1, AISI S213-07-S1-09

In addition to the information noted for 2.3.4.2 *Cold Formed Steel* on page 125 and the relevant subsections, the following information applies to all lateral force resisting cold formed steel light frame construction items on given project.

I. Receipt of documentation for constructed elements:

- I.A. For proprietary cold formed steel products, refer to 1.3 *Proprietary Products* on page 40 for documentation and inspection requirements.
- I.B. Material/Structural Test Documentation:
 - I.B.1. Framing Members
 - I.B.1.1. Framing members comply with additional material requirements associated with lateral force resisting systems.

II. Inspection of the following items:

- II.A. For proprietary cold formed steel products, refer to 1.3 *Proprietary Products* on page 40 for documentation and inspection requirements.
- II.B. Panels
 - II.B.1. Minimum panel width per requirements.
 - II.B.2. Wood structural panels
 - II.B.2.1. Refer to 2.4.3.1 *Wood Structural Panel* on page 142 for documentation and inspection requirements.
- II.C. Fasteners
 - II.C.1. Screws
 - II.C.1.1. Dimensional Requirements
 - II.C.1.1.1. Size
 - II.C.1.1.2. Head type and size
 - II.C.1.1.2.1 At exterior walls exposed to wind suction additional screw head requirements may apply per approved construction documents.

2.4.4.2.1 Steel Sheet

I. Receipt of documentation for constructed elements:

- I.C. For proprietary cold formed steel products, refer to 1.3 *Proprietary Products* on page 40 for documentation and inspection requirements.
- I.D. Material/Structural Test Documentation:
 - I.D.1. Sheet Steel

II. Inspection of the following items:

- II.A. For proprietary cold formed steel products, refer to 1.3 *Proprietary Products* on page 40 for documentation and inspection requirements.
- II.B. Fasteners

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.1. Type

II.B.2. Size

II.B.3. Placement

2.4.4.2.2 Steel Flat Strap Bracing

Refer to 2.3.4.2 *Cold Formed Steel* on page 125 and other appropriate sections above for documentation and inspection requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

2.5 Non-Structural Component Support/Bracing/Anchorage

For all non-structural components, proper support/bracing/anchorage to the primary or secondary structural framing is crucial. The approved construction documents provide the relevant details showing this information.

Prior to any non-structural component support/bracing/anchorage item being inspected, generally speaking, the gravity and lateral system related items applicable to a given building or portion thereof (refer to *2.3 Gravity Framing Systems* on page 74 and *2.4 Lateral Force Resisting Systems* on page 140 for further information) must be inspected for compliance with the approved construction documents by the project inspector.

2.5.1 Mechanical/Electrical/Plumbing Equipment

For mechanical, plumbing, and kitchen and food service equipment, a standard often used for support and bracing for the ductwork, piping, and equipment for DSA projects is issued by the [Sheet Metal And Air Conditioning Contractor's National Association](http://www.smacna.org) (SMACNA, see <http://www.smacna.org>). Specifically, those are listed below:

- Seismic Restraint Manual: Guidelines for Mechanical Systems
- Kitchen Ventilation Systems and Food Service Equipment Guidelines

The following information applies to all mechanical/electrical/plumbing equipment.

I. Receipt of documentation for constructed elements:

I.A. Product “cut sheets” showing delivered equipment complies with requirements.

I.B. Post-installed anchors:

I.B.1. For both masonry and concrete construction, refer to the post-installed anchor section in *2.3.1.1 Cast In Place (CIP) Concrete* subsection *I.B.3 Post-installed anchors*: on page 76.

II. Inspection of the following items:

II.A. Proper storage and handling of equipment.

II.B. Fasteners

II.B.1. Size, type, and placement of connections/fasteners of equipment to structure.

II.C. Post-installed anchors and connections.

II.C.1. For both masonry and concrete construction, refer to the post-installed anchor section in *2.3.1.1 Cast In Place (CIP) Concrete* subsection *II.F Post-installed anchors and connections*: on page 82.

STRUCTURAL SAFETY INSPECTION ITEMS

2.5.1.1 Floor/Roof Mounted

For composite base HVAC units, refer to [IR 16-6](#) for additional anchorage documentation and inspection requirements and restrictions.

2.5.1.2 Wall Mounted

There are no additional documentation or inspection requirements beyond the information given in other sections in this manual.

2.5.1.3 Suspended/Hung

Pendant light fixtures and similar types of equipment provide a potential hazard for occupants during a seismic event if they are not properly braced (see Figure 2-62). Such hung



Figure 2-62: Pendant Lights Missing Safety Cables

equipment can sway and contact other adjacent equipment or structure, which could lead to falling hazards. [IR 16-9](#) has general design requirements for pendant lights. There are no additional documentation or inspection requirements beyond the information given in other sections in this manual.

STRUCTURAL SAFETY INSPECTION ITEMS

2.5.2 Architectural Items

2.5.2.1 Walls

Refer to other sections above and below (e.g. 3.3.5.1 *Walls* on page 197) for documentation and inspection requirements depending on the wall type. For all walls, verify that the top and bottom connection of the wall, and at each floor level if the wall runs past the floor/roof, comply with requirements.

2.5.2.1.1 Interior

I. Receipt of documentation for constructed elements:

- I.A. For documentation requirements, refer to the applicable sections above and below based on applicable construction materials.
- I.B. Finish Material Documentation
 - I.B.1. Receipt of bill of material or equivalent information for finish materials.

II. Inspection of the following items:

- II.A. For framing inspection requirements, refer to respective sections above and below.
- II.B. Finish Material
 - II.B.1. Placement
 - II.B.2. Installation
 - II.B.2.1. Fasteners
 - II.B.2.1.1. Type
 - II.B.2.1.2. Size
 - II.B.2.1.3. Spacing
 - II.B.2.2. Taping
 - II.B.2.3. Caulking
 - II.B.2.4. Accessories

2.5.2.1.1.1 Casework/Lockers

I. Inspection of the following items:

- I.A. Support and anchorage of casework.
 - I.A.1. Verify separate fasteners attach casework backing to casework.
 - I.A.1.1. Fasteners used for attaching casework through backing should have only one faying surface.
 - I.A.2. Fasteners between casework/lockers to structure.
 - I.A.2.1. Size
 - I.A.2.2. Type
 - I.A.2.3. Placement
- I.B. Post-installed anchors and connections.

STRUCTURAL SAFETY INSPECTION ITEMS

- I.B.1. For both masonry and concrete construction, refer to the post-installed anchor section in *2.3.1.1 Cast In Place (CIP) Concrete* subsection *I.B.3 Post-installed anchors*: on page 76 and *II.F Post-installed anchors and connections*: on page 82.

2.5.2.1.1.2 Glass Panel Railing

Refer to the project approved [DSA 103](#) form to determine whether glass panel railing testing is required. If it is, refer to the approved construction documents and [IR 24-1](#) for testing documentation requirements which must be received by the project inspector prior to railing installation.

2.5.2.1.2 Exterior

In addition to the information in this section, see *2.6.1.2 Exterior Walls* on page 171 for additional information.

2.5.2.1.2.1 Veneer OR Glass Block

I. Receipt of documentation for constructed elements:

I.A. Shop Drawings:

- I.A.1. When applicable, receipt of design professional reviewed steel reinforcing shop drawings.
- I.A.2. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents, they must be submitted to DSA for review and approval prior to installation of modified elements.
- I.A.3. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.B. Material/Structural Test Documentation:

- I.B.1. Test veneer bond strength.
- I.B.2. Upon completion of all testing, the DSA approved laboratory provides a verified report ([DSA 291](#)).

I.C. Special Inspection Documentation

- I.C.1. Masonry special inspector to provide documentation for the following in the form of reports of tests performed and/or daily special inspection reports
 - I.C.1.1. Proportions of site-prepared, premixed or preblended:
 - I.C.1.1.1. Mortar
 - I.C.1.1.2. Grout
 - I.C.1.2. Inspect placement of:

STRUCTURAL SAFETY INSPECTION ITEMS

- I.C.1.2.1. Steel reinforcement
- I.C.1.2.2. Connectors
- I.C.1.2.3. Anchors
- I.C.1.2.4. Masonry units
- I.C.1.3. Construction of mortar joints.
- I.C.1.4. Verify protection of masonry during cold weather (temperature below 40⁰ F) or hot weather (temperature above 90⁰ F).
- I.C.1.5. Inspect anchors and embedded items, including but not limited to those connecting masonry to other portions or elements of the structure, for:
 - I.C.1.5.1. Type
 - I.C.1.5.2. Size
 - I.C.1.5.3. Location
- I.C.2. Upon completion of the masonry work, the masonry special inspector provides a verified report ([DSA 292](#)).

II. Inspection of the following items:

- II.A. Refer to 2.3.2 *Masonry subsection II Inspection of the following items*: on page 91 for applicable items.

2.5.2.1.2.2 Screen Walls

Depending on the construction materials used for the screen wall dictates which of the sections in this manual apply. There are no additional inspection or documentation requirements for screen walls beyond those already noted in other sections of this manual; refer to the appropriate section accordingly for requirements.

2.5.2.1.2.3 Casework/Lockers

I. Inspection of the following items:

- I.A. Support and anchorage of casework.
 - I.A.1. Verify separate fasteners attach casework backing to casework.
 - I.A.1.1. Fasteners used for attaching casework through backing should have only one faying surface.
 - I.A.2. Fasteners between casework/lockers to structure.
 - I.A.2.1. Size
 - I.A.2.2. Type
 - I.A.2.3. Placement
- I.B. Post-installed anchors and connections.
 - I.B.1. For both masonry and concrete construction, refer to the post-installed anchor section in 2.3.1.1 *Cast In Place (CIP) Concrete* subsection *I.B.3 Post-installed anchors*: on page 76 and *II.F Post-installed anchors and connections*: on page 82.

STRUCTURAL SAFETY INSPECTION ITEMS

2.5.2.2 Floors

2.5.2.2.1 Computer Access Floors

For projects approved under the 2001 CBC, refer to [IR 16-2](#) for documentation and testing requirements. For projects approved under later editions, there are no additional documentation or testing requirements for computer access floors, except for post-installed anchors, noted below:

For both masonry and concrete construction, refer to the post-installed anchor section in *2.3.1.1 Cast In Place (CIP) Concrete* subsection *I.B.3 Post-installed anchors*: on page 76 and *II.F Post-installed anchors and connections*: on page 82.

2.5.2.3 Ceilings

2.5.2.3.1 Metal Suspension Systems for Lay-In Panel Ceilings

There are no additional documentation or inspection requirements for metal suspension systems for lay-in panel ceilings, except where re-use of ceiling hanger and bracing wires occurs. In that case, refer to [IR 25-2.10](#) (for 2010 CBC) or [IR 25-2.07](#) (for 2007 CBC) for field testing inspection requirements.

2.5.2.3.2 Soffits

STRUCTURAL SAFETY INSPECTION ITEMS

Due to common construction sequencing or phasing, soffit construction can be challenging given the various obstructions to soffit support framing that may not be apparent in the drawings. Large ducts or primary structural framing can cause interruptions in support framing



Figure 2-63: Soffit Framing at Ducts and Primary Framing

STRUCTURAL SAFETY INSPECTION ITEMS

that may not be clear in approved drawings (see Figure 2-63 for examples). One of the key components to proper soffit construction is the bracing noted in the approved drawings (see Figure 2-64 for an example). All support and bracing framing must be as shown in the



Figure 2-64: Example of Soffit Bracing

approved construction documents. Any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents must be approved by the design professional in responsible charge and submitted to and approved by DSA.

I. Receipt of documentation for constructed elements:

I.A. For documentation requirements, refer to the applicable sections above and below based on applicable construction materials.

II. Inspection of the following items:

II.A. Framing

II.A.1. Size

II.A.2. Type

II.A.3. Spacing

II.A.3.1. At showers and similar areas, verify spacing complies with requirements, which may be different than in other areas based on the ceiling finish specified.

STRUCTURAL SAFETY INSPECTION ITEMS

2.5.2.4 Roofs

2.5.2.4.1 Roof Tile

For documentation and inspection requirements, refer to [IR 15-1](#) and [IR 15-2](#) as well as the approved construction documents. Refer to *2.6.1.1 Roofing* on page 169 for additional information.

2.5.2.4.2 Standing Seam Roofing

The following information applies to all standing seam roofing on a given project.

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for documentation requirements.

I.B. Shop Drawings:

I.B.1. When applicable, receipt of design professional reviewed standing seam roof drawings and placement/erection drawings.

I.B.2. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents, they must be submitted to DSA for review and approval prior to installation of modified elements.

I.B.3. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.

I.C. Material/Structural Test Documentation:

I.C.1. For both standing seam roofing and anchorage devices:

I.C.1.1. Material/member sizes

I.C.1.2. Material types

I.C.1.3. Material grades

I.C.2. Lab tests for unidentified materials.

II. Inspection of the following items:

II.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for inspection requirements.

II.B. Standing Seam Roof

II.B.1. Dimensional requirements within specified tolerances.

II.B.2. Installation Requirements

II.B.2.1. Connections

II.B.2.1.1. Fasteners

II.B.2.1.1.1 Type

II.B.2.1.1.1.1 For ferrous fasteners, corrosion protective coatings per requirements.

STRUCTURAL SAFETY INSPECTION ITEMS

II.B.2.1.1.2 Size

II.B.2.1.1.3 Placement

II.B.2.1.1.3.1 Proper engagement of joined materials.

II.B.2.1.1.3.1.1 For “blind” connections (i.e. due to the sequence of construction, joined materials cannot be easily seen once connection is complete), proper markings to facilitate placement of fastener to join materials.

II.B.2.1.1.3.2 Frequently, fasteners are more tightly spaced at the perimeter and corners of the roof compared to the interior. Refer to approved construction documents for requirements.

II.B.2.1.2. Anchorage Devices

II.B.2.1.2.1 Type

II.B.2.1.2.2 Size

II.B.2.1.2.3 Placement

II.B.2.1.2.3.1 Proper engagement of joined materials.

II.B.2.1.2.3.2 Frequently, anchorage devices are more tightly spaced at the perimeter and corners of the roof compared to the interior. Refer to approved construction documents for requirements.

2.5.2.4.3 Solar Photovoltaic and Thermal Systems

For documentation and inspection requirements, refer to [IR 16-8](#) as well as the approved construction documents.



Figure 2-65: Thermal System

STRUCTURAL SAFETY INSPECTION ITEMS

2.6 Non-Structural Requirements

Prior to any non-structural item being inspected, generally speaking, the gravity and lateral system related items applicable to a given building or portion thereof (refer to *2.3 Gravity Framing Systems* on page 74 and *2.4 Lateral Force Resisting Systems* on page 140 for further information) must be inspected for compliance with the approved construction documents by the project inspector.

2.6.1 Weather Protection

Proper protection of the structure from the elements is important to ensure that the anticipated life-span for the structure occurs (see Figure 2-66). This section provides documentation and inspection information of weather protection systems in accordance with the approved construction documents.



Figure 2-66: Water Damage to Roof Framing

2.6.1.1 Roofing

Roofs suffering from incorrect weather protection can cause damage to structural and non-structural components. Proper roofing products and installation, along with maintenance, are important to minimize detrimental weathering effects on these elements.

I. Receipt of documentation for constructed elements:

STRUCTURAL SAFETY INSPECTION ITEMS

- I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for documentation requirements.
- I.B. Shop Drawings:
 - I.B.1. When applicable, receipt of design professional reviewed shop drawings.
 - I.B.2. If the reviewed shop drawings cause any changes affecting the Structural, Fire/Life Safety or Accessibility portions of the DSA approved construction documents, they must be submitted to DSA for review and approval prior to installation of modified elements.
 - I.B.3. If conflicts arise between the DSA approved construction documents and the shop drawings, the DSA approved construction documents shall govern.
- I.C. Material/Structural Test Documentation:
 - I.C.1. Materials comply with requirements.
 - I.C.1.1. Manufacturer's certification or identifying marks on materials packaging or other approved means.
 - I.C.1.1.1. Fire retardant-treated wood shingles and shakes bear specified labels.
 - I.C.1.1.2. Asphalt shingles bear specified ASTM label indicating wind load resistance compliance.
 - I.C.1.2. Approved testing/quality control agency label.

II. Inspection of the following items:

- II.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for inspection requirements.
- II.B. Proper storage and handling of materials.
- II.C. Installation
 - II.C.1. Insulation system, where occurs, per requirements.
 - II.C.2. Fasteners
 - II.C.2.1. Type
 - II.C.2.1.1. Corrosion inhibiting coatings per requirements.
 - II.C.2.2. Size
 - II.C.2.3. Placement
 - II.C.3. Drainage System
 - II.C.3.1. Achievement of specified roof slopes.
 - II.C.3.2. Type
 - II.C.3.2.1. Primary and secondary
 - II.C.3.3. Location
 - II.C.3.3.1. Drains, piping, gutters
 - II.C.3.3.1.1 Connection/anchorage details per requirements.
 - II.C.4. Ballasted Systems
 - II.C.4.1. Type of ballast.
 - II.C.4.2. Thickness of ballasted layer.
 - II.C.5. Where roofing tile occurs, see *2.5.2.4.1 Roof Tile* on page 167 for additional information.

STRUCTURAL SAFETY INSPECTION ITEMS

II.C.6. Repair procedures and materials where protective weather covering is punctured, torn, cut, or penetrated by various trades.

2.6.1.2 Exterior Walls

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for documentation requirements.

I.B. Material/Structural Test Documentation:

I.B.1. Materials comply with requirements.

I.B.1.1. Special siding requirements:

I.B.1.1.1. Vinyl siding and fiber-cement siding have labeling by an approved quality control agency per requirements.

I.B.1.1.2. Metal composite siding is labeled by an approved agency per requirements. Information in labeling frequently contains the following:

I.B.1.1.2.1 Manufacturer's or distributor's identification.

I.B.1.1.2.2 Model Number

I.B.1.1.2.3 Serial number or definitive information describing the product or material's performance characteristics.

I.B.1.1.2.4 Approved agency's identification.

I.B.1.2. Refer to appropriate sections above and below for documentation requirements.

II. Inspection of the following items:

II.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for inspection requirements.

II.B. Proper storage and handling of materials.

II.C. Installation

II.C.1. Sequential installation of flashing and layers per requirements.

II.C.1.1. Openings

II.C.1.2. Laps

II.C.1.2.1. Minimum lap dimensions.

II.C.2. Thickness of covering per requirements.

II.C.3. Fasteners

II.C.3.1. Type

II.C.3.1.1. Corrosion inhibiting coatings per requirements.

II.C.3.2. Size

II.C.3.3. Placement

II.C.4. Repair procedures and materials where protective weather covering is punctured, torn, cut, or penetrated by various trades.

II.C.5. Buildings in flood hazard zones

STRUCTURAL SAFETY INSPECTION ITEMS

- II.C.5.1. Any special preservative treatment requirements associated with wood framed walls extending below the design flood.
- II.C.6. Plastered Wall
 - II.C.6.1. Where wood structural panel occurs, confirm water resistive barrier per requirements, which may exceed requirements at other locations.
 - II.C.6.2. Surface preparation of masonry or concrete walls having directly applied plaster per requirements.
 - II.C.6.3. Lathing
 - II.C.6.3.1. Self-furring lath per requirements. See [IR 25-4](#) for additional requirements.
 - II.C.6.3.2. Weep screed placement, including minimum dimensions from earth/hardscape.
 - II.C.6.4. Layer thicknesses per requirements.
 - II.C.6.5. Wait times between coating applications per requirements.

2.6.1.3 Ventilation

I. Inspection of the following items:

- I.A. Ventilation openings per requirements.
 - I.A.1. Opening Size
 - I.A.2. Opening Location



Figure 2-67: Attic Ventilation Holes

- I.A.2.1. Attics (see Figure 2-67).
- I.A.2.2. Enclosed rafter spaces (see Figure 2-68).
- I.A.2.3. Under-floor

STRUCTURAL SAFETY INSPECTION ITEMS

I.A.2.3.1. Ventilation opening coverings per requirements.



Figure 2-68: Enclosed Rafter Space Ventilation Holes at Ridge

STRUCTURAL SAFETY INSPECTION ITEMS

2.7 Specialty Structures and Items

This section provides documentation and inspection guidance for structures and items that are different from common building structures and components.

However, nearly all specialty structures have foundations of some type. Prior to specialty structure item being inspected, generally speaking, all foundation system related items applicable to a given structure or portion thereof (refer to 2.2 Foundation Systems on page 62 for further information) must be inspected for compliance with the approved construction documents by the project inspector.

2.7.1 Steel Storage Racks

In addition to the California Building Code, projects using steel storage racks are generally governed by a referenced standard issued by the [Rack Manufacturers Institute](http://www.mhia.org/industrygroups/rmi) (RMI; see <http://www.mhia.org/industrygroups/rmi>). The primary reference for general design and construction requirements is:

- Specification for Design, Testing and Utilization of Industrial Steel Storage Racks, ANS/MH16.1-08 (RMI 2008)

RMI 2008 has both gravity and seismic requirements; no additional reference is necessary.

For all steel storage racks, the following information applies:

I. Receipt of documentation for constructed elements:

I.A. Material/Structural Test Documentation:

I.A.1. Depending on the sections provided and information in the approved construction documents, material identification is based on either:

I.A.1.1. Specification for Structural Steel Buildings, ANSI/AISC 360-05.

I.A.1.1.1. Refer to 2.3.4.1 *Structural Steel* on page 116 for additional documentation requirements (including special inspections).

I.A.1.2. North American Specification for the Design of Cold-Formed Steel Structural Members, AISI 2001 (Note: this is an older reference than for typical cold formed steel products).

I.A.1.2.1. Refer to 2.3.4.2 *Cold Formed Steel* on page 125 for additional documentation requirements (including special inspections).

I.A.1.3. Refer to RMI 2008 Section 9 for additional information.

STRUCTURAL SAFETY INSPECTION ITEMS

II. Inspection of the following items:

- II.A. Specified loading identification plaque is in place for each rack (RMI 2008 Section 1.4.2).
- II.B. For storage racks with moveable shelves, all required stability components are in place (RMI 2008 Section 1.4.6).
- II.C. When used, column base plate shims per requirements (RMI 2008 Section 7.2.4).
- II.D. Racks adjacent to building structure:
 - II.D.1. When connected to building structure, connection and any testing associated with connection.
 - II.D.1.1. Post-installed anchors and connections.
 - II.D.1.1.1. For both masonry and concrete construction, refer to the post-installed anchor section in *2.3.1.1 Cast In Place (CIP) Concrete* subsection *I.B.3 Post-installed anchors*: on page 76 and *II.F Post-installed anchors and connections*: on page 82.
 - II.D.2. When not connected to building structure, gap between rack and building per requirements.
- II.E. Out-of-plumb and out-of-straight conditions per requirements (RMI 2008 Section 1.4.11).

2.7.2 Walk-In Freezers and Cold Storage Boxes

Walk-in freezers and cold storage boxes (WIF/CSB) are to be anchored to the floor and structure based on the details shown in the approved drawings. There are no special documentation and inspection requirements for WIF/CSB, except for any post-installed anchors:

For both masonry and concrete construction, refer to the post-installed anchor section in *2.3.1.1 Cast In Place (CIP) Concrete* subsection *I.B.3 Post-installed anchors*: on page 76 and *II.F Post-installed anchors and connections*: on page 82.

Depending on the type of foundation and structural framing dictates which section above applies; likewise, depending on the fire/life safety and accessibility requirements, various sections below apply. Refer to the respective applicable sections for documentation and inspection requirements.

2.7.3 Remotely Fabricated Structures or Structural Elements

For general requirements associated with testing and inspection of remotely fabricated structures and structural elements, refer to [IR A-15](#).

STRUCTURAL SAFETY INSPECTION ITEMS

2.7.3.1 Elevators

Special requirements and allowances specific to plant fabricated elevators are provided in [IR 16-1](#). The majority of the requirements with respect to testing and inspection apply to in-plant inspectors. Therefore, the list below relies heavily on documents produced by those inspectors.

I. Receipt of documentation for constructed elements:

- I.A. Receipt of the [DSA 6-PI](#) form by the in-plant inspector indicated in [IR 16-1](#) for each building module.
- I.B. Receipt of all applicable material/structural testing and special inspection documentation based on the information noted in the [DSA 103](#) form.

II. Inspection of the following items:

- II.A. Refer to the applicable sections above and below for further information.
- II.B. Post-installed anchors and connections.
 - II.B.1. For both masonry and concrete construction, refer to the post-installed anchor section in *2.3.1.1 Cast In Place (CIP) Concrete* subsection *I.B.3 Post-installed anchors*: on page 76 and *II.F Post-installed anchors and connections*: on page 82.

2.7.3.2 Relocatable Buildings

Special requirements and allowances specific to relocatable buildings are provided in [IR 16-1](#). The majority of the requirements with respect to testing and inspection apply to Relocatable Building In-Plant (RBIP) inspectors (for a list of DSA approved RBIP inspectors, see <https://www.apps.dgs.ca.gov/Tracker/InspByCategory.aspx?Id=03>). Therefore, the list below relies heavily on documents produced by those inspectors.

I. Receipt of documentation for constructed elements:

- I.A. Receipt of the [DSA 6-PI](#) form by the RBIP inspector indicated in [IR 16-1](#) for each building module.
- I.B. Receipt of all applicable material/structural testing and special inspection documentation based on the information noted in the [DSA 103](#) form.
- I.C. Grounding tests (see *5 OTHER BUILDING COMPONENTS AND SYSTEMS* subsection *5.4 Electrical*)
- I.D. *In addition to* the information below, also refer to the CEC. on page 257 for additional information).

II. Inspection of the following items:

- II.A. Refer to each of the cases below for further information.

STRUCTURAL SAFETY INSPECTION ITEMS

2.7.3.2.1 Single Story Buildings

In addition to the noted items applicable to all relocatable buildings, the necessary documentation and inspection items are listed in [DSA 121: Checklist for Site Inspection of Relocatable Buildings](#) (refer to *APPENDIX B – REFERENCED DSA FORMS* starting on page 313 for a copy of the noted form).

2.7.3.2.2 Multi-Level Buildings

Depending on the type of construction materials dictates which section in this manual applies. Based on that information, refer to the applicable sections above and below.

2.7.3.3 Reviews Stands, Grandstands, and Bleachers

For documentation and inspection requirements, refer to the following IRs:

- For projects approved under the 2001 CBC, see [IR 16-5.01](#).
- For projects approved under the 2007 CBC, see [IR 16-5.07](#).

Refer to *APPENDIX B – REFERENCED DSA FORMS* on page 313 for forms [DSA 130](#) and [DSA 131](#).

2.7.4 Wind Turbines

Wind turbines are usually constructed of structural steel. Refer to *2.3.4.1 Structural Steel* on page 116 and, based on the lateral system, the appropriate section in *2.4.4 Steel* starting on page 148. Due to the rather unique nature of wind turbines, additional requirements are provided in [IR A-29](#).

3 FIRE/LIFE SAFETY INSPECTION ITEMS

FIRE/LIFE SAFETY INSPECTION ITEMS

3.1 Site Issues

Fire/Life Safety items related to the site typically involve issues important to the Local Fire Authority (LFA) and are generally addressed on a LFA-dedicated site plan sheet. The LFA's review and approval of site items is confirmed during DSA design review and indicated on the LFA drawing with a checked and signed information box directly on the sheet. Frequent questions generated by both school districts and LFAs have resulted in DSA generating a [Fire and Life Safety Frequently Asked Questions](#) document addressing those.

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

II.A. Site issues: (CFC Chapter 5)

II.A.1. Confirm that all actual site conditions are reflected on the approved documents. Any discrepancies shall be immediately brought to the attention of the Architect of Record for DSA-approved resolution.

II.A.2. Temporary fire protection is provided during construction as required.

II.A.3. Location

II.A.3.1. Fire Hydrants

II.A.3.1.1. Confirm point-of-connection for fire line. (Note that off-site points of connection will typically require off-site drawings reviewed and approved by the local municipality.)

II.A.3.1.2. Verify hydrants have proper clear space around and are protected from mechanical damage.

II.A.3.2. Back flow preventer

II.A.3.3. Post Indicator Valve

II.A.3.4. Local fire department verification of locations of items above and the following (this is not an exhaustive list):

II.A.3.4.1. Siamese Connections

II.A.3.4.2. Hose and threading connections.

II.A.3.4.3. Alarm system (see *3.3.1 Fire/Smoke Alarms* on page 185 for additional information).

II.A.4. See *3.3.2 Automatic Fire Suppression Systems*, subsection *II.A* on page 188 for additional related requirements.

II.A.4.1. Fire Lane:

II.A.4.1.1. Unobstructed per requirements horizontally and vertically, especially required clearances at fire truck turn-arounds.

II.A.4.1.2. Knox box location.

FIRE/LIFE SAFETY INSPECTION ITEMS

- II.A.4.1.3. "Drop-off/pick-up" zones do not encroach into fire lane.
- II.A.4.2. Safe Dispersal Area (SDA)
 - II.A.4.2.1. No closer than specified limit to the nearest building
 - II.A.4.2.2. Located so that a clear path of egress is provided from the building to the SDA.
- II.A.4.3. Fences and Gates:
 - II.A.4.3.1. Site fences and gates per requirements.
 - II.A.4.3.1.1 Panic Hardware
 - II.A.4.3.1.2 Swing direction of egress gates.
- II.A.4.4. Cargo Containers:
 - II.A.4.4.1. Note that most sites use cargo containers for various storage purposes and relocate them around campus as needed. These containers may not be located haphazardly. Verify container location is a specified minimum distance away from any building or property line unless noted otherwise. See [IR A-27](#) for additional information.
 - II.A.4.4.2. .
- II.A.5. Check fire lane paving section will support a fully loaded fire truck.
- II.A.6. Signage:
 - II.A.6.1. Fire lane is properly signed and marked.
 - II.A.6.2. Building construction has an address number, building number or building identification in a position plainly legible and visible from the street.
 - II.A.6.3. Exterior doors that have been rendered non-functional yet still retain a functional door appearance are labeled with a sign indicating "THIS DOOR BLOCKED."
- II.A.7. Stairs and Ramps:
 - II.A.7.1. Stairs
 - II.A.7.1.1. Rise-to-run ratio for site stairs
 - II.A.7.1.1.1 Top or bottom of an exterior stair meeting a sloping public way, walkway or driveway are common problem areas.
 - II.A.7.1.2. Verify exterior steps will not accumulate standing rain water.
 - II.A.7.1.3. Handrails are provided within specified limit of the required exit width.
 - II.A.7.2. Confirm handrail and guardrail heights.
 - II.A.7.3. Handrails do not each encroach more than specified limit into the required width.

FIRE/LIFE SAFETY INSPECTION ITEMS

3.2 General Building Characteristics

Becoming familiar with the overall building layout and its various fire/life safety characteristics is a crucial first step to properly inspect those features. ACTIVE PROTECTION includes fire detectors and alarms, fire sprinklers and smoke control systems; PASSIVE PROTECTION includes fireproofing, rated assemblies, fire-rated through-penetration details, and exiting pathways, to name a few. Note that the California Building Code allows some reductions in requirements for passive systems if the building has a fire sprinkler system. All of these systems are intended to limit the passage and growth of smoke and fire.

The required components are dictated by the relative fire hazard associated with the building occupancy classification, specified room use, type of construction, and distance between adjacent buildings or the property line. The severity of hazard depends on the flammability, combustibility and reactivity of the materials and the quantity of material present. Some of these requirements can impact other types of inspections (e.g. fire walls require independent structural stability on both sides of the wall, which can affect the structural framing support details). The DSA approved construction documents identify all of these features which act as a fire/life safety 'system' to protect the building occupants.

3.2.1 Use/Occupancy

I. Inspection of the following items:

- I.A. Review the approved plans to become familiar with the various occupancies and room uses for the building.
 - I.A.1. Confirm that the use and occupancy of each room is consistent with the approved documents.

FIRE/LIFE SAFETY INSPECTION ITEMS

I.A.1.1. For assembly use areas, signage posting is provided per requirements (see [BU 11-08](#)).

I.B. Confirm required fire rated separations, horizontal and vertical, between adjacent room uses and occupancies, and fire areas. (refer to Table 3-1 and Table 3-2, taken from CBC [508.2.5](#) and [508.4](#), for commonly specified fire rated separations)

**TABLE 508.2.5
INCIDENTAL ACCESSORY OCCUPANCIES**

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic fire-extinguishing system ^a
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	1 hour or provide automatic fire-extinguishing system ^a
Refrigerant machinery room	1 hour or provide automatic sprinkler system ^a
Hydrogen cutoff rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic fire-extinguishing system
Laboratories and vocational shops, not classified as Group H, located in a Group I-2 and I-2.1 occupancy	1 hour or provide automatic fire-extinguishing system ^a
<i>[SFM] Rooms or areas with special hazards such as laboratories, vocational shops and other such areas not classified as Group H, located in Group E occupancies where hazardous materials in quantities not exceeding the maximum allowable quantity are used or stored.</i>	1 hour
Laundry rooms over 100 square feet	1 hour or provide automatic fire-extinguishing system ^a
Storage rooms over 100 square feet	1 hour or provide automatic fire-extinguishing system ^a
Group I-2 and I-2.1 waste and linen collection rooms	1 hour ^a
Waste and linen collection rooms over 100 square feet	1 hour or provide automatic fire-extinguishing system ^a
Stationary storage battery systems having a liquid electrolyte capacity of more than 50 gallons, or a lithium-ion capacity of 1,000 pounds used for facility standby power, emergency power or uninterrupted power supplies	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies. ^a
Rooms containing fire pumps in nonhigh-rise buildings	2 hours; or 1 hour and provide automatic sprinkler system throughout the building
Rooms containing fire pumps in high-rise buildings	2 hours

For SI: 1 square foot = 0.0929 m², 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L.

a. *[SFM] Fire barrier protection and automatic sprinkler protection required throughout the fire area in I-2 and I-2.1 occupancies as indicated.*

Table 3-1: CBC Table 508.2.5 - Incidental Accessory Occupancies - Required Separations

I.B.1. Note the difference between fire walls, fire barriers and fire partitions described in CBC [706](#), [707](#), and [709](#).

FIRE/LIFE SAFETY INSPECTION ITEMS

**TABLE 508.4
REQUIRED SEPARATION OF OCCUPANCIES (HOURS)**

OCCUPANCY	A ^d , E		I-4, R-2.1		I-2, I-2.1		I-3		R-1, R-2, R-3, R-3.1, R-4		F-2, S-2 ^b , U		B, F-1 ^g , M, S-1		L		H-1		H-2		H-3, H-4, H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A ^d , E	N	N	2	2	2	NP	2	NP	1	2	N	1	1	2	2	NP	NP	NP	3	4	2	3 ^a
I-4, R-2.1	—	—	I ^e	NP	2	NP	2	NP	1	NP	2	2	2 ^f	2	2	NP	NP	NP	4	NP	4	NP
I-2, I-2.1	—	—	—	—	N	NP	2	NP	2	NP	2	NP	2 ^f	NP	2	NP	NP	NP	4	NP	4	NP
I-3	—	—	—	—	—	—	N	NP	2	NP	2	2	2	2	2	NP	NP	NP	4	NP	4	NP
R-1, R-2, R-3, R-3.1, R-4									N	N	1 ^c	2 ^c	1	2	4	NP	NP	NP	3	NP	2	NP
F-2, S-2 ^b , U	—	—	—	—	—	—	—	—			N	N	1	2	I	NP	NP	NP	3	4	2	3 ^a
B, F-1, M, S-1	—	—	—	—	—	—	—	—			—	—	N	N	I	NP	NP	NP	2	3	1	2 ^a
L															I	NP	NP	NP	2	NP	I	NP
H-1	—	—	—	—	—	—	—	—			—	—	—	—			N	NP	NP	NP	NP	NP
H-2	—	—	—	—	—	—	—	—			—	—	—	—			—	—	N	NP	1	NP
H-3, H-4, H-5	—	—	—	—	—	—	—	—			—	—	—	—			—	—	—	—	1 ^{e, f}	NP

For SI: 1 square foot = 0.0929 m².

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

N = No separation requirement.

NP = Not permitted.

a. For Group II-5 occupancies, see Section 903.2.5.2.

b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but to not less than 1 hour.

c. See Section 406.1.4.

d. Commercial kitchens need not be separated from the restaurant seating areas that they serve.

e. Separation is not required between occupancies of the same classification.

f. For H-5 occupancies, see Section 415.8.2.2.

g. [SFM] Group I and F1 occupancies and Group R-2.1 and F-1 occupancies shall have a 3-hour separation.

Table 3-2: CBC Table 508.4 - Occupancy Separation Requirements

3.2.2 Type of construction

I. Inspection of the following items:

- I.A. Review the approved plans to become familiar with the type of construction for the building.
- I.B. Fire rating of the building frame, walls, floors, and roof is per requirements (refer to Table 3-3 on page 184 and Table 3-6 on page 198 taken from CBC Table 601 and 602, respectively, for commonly specified fire ratings for these portions of the building).

FIRE/LIFE SAFETY INSPECTION ITEMS

**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (hours)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A ^d	B	A ^d	B	HT	A ^d	B
Primary structural frame ^e (see Section 202)	3 ^a	2 ^a	1	0	1	0	HT	1	0
Bearing walls									
Exterior ^{f, g}	3	2	1	0	2	2	2	1	0
Interior	3 ^a	2 ^a	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions	See Table 602								
Exterior									
Nonbearing walls and partitions	See Section 602.4.6								
Interior ^e									
Floor construction and secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and secondary members (see Section 202)	1 1/2 ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	HT	1 ^{b, c}	0

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
- b1. Except in Group A, E, F-1, H, I, L, M, R-1, R-2, R-2.1 and S-1 occupancies, high-rise buildings, and other applications listed in Section 1.11 regulated by the Office of the State Fire Marshal, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- b2. For Group A, E, I, L, R-1, R-2, and R-2.1 occupancies, high-rise buildings, and other applications listed in Section 1.11 regulated by the Office of the State Fire Marshal, fire protection of members other than the structural frame shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- b3. One-story portions of Group A and E assembly occupancies the roof-framing system of Type II A or Type III A construction may be of unprotected construction when such roof-framing system is open to the assembly area and does not contain concealed spaces.
- c. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.
- d. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3 or an allowable height increase in accordance with Section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.
- e. Not less than the fire-resistance rating required by other sections of this code.
- f. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- g. Not less than the fire-resistance rating as referenced in Section 704.10

Table 3-3: CBC Table 601 - Fire Rating Requirements for Building Elements

3.2.3 Setbacks and Yards

I. Inspection of the following items:

- I.A. Review plans to become familiar with the setbacks and yards for the building.
- I.B. Fire rating of the building exterior walls.
- I.C. Fire rated separations between adjacent room uses or occupancies.

FIRE/LIFE SAFETY INSPECTION ITEMS

3.3 Fire/Smoke Protection

Fire-resistant-rated construction, typically referred to as PASSIVE PROTECTION, provides fire and smoke safety and is one of two basic forms of fire protection in building design. Passive protection provides defense against the migration of flame, smoke and heat by the use of fire-resistant materials, atmospheric compartmentalization, and – based on typical human response behavior – properly sized and positioned corridors, stairways, exits and other related egress system components.

The other form of safety, ACTIVE PROTECTION, is generally concerned with the design of fire detection, alarm, and suppression systems and is primarily addressed in *3.3.1 Fire/Smoke Alarms* on page 185 and *3.3.2 Automatic Fire Suppression Systems* on page 187. Note that inspections involving fire/smoke protection issues should be coordinated with structural and access issues since the integration of all three is crucial to the success of the overall design. All the associated passive features are incorporated in the DSA approved construction documents and are usually provided in the Code analysis sheets and related details.

3.3.1 Fire/Smoke Alarms

Detectors and alarm notification devices are an important part of the ACTIVE PROTECTION system for fire-resistant-rated construction. Although CBC section [907](#) addresses the conditions requiring a fire alarm and detection system, the majority of the design, installation, testing and inspection requirements are found in the following reference standard, previously noted in *1.2.4 Codes and Referenced Standards* on page 38:

- 2010 NFPA 72 National Fire Alarm Code (CA Amended)

The typical system is an interconnected series of smoke and/or heat detectors on dedicated power distributed throughout the building so that, when activated, either manually or automatically, a signal is sent triggering visual and audio alarm devices within the threatened fire area and also to an off-site, supervised facility that alerts the local fire authority (LFA). The intent is to detect a fire sufficiently early so that the building occupants are alerted to the danger and have adequate time to evacuate safely and so the LFA can respond in a timely manner to limit casualties and reduce property losses.

I. Receipt of documentation for constructed elements:

- I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.
- I.B. Test Documentation

FIRE/LIFE SAFETY INSPECTION ITEMS

I.B.1. For existing buildings, fire alarm testing documentation is required per [IR A-28](#).

I.B.2. For additional testing documentation, refer to *II.D Testing* on page 187.

II. Inspection of the following items:

II.A. Proper storage and handling of materials and devices.

II.B. Devices

II.B.1. California State Fire Marshal approved:

II.B.1.1. Detectors

II.B.1.2. Alarms

II.B.1.2.1. Fire alarm has approved supervising station per requirements (see [PL 11-01](#)).

II.B.1.3. All other associated equipment.

II.B.2. Fire alarm and detection system devices are protected from mechanical damage.

II.B.2.1. Check that devices have not been dropped, painted or otherwise compromised.

II.C. Installation

II.C.1. Location:

II.C.1.1. Verify location of each device.

II.C.1.1.1. Note that due to the diagrammatic nature of mechanical, plumbing and electrical designs, the actual installation of such items may interfere with the intended design of the fire alarm system. The fire alarm detector spacing is extremely important to the correct functioning of the system; deviations from the drawings could be detrimental to the system performance and may require redesign.

II.C.1.1.2. Spacing complies with the device listing.

II.C.1.2. Fire alarm and detection system devices properly attached to the substrate.

II.C.1.3. Check fire alarm and detection system devices are not adjacent to any unusual heat source that might trigger premature notification.

II.C.1.4. Above-ceiling fire alarm and detection system are accessible for repair and maintenance.

II.C.1.5. Obstructions:

II.C.1.5.1. Each detector is not obstructed by structural members, ductwork, cable trays and other similar items. If such obstruction occurs, the PI shall notify the Architect immediately for resolution.

II.C.1.5.2. Ceiling changes during construction that affect the Structural or Fire/Life Safety portions of the project must be reviewed for their impact to the fire alarm and detection system and DSA approved prior to installation.

FIRE/LIFE SAFETY INSPECTION ITEMS

II.C.1.5.3. Walls

II.C.1.5.3.1 Fire alarm and detection system conduit crossing building expansion/seismic joints are properly installed for movement.

II.C.1.5.3.2 Fire alarm and detection system conduit penetrating rated walls are installed to resist the passage of fire, smoke, hot gases and heat per requirements.

II.C.1.5.3.2.1 Fire alarm and detection system lines through rated walls are securely fastened on each side of the wall per requirements.

II.C.2. All required signage is provided.

II.D. Testing

II.D.1. Test both the fire alarm and detection system per requirements. (Note: NFPA 72 Chapter 14 addresses acceptance requirements in detail. See also [IR A-21](#) and [GL-2](#).)

II.E. Verify owner has received all required literature, reference standards and instructions describing the proper operation and maintenance of the equipment and devices installed.

3.3.2 Automatic Fire Suppression Systems

Automatic fire suppression systems are another important part of the ACTIVE PROTECTION system for fire-resistant-rated construction. Although CBC section [903](#) addresses the conditions requiring an automatic sprinkler system, the majority of the design, installation, testing and inspection requirements are found in the following reference standards, previously noted in *1.2.4 Codes and Referenced Standards* on page 38:

- 2010 NFPA 13 Automatic Sprinkler Systems (CA Amended)
- 2007 NFPA 14 Standpipe Systems (CA Amended)
- 2007 NFPA 20 Stationary Pumps
- 2010 NFPA 24 Private Fire Mains (CA Amended)

In addition, the following reference standard also applies:

- 2008 NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

FIRE/LIFE SAFETY INSPECTION ITEMS

As a system, water-based fire suppression is widely used, generally available and relatively inexpensive. Since water is pump-able, nontoxic, relatively noncorrosive and stable, it is a highly effective cooling and extinguishing agent. A fire sprinkler system is also much more effective than a fire hose response since it applies a minimal amount of water at the source before total room fire involvement.

The general effect of the production of a mist of water droplets by a fire sprinkler causes significant cooling, reducing the radiative feedback to the fire below the level which is needed to sustain combustion. In addition, the evaporation of the water produces steam which has a volume 1,700 times greater than that of water thus depriving the fire of needed oxygen and therefore effectively smothering it.

A fire sprinkler system typically includes the following elements:

- A tap-in to the city water main.
- An underground extension from the main to the building in question - sized to provide sufficient gallons per minute at sufficient pressure.
- Valves and monitoring devices connected to the fire alarm system.
- A pipe distribution system throughout the building, providing a designed gallons/minute coverage via sprinkler heads of certain capacity and spacing.

Each sprinkler head has a liquid-filled tube designed to respond to a particular preset temperature, depending on its location in the building. When that temperature is reached, the liquid expands, bursting the tube, simultaneously opening the valve for that sprinkler head. This is a self-operating system, needing no power or signal to activate.

I. Receipt of documentation for constructed elements:

- I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.
- I.B. Qualifications of individuals planning to install, either above or below ground, fire sprinkler system components per [IR A-25](#).
- I.C. Testing Documentation
 - I.C.1. Where electric fire pumps occur, qualifications of individuals providing acceptance or performance testing of such pumps per [IR A-25](#).
 - I.C.2. For additional testing documentation, refer to *II.F Testing* on page 193.

II. Inspection of the following items:

- II.A. Fire protection system serving other occupied buildings is not Interrupted or shut off during construction.
- II.B. Main service, distribution, gong or alarm locations, and space provisions are understood.
- II.C. Proper storage and handling of materials and devices.

FIRE/LIFE SAFETY INSPECTION ITEMS

II.C.1. Ensure that distribution pipes are not cracked at junctures due to fabrication or storage and handling problems (see Figure 3-1).



Figure 3-1: Rejected Sprinkler Pipe Due To Separation At Welds

II.D. Devices

II.D.1. Fire Hydrants

II.D.2. Fire pumps (see CBC [913](#) and NFPA 20)

II.D.2.1. Verify pump. Note that design changes to the building during construction may affect fire pump capacity and must be reviewed and approved by DSA prior to pump installation.

II.D.3. Back Flow Preventers

II.D.4. Fire Department Connections

II.D.5. Post Indicator Valves

II.D.6. Piping (for standpipe, riser, main and distribution systems)

II.D.6.1. Type

II.D.6.2. Size

II.D.6.3. Pressure Capacity

II.D.7. Standpipes (see CBC [905](#) and NFPA 14)

II.D.8. Distribution system

II.D.8.1. Sprinkler Type

II.D.8.1.1. Sprinkler Heads

II.D.8.1.1.1 Heads as required for spaces are provided and installed in accordance with NFPA and approved plans.

II.D.8.1.1.1.1 All heads are:

II.D.8.1.1.1.1.1 New

II.D.8.1.1.1.1.2 Unpainted

II.D.8.1.1.1.1.3 Properly temperature-rated

II.D.8.1.1.1.1.4 Provided with guards where subject to mechanical injury.

FIRE/LIFE SAFETY INSPECTION ITEMS

II.D.8.1.1.1.1.5 Have clearances required.

II.D.8.2. Sprinkler Rating

II.E. Installation

II.E.1. No unscheduled (not specified on approved drawings) cutting of structural members occurs.

II.E.2. Location

II.E.2.1. Wet standpipe cabinets of proper type, size, and base length are provided, located, and installed as specified.

II.E.2.1.1. Valve is not over specified limit above floor.

II.E.2.2. Proper Device/Piping Orientation

II.E.2.3. Device/Piping Protection

II.E.2.3.1. Mechanical damage (see Figure 3-1 on page 189 for an example).

II.E.2.3.2. Freezing (for both exterior components and those within building envelope which may be without heating, such as fire pump rooms).

II.E.2.3.2.1 Protection from temperatures below 40°F.

II.E.2.4. Underground (see NFPA 24)

II.E.2.4.1. Pathway from point of connection to building is free of encumbrances.

II.E.2.4.1.1 Note that even though the system is pressurized, added horizontal bends and vertical dips to the pipe layout due to unknown or unexpected obstacles may impact the hydraulic calculations and may necessitate system redesign.

II.E.2.4.2. Pipe-to-pipe connections.

II.E.2.4.3. Trench/Pipe Bedding

II.E.2.4.4. Installation Depth

II.E.2.4.5. Protection (if needed due to "hot" soil).

II.E.2.4.6. Thrust block installation.

II.E.2.4.7. Trench backfill requirements.

II.E.2.4.8. Check underground work to the point of connection, usually to a point 6" above the finished floor in a fire riser closet.

II.E.2.4.8.1 No fire line pipe joints are allowed under the building footing.

II.E.2.4.9. Verify that fire line does not run under building slab except at the entrance to the building fire riser room.

II.E.2.5. Riser

II.E.2.5.1. Clearance between riser and floor where it enters the building.

II.E.2.5.2. Back check valve, drains, bells, gauges and switches per requirements.

II.E.2.5.3. Correct flex couplings and 4-way braces.

FIRE/LIFE SAFETY INSPECTION ITEMS

II.E.2.6. Distribution System

II.E.2.6.1. Wet pipe systems:

II.E.2.6.1.1 Alarm, valve assembly, and water flow indicators comply with connection diagram.

II.E.2.6.2. Dry pipe systems:

II.E.2.6.2.1 Valve installation complies with connection diagram.

II.E.2.6.2.2 Proper installation of air compressors and tanks.

II.E.2.6.3. Note differences between interior and exterior installations.

II.E.2.6.3.1 Location of concealed and exposed lines is understood (vaulted ceilings are a common coordination problem).

II.E.2.6.4. Drainage valves or plugs allow complete drainage of entire system.

II.E.2.6.4.1 These items are located so as not to cause water damage during usage.

II.E.2.6.5. Branch piping is off top of main.

II.E.2.6.6. Sprinkler lines are hung and braced, longitudinally and laterally as shown in approved construction documents.

II.E.2.6.7. Sprinkler Head Layout

II.E.2.6.7.1 Sprinkler head water flow density may vary depending on hazard classification and construction type.

II.E.2.6.7.2 Due to the diagrammatic nature of mechanical, plumbing and electrical designs, their installation layout may interfere with the intended design of the fire sprinkler system. The sprinkler head spacing is extremely important to the correct functioning of the system.

II.E.2.6.7.2.1 Deviations from the approved drawings could be detrimental to the system performance and may require redesign.

II.E.2.6.8. Sprinkler head elevation above finished floor.

II.E.2.6.8.1 If the designed elevation conflicts with structural members, ductwork, cable trays, cabinetwork and other similar items and the conflict will affect the sprinkler water discharge pattern, the PI shall notify the Architect immediately for resolution. (Deviations from the approved documents that add pipe elbows become more and more detrimental to the design capacity of the system, especially where small pipe sizes are involved due to the resulting increased friction loss.)

FIRE/LIFE SAFETY INSPECTION ITEMS

II.E.2.6.9. Ceilings

II.E.2.6.9.1 Ceiling design changes during construction affecting the Structural or Fire/Life Safety portions of such work are reviewed for their impact to the fire sprinkler design and DSA approved prior to installation.

II.E.2.6.9.2 Sprinkler heads not integrally tied to a ceiling system must have free lateral movement in any horizontal direction of a specified dimension. See [IR 25-2.10](#) for more information.

II.E.2.7. Fire Pumps

II.E.2.7.1. Where fire pumps are indicated, check system is protected against any interruption in service.

II.E.2.7.2. Check pump room is fire rated per requirements.

II.E.2.7.2.1 If a separate pump house is provided, it is at least the specified distance away from the building.

II.E.2.8. Standpipes

II.E.2.8.1. Proper Drains

II.E.2.8.2. Proper Gauges.

II.E.2.9. Obstructions

II.E.2.9.1. Distribution Systems

II.E.2.9.1.1 Sprinkler lines crossing building expansion/seismic joints are properly installed for movement.

II.E.2.9.1.2 Sprinkler lines penetrating rated walls are properly installed to resist the passage of fire, smoke, hot gases and heat per requirements.

II.E.2.9.1.2.1 Sprinkler lines through rated walls are securely fastened on each side of the rated wall.

II.E.2.9.1.3 Sprinkler heads are protected from mechanical.

II.E.2.9.1.3.1 Check that heads have not been dropped, painted or otherwise compromised.

II.E.2.9.1.4 Sprinkler heads are not adjacent to any unusual heat source that might trigger premature sprinkler operation.

II.E.2.9.1.5 Above-ceiling sprinklers are accessible for repair and maintenance.

II.E.2.10. Signage/Labeling

II.E.2.10.1. Riser

II.E.2.10.2. Standpipes

II.E.2.10.3. Fire Pump and Fire Pump Room

FIRE/LIFE SAFETY INSPECTION ITEMS

II.E.2.10.3.1 Electrical fire pumps labeling per requirements
(see [IR E-3](#)).

- II.E.2.11. Alarm-Supervised
 - II.E.2.11.1. Riser Assembly
 - II.E.2.11.2. Distribution System
 - II.E.2.11.3. Standpipes
 - II.E.2.11.4. Fire Pump Assembly.

II.F. Testing

II.F.1. Special Requirements

II.F.1.1. Underground

II.F.1.1.1. If nearby construction has occurred during the time interval between the approval of the DSA approved documents and the start of construction, and the fire flow is suspected of being reduced because of the construction, verify the fire flow capacity per the approved requirements.

II.F.1.1.2. Mains or Hydrants

II.F.1.1.2.1 Where underground mains and hydrants are provided, check they are installed, completed and in service prior to building construction work.

II.F.2. Post-Installation Testing

II.F.2.1. Test devices for functionality.

II.F.2.2. Test underground work per NFPA 25.

II.F.2.3. Test sprinkler system and riser. (Note NFPA 13 Chapter 24 addresses acceptance requirements in detail.)

II.F.2.3.1. Sprinkler test valve is installed as shown on the approved drawings (see [GL-1](#)).

II.F.2.4. Fire Pumps (see NFPA 20 Chapter 14)

II.F.2.5. Standpipes (see NFPA 14 Chapter 11)

II.F.2.6. Wet pipe systems:

II.F.2.6.1. Observe test of water flow alarm signal.

II.F.2.6.2. Confirm alarm, valve assembly, and water flow indicators for conformance with connection diagram.

II.F.2.7. Dry pipe systems:

II.F.2.7.1. Observe test of alarm signal time, etc...

II.G. Verify Owner has received all required literature, reference standards and instructions describing the proper operation and maintenance of the equipment and devices installed.

II.G.1. Riser

II.G.2. Distribution System

II.G.2.1. Spare sprinkler heads are provided as specified.

II.G.3. Fire Pumps

II.G.4. Standpipes

FIRE/LIFE SAFETY INSPECTION ITEMS

3.3.3 Other Extinguishing Systems

Beside water-based ACTIVE PROTECTION fire suppression systems, other media are allowed. These are typically divided between dry and wet chemical agents. Although CBC sections [904](#) and [906](#) address the conditions requiring fire suppression by means other than water, the majority of the design, installation, testing and inspection requirements are addressed in the following reference standards, previously noted in *1.2.4 Codes and Referenced Standards* on page 38:

- 2002 NFPA 17A Standard for Wet Chemical Extinguishing Systems
- 2008 NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems

In addition, the following reference standards apply:

- 2007NFPA 10 Standard for Portable Fire Extinguishers
- 2002 NFPA 17 Standard for Dry Chemical Extinguishing Systems
- 2008 NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

Wet or dry agents are used in special cases where an agent is particularly suited to protect an area with an unusual type of hazard or where extra-quick and/or non-destructive (clean agent) extinguishing is desired. Such systems can be applied through a distributed pipe array or in individual hand-operated devices such as fire extinguishers.

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

II.A. Proper storage and handling of materials and devices.

II.B. Devices

II.B.1. Dry, wet and clean agent systems::

II.B.1.1. System Type

II.B.1.2. Systems for Type I cooking hoods

II.B.1.2.1. Agent Capacity

II.B.1.2.2. Safety Controls

II.B.2. Confirm Owner has received all required literature, reference standards and instructions describing the proper operation and maintenance of the equipment and devices installed.

II.B.3. Hand-Operated Fire Extinguishers:

II.B.3.1. Extinguisher Type

II.C. Installation

FIRE/LIFE SAFETY INSPECTION ITEMS

II.C.1. Location

II.C.1.1. Top of wall-mounted extinguishers is not over specified limit.

II.C.1.2. Dry, wet and clean agent systems:

II.C.1.2.1. Head or nozzle arrangement and its structural support system.

II.C.1.2.2. Check manual activation apparatus is provided and properly located.

II.C.1.2.3. Systems for Type 1 cooking hoods

II.C.1.2.3.1 Nozzle Layout

II.C.1.3. Hand-Operated Fire Extinguishers:

II.C.1.3.1. Distribution distances of extinguishers per requirements.

II.C.1.3.2. Extinguishers are in conspicuous and readily accessible locations along the normal paths of egress.

II.C.1.3.2.1 Special hazard locations may require additional fire extinguishers where shown on approved construction documents.

II.C.2. Dry, wet and clean agent systems:

II.C.2.1. System alarm connection to the general building fire alarm system.

II.C.3. Obstructions

II.C.3.1. Dry, wet and clean agent systems:

II.C.3.1.1. If system piping or system conduit penetrates a rated wall, verify penetration detail.

II.C.4. Signage/Labeling

II.C.4.1. Dry, wet and clean agent systems:

II.C.4.1.1. Warning signs and other visual indicators indicating that the system is about to be activated and/or has been activated.

II.C.4.1.2. Systems for Type 1 cooking hoods.

II.D. Testing

II.D.1. Dry, wet and clean agent systems:

II.D.1.1. Test extinguishing system per NFPA 96 Chapter 11.

II.D.1.2. Post-activation venting of system.

II.D.1.2.1. Space is sealed to limit air leakage as required.

II.D.1.3. Systems for Type 1 cooking hoods

II.D.1.3.1. Verify automatic shut downs of the make-up air supply and the heating fuel system when the fire suppression system is activated.

FIRE/LIFE SAFETY INSPECTION ITEMS

3.3.4 Smoke Control Systems

Smoke control is a complex problem that is highly dependent on the geometry of the building in question and requires specialized design and inspection. The purpose of a smoke control system is to provide a tenable atmospheric environment for occupants during evacuation.

Smoke control systems can be either PASSIVE PROTECTION systems, where the use of smoke barriers or high bay spaces are used to control the movement of smoke to other areas; or ACTIVE PROTECTION, where mechanical means are used to utilize pressure differences to contain smoke within the event zone or control make-up air and exhaust rates sufficient to slow the descent of high level smoke accumulation to a minimum height above egress paths.

Besides CBC [909](#), smoke control system design is referenced by the CBC to the following reference standards:

- 2009 NFPA 92A, Recommended Practice for Smoke-Control Systems
- 2005 NFPA 92B, Guide for Smoke Management Systems in Malls, Atria, and Large Areas

I. Receipt of documentation for constructed elements:

I.A. Proprietary Products

I.A.1. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

I.A.2. A rational analysis report shall be provided to the PI providing sufficient information and detail to adequately describe the elements of the design.

I.B. Special Inspection Documentation

I.B.1. Smoke control systems must have special inspection by a qualified inspector having expertise in fire protection engineering, mechanical engineering and certification as air balancers.

I.B.1.1. Preliminary testing shall occur prior to concealment of the system

I.B.1.2. Final testing shall occur prior to occupancy for pressure differential, leakage, flow, detection and control verification.

II. Inspection of the following items:

II.A. Smoke control systems shall be inspected and tested by special agencies having expertise in fire protection engineering, mechanical engineering and certification as air balancers.

II.A.1. Verify preliminary and final testing noted above occurs.

FIRE/LIFE SAFETY INSPECTION ITEMS

3.3.5 Fire-Rated Assemblies

Fire rated assemblies are part of a building’s PASSIVE PROTECTION system, using vertical and horizontal barriers to prevent the migration of fire, smoke, heat and hot gases to other building areas. Different assemblies have different hourly ratings, depending on their materials and physical arrangement. The required rated assemblies, discussed primarily in CBC [Chapter 7](#) and as shown on the DSA approved documents, are determined by the building’s construction type, occupancy, height, area and means of egress system. Openings and penetrations through fire-rated assemblies are addressed elsewhere in this document.

3.3.5.1 Walls

The information below applies to all fire-rated walls.

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

II.A. Verify if wall is a fire wall, fire barrier, fire partition, smoke barrier or smoke partition as described in CBC [Chapter 7](#).

II.A.1. Verify wall assemblies comply with requirements. Commonly specified ratings for wall (based on their function, e.g. fire wall, fire barrier, etc.) can be seen in Table 3-4 and Table 3-5 taken from CBC Table 707.3.9 and Table 706.4, respectively.

**TABLE 707.3.9
FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE
BARRIER ASSEMBLIES OR HORIZONTAL ASSEMBLIES
BETWEEN FIRE AREAS**

OCCUPANCY GROUP	FIRE-RESISTANCE RATING (hours)
H-1, H-2	4
F-1, H-3, S-1	3
A, B, E, F-2, H-4, H-5, I, L, M, R, S-2	2
U	1

Table 3-4: CBC Table 707.3.9 - Fire Barrier Ratings

**TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS**

GROUP	FIRE-RESISTANCE RATING (hours)
A, B, E, H-4, I, R-1, R-2, R-2.J, U, L	3 ^a
F-1, H-3 ^b , H-5, M, S-1	3
H-1, H-2	4 ^b
F-2, S-2, R-3, R-4	2

a. In Type II or V construction, walls shall be permitted to have a 2-hour fire-resistance rating.

b. For Group H-1, H-2 or H-3 buildings, also see Sections 415.4 and 415.5.

Table 3-5: CBC Table 706.4 - Fire Wall Ratings Based on Occupancy

II.A.2. Refer to the documents for the required fire rating of the building exterior walls based on fire separation distance (refer to Table 3-6, taken from CBC Table 602, for commonly specified fire ratings for these portions of the building).

II.A.3. Confirm that fire walls are given construction priority for installation.

II.A.4. Wall Assembly Components

FIRE/LIFE SAFETY INSPECTION ITEMS

**TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, b}**

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H ^f , L	OCCUPANCY GROUP F-1, M, S-1	OCCUPANCY GROUP A, B, E, F-2, I, R ^h , S-2 ^g , U ^{b, h}
$x < 5^c$	All	3	2	1
$5 \leq x < 10$	IA Others	3 2	2 1	1 1
$10 \leq x < 30$	IA, IB IIB, VB Others	2 1 1	1 0 1	1 ^d 0 1 ^d
$x \geq 30$	All	0	0	0

For SI: 1 foot = 304.8 mm.

- a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
- b. For special requirements for Group U occupancies, see Section 406.1.2.
- c. See Section 706.1.1 for party walls.
- d. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
- e. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
- f. For special requirements for Group H occupancies, see Section 415.3.
- g. For special requirements for Group S aircraft hangars, see Section 412.4.1.
- h. Group R-3 and Group U occupancies when used as accessory to Group R-3 occupancies, shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet or more; or when equipped throughout with an automatic residential fire sprinkler system installed in accordance with Section 903.3 the fire-resistance rating shall not be required where the fire separation distance is 3 feet or more.

Table 3-6: CBC Table 602 - Exterior Wall Fire Rating Requirements

- II.A.4.1. Wall coverings comply with specified smoke and flame spread ratings.
- II.A.4.2. Insulation per requirements.
- II.A.4.3. In combustible construction, check for fire blocking in concealed wall spaces. Verify openings comply with requirements. See 3.3.6 *Fire Proofing of Structural Members* on page 207.
- II.A.4.4. Structural steel elements within wall requiring fireproofing are properly covered. See 3.3.6 *Fire Proofing of Structural Members* on page 207.
- II.A.5. Continuity of wall:
 - II.A.5.1. There are many options available to the designer for maintaining the fire rating at the perimeter of the fire-rated wall. Below are several common conditions. Verify requirements per the approved documents.
 - II.A.5.1.1. Rated wall terminates at the roof deck or exterior wall; if so the wall or roof on either side of that rated wall may also need to be rated.
 - II.A.5.1.2. Rated wall continues beyond roof deck or exterior wall and extends beyond the roof deck and exterior wall.
 - II.A.5.1.2.1 Where parapets occur, they have the same fire resistance as that required for its supporting wall.
 - II.A.5.1.2.2 Where rated walls serve as an exterior wall where a building has two different roof levels, the fire-rated wall continues through the low roof/high roof junction.

FIRE/LIFE SAFETY INSPECTION ITEMS

II.A.6. Opening Limitations

II.A.6.1. No roof opening is provided within the specified distance of a fire wall.

II.A.6.2. Electrical boxes in rated walls

II.A.6.2.1. Not installed back to back but are properly spaced or have specified protective coverings.

II.A.6.3.

II.A.7. Mounting devices and hardware connected directly to wall framing allow sufficient room for rated gypsum board or fireproofing to be installed properly.

II.A.8. Signage

II.A.8.1. Rated walls are properly marked indicating their rating.

II.A.8.1.1. In accessible concealed spaces and attics, *after* taping of



Figure 3-2: Examples of Fire/Smoke Rated Wall Identification

joins and/or painting in those areas, rated walls are marked accordingly (see Figure 3-2).

II.A.9. At fire walls, verify wall-floor/roof framing connections comply with documents for special details required to ensure structural stability if the structure on one side should collapse due to fire.

3.3.5.2 Horizontal Projections

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to 1.3 *Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

II.A. Fire Wall/Fire Barrier

II.A.1. Rated assembly extends to the outer edge of projecting elements when it is within the indicated dimensions of the fire wall.

II.A.2. Rated assembly extends through concealed spaces.

II.A.2.1. Though the CBC has some exceptions to the required extent of fire walls/barriers through concealed spaces (for example, see

FIRE/LIFE SAFETY INSPECTION ITEMS

CBC [706.5](#), exception 2), the approved construction plans dictate the requirements for the project.

3.3.5.3 Horizontal Assemblies – Floor/Ceiling and Roof/Ceiling

The information below applies to all fire-rated floor/ceiling and roof/ceiling assemblies.

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

II.A. Horizontal Assembly Components

II.A.1. Framing

II.A.1.1. Assembly complies with:

II.A.1.1.1. Framing Type

II.A.1.1.2. Spacing

II.A.1.1.3. Penetration Depth.

II.A.1.2. Structural steel elements requiring fireproofing are properly covered.

II.A.1.2.1. No utility or other item in the horizontal assembly compromises the integrity of the fireproofing.

II.A.1.2.1.1. If intumescent paint is used, paint has sufficient room to expand when heated. (Intumescent paint typically expands 10x its original volume and only performs to its specification when fully expanded.)

II.B. Combustible Construction

II.B.1. At interconnection between vertical and horizontal spaces, see *3.3.7 Concealed Spaces* on page 208.

II.B.2. Hot assemblies through a roof assembly, such as a gas vent stack, are separated from combustible construction per requirements. See *3.3.5.5 Penetrations of Assemblies* on page 204 for additional requirements.

II.B.3. Combustible vs. non-combustible materials in above-ceiling spaces:

II.B.3.1. Note that above-ceiling spaces generally contain a multitude of materials and equipment, some of which may compromise the designation of such a space as “non-combustible.” The architect is required to provide on the drawings an analysis of the ceiling space and a confirmation statement that the listed materials conform with non-combustible requirements. If the PI observes materials in the ceiling space not listed and/or materials whose

FIRE/LIFE SAFETY INSPECTION ITEMS

non-combustibility is suspect, notify the Architect of Record immediately for corrective DSA-approved action.

II.C. Edge Details

II.C.1. Floor/Ceiling

II.C.2. Roof/Ceiling

II.C.3. Joint system between wall and floor/roof-with-attic is securely installed (see Figure 3-3 for an example condition).

II.C.3.1. At rated walls or floors/roofs, joint system must have a rating that matches or exceeds those elements.

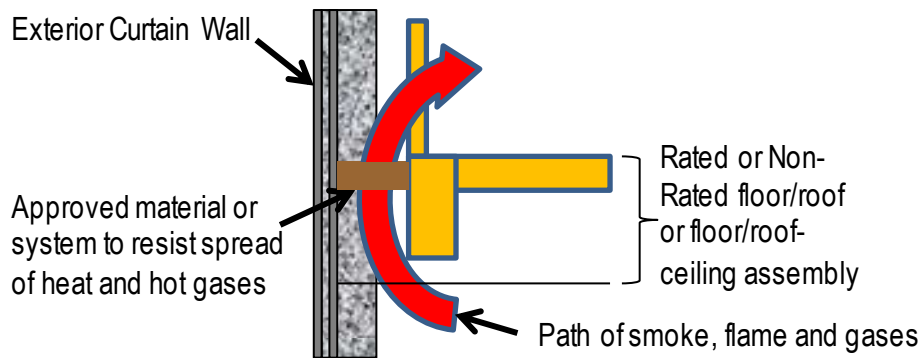


Figure 3-3: Fire Blocking At Floor Level & Curtain Wall

II.C.3.2. Though the CBC allows exceptions (see CBC [712](#)), the approved construction documents dictate the requirements for the project.

II.D. Openings comply with 3.3.5.6 *Openings in Rated Assemblies (Opening Protectives)* on page 205.

3.3.5.4 Shaft Enclosures

Shaft enclosures are provided to protect openings and penetrations through floor/ceiling and roof/ceiling assemblies. They include utility shafts, interior exit stairways, and elevator shafts. Shaft enclosures are typically built as fire barriers. Their purpose is to confine a fire to its floor of origin and to prevent fire, smoke, heat, and hot gases from migrating to other levels. Note that shaft enclosures are not always required depending on how many stories a utility run extends and whether the building has a fire sprinkler system, to mention just two exceptions found in CBC [708](#); verify with the DSA approved documents.

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to 1.3 *Proprietary Products* on page 40 for requirements.

I.B. Receipt of Rational Analysis Report if elevator hoist way pressurization is a part of the design.

II. Inspection of the following items:

FIRE/LIFE SAFETY INSPECTION ITEMS

II.A. Rated Shafts

- II.A.1. Shaft enclosure fire rated construction.
- II.A.2. Location of shaft enclosures and their contents.
 - II.A.2.1. Note if shaft enclosures penetrate rated horizontal assemblies.
 - II.A.2.2. If a portion of a shaft enclosure includes an exterior wall the shaft rating may not be required on the exterior wall unless it is shown in the approved construction documents.
 - II.A.2.3. Verify the top and bottom of shaft complies
- II.A.3. No shaft enclosure penetration is permitted other than that necessary for the purpose of the shaft enclosure.
- II.A.4. Duct and air transfer openings in a shaft enclosure per requirements.
 - II.A.4.1. Though there are some exceptions given in CBC [716](#), the approved construction documents dictate requirements for the project.

3.3.5.4.1 Elevators

Elevators are mobile cabs within a building shaft that allow people and materials to move vertically through a building. Elevators may be unsafe in a fire because:

- A person may push a call button and wait for an elevator that may never respond.
- In a panic an elevator may be overcrowded which would prevent the doors from closing and the elevator from operating.
- A power failure could happen any time, preventing elevator operation.
- An elevator may be called to the fire floor, exposing cab occupants to the fire.

Reference standards for elevators include the following:

- CBC Chapter 30
- ASME 17.1 as referenced in CBC section 3001.2
- CFC sections 607 and 907
- NFPA 13, section 8.15.5
- NFPA 72, Chapter 21

Because elevator hoistways are frequently rated shafts, the documentation and inspection items indicated in *3.3.5.4 Shaft Enclosures* on page 201 apply to elevator shafts as well. The additional inspection items noted below specifically apply to elevators:

I. Inspection of the following items:

I.A. Elevators

- I.A.1. Specified signage indicating usage of stairs in case of fire.
 - I.A.1.1. EXCEPTION: There are allowances to use elevators if they are part of the accessible means of egress, such as in a building four

FIRE/LIFE SAFETY INSPECTION ITEMS

or more stories above or below the level of exit discharge. Verify requirements with the approved construction documents.

- I.A.2. Elevator doorway and cab interior dimensions comply with requirements (e.g. confirm sufficient room is provided for an ambulance gurney or stretcher). Refer to *4.2.5 Elevators and Lifts* on page 226 for additional dimensional requirements.
- I.A.3. Emergency recall operation per requirements.
 - I.A.3.1. Phase I (smoke detection)
 - I.A.3.2. Phase II (fire fighter operation)
- I.A.4. Standby power per requirements (e.g. usually seen in elevators required for accessible egress, fire service access, occupant evacuation elevators, or high-rises). Refer to *5.4.1 Emergency and Standby Power Systems* on page 265 for additional documentation and inspection requirements.
 - I.A.4.1. Elevator Equipment
 - I.A.4.2. Elevator Room Ventilation and Cooling Equipment
 - I.A.4.3. Elevator Cooling Controller Equipment
- I.B. Elevator Shafts
 - I.B.1. Elevator Shaft Rating
 - I.B.2. Continuity of Rating
 - I.B.2.1. Structural attachments for elevator guide rails typically penetrate rated assemblies. Refer to approved construction documents for rated penetration detail.
 - I.B.2.2. Where shown in approved plans, an enclosed elevator lobby is provided as part of the elevator shaft enclosure.
 - I.B.2.2.1. Though there are many exceptions to this requirement (see CBC [708.14.1](#)), the approved construction documents dictate requirements for the project.
 - I.B.2.2.2. Elevator doors:
 - I.B.2.2.2.1 Fire Rating
 - I.B.2.2.2.2 Smoke Rating
 - I.B.2.2.2.3 Draft Protection
 - I.B.2.2.2.4 The above elevator door requirements may not be provided by the elevator door themselves; some features may be provided by a rated elevator lobby or additional smoke/draft rated door immediately in front of the elevator doors. Refer to the approved construction documents for requirements.
 - I.B.3. Only utilities related to the elevator shall be allowed in the elevator shaft.
 - I.B.4. Automatic Fire Suppression Systems
 - I.B.4.1. Fire sprinkler placement in shaft and machine rooms, when applicable.
 - I.B.4.1.1. Automatic power disconnect to elevator and machine rooms prior to sprinkler activation.

FIRE/LIFE SAFETY INSPECTION ITEMS

- I.B.5. Fire alarm device placement, when applicable.
- I.B.6. Signage per requirements in machine room indicating no combustible storage allowed.

3.3.5.5 Penetrations of Assemblies

Each of the various types of penetrations through rated assemblies require specific methods of protection that are addressed in the DSA approved documents. Information in the approved construction documents typically reference a UL Through-Penetration Firestop System detail. The purpose of these details is to maintain the integrity of the rated assembly for the duration of the required fire-resistance rating despite being punctured by utilities and other penetrants used in construction. Combustible penetrants will be found to have more restrictive requirements than non-combustible penetrants. Note that penetrations may either go through the entire assembly (through-penetration) or just through a portion of the assembly (membrane penetration). In either case, in their final constructed state, they act to restrict the passage of fire, hot gases, smoke, and, in some cases, heat.

The following applies to fire-rated assemblies:

I. Receipt of documentation for constructed elements:

- I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

- II.A. Appropriate product is used based on fire-rating and type of assembly (e.g. wall, floor/roof/ceiling, etc.) per requirements.
 - II.A.1. Confirm penetration detail for each listed assembly for each subcontractor work (one detail will not fit all situations).
 - II.A.1.1. Electrical/data penetrations using cable trays and wiring bundles often require special penetration details – verify per requirements.
 - II.A.2. Penetrant
 - II.A.2.1. Some penetrations may require a minimum spacing between penetrants; verify with documents.
 - II.A.2.2. Penetrants are securely anchored on each side of the wall.
 - II.A.2.3. Penetrant material type matches the DSA approved detail (some penetration details require a metal sleeve of a minimum length.)
 - II.A.2.4. Penetrant meets the rated assembly at the specified angle; anything less compromises the assembly rating.
 - II.A.2.5. Penetrants at a seismic joint have movement capability on each side of the wall while still maintaining secure fastening through the rated assembly. (A protected annular space is often specified.)
 - II.A.2.6. Duct penetrations have specified smoke/fire dampers.

FIRE/LIFE SAFETY INSPECTION ITEMS

- II.A.2.6.1. California State Fire Marshall labels are clearly visible.
- II.A.2.6.2. Confirm proper installation of smoke/fire damper.
 - II.A.2.6.2.1 Orientation of damper with respect to air flow (e.g. some devices may be put in upside down or facing the wrong direction with respect to air-flow and, thus, ineffective).
 - II.A.2.6.2.2 Dampers are securely attached.
 - II.A.2.6.2.3 Adequate access to be able to reset after a test or fire event.
- II.A.2.6.3. Though the CBC allows exceptions to providing smoke/fire dampers (see CBC [716.5](#)), the approved construction documents dictate requirements.

3.3.5.6 Openings in Rated Assemblies (Opening Protectives)

Openings in rated assemblies, meaning fire door assemblies and fire window assemblies, are designed and installed to maintain the integrity of the rated wall assembly that they are associated with. The fire protection rating for an opening protective is generally less than the required fire resistance of the wall since doors and windows do not usually have material/fuel loading stored directly against them.

Although CBC [Chapter 7](#) addresses many details regarding fire doors and fire windows, the code refers to the following standard for additional installation information:

- 2007 NFPA 80 Fire Door and Other Opening Protectives

In order to make use of the information below, it is important to identify the type of assembly in which an opening is placed to ensure that the proper label or installation or other inspection related items are verified or carried out.

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

II.A. Doors/Shutters

II.A.1. Fire Protective Rating Labeling

II.A.1.1. Complies with NFPA 80

II.A.1.2. Permanently affixed and not painted over.

II.A.1.3. Has the following information:

II.A.1.3.1. Manufacturer name or some other means to identify manufacturer.

FIRE/LIFE SAFETY INSPECTION ITEMS

- II.A.1.3.2. Name or trademark of inspection agency issuing label.
- II.A.1.3.3. Fire Protection Rating
- II.A.1.3.4. Temperature rating (when applicable – e.g. at exit enclosures and exit passageways when automatic fire sprinklers are not installed throughout the building).
- II.A.1.4. Where fire exit hardware is part of the door, labeling indicates such.
- II.A.2. Fire doors are self-closing or automatic-closing per requirements.
 - II.A.2.1. Doors that are automatic-closing by smoke detection close within the specified time delay.
- II.A.3. Oversized doors
 - II.A.3.1. Either labels indicate door is oversized, or an inspection certificate by a DSA approved inspector is provided. The inspection certificate must indicate conformance to requirements for the following:
 - II.A.3.1.1. Design
 - II.A.3.1.2. Material
 - II.A.3.1.3. Construction
 - II.A.3.1.4. No fire test was performed.
- II.A.4. Doors in fire rated corridors and smoke barriers (also see 3.5.1 *Fire/Smoke Protection of Means of Egress* subsection II.A.2.1 *Doors In Corridors* on page 213 for additional requirements):
 - II.A.4.1. Gaskets or seals around their perimeter.
 - II.A.4.2. Closers that properly close and latch the door.
 - II.A.4.3. Metal thresholds where noted per the approved construction documents.
 - II.A.4.4. Louvers are not allowed in rated door assemblies in rated corridors and/or smoke barriers.
 - II.A.4.4.1. EXCEPTION: Viewports less than the specified limits and consisting of certain construction are acceptable.
 - II.A.4.5. Verify hardware is appropriate to the door rating per requirements.
 - II.A.4.6. No miscellaneous holes, gaps or other imperfections or adjustments that would nullify fire rating.
 - II.A.4.6.1. Metal doors cannot be “cut to fit.”
- II.B. Frames
 - II.B.1. Fire Protective Rating Labeling
 - II.B.1.1. Labels permanently affixed and not painted over.

FIRE/LIFE SAFETY INSPECTION ITEMS

- II.B.2. No miscellaneous holes, gaps or other imperfections or adjustments that would nullify fire rating.
 - II.B.2.1. Metal frames cannot be “cut to fit.”
- II.B.3. .
- II.C. Glazing in doors
 - II.C.1. Fire Protective Rating Labeling
 - II.C.2. Label for safety glazing in rated fire doors.
- II.D. Windows/Shutters in rated walls
 - II.D.1. Fire Protective Rating Labeling
 - II.D.1.1. Labels for glazing should be readable and not obscured by the window stops.
 - II.D.2. Label for safety glazing in fire protection rated glazing in fire window assemblies in areas subject to human impact per requirements.

3.3.6 Fire Proofing of Structural Members

In order for a building to gain additional allowable area, height, and number of stories (see CBC Table 503) a building must be built to a higher level of fire resistance. One way to achieve this goal is through PASSIVE PROTECTION provided by fireproofing various building elements in order to obtain a fire rating of one, two, or three hours. The elements that require fire protection are the primary structural frame, the floor and secondary members, the roof and secondary members, interior and exterior bearing walls, and interior and exterior non-bearing walls.

Primary frame members of various types of materials achieve fire ratings through different methodologies. Typically structural steel is protected with a sprayed fire-resistant material (SFRM), steel reinforcing with concrete, and wood can achieve a rating depending on its use and thickness. The fire resistance rating requirements for these building elements are spelled out in CBC Table 601 (see Table 3-3 on page 184).

I. Receipt of documentation for constructed elements:

- I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

- II.A. Required thickness and type of fire protection per requirements.
 - II.A.1. Required thickness may vary based on member classification being “restrained” or “unrestrained”.

FIRE/LIFE SAFETY INSPECTION ITEMS

- II.A.2. Fireproofing is not damaged from weather intrusions or from mechanical damage.
 - II.A.2.1. Fireproofing is not compromised by wall framing, wall backing, furring, supports, or utility runs; the full thickness of protection is continuous for the entire member length.
 - II.A.3. Where intumescent paint is used, verify there is sufficient room for the paint to expand. (Intumescent paint typically expands 10x its original volume and only performs to its specification when fully expanded.)
- II.B. Primary structural columns and beams required to be protected have individual encasement on all four sides their full length, including connections to other members. (Primary structural frame elements are considered to be *“the columns and the girders, beams, trusses and spandrels having direct connections to the columns and all other members which are essential to the stability of the building as a whole.”* See CBC [1102B](#).)
- II.C. Structural framing inside a rated wall is individually protected per requirements.
- II.D. Secondary members are protected per requirements, when applicable.

3.3.7 Concealed Spaces

In combustible construction (e.g. wood, etc.), because concealed spaces provide avenues for fire and hot gases to travel without building occupant awareness, proper installation of fire/smoke/draft protection in these areas is crucial. Regardless of fire-rating, the following information applies to the various concealed spaces often found in buildings with combustible construction. See CBC [717](#).

I. Receipt of documentation for constructed elements:

- I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

- II.A. Fire/smoke/draft stop construction complies with requirements to block off fire/smoke or hot gasses.
 - II.A.1. Walls
 - II.A.1.1. Fire blocking at specified locations:
 - II.A.1.2. Horizontal Spacing
 - II.A.1.2.1. At ceiling and floor levels.
 - II.A.1.3. Vertical Spacing
 - II.A.2. Floor/Roof/Ceiling

FIRE/LIFE SAFETY INSPECTION ITEMS

- II.A.2.1. Close off continuous space between wall (vertical) framing and floor/roof framing (horizontal).
- II.A.2.2. At concealed sleeper spaces above masonry or concrete fire-rated floors, fire blocking is provided.
 - II.A.2.2.1. No space beneath floor exceeds specified area limits.
 - II.A.2.2.2. Under permanent partitions fire blocking is provided per requirements.
- II.A.2.3. Draftstops are provided per requirements.
- II.A.3. Architectural features (e.g. soffits, enclosed canopies, walkway covers, etc.).
 - II.A.3.1. Fire blocking between exterior wall and end of architectural feature per requirements.
- II.A.4. In Type I or II construction, combustible construction is not permitted, unless specifically shown in the approved construction documents (if shown, it is usually based on the allowed exceptions in CBC [717.5](#)).

FIRE/LIFE SAFETY INSPECTION ITEMS

3.4 Hazardous Materials

Hazardous materials are considered unsafe to life and/or property because they are ignitable, corrosive, reactive or toxic (for an explanation of commonly seen hazardous material signage, see <http://www.compliancesigns.com/nfpadiamonds.shtml>). Such items may be found in any state: solid, liquid, gas or dust, and can be in usable or waste condition. Buildings that manufacture, process, generate, store or otherwise use hazardous materials in quantities that exceed the maximum allowable per control area (defined as an area bounded by fire barriers, horizontal assemblies, fire walls or exterior walls in any combination and as listed in CBC Table 307.1(1)), constitute an above-average fuel load and are therefore considered H-occupancies subject to the limitations spelled out in the CBC. Because there is a multitude of different high-hazard operations state-wide, the code categorizes such facilities in terms of their degree of hazard rather than define them in terms of their function.

Hazardous materials in excess amounts are generally required to be located along an exterior wall to help facilitate fire-fighting operations and venting of the products of combustion. In some cases they may need to be located in a detached building set away from other buildings and/or property lines a minimum distance, depending on their hazard level. Hazardous materials and electrical sparking could be a dangerous combination and may be need to be separated. Note that the potential hazard of adjacent incompatible materials (materials that when mixed have the potential to react in a manner that generates heat, fumes, gases or byproducts which are hazardous to life or property) is not addressed in the CBC and requires expert advice for resolution during the design phase.

The code allows for some factors that can mitigate the hazard of a material. Such mitigations can include the following (this is not an exhaustive list):

- Size of a hazardous material container.
- Whether the material is part of an open or closed system.
- How material is packaged.
- How and in what configuration material is stored.
- Whether the material is stored in a hazardous material storage cabinet or concealed space.
- Whether there is sufficient ventilation to prevent hazardous concentrations.
- Whether there is an emergency or stand-by power system.
- Whether an hazardous activity occurs inside or outside.
- Whether the building is fire sprinklered.

FIRE/LIFE SAFETY INSPECTION ITEMS

In any case, these issues are required to be resolved in the design phase and their solutions via the use of PASSIVE and ACTIVE fire control systems shall be indicated on the DSA approved documents. Testing and inspection for each passive and active system shall be carried out as discussed elsewhere in this document.

FIRE/LIFE SAFETY INSPECTION ITEMS

3.5 Means of Egress

This section addresses the safe exiting system for a building. The general principles on which means of egress are based are:

1. The egress system will provide occupants alternative paths of travel to a place of safety to avoid a fire.
2. The system will shelter occupants from fire and the products of combustion.
3. The system will accommodate all occupants of a structure.
4. The egress system shall be clear, unobstructed, well-marked and illuminated so that the user can exit without requiring any tools, keys, special knowledge or effort.

3.5.1 Fire/Smoke Protection of Means of Egress

Proper protection from smoke and fire for occupants within the means of egress system is crucial. Life safety from fire is a matter of successfully evacuating the occupants of a building to a place of safety; thus, it is a function of time: time for detection, time for notification, and time for egress. A properly designed egress system provides all of the above. Once in a safe egress system the exit pathway must maintain its fire-safe integrity to the point of the exit discharge.

I. Receipt of documentation for constructed elements:

I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.

II. Inspection of the following items:

II.A. Corridors

II.A.1. Corridor rating and construction per requirements.

II.A.1.1. Walls (See *3.3.5.1 Walls* on page 197 for additional information.)

II.A.1.1.1. The rated "envelope" should be continuous to the exit.

II.A.1.1.1.1 If corridor is a rated tunnel construction, horizontal rated assembly is constructed per requirements.

II.A.1.1.2. Utility penetrations through rated corridor walls per requirements. (See also *3.3.5.5 Penetrations of Assemblies* on page 204.)

FIRE/LIFE SAFETY INSPECTION ITEMS

- II.A.1.1.2.1 Check especially all penetrations above the corridor ceiling if the rated corridor walls extend up to the deck.
- II.A.2. Corridor width matches approved documents.
 - II.A.2.1. Doors In Corridors
 - II.A.2.1.1. Door swings do not encroach more than the specified limit into the minimum required width of the corridor (construction drawings should indicate the minimum required width).
 - II.A.2.1.1.1 Exit doors provide the specified minimum clear exit width measured between the face of the door at the 90° open position and the face of the door stop.
 - II.A.2.1.2. Panic hardware is typically required for corridor exit doors – verify with approved construction documents.
 - II.A.2.1.2.1 Where noted on approved plans, classroom door hardware provides locking ability from the inside (see [BU 11-05](#) and [Security vs. Exiting: Door Locking Hardware in Schools](#)).
 - II.A.2.1.3. Door swing does not compromise the direction of exiting.
 - II.A.2.1.4. Check doors, lites in doors, frames and hardware provided are constructed, labeled and installed properly (see 3.3.5.6 *Openings in Rated Assemblies (Opening Protectives)* on page 205 for additional requirements).
 - II.A.2.1.5. Exit doors are clearly distinguishable from the adjacent construction.
 - II.A.2.1.2. Panic hardware is typically required for corridor exit doors – verify with approved construction documents.
 - II.A.2.1.2.1 Where noted on approved plans, classroom door hardware provides locking ability from the inside (see [BU 11-05](#) and [Security vs. Exiting: Door Locking Hardware in Schools](#)).
 - II.A.2.1.3. Door swing does not compromise the direction of exiting.
 - II.A.2.1.4. Check doors, lites in doors, frames and hardware provided are constructed, labeled and installed properly (see 3.3.5.6 *Openings in Rated Assemblies (Opening Protectives)* on page 205 for additional requirements).
 - II.A.2.1.5. Exit doors are clearly distinguishable from the adjacent construction.
 - II.A.3. Window frames and glazing in corridor walls are constructed, labeled and installed per the documents (see 3.3.5.6 *Openings in Rated Assemblies (Opening Protectives)* on page 205 for additional requirements).
 - II.A.4. Emergency Lighting
 - II.A.4.1. Emergency artificial lighting for the corridor is supplemented with battery packs or other emergency power systems.
 - II.A.4.2. Lighted exit lights, both high and low-level, are clearly visible per their listing.
 - II.A.5. Fire alarm devices in the corridor per requirements. See also 3.3.1 *Fire/Smoke Alarms* on page 185.
 - II.A.6. Fire sprinkler devices in the corridor per requirements. See also 3.3.2 *Automatic Fire Suppression Systems* on page 187.

FIRE/LIFE SAFETY INSPECTION ITEMS

II.A.7. Fire extinguishers in corridor per requirements.

II.B. Exits

II.B.1. Exit doors are provided per requirements.

II.B.1.1. Number of exit doors for each room per requirements.

II.B.1.2. Distance between multiple exit doors for a given room or space per requirements.

II.B.1.3. Panic hardware, when applicable (see *4.2.6 Doors and Hardware* on page 227 for additional information).

II.B.1.4. Tactile exit sign (see *4.2.1 Signage* on page 224 for additional information).

II.B.1.5. Lighted Exit Sign

II.B.2. Exit doors provide the specified minimum clear exit width measured between the face of the door at the 90° open position and the face of the door stop.

II.B.3. Exit door leaves are not wider than specified in the approved construction documents.

II.B.4. Exterior exit doors located in a rated exterior wall are properly rated and labeled (see *3.3.5.6 Openings in Rated Assemblies (Opening Protectives)* on page 205 for additional requirements).

II.C. Stairways, ramps and upper floor exitways

II.C.1. For accessible features of stairs and ramps, see the appropriate sections in *4 ACCESS COMPLIANCE INSPECTION ITEMS* beginning on page 216.

II.C.2. Exit stairways are given construction priority for installation.

II.C.3. The exit loading for stairs, ramps and upper floor exitways is determined by the cumulative load for the rooms they serve. Verify the minimum width required is provided as shown on the approved construction documents.

II.C.4. Stair rise-to-run ratio, especially where the top or bottom of an exterior stair meets a sloping public way, walkway or driveway.

II.C.4.1. Exterior steps are sloped to not accumulate standing rain water.

II.C.5. Handrails and Guardrails

II.C.5.1. Handrail and guardrail heights per requirements.

II.C.5.2. Ramp handrails do not each encroach more than the specified limits into the required exit width

II.C.5.3. Stair handrails are provided within the specified distance of the required exit width.

FIRE/LIFE SAFETY INSPECTION ITEMS

- II.C.6. Confirm exterior stairs and ramps have no possibility of storage underneath unless the space is enclosed with fire rated construction indicated in the approved drawings.
 - II.C.6.1. If enclosed space is provided under an enclosed stair verify it is fire rated per requirements and that access to the space is not directly from within the stair enclosure.
- II.C.7. If exterior stairs, ramps and upper floor exitways are of combustible construction, fire sprinklers are provided per requirements; see 3.3.2 *Automatic Fire Suppression Systems* on page 187.
- II.C.8. In combustible construction verify fire blocking is provided in concealed spaces per requirements.
- II.C.9. Areas of refuge are provided where required by the approved construction documents.
- II.C.10. Egress illumination extends fully through the exit discharge.
 - II.C.10.1. Verify required luminosity is achieved at walking surfaces (see [IR 10-1](#)).

4 ACCESS COMPLIANCE INSPECTION ITEMS

ACCESS COMPLIANCE INSPECTION ITEMS

Due to the nature of the accessibility inspection items, there are no requirements for receipt of documentation beyond the approved construction documents. Therefore, the items listed below are strictly inspection items that are to be **verified for compliance with the approved construction documents**.

ACCESS COMPLIANCE INSPECTION ITEMS



Figure 4-1: Path Of Travel at Site – Missing Items

4.1 Site

I. Inspection of the following items:

I.A. Location

I.A.1. An accessible route of travel between all buildings and accessible site facilities, including parking serving (see Figure 4-1):

I.A.1.1. Area of new work

I.A.1.2. Public right-of-way.

I.B. Key features of an accessible path of travel (POT):

I.B.1. Dimensions

I.B.1.1. Slope/cross-slopes

I.B.1.2. Level changes leading to additional accessible features (e.g. ramps, stairs, etc.).

I.B.1.3. Maintenance of specified clear width and height

I.B.1.3.1. Projections into path

I.B.1.3.1.1 Overhanging obstructions

I.B.1.4. Warning Curbs

I.B.2. Surfaces

I.B.2.1. Materials on and along POT.

I.B.3. Tactile Requirements

I.B.3.1. Tactile indicators along POT.

I.B.4. Visual Requirements

I.B.4.1. Visual indicators along POT.

ACCESS COMPLIANCE INSPECTION ITEMS

I.C. Civil Engineering work related to accessibility.

4.1.1 Parking

I. Inspection of the following items:

I.A. Location

I.A.1. Location and layout of accessible parking on the site

I.A.2. Number of accessible spaces per lot for multiple lots.

I.A.3. POT connection for:

I.A.3.1. Ramps at accessible spaces.

I.A.3.2. Passenger or Bus Loading zones.

I.A.3.2.1. Verify “drop-off/pick-up” areas do not encroach into fire lane (see 3.1 *Site Issues* subsection II.A.4.1 on page 179 for additional information).

I.B. Dimensions

I.B.1. Parking Spaces

I.B.2. Access Aisles

I.B.3. Paint and required markings.

I.B.4. Vertical clearance at parking spaces.

I.B.5. Parking Structures

I.B.5.1. Special dimensions and clearance requirements per approved construction documents.

I.C. Visual Requirements

I.C.1. Paint and required markings.

I.C.2. Signage at each type of space.

I.C.3. ‘Tow-away’ sign at lot entrances.

I.D. Special equipment, where occurs per requirements:

I.D.1. Parking lot ticket dispensers.

I.D.2. Electric vehicle charging station.

4.1.2 Signage

I. Inspection of the following items:

I.A. Location

I.A.1. "Tow-away" sign(s) at parking lot entrance(s).

I.A.2. At accessible parking spaces (see Figure 4-2).

I.A.2.1. Van Signs

I.A.2.2. International symbol of accessibility (ISA) at accessible spaces.



Figure 4-2: Example Parking Signage

ACCESS COMPLIANCE INSPECTION ITEMS

- I.B. Dimensions
 - I.B.1. Sign size
 - I.B.2. Height
 - I.B.3. Text Dimensions
- I.C. Visual Requirements
 - I.C.1. Text of "Tow-away" sign(s) at parking lot entrance(s).
- I.D. When specified in approved construction documents, verify directional signs.

4.1.3 Walks

I. Inspection of the following items:

- I.A. Location
 - I.A.1. See 4.1 Site on page 218 for location information.
 - I.A.2. Edge protection if sloping adjacent grade occurs.
- I.B. Dimensions
 - I.B.1. Walk/POT Width
 - I.B.2. Distance between landings on sloping walks.
 - I.B.3. Passing Spaces
 - I.B.4. Slope/cross-slope
 - I.B.4.1. At door and gate landings.
 - I.B.5. Warning Curbs
- I.C. Surfaces
 - I.C.1. Texture and slip-resistance, including at level changes.
 - I.C.2. Transition of new walk to existing walk.
 - I.C.3. Drainage gratings (see Figure 4-3)
 - I.C.3.1. Locations
 - I.C.3.2. Type
 - I.C.3.3. Opening size/orientation.
- I.D. Tactile Requirements
 - I.D.1. Tactile indicators along POT.
- I.E. Visual Requirements
 - I.E.1. Visual indicators along POT.
- I.F. Civil Engineering work related to accessibility.



Figure 4-3: Incorrect Grating Type

ACCESS COMPLIANCE INSPECTION ITEMS

4.1.4 Curb Ramps

I. Inspection of the following items:

I.A. Location

I.A.1. See 4.1 Site on page 218 for location information.

I.A.2. Crossings at vehicular ways.

I.A.3. Configuration (see Figure 4-4).

I.B. Dimensions

I.B.1. Landings at top and bottom.

I.B.2. Slope

I.C. Surfaces

I.C.1. Border Grooves

I.C.2. Detectable Warnings

I.C.3. Slip-resistance

I.D. Visual Requirements

I.D.1. Finish/contrast versus adjacent sidewalk.



Figure 4-4: Curb Ramp Examples

4.1.5 Ramps and Landings

I. Inspection of the following items:

I.A. Location

I.A.1. New and existing ramps on accessible POT.

I.A.2. Landings

I.A.2.1. Top

I.A.2.2. Bottom

I.A.2.3. Intermediate

ACCESS COMPLIANCE INSPECTION ITEMS

- I.A.2.3.1. Between level landings.
- I.A.2.3.2. Change of direction
- I.A.2.4. At door or gate.
- I.A.3. Guards, if required.
- I.B. Dimensions
 - I.B.1. Slope/cross-slope of ramp and landings.
 - I.B.1.1. Sloped to prevent standing water.
 - I.B.2. Ramp
 - I.B.2.1. Slope/cross-slope
 - I.B.2.1.1. Sloped to prevent standing water.
 - I.B.2.2. Length
 - I.B.2.3. Width
 - I.B.3. Landings (top/bottom/intermediate)
 - I.B.3.1. Slope/cross-slope
 - I.B.3.1.1. Sloped to prevent standing water.
 - I.B.3.2. Length
 - I.B.3.3. Width
 - I.B.3.4. Distance between level landings.
 - I.B.4. Handrails
 - I.B.4.1. Handrail Location
 - I.B.4.2. Handrail Extensions
 - I.B.5. Guide Curb or Rails
- I.C. Surfaces
 - I.C.1. Surfaces behind handrails per requirements.

4.1.6 Stairs and Landings

I. Inspection of the following items:

- I.A. Location
 - I.A.1. New stairs/stairways, existing modified stairs/stairways.
- I.B. Dimensions
 - I.B.1. Stair/stairway width.
 - I.B.2. Treads
 - I.B.2.1. Markings for the visually-impaired.
 - I.B.3. Risers
 - I.B.4. Landings
 - I.B.4.1. Sloped to prevent standing water.
 - I.B.5. Handrails
 - I.B.5.1. Handrail Location
 - I.B.5.2. Handrail Extensions
- I.C. Surfaces
 - I.C.1. Slip-resistance
 - I.C.1.1. Treads

ACCESS COMPLIANCE INSPECTION ITEMS

- I.C.1.2. Landings
- I.C.2. Surfaces behind handrails per requirements.
- I.D. Visual Requirements
 - I.D.1. Markings for the visually-impaired.

4.1.7 Gates

I. Inspection of the following items:

- I.A. Location
 - I.A.1. Configuration
- I.B. Dimensions
 - I.B.1. Strike-side clearance.
 - I.B.2. Push-side clearances.
 - I.B.3. Level landings
 - I.B.3.1. Width
 - I.B.3.2. Depth
 - I.B.4. Hardware (see Figure 4-5).
- I.C. Gate Construction

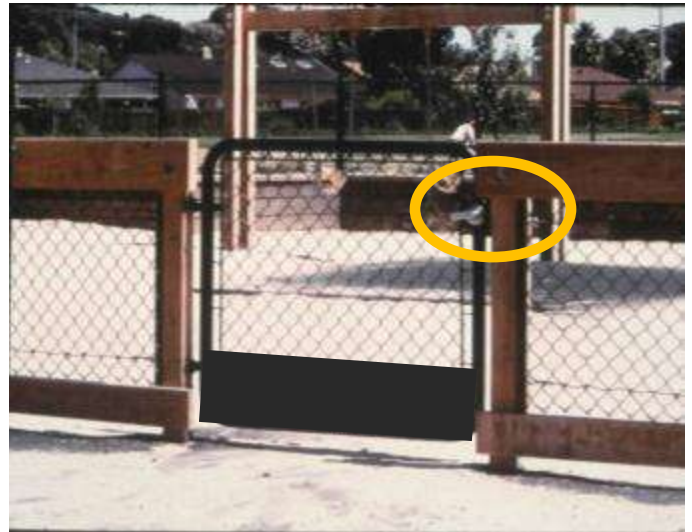


Figure 4-5: Gates

ACCESS COMPLIANCE INSPECTION ITEMS

4.2 Building

I. Inspection of the following items:

- I.A. Location on site.
- I.B. Proximity to accessible features.

4.2.1 Signage

I. Inspection of the following items:

- I.A. Locations
 - I.A.1. ISA
 - I.A.2. Room Identification Signs
 - I.A.3. Tactile Exit Signs
 - I.A.4. Elevator or platform lift identification, way-finding
 - I.A.5. Stairway Signage
 - I.A.5.1. Directional Signage (see Figure 4-6).
 - I.A.6. Area of refuge
 - I.A.7. Building directory
 - I.A.8. Text Telephone (if applicable).
 - I.A.9. Signage at special-use areas
 - I.A.9.1. Assistive Listening Systems
 - I.A.9.2. Restroom Doors (see Figure 4-7).
- I.B. Dimensions
 - I.B.1. Mounting height
 - I.B.1.1. Room Identification Signs
 - I.B.1.2. Tactile Exit Signs
- I.C. Visual Requirements
 - I.C.1. Type/font
 - I.C.1.1. Size
 - I.C.1.2. Style
 - I.C.1.3. Raised Text
 - I.C.1.4. Color contrast
 - I.C.1.5. Texture of sign
- I.D. Tactile Requirements
 - I.D.1. Corresponding braille text for visual signs.



Figure 4-6: Example of Stair and Directional Signage



Figure 4-7: Example of Restroom Signage

ACCESS COMPLIANCE INSPECTION ITEMS

4.2.2 Hallways, Corridors, Vestibules

I. Inspection of the following items:

I.A. Location

I.A.1. POT to area of new work.

I.B. Dimensions

I.B.1. Widths of:

I.B.1.1. Halls

I.B.1.2. Corridors

I.B.1.3. Exit Balconies

I.B.2. Passing spaces (if required) at long halls/corridors.

I.B.3. Maneuvering clearances at

I.B.3.1. Turns

I.B.3.2. Switchbacks

I.B.3.3. Doors

I.B.3.3.1. Door swing clearances at vestibules.

I.B.3.4. Gates

I.C. Guards at balconies and other required areas.

4.2.3 Ramps and Landings

I. Inspection of the following items:

I.A. Location

I.A.1. New and existing ramps on accessible path of travel.

I.A.2. Landings

I.A.2.1. Top

I.A.2.2. Bottom

I.A.2.3. Intermediate

I.A.2.3.1. Between level landings.

I.A.2.3.2. Change of direction

I.A.2.4. At door or gate.

I.A.3. Guards, if required.

I.B. Dimensions

I.B.1. Ramp

I.B.1.1. Slope/cross-slope

I.B.1.2. Length

I.B.1.3. Width

I.B.2. Landings (top/bottom/intermediate)

I.B.2.1. Slope/cross-slope

I.B.2.2. Length

I.B.2.3. Width

I.B.2.4. Distance between level landings.

I.B.3. Handrails

ACCESS COMPLIANCE INSPECTION ITEMS

- I.B.3.1. Handrail Location
- I.B.3.2. Handrail Extensions
- I.B.4. Guide Curb or Rails
- I.C. Surfaces
 - I.C.1. Surfaces behind handrails per requirements.

4.2.4 Stairs and Landings

I. Inspection of the following items:

- I.A. Location
 - I.A.1. New stairs/stairways, existing modified stairs/stairways.
- I.B. Dimensions
 - I.B.1. Stair/stairway width.
 - I.B.2. Treads
 - I.B.2.1. Markings for the visually-impaired.
 - I.B.3. Risers
 - I.B.4. Landings
 - I.B.4.1. Sloped to prevent standing water.
 - I.B.5. Handrails
 - I.B.5.1. Handrail Location
 - I.B.5.2. Handrail Extensions
- I.C. Surfaces
 - I.C.1. Slip-resistance
 - I.C.1.1. Treads
 - I.C.1.2. Landings
 - I.C.2. Surfaces behind handrails per requirements.
- I.D. Visual Requirements
 - I.D.1. Markings for the visually-impaired.

4.2.5 Elevators and Lifts

I. Inspection of the following items:

- I.A. Location:
 - I.A.1. Passenger/Freight Elevators
 - I.A.2. Hall lantern fixtures.
 - I.A.3. Door jamb markings.
- I.B. Emergency Features
 - I.B.1. Emergency operation
 - I.B.2. Intercom System
 - I.B.3. Signaling Devices
 - I.B.4. Door re-opening sensors.



Figure 4-8: Elevator In-Car Controls

ACCESS COMPLIANCE INSPECTION ITEMS

I.C. Dimensions

I.C.1. Height of centerline of hall call buttons in elevator lobby or hall.

I.C.2. Clear Opening Width

I.C.3. Interior Of Cab

I.C.3.1. Handrail type and location.

I.C.4. In-car controls (see Figure 4-8).

I.C.4.1. Configuration

I.C.4.2. Identification

I.D. Surfaces

I.D.1. Surfaces behind handrails per requirements.

I.E. Visual Requirements

I.E.1. In-car controls

I.E.1.1. Button style and dimensions.

I.F. Tactile Requirements

I.F.1. In-car controls

I.F.1.1. Braille text for buttons.

4.2.6 Doors and Hardware

I. Inspection of the following items:

I.A. Location

I.A.1. All Doors

I.A.1.1. Main Entry

I.A.1.2. Passage Doors

I.A.1.3. Single or double leaf.

I.B. Dimensions

I.B.1. Width

I.B.1.1. Clear Opening

I.B.2. Height

I.B.3. Clearances at:

I.B.3.1. Strike-side

I.B.3.2. Push-side

I.B.3.3. Approach

I.B.4. Threshold

ACCESS COMPLIANCE INSPECTION ITEMS

I.B.5. Hardware Mounting Height



Figure 4-9: Door Handles

I.C. Hardware

I.C.1. Hardware Group

I.C.2. Type of hardware (see Figure 4-9).

I.D. Additional door/door related features

I.D.1. Operational Effort

I.D.1.1. Maximum effort to operate door(s).

I.D.2. Closer

I.D.3. Kick Plate

I.D.4. Anchorage of doormats, grills, and carpets.

I.D.5. Automatic doors

I.D.5.1. Fire Doors

I.D.6. Locations/types of:

I.D.6.1. Door Stops

I.D.6.2. Hold-Open Devices

4.2.7 Plumbing Fixtures

I. Inspection of the following items:

I.A. Dimensions

I.A.1. Counter height and knee clearance at sink(s) (refer to 4.2.8 *Cabinets and Counters* on page 229 for additional requirements)

I.A.2. Clear floor space for approach and use.

I.B. Operational Effort

I.B.1. Fixture operating force required.

ACCESS COMPLIANCE INSPECTION ITEMS

4.2.7.1 Drinking Fountains

I. Inspection of the following items:

I.A. Location

I.A.1. High-Low combination

I.A.2. Number of drinking fountains.

I.B. Dimensions

I.B.1. Approach and clear space for use (see Figure 4-11 and Figure 4-10).

I.B.2. Alcove or space at 'wing walls' (see Figure 4-11).



Figure 4-11: Drinking Fountains



Figure 4-10: "Convenience" Drinking Fountain Causing Accessibility Violations

I.B.2.1. Width

I.B.2.2. Depth

I.B.3. Height of bubbler.

I.B.4. Clear height of:

I.B.4.1. Knee space

I.B.4.2. Toe space.

I.B.5. Location of bubbler on unit.

I.B.5.1. Water flow height.

I.B.6. Alternate dimensions for children, if applicable.

4.2.8 Cabinets and Counters

I. Inspection of the following items:

I.A. Location

I.A.1. Clear access at employee work areas and work stations.

ACCESS COMPLIANCE INSPECTION ITEMS

- I.A.2. Accessibility at storage cabinets and built-in equipment (see Figure 4-12).
- I.B. Dimensions
 - I.B.1. Countertop (accessible knee space)
 - I.B.1.1. Height
 - I.B.1.1.1. Maximum height at 'customer' side.
 - I.B.1.2. Depth
 - I.B.1.3. Width
 - I.B.1.3.1. Minimum width of circulation space(s) at casework).
 - I.B.1.4. Minimum counter length.
 - I.B.1.5. Clearance at theft protection barriers.
- I.C. Visual Requirements
 - I.C.1. ISA at locations, if required.



Figure 4-12: Example Accessible Lab Equipment

4.2.9 Alarms and Fire Extinguishers

I. Inspection of the following items:

- I.A. Location
 - I.A.1. Coordinate with Fire/Life Safety requirements (refer to 3.3.1 *Fire/Smoke Alarms* on page 185 and 3.3.3 *Other Extinguishing Systems* on page 194).
- I.B. Dimensions
 - I.B.1. Front/parallel approach to alarm initiating device, on accessible route.
 - I.B.2. Height of:
 - I.B.2.1. Mounting of:
 - I.B.2.1.1. Audible Devices
 - I.B.2.1.2. Visual Devices (see Figure 4-13)

ACCESS COMPLIANCE INSPECTION ITEMS



Figure 4-13: Example of Visual Fire Alarm

I.B.2.2. Extinguisher Handle

I.B.2.3. Cabinet Handle

I.C. Operational Effort

I.C.1. Force required to initiate alarm device.

I.D. Visual Requirements

I.D.1. Visual Devices

4.2.10 Public Telephones

I. Inspection of the following items:

I.A. Location

I.A.1. Number and location of pay or closed-circuit telephones.

I.A.2. Location of telephone book, if provided.

I.A.3. Location of signage for accessible phones.

I.B. Dimensions

I.B.1. Access path and clear space at accessible telephones.

I.B.2. Knee Clearances

I.B.3. Height of operable parts.

I.B.3.1. Shelf Height

I.B.4. Cord length.

I.C. Visual Requirements

I.C.1. Location of signage for accessible phones.

I.D. Volume control provided or text telephones.

ACCESS COMPLIANCE INSPECTION ITEMS

4.2.11 Restrooms

I. Inspection of the following items:

- I.A. Location
 - I.A.1. Clear path of travel to accessible fixtures.
- I.B. Dimensions
 - I.B.1. Clear Entry Width
- I.C. Visual Requirements
 - I.C.1. Room Identification Signage
 - I.C.2. Door Symbols

4.2.11.1 Water Closet and Water Closet Compartments

I. Inspection of the following items:

- I.A. Dimensions
 - I.A.1. Compartment door required clear space side or end entry.



Figure 4-14: Example Measurement of Maneuvering Clearances

- I.A.2. Clear maneuvering space within compartment (see Figure 4-14).
- I.A.3. Location of flush valve.
- I.A.4. Height of toilet seat.
- I.A.5. Dimension to centerline of fixture from adjacent wall (see Figure 4-15).
- I.A.6. Ambulatory accessible stall requirements.

ACCESS COMPLIANCE INSPECTION ITEMS

I.B. Compartment door hardware.



Figure 4-15: Example Measurement of Water Closet Centerline From Adjacent Wall

4.2.11.2 Grab Bars

I. Inspection of the following items:

I.A. Location within stall relative to toilet.

I.B. Dimensions

I.B.1. Length

I.B.2. Diameter

I.B.3. Space from wall.

I.B.4. Mounting height (by 'user group').

I.B.5. Position relative to toilet.

4.2.11.3 Accessories

I. Inspection of the following items:

I.A. Location

I.A.1. Location and mounting heights of dispensers/disposal units.

I.A.2. Allowable types of dispensers/disposal units.

I.B. Dimensions

I.B.1. Maximum projection of dispensers and equipment.

I.B.2. Heights of operable parts of accessories.

I.B.3. Mounting heights of mirrors.

ACCESS COMPLIANCE INSPECTION ITEMS

4.2.11.4 Lavatories

I. Inspection of the following items:

- I.A. Location
 - I.A.1. Total Number
- I.B. Dimensions
 - I.B.1. Height of:
 - I.B.1.1. Mounting
 - I.B.1.2. Rim Height (see Figure 4-16).
 - I.B.2. Centering from wall (see Figure 4-17).
 - I.B.3. Knee Clearances
 - I.B.4. Clear floor space for approach and use.
- I.C. Insulation/protection under lavatories.



Figure 4-16: Example Measurement of Lavatory



Figure 4-17: Example Measurement of Lavatory Centerline From Adjacent Wall

4.2.11.5 Urinals

I. Inspection of the following items:

- I.A. Location
 - I.A.1. Number and location of accessible urinals.
- I.B. Dimensions
 - I.B.1. Clear floor space for approach and use.
 - I.B.2. Height of:

ACCESS COMPLIANCE INSPECTION ITEMS

- I.B.2.1. Mounting
- I.B.2.2. Rim
- I.B.2.3. Flush Controls (if applicable).
- I.B.3. Projection from wall.
- I.B.4. Clearance if located in alcove.

4.2.11.6 Showers and Locker Areas

I. Inspection of the following items:

- I.A. Location
 - I.A.1. Number and location of accessible showers.
 - I.A.2. Bench near accessible locker.
- I.B. Dimensions
 - I.B.1. Based on specific type of shower unit.
 - I.B.2. Height of:
 - I.B.2.1. Mounting of controls.
 - I.B.2.2. Hand-held sprayer/hose.
 - I.B.2.3. Grab Bars
 - I.B.2.4. Seat
 - I.B.2.5. Soap Dish
 - I.B.2.6. Threshold, if applicable.
 - I.B.3. Maximum Floor Slope
 - I.B.4. Accessible mirror
 - I.B.5. Bench near accessible locker (see Figure 4-18)
 - I.B.5.1. Locker clear space.
- I.C. Accessible hardware at locker
- I.D. Visual Requirements
 - I.D.1. Locker with ISA on door.



Figure 4-18: Various Accessible Locker Types

5 OTHER BUILDING COMPONENTS AND SYSTEMS

OTHER BUILDING COMPONENTS AND SYSTEMS

Besides a structural frame with architectural components and ACTIVE PROTECTION fire/life safety systems, buildings also include various other elements that contribute to the whole: mechanical, plumbing, gas, and electrical systems including signal systems such as data, communication and security. All of these must integrate within the framework of the building in a way that does not compromise its overall fire/life safety.

Because mechanical, plumbing, gas, electrical, and signal drawings tend to be diagrammatic in nature, the actual installed work may not resemble the DSA approved layout drawings. Changes in layout due to unexpected structural obstructions and other utility impediments may compromise the effective layout of fire alarm and fire sprinkler systems. Furthermore, these same layout changes may inadvertently encroach into rated assemblies or other required clear spaces (see Figure 5-1). Such changes to design during the construction phase must be properly documented and received DSA review and approval before installation. Once all of these systems components are in place, walking along the routes for each utility can facilitate identification of the potential problems noted.



Figure 5-1: Improper Piping Location at AC Switch

OTHER BUILDING COMPONENTS AND SYSTEMS

The following information is applicable to all mechanical, plumbing, gas, electrical, signal and similar systems.

I. Receipt of documentation for constructed elements:

- I.A. For proprietary products, refer to *1.3 Proprietary Products* on page 40 for requirements.
- I.B. Shop Drawings:
 - I.B.1. Receipt of design professional approved shop drawings.
- I.C. Materials/Test Documentation:
 - I.C.1. Submittal to design professional of all required samples, documentation, etc. for review, testing, evaluation, and approval.
 - I.C.2. The vendor or supplier submits certificates, affidavits or other documentation.
 - I.C.2.1. Verify source of certification.
 - I.C.3. All materials are identifiable by an appropriate means, such as one or more of the following:
 - I.C.3.1. Tags
 - I.C.3.2. Markings
 - I.C.3.3. Stamps
 - I.C.4. Materials identified conform to specified requirements, such as the following, as applicable:
 - I.C.4.1. Type
 - I.C.4.2. Size
 - I.C.4.3. Material
 - I.C.4.4. Gauge
 - I.C.4.5. Weight
 - I.C.4.6. Grade
 - I.C.4.7. Treatment
 - I.C.4.8. Finish
 - I.C.4.8.1. Pattern
 - I.C.4.8.2. Color
 - I.C.5. Extent and schedule of required testing and third-party inspection services understood.
 - I.C.5.1. Laboratory tests, reports, off-site inspections, etc. have been performed as required and are evidenced before the installation.
 - I.C.5.2. Third-Party Inspection Documentation:
 - I.C.5.2.1. Verify qualifications for those performing inspections.
 - I.C.5.2.1.1 Testing and Inspection Laboratory
 - I.C.5.2.1.2 Engineers
 - I.C.5.2.1.3 Agencies
 - I.C.5.2.1.4 Manufacturers' Representatives
 - I.C.5.2.1.5 Others

OTHER BUILDING COMPONENTS AND SYSTEMS

I.C.6. For additional testing requirements, some of which may require documentation, refer to the subsection *Testing* in each of the sections listed below (usually located near the end of the section):

I.C.6.1. 5.1 Mechanical on page 241.

I.C.6.2. 5.2 Plumbing (Including Wet-Side Mechanical) on page 250.

I.C.6.3. 5.3 Gas on page 255.

I.C.6.4. 5.4 Electrical on page 257.

I.C.6.5. 5.5 Signal on page 267.

I.D. Collect, review, and file all copies of tests, certificates, reports, delivery tags, etc., issued by on-site and off-site parties, agencies, and inspectors.

II. Inspection of the following items:

II.A. Prior To Installation

II.A.1. All materials (equipment and items) delivered to site (or to approved off-site location) are inspected for damage in transit.

II.A.1.1. All accessories, parts, and items required and approved are available for use before material is installed.

II.A.1.2. Approved samples are on-site or evidenced before installation as specified.

II.A.2. Materials are adequately stored and protected.

II.A.3. Containers are properly labeled, sealed, and unopened.

II.A.4. Materials are new unless otherwise specified.

II.B. During Installation

II.B.1. Work is inspected during installation in a timely manner so that deficiencies of materials or methods can be readily identified and corrected.

II.B.1.1. The architect and consultants are notified before phases of work are closed up as required or instructed.

II.B.1.2. Changes to work due to field conditions are recorded.

II.B.2. Existing and adjacent work connections and tie-in are suitably performed as specified.

II.B.2.1. Allow no unscheduled (i.e. not detailed on approved plans) cutting, boring, notching or other alteration of structural members or connections.

II.B.2.1.1. Ensure those special provisions for pipes passing through or parallel to footings are met as required. (Refer to 2.1.1.3 *Underground Utilities* on page 50 for additional information.)

II.B.2.2. Surfaces to receive materials are acceptable and satisfactory as required.

II.B.2.2.1. Adequate protection is provided for adjacent surfaces before, during and after installation.

II.B.2.3. Climatic and temperature conditions are suitable and as required before, during, and after installation.

OTHER BUILDING COMPONENTS AND SYSTEMS

II.B.2.3.1. Adequate lighting and other working conditions are provided so that proper workmanship can be performed.

II.B.3. Local or state agency code inspections (e.g. health department, public works, Cal-OSHA) have been performed as required. Accompany local code inspector.

II.B.3.1. Observe tests and inspections performed in the field.

II.C. Post-Installation

II.C.1. Work installed is cleaned and adjacent work is protected if required during cleaning.

II.C.1.1. Work areas are cleaned periodically before installation, where required.

II.C.1.2. At completion of phases as required, debris is removed periodically and not piled so as to cause damage.

II.C.2. Installed work is properly protected.

OTHER BUILDING COMPONENTS AND SYSTEMS

5.1 Mechanical

The following applies to all mechanical systems.

I. Inspection of the following items:

I.A. Condition of using building equipment for temporary heat is understood and/or approved.

I.B. Heat Generation/Emitting Equipment

I.B.1. Location

I.B.2. Expansion joints are provided and guided.

I.B.3. Expansion Tanks

I.B.3.1. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.B.3.2. Provided with accessories and drain.

I.B.4. Piping (see *5.2 Plumbing (Including Wet-Side Mechanical)* on page 250 and *I.D Piping* below on page 243 for additional information).

I.B.4.1. Shutoff for fuel and water are provided.

I.B.4.2. Valves are provided to shut down sections of system if required.

I.B.4.2.1. Valves are labeled if required.

I.B.4.2.2. Safety and relief valves are provided and set to the specified pounds per square inch gauge or gauge pressure (psig).

I.B.4.2.3. Discharges are piped to drains.

I.B.5. Oil Storage Tank

I.B.5.1. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.B.5.2. Approved standard tank capacity and calibration.

I.B.5.3. Required Openings

I.B.5.4. Minimum cover and/or clearance.

I.B.5.5. Tank heaters, if required, and coatings.

I.B.6. Boilers

I.B.6.1. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.B.6.2. Pressure boilers conform with or are identified with ASME code.

I.B.6.3. Bases or refractory bases are provided as required.

I.B.6.4. Expansion joint in floor around boiler.

I.B.6.5. Oil burning equipment

I.B.6.5.1. Size of burner tips.

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.B.6.5.2. Location of electrodes.
- I.B.6.5.3. Position of gas or oil pilot.
- I.B.6.5.4. Clearances for removal of burner from furnace.
- I.B.6.6. Gas burners
 - I.B.6.6.1. Approved standard position of pilot flame and sensing element.
 - I.B.6.6.2. Regulators and controls provided.
 - I.B.6.6.3. Regulator installed in a vertical position.
 - I.B.6.6.4. Gas vents piped to exterior.
- I.B.7. Forced draft fans
 - I.B.7.1. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).
 - I.B.7.2. Alignment and Rotation
 - I.B.7.3. Accessibility for lubrication.
 - I.B.7.4. Damper operation as required.
 - I.B.7.5. Insulation Application
 - I.B.7.6. Safety control interlocks and airflow switches.
- I.B.8. Furnaces
 - I.B.8.1. Adequate space for maintenance, operation, repair, and servicing of equipment.
 - I.B.8.1.1. Clearances to all equipment electric panels are adequate.
 - I.B.8.2. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).
 - I.B.8.3. Fire-resistive surfaces and spacing are provided as specified.
 - I.B.8.4. Combustion air provisions are made as specified.
- I.B.9. Combustion air systems are provided when applicable.
 - I.B.9.1. Breaching and Flues
 - I.B.9.1.1. Material
 - I.B.9.1.2. Construction
 - I.B.9.1.3. Type
- I.B.10. Terminal Units
 - I.B.10.1. Heating and Ventilating Units
 - I.B.10.1.1. Location and layout is coordinated.
 - I.B.10.1.2. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).
 - I.B.10.1.3. Vibration isolators, per requirements.
 - I.B.10.1.4. Access doors are provided and are tight.
 - I.B.10.1.5. Flexible pipe connectors are provided per requirements.
 - I.B.10.1.6. Controls are provided per requirements.
 - I.B.10.2. Unit Heaters
 - I.B.10.2.1. Location

OTHER BUILDING COMPONENTS AND SYSTEMS

I.B.10.2.2. Clearances

I.B.10.2.3. Noise level is within specified range.

I.B.10.2.4. Adequate air distribution is provided.

I.B.10.2.5. Controls

I.B.10.3. Base Board Units

I.B.10.3.1. Location

I.B.10.3.2. Type

I.B.10.3.3. Size

I.B.10.3.4. Mounting

I.B.10.3.5. Controls

I.B.10.3.6. Covers, access doors, dampers, and end plates are provided to extent required.

I.C. Refrigeration

I.C.1. Adequate space for maintenance, operation, repair, and servicing of equipment.

I.C.1.1. Clearances to all equipment electric panels are adequate.

I.C.2. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.C.3. All rotating parts, belts, etc., have guards or other appropriate protection.

I.C.4. Fire separation from fuel-fired equipment is provided, if required.

I.C.5. Freeze protection devices and materials are provided if required.

I.D. Piping (see *5.2 Plumbing (Including Wet-Side Mechanical)* on page 250 for additional information).

I.D.1. Air vents are installed at high points and drains installed at low points as required in water lines.

I.D.2. Vapor barriers, adhesives, and sealants are noncombustible where specified.

I.D.3. Insulation for flanges, fittings, and valves per requirements.

I.D.4. Cooling coil condensate drains with trap seals per requirements.

I.E. Equipment

I.E.1. Adequate space for maintenance, operation, repair, and servicing of equipment.

I.E.1.1. Clearances to all equipment electric panels are adequate.

I.E.2. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.E.3. Condensers

I.E.3.1. Air-Cooled

I.E.3.1.1. Airflow is not obstructed.

I.E.3.1.2. Wind deflectors per requirements.

I.E.3.2. Water-Cooled

I.E.3.2.1. Confirm proper flow is provided.

I.E.3.2.2. No leaks occur.

I.E.3.3. Evaporative Condenser

I.E.3.3.1. Confirm proper spray coverage.

OTHER BUILDING COMPONENTS AND SYSTEMS

I.E.3.3.2. Quiet Float Valve

I.E.3.3.3. Water Level

I.E.4. Compressors

I.E.4.1. Reciprocating Compressor

I.E.4.1.1. Shaft alignment on direct drive.

I.E.4.1.2. Suction and discharge pressures.

I.E.4.1.3. Gauges

I.E.4.1.4. Motor amperage under maximum load.

I.E.4.1.5. Cylinder Overheating

I.E.4.2. Centrifugal Compressor

I.E.4.2.1. Alignment of unit, drive, and gear box.

I.E.4.2.2. Noise within specified range.

I.E.4.2.3. Vibration within specified range.

I.E.4.2.4. Gauges

I.E.5. Receivers

I.E.5.1. Located out of direct sunlight when outside of building.

I.E.5.2. Relief valve size and proper discharging to atmosphere.

I.E.5.3. Drain

I.E.5.4. Purge Valve

I.E.5.5. Liquid Level Indicator

I.E.5.6. Shutoff Valve

I.E.5.7. Items required to be piped to exterior do so.

I.E.6. Cooling Towers

I.E.6.1. Mist Eliminators

I.E.6.2. Overflow and drain piping per requirements.

I.E.6.3. Mechanical Draft Cooling Tower

I.E.6.3.1. Unobstructed air intake is provided.

I.E.6.3.2. Fan rotation and speed.

I.E.6.3.3. Belt Tension

I.E.6.3.4. Weather protection is provided for motor per requirements.

I.E.7. Pumps

I.E.7.1. Supported to be free of excess vibration per requirements.

I.E.7.2. Support of surrounding piping.

I.E.7.3. Gauges

I.E.7.4. Motors

I.F. Air Handling Units and Fans

I.F.1. Adequate space for maintenance, operation, repair, and servicing of equipment.

I.F.1.1. Clearances to all equipment electric panels are adequate.

I.F.2. Anchorage (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.F.3. Confirm fan rotation direction prior to power being connected.

I.F.4. Belt Driven Method

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.F.4.1. Means of belt adjustment.
- I.F.4.2. Pulley and belt are aligned.
- I.F.4.3. Bearing and belt numbers before connection of ducts is made to unit.
- I.F.4.4. Guards or other protection for rotating equipment and belts.
- I.F.5. Lubrication of equipment, if required, is accessible and extends to exterior of unit.
- I.F.6. Equipment exposed to weather is protected from direct exposure per requirements.
 - I.F.6.1. Roof mounted equipment is flashed at curbs per requirements.
 - I.F.6.2. Gooseneck and rain hoods are provided and installed to prevent moisture entrance into system.
- I.F.7. Backdraft dampers and/or sound traps are provided as required on exhaust fans.
 - I.F.7.1. Check for operation, rattle, felt strips, separate frames, etc. as required.
- I.F.8. Exhaust and supplies are oriented to avoid conflict.
- I.G. Filters and Screens
 - I.G.1. Type
 - I.G.2. Adequate space is provided for removal, repair, and replacement of filters.
 - I.G.3. Air stream can be distributed over entire filter area.
 - I.G.4. Proper amount of adhesive and washing tank for viscous medium type filters are provided.
 - I.G.5. Sealing strips are provided as required.
 - I.G.6. Electrostatic filters have warning lights and interlocks as required.
 - I.G.6.1. Ionizers have free access and do not have loose wires or sparking.
 - I.G.7. Automatic sprays provide complete washing and spray coverage.
 - I.G.8. Traveling screen filters are observed for oil charge and operation of screen.
 - I.G.9. Renewable Roll Filters
 - I.G.9.1. Tracking Of Roll
 - I.G.9.2. Media Runout Switch
 - I.G.9.3. Timer Setting
 - I.G.9.4. Static Pressure Control
 - I.G.9.5. Tension On Media
 - I.G.9.6. Spare filters are provided as required.
 - I.G.9.6.1. Equipment filters to be clean and/or replaced as required at date of acceptance.
 - I.G.9.7. Bird and insect screen of proper mesh size and material is provided as required.
 - I.G.9.8. Isolation is made between dissimilar metals.
 - I.G.10. All filters and screens are clean at completion of final tests.
- I.H. Ductwork

OTHER BUILDING COMPONENTS AND SYSTEMS

I.H.1. Location

I.H.1.1. Ductwork is provided with means to adjust to expansion and contraction where needed and as shown on the approved construction documents.

I.H.1.2. Appropriate space and headroom are provided for proper operation, servicing, cleaning, and repair.

I.H.1.2.1. Lighting is suitably located with respect to equipment.

I.H.1.2.2. Clearances to all equipment electric panels are adequate and per requirements.

I.H.2. Ductwork layout is coordinated with other trades to avoid congestion and interference.

I.H.2.1. Hangers

I.H.2.2. Stiffeners

I.H.2.3. Reinforcement

I.H.2.4. Anchorage and bracing of ductwork (refer to 2.5.1 *Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.H.2.5. Slope ratio of transitions, radius of curved duct, air turns, and deflectors are provided as specified.

I.H.2.6. Environmental Air

I.H.2.6.1. Ceiling space used as a return air plenum contains plenum rated cable.

I.H.2.6.2. Corridors do not serve as supply, return, exhaust, relief, or ventilation air ducts per the approved construction documents.

I.H.2.6.2.1 Though there are exceptions to these requirements given in CBC [1018.5](#), the approved construction documents dictate requirements for the project.

I.H.2.6.3. Air moving systems supplying air in excess of specified limits to enclosed spaces within buildings are equipped with an automatic shutoff per requirements.

I.H.2.7. Exhaust Air

I.H.2.7.1. Flammable vapor or dust to be exhausted is interlocked with the equipment creating the vapor or dust per requirements.

I.H.2.7.2. Exhaust ducts do not have dampers, unless specifically shown on approved drawings.

I.H.2.7.3. Fume hoods are exhausted separately from the building exhaust system.

I.H.2.7.3.1 Roof-top exhaust stack is at specified height above the roof surface.

I.H.2.7.3.2 Generally, fume hoods are not manifolded together, but there are exceptions; check with

OTHER BUILDING COMPONENTS AND SYSTEMS

approved construction documents. See also [IR M-1](#).

I.H.2.7.4. Type I Cooking Hoods (See NFPA 96 for additional information.)

I.H.2.7.4.1 Exhaust directly to the outside per requirements.

I.H.2.7.4.2 Located away from building air intakes per requirements.

I.H.3. Type

I.H.4. Material

I.H.5. Thickness

I.H.6. Shape

I.H.7. Joints

I.H.7.1. Type

I.H.7.2. Seams

I.H.7.3. Check for breaks or cracks.

I.H.7.4. Joint provides a smooth surface on interior of duct.

I.H.7.5. Laps are in direction of air flow.

I.H.7.6. Flexible connectors are fabricated and provided where specified.

I.H.8. Splitter dampers are provided if required and operating mechanism is accessible.

I.H.9. Access doors and/or access space is provided at all items requiring servicing.

I.H.9.1. Size is sufficient for access and maintenance for the following (this is not an exhaustive list):

I.H.9.1.1. Fire Dampers

I.H.9.1.1.1 Fire dampers of type required are furnished and installed as specified (refer to 3.3.5.5 *Penetrations of Assemblies* subsection II.A.2.6 on page 204 for additional information).

I.H.9.1.2. Automatic Dampers

I.H.9.1.3. Manual Dampers

I.H.9.1.4. Coils

I.H.9.1.5. Heaters Filters

I.H.9.1.6. Thermostats

I.H.10. Duct Lining and Insulation

I.H.10.1. Ducts are tested for air tightness, if required, before installation of insulation.

I.H.10.2. Material

I.H.10.2.1. Fire retardant or incombustible where noted.

I.H.10.3. Type

I.H.10.4. Thickness

I.H.10.5. Extent

I.H.10.6. Method of fastening and installation are as specified.

I.H.10.7. Sound deadening and vapor barrier are provided as specified.

OTHER BUILDING COMPONENTS AND SYSTEMS

I.H.10.8. Insulation subject to damage is protected as specified.

I.H.10.9. Vapor barrier integrity is maintained.

I.I. Outlets, Diffusers, Registers and Grilles

I.I.1. Materials

I.I.2. Type

I.I.3. Finish

I.I.4. All ducts, plenums, and equipment are thoroughly cleaned of all debris before supply outlets are installed.

I.I.5. Volume control devices are provided as required and are accessible.

I.I.6. Gaskets are provided and installed as required.

I.I.7. Items are securely attached and supported per requirements (see [IR 25-2.10](#) for 2010 CBC or [IR 25-2.07](#) for 2007 CBC).

I.J. Penetrations

I.J.1. Mechanical penetrations through rated assemblies including floors, roofs, walls and shafts comply with approved construction documents. See *3.3.5.5 Penetrations of Assemblies* on page 204 for additional information.

I.K. Conflicts

I.K.1. Mechanical equipment does not interfere with the normal use and operation of doors, windows, and other required facilities.

I.L. Emergency Requirements

I.L.1. Mechanical system has emergency power capability where required.

I.L.1.1. Such systems are clearly labeled.

I.L.2. Machinery may require a disconnect switch; verify per requirements.

I.L.3. Safety and relief valves are provided and set to specified PSIG.

I.L.4. Safety operating controls are provided as required.

I.M. Testing

I.M.1. Verify system is completely clean and flushed of all debris.

I.M.2. Operate system in presence of agencies and engineers, as required.

I.M.2.1. Verify outside air settings and damper operation.

I.M.2.1.1. Relocatable buildings with wall-mounted HVAC units are commonly shipped with outside air dampers secured shut.

I.M.2.2. Ducts are tested for air tightness, if required, before installation of insulation.

I.M.3. Balancing:

I.M.3.1. All bearings are lubricated.

I.M.3.2. Tension of pulleys and belts is adjusted.

I.M.3.3. Guards are in place

I.M.3.4. All adjustments, connections, etc., are made.

I.M.3.5. Balancing report is provided.

I.M.4. Test and verify compliance of the mechanical system with the approved construction documents.

I.N. Maintenance.

I.N.1. Required signs and labeling are provided.

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.N.1.1. Signs/labels are not covered by insulation or painted out.
- I.N.2. System is operated and instruction given to future operating personnel.
- I.N.3. Verify Owner has received all required literature, reference standards and instructions describing the proper operation and maintenance of the equipment and devices installed.

OTHER BUILDING COMPONENTS AND SYSTEMS

5.2 Plumbing (Including Wet-Side Mechanical)

In addition to the items noted below, refer to the CPC.

I. Inspection of the following items:

- I.A. Pipe and fitting materials per requirements (see [BU 09-10](#)).
 - I.A.1. Material
 - I.A.2. Type/Grade
 - I.A.3. Size
 - I.A.4. Weight
 - I.A.5. Corrosion protection measures (e.g. PVC coated conduit) are provided as specified.
- I.B. Location
 - I.B.1. Underground Installation (Refer to *2.1.1.3 Underground Utilities* on page 50 for additional information.)
 - I.B.1.1. Depth
 - I.B.1.2. Clearances
 - I.B.1.3. Backfilled per requirements.
 - I.B.2. Grades and location of piping with respect to other features of the building are understood.
 - I.B.2.1. Existing lines and conflict with other trade's work is coordinated to avoid congestion or interference.
 - I.B.2.1.1. Excavation of stubs or lines to which connection will be made is performed before trenching for new work.
 - I.B.2.2. Prior to placement of foundation, slabs, walls, and floors, confirm piping sleeves meet requirements for:
 - I.B.2.2.1. Number
 - I.B.2.2.2. Size
 - I.B.2.2.3. Locations
 - I.B.2.2.4. Adequacy to receive insulation, caulking, or other requirements.
 - I.B.2.3. Coordinate riser locations, size and spacing with structural requirements where risers pass through structural elements (e.g. foundation, curb, sill plates, etc.).
 - I.B.2.3.1. No cutting, notching, boring or other modifications of structural members unless specifically shown on approved drawings.
 - I.B.3. Pipe supports, hangers, and anchorage's are provided and spaced as specified.
 - I.B.3.1. Isolation between pipe and support is provided as specified.

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.B.3.1.1. Piping is provided with means to adjust to expansion and contraction where needed and as shown on the approved construction documents.
- I.B.3.2. At restrooms with waterless urinals, additional piping per requirements is provided (see [IR P-1](#)).
- I.B.4. Protection is provided to keep concrete, trash, debris, etc., out of lines.
 - I.B.4.1. Capping and plugging is as required.
 - I.B.4.1.1. Verify lines are cleaned at completion, with inspection as specified.
 - I.B.5. Vents are terminated the specified clear distance from building openings.
- I.C. Pipe Fittings
 - I.C.1. Pipes to be threaded are squarely cut, threaded, and reamed properly.
 - I.C.1.1. Fabrication equipment used is adequate.
 - I.C.1.1.1. Lines are reamed.
 - I.C.1.1.2. Tapered threads are used.
 - I.C.1.2. Joints are wiped clean.
 - I.C.2. Pipes to be soldered are cut with tool, reamed, brightened and soldered using flux and solder required.
 - I.C.2.1. Pipes and fittings weakened by overheating are replaced.
 - I.C.3. Pipes with flanged joints are gasketed per requirements.
 - I.C.3.1. Drift pins and spud wrenches are not used.
 - I.C.4. Pipes to be welded are prepared per requirements.
 - I.C.4.1. Welder to be properly certified, if specified (see *1.2.2 Required During Construction* on page 32 for additional information).
 - I.C.5. Pipes to be cemented are properly joined.
 - I.C.5.1. Manufacturer's instructions and approved construction documents for pipe and cement are followed.
 - I.C.6. Installation of valves, unions, and fittings.
 - I.C.6.1. Proper type of valve.
 - I.C.6.1.1. Access to valves is possible.
 - I.C.6.1.2. Orientation of valves and valve systems is as specified.
 - I.C.6.1.3. Vapor seal, were required.
 - I.C.6.2. Proper Fittings
 - I.C.6.2.1. Strainers
 - I.C.6.2.2. Checks
 - I.C.6.2.3. Gauges
 - I.C.6.2.4. Air Reliefs
 - I.C.6.2.5. Drips
 - I.C.6.2.6. Traps
 - I.C.6.3. Valves and fittings are insulated as required.
 - I.C.6.3.1. If hangers are required to be installed over insulation, see that high-density insulation inserts and metal shields are provided per requirements.
 - I.C.6.4. Balancing Cocks

OTHER BUILDING COMPONENTS AND SYSTEMS

I.C.7. Pipes and joints are wrapped or coated as required.

I.C.7.1. Dissimilar metals have dielectric or isolating couplings; no contact of dissimilar metal piping occurs.

I.C.7.1.1. Copper pipes are wrapped with specified tape (or equivalent dielectric) adjacent to steel studs.

I.C.8. Proper alignment without strain on joints.

I.C.9. Future provisions, such as capped lines, and proper location and identification are provided if required.

I.D. Soil, Waste, and Vent Systems

I.D.1. Rough-ins for fixtures and equipment are located and installed as required.

I.D.2. No-hub pipe is installed and hung as required.

I.D.2.1. Clamps are provided at:

I.D.2.1.1. Base of risers

I.D.2.1.2. At every floor penetration

I.D.2.2. Support is provided at every closet bend, trap, arm, etc., unless otherwise specified.

I.D.3. Exterior manholes, lampholes, and cleanouts are located and installed as required.

I.D.3.1. Slope of lines and their alignment are as specified.

I.D.3.2. Cleanouts to grade are provided as required.

I.D.4. Floor drains, airway drains, floor sinks, etc., are elevated and properly located with respect to finish floor (i.e. recessed slab at tile/mortar bed floor) and will adequately drain area served.

I.D.4.1. Provisions are adequate for connection to membranes, waterproofness, etc.

I.D.4.1.1. Clamping rings are provided as required in floors with membranes.

I.D.4.2. Trap primers are provided as specified (floor drains, sinks).

I.D.4.3. Cleanouts are located to allow access, and locations are as specified.

I.D.5. Dielectric unions and connectors per requirements.

I.D.6. Provisions for settlement and shrinkage are made if specified.

I.D.6.1. Observe soil stack supports.

I.D.7. Vent piping, combined and concealed in spaces provided, sloped on horizontals, and extended through roof are flashed and counter-flashed as required.

I.E. Water Supply

I.E.1. Rough-ins to fixtures and equipment are located and installed as required.

I.E.2. Coordination is made for meters, shutoffs, hydrants, boxes, etc.

I.E.2.1. In large structures, shutoff valves are provided if required to isolate portions of system.

I.E.3. Valves for proper function are as required

I.E.3.1. Location and accessibility are understood.

I.E.3.2. Verify location and type of access panels.

OTHER BUILDING COMPONENTS AND SYSTEMS

I.E.3.3. Verify that water system can be drained at lowest point.

I.E.3.4. All valves are labeled, if required.

I.E.4. Air chambers or shock absorbers are provided as specified.

I.E.4.1. Sound and vibration isolators are provided as specified.

I.E.5. Dielectric unions and connectors per requirements.

I.E.6. Allowance for expansion and contraction is provided.

I.F. Fixtures

I.F.1. Installation

I.F.1.1. Adequate blocking, backing, and brackets are provided to receive fixtures (refer to *2.5.1 Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information).

I.F.1.1.1. Hot water generators are securely anchored.

I.F.1.1.1.1 All gauges, valves, strainers, etc. are visible and accessible.

I.F.1.2. Installed fixtures are undamaged and protected during construction.

I.F.1.2.1. Use of fixtures is avoided until system is complete and tested.

I.F.1.3. Fixtures are installed with specified components:

I.F.1.3.1. Accessories

I.F.1.3.2. Trim

I.F.1.3.3. Brass

I.F.1.3.4. Finish

I.F.1.3.5. Stops

I.F.1.3.6. Vacuum Breakers

I.F.1.3.7. Strainers

I.F.1.3.8. Escutcheons

I.F.1.3.9. Flanges

I.F.1.3.10. Cover Plates

I.F.1.4. Fixtures are installed level.

I.F.1.4.1. All gauges, valves, strainers, etc. are visible and accessible.

I.F.1.5. Piping is provided to floor drains or exterior from relief valves.

I.F.1.5.1. Pressure reducing valve is installed and set to pressure as required.

I.F.1.5.2. Floor drains, roof drains, etc., with clamping rings are properly installed to membrane and weeps are cleared as provided.

I.F.1.5.2.1 Observe that shower drains are similarly installed as required.

I.G. Penetrations

I.G.1. Plumbing penetrations through rated assemblies including floors, roofs, walls and shafts comply with approved construction documents.

I.H. Conflicts

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.H.1. Plumbing equipment does not interfere with the normal use and operation of doors, windows, and other required facilities.
- I.H.2. Piping over electrical equipment does not encroach into the required clear space.
- I.I. Emergency Requirements
 - I.I.1. Specified relief valves are provided for pressurized systems.
- I.J. Testing
 - I.J.1. Test and verify compliance of the plumbing system with the approved construction documents.
 - I.J.1.1. All pipes are inspected for damage and tested, inspected before covering up.
 - I.J.1.1.1. Observe testing process.
 - I.J.1.1.2. Water supply system piping, lines are sterilized as specified.
 - I.J.1.1.2.1 Proper Dosage
 - I.J.1.1.2.2 Distribution
 - I.J.1.1.2.3 Retention
 - I.J.1.1.2.4 Final Flush Out
 - I.J.1.1.2.5 Certification is provided.
 - I.J.1.1.3. Fixtures
 - I.J.1.1.3.1 Fixtures are properly cleaned at completion.
 - I.J.1.1.3.2 Check temperature and pressure settings for relief valves.
 - I.J.1.1.3.3 Faucets operate easily and are in proper position.
 - I.J.1.1.3.4 Flush water closets for proper operation.
- I.K. Maintenance
 - I.K.1. Required signs and labeling are provided.
 - I.K.1.1. Piping is painted and/or identified for flow and type.
 - I.K.1.2. Signs/labels are not covered by insulation or painted out.
 - I.K.2. Verify Owner has received all required literature, reference standards and instructions describing the proper operation and maintenance of the equipment and devices installed.

OTHER BUILDING COMPONENTS AND SYSTEMS

5.3 Gas

In addition to the information below, also refer to the CPC and 2009 NFPA 54 National Fuel Gas Code.

I. Inspection of the following items:

I.A. Piping

- I.A.1. Material
- I.A.2. Grade
- I.A.3. Size
- I.A.4. Coating of exterior lines.
- I.A.5. Piping ventilation per requirements.
- I.A.6. Drip pockets are provided per requirements.
- I.A.7. Plug cocks, as pressure regulators and insulating couplings are installed as required. All are labeled if required.

I.B. Location

- I.B.1. Underground Installation (Refer to *2.1.1.3 Underground Utilities* on page 50 for additional information.)
 - I.B.1.1. Depth
 - I.B.1.2. Clearances
 - I.B.1.3. Backfilled per requirements.
- I.B.2. Gas piping is provided with means to adjust to expansion and contraction where needed and indicated in approved construction documents.
- I.B.3. Support and bracing/anchorage per requirements.
- I.B.4. Alignments with existing piping, where applicable.

I.C. Penetrations

- I.C.1. Gas penetrations through rated assemblies including floors, roofs, walls and shafts comply with approved construction documents.

I.D. Conflicts

- I.D.1. Gas equipment does not interfere with the normal use and operation of doors, windows, and other required facilities.

I.E. Emergency Requirements

- I.E.1. Specified relief valves are provided for pressurized pipes.
- I.E.2. Earthquake activated shut-off valve is provided (refer to [BU 11-03](#) for other commonly specified conditions associated with seismic safety for gas piping).
 - I.E.2.1. Refer to [Earthquake Sensitive Automatic Gas Shut-off Valve Certifications](#) for a list of certified valves.
 - I.E.2.2. Refer to [Excess Flow Automatic Gas Shut-off Valve Certifications](#) for a list of certified valves.

OTHER BUILDING COMPONENTS AND SYSTEMS

I.E.2.3. Refer to [Verified Laboratories Qualified for Testing Earthquake-Sensitive and Excess Flow Gas Shut-off Devices](#) for a listing of DSA approved laboratories for testing shut-off valves.

I.E.3. Emergency manual shut-off valve is provided.

I.E.3.1. Emergency shut-off valve is provided in lab spaces and kitchens.

I.F. Testing

I.F.1. Test and verify compliance of the gas system with the approved construction documents.

I.G. Maintenance

I.G.1. Required signs and labeling are provided.

I.G.1.1. Signs/labels are not covered by insulation or painted out.

I.G.2. Gas lines in slab are accessible from a trench with a removable trench-plate cover.

I.G.3. Verify Owner has received all required literature, reference standards and instructions describing the proper operation and maintenance of the equipment and devices installed.

OTHER BUILDING COMPONENTS AND SYSTEMS

5.4 Electrical

In addition to the information below, also refer to the CEC.

I. Inspection of the following items:

I.A. Conduit and Cable

I.A.1. Material

I.A.2. Size

I.A.3. Type/Grade

I.A.3.1. Observe limitations on use of different types of conduit (this is not an exhaustive list):

I.A.3.1.1. Rigid

I.A.3.1.2. Flexible Metal

I.A.3.1.2.1 Thin-Wall

I.A.3.1.2.2 Liquid-Tight

I.A.3.1.3. Plastic

I.A.3.1.4. Cement-Asbestos

I.A.3.1.5. Impregnated-Fiber

I.A.4. Fittings

I.A.4.1. Compatibility with conduit type.

I.A.4.2. Weather tight where applicable.

I.A.5. Insulating Bushings

I.A.6. Connector Linings

I.A.7. Double lock nuts are provided as required.

I.B. Location

I.B.1. Clearances to all equipment electric panels are adequate.

I.B.2. Underground Installation (Refer to 2.1.1.3 *Underground Utilities* on page 50 for additional information.)

I.B.2.1. Depth

I.B.2.2. Clearances

I.B.2.3. Backfilled per requirements.

I.B.3. Anchorage (refer to 2.5.1 *Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.B.4. Means are provided to accommodate contraction and expansion at building expansion joints as required.

I.B.5. Conduit

I.B.5.1. Exposed conduit locations comply with requirements.

I.B.5.1.1. Exposed conduits are installed parallel or perpendicular to structure.

I.B.5.1.2. Vertical runs are plumb.

I.B.5.2. Conduit is secured and fastened as specified.

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.B.5.2.1. Runs in wet areas are elevated above surface at specified dimension.
- I.B.5.3. Conduit is provided with means to adjust to expansion and contraction where needed and indicated in approved construction documents.
- I.B.5.4. Field cutting of conduit square cut, reamed or filed, and cleaned of oil and filings.
- I.B.5.5. Pull wires/ropes/strings are provided, extend full length, and are of the type required.
- I.B.6. Raceways and Busways
 - I.B.6.1. Support is provided as specified in approved construction documents.
 - I.B.6.1.1. Bracing/anchorage is provided per requirements.
 - I.B.6.1.2. Provision for expansion is in accordance with manufacturer's instructions and as shown in approved construction documents.
 - I.B.6.1.3. Support of vertical raceways at each floor level is provided in multistory structures per requirements.
 - I.B.6.2. Raceways
 - I.B.6.2.1. Raceways are kept closed during construction.
 - I.B.6.2.2. Underfloor Raceways
 - I.B.6.2.2.1 Cross sectional dimensions are as specified.
 - I.B.6.2.2.2 Specified setting depth has been provided at junction boxes.
 - I.B.6.2.2.3 Raceways are parallel with floor construction, firmly supported at proper elevation and in straight alignment.
 - I.B.6.2.2.4 All joints are tight and sealed in accordance with manufacturer's instructions and approved construction documents between sections and to junction boxes.
 - I.B.6.2.2.4.1 No damaged joints are allowed.
 - I.B.6.2.2.5 Inserts, both preset and post-installed, are or will be secure to raceways and set flush with floor.
 - I.B.6.3. Busway
 - I.B.6.3.1. Busway is accessible as required.
 - I.B.6.3.2. Plug-in features and top of devices per requirements.
 - I.B.6.3.3. Trolley busways, trolleys, brushes, contact rollers, and flexible cables have good contact and move freely.
 - I.B.6.3.4. Grounding of busway housing is provided per requirements.
 - I.B.6.3.5. Joints are tightened in strict accordance with manufacturer's instructions.

OTHER BUILDING COMPONENTS AND SYSTEMS

I.B.6.3.6. Component sections are legibly identified and marked with voltage, amperage, and name of manufacturer per requirements.

I.B.7. Conductors

I.B.7.1. Material

I.B.7.2. Size

I.B.7.3. Stranding

I.B.7.4. Type of Insulation

I.B.7.5. Pulling of conductors and cables per requirements.

I.B.7.5.1. Suitable equipment and methods.

I.B.7.5.2. No damage to sheath jackets or insulation.

I.B.7.6. Connectors and joints are clean and tight.

I.B.7.6.1. Connectors, lugs, clamps, etc., to connect copper and aluminum are approved for specific application.

I.B.7.6.1.1 Where subject to moisture, materials provided comply with requirements to avoid galvanic corrosion.

I.B.7.6.2. All connections are made in accessible junction or outlet boxes, not in conduits.

I.B.7.7. Color coding of wires, including neutral and grounding (see *I.C.1 Fixtures* on page 263 for additional information), and branch circuits per requirements.

I.B.7.7.1. Neutral is insulated throughout per requirements.

I.B.7.8. Branch circuit conductors extending through fluorescent fixtures in continuous runs per requirements.

I.B.8. Cable Systems

I.B.8.1. Cables are secured per requirements.

I.B.8.2. Metal-clad cable (BX) is installed per requirements.

I.B.8.2.1. Cutting is performed without conductor damage.

I.B.8.2.2. Bushings are installed per requirements.

I.B.8.3. Nonmetallic-cable is only installed in specified areas.

I.B.8.3.1. Used in wet locations or areas exposed to dampness including exterior masonry walls.

I.B.8.3.2. In wood or cold formed steel light frame construction, nonmetallic-cable is located within wall to prevent driving of nails into cable.

I.B.8.3.2.1 Protection plates are provided where required.

I.B.8.4. Cable is covered by finishes per requirements.

I.B.9. Outlets

I.B.9.1. Locations of outlets per approved drawings.

I.B.9.1.1. Wall receptacle, switch outlets, and fixture outlets are mounted at height and location specified.

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.B.9.1.2. Based on proposed furniture and equipment layout, verify suitable clearances to outlets will be provided when those items will be placed near outlets.
- I.B.9.1.3. Door swings, equipment, and other features are not in conflict for convenience of use.
- I.B.9.1.4. Light outlets in mechanical and equipment rooms are located to suit servicing and maintenance and extend below ducts and ceiling.
- I.B.9.2. Junction, pull, and outlet boxes are of type, size, and location required.
 - I.B.9.2.1. Boxes are securely and rigidly supported and do not rely on conduits for this support.
 - I.B.9.2.2. Boxes are accessible.
 - I.B.9.2.3. Cast boxes and special boxes are provided as required in exposed areas, exterior areas, wet locations, and hazardous locations.
 - I.B.9.2.4. All boxes exposed to weather are weatherproof.
 - I.B.9.2.5. Plaster rings, extension rings, etc., are provided.
 - I.B.9.2.5.1 Where noncombustible surfaces occur, specified space is provided from finish.
 - I.B.9.2.5.1.1 Combustible surface has flush mounting.
 - I.B.9.2.5.1.1.1 No combustible material is exposed to interior of box.
 - I.B.9.2.6. Number of conductors in boxes does not exceed limits specified.
- I.B.9.3. Unused openings are closed.
- I.B.9.4. Grounding continuity is maintained, including jumper if required.
- I.B.9.5. Prior to close-in, architect is notified.
- I.B.9.6. Special inspection is provided, when specified.
- I.B.9.7. Installed devices comply with requirements (the list below is not exhaustive):
 - I.B.9.7.1. Type
 - I.B.9.7.2. Voltage
 - I.B.9.7.3. Amperage
 - I.B.9.7.4. Color
- I.B.9.8. Switches
 - I.B.9.8.1. Installed in hot leg of circuit (not neutral)
 - I.B.9.8.2. "On" position is up, except for momentary contact.
 - I.B.9.8.3. 3-way and 4-way switches.
- I.B.9.9. Device plates per requirements (the list below is not exhaustive).
 - I.B.9.9.1. Material
 - I.B.9.9.2. Type
 - I.B.9.9.3. Ganging
 - I.B.9.9.4. Finish

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.B.9.9.5. Completely cover openings.
- I.B.9.9.6. In contact and flush with surface.
- I.B.9.9.7. Plumb (not dished or bowled).
- I.B.9.9.8. Surface-mounted boxes are provided with compatible plates and without overhanging edges.
- I.B.9.10. Neutral of multi-wire circuit will not be interrupted by removal of device or fixture.
- I.B.10. Motors
 - I.B.10.1. Motors have voltage rating, and number of phases to suit supply system.
 - I.B.10.2. Motor rotation is correct for driven machine.
 - I.B.10.3. Motors subject to vibration or mounted on adjustable bases are connected with flexible metal conduit
 - I.B.10.3.1. Liquid-tight or explosion-proof flexible metal conduit provided where required.
 - I.B.10.4. Flexible metal conduit length is as required and allows flexibility in all possible motor locations.
 - I.B.10.5. Observe lubrication requirements are met prior to operation.
- I.B.11. Motor Control, Disconnects, and Starters
 - I.B.11.1. Motor Control
 - I.B.11.1.1. Horsepower and voltage rating is to be at least equal to motor controlled.
 - I.B.11.1.1.1 Each controller with disconnect per requirements.
 - I.B.11.1.2. Automatic control devices (e.g. thermostats, float and pressure switches) are adequately rated and as required.
 - I.B.11.1.3. All control accessories are furnished as required (the list below is not exhaustive):
 - I.B.11.1.3.1 Start-stop push buttons.
 - I.B.11.1.3.2 Pilot Lights
 - I.B.11.1.3.3 Selector Switches
 - I.B.11.1.4. Motor controllers do not have excessive humming or noise under operating conditions.
 - I.B.11.2. Magnetic coil voltage is same as control circuit voltage (may be different from motor voltage).
 - I.B.11.3. Disconnects
 - I.B.11.3.1. Manual disconnect switch is provided for each motor and motor starter, as specified.
 - I.B.11.3.2. Motor nameplate full-load rated currents are compared with ratings of motor-running overcurrent protective devices (heater).
 - I.B.11.3.2.1 Heaters of proper size are installed in starters.
- I.B.12. Electrical Service and Distribution

OTHER BUILDING COMPONENTS AND SYSTEMS

I.B.12.1. Service

I.B.12.1.1. Provisions are made in construction for service entrance system in accordance with utility company requirements and coordinated with drawings.

I.B.12.1.1.1 Clearances under service drops are provided.

I.B.12.1.2. Sleeves and spaces are provided of sizes required.

I.B.12.1.3. Meter location and main disconnect location are understood.

I.B.12.2. Transformers

I.B.12.2.1. Pad for exterior transformer conforms to requirements.

I.B.12.2.2. Location and installation method is understood.

I.B.12.2.3. Transformer is of type required.

I.B.12.2.4. Anchorage (refer to 2.5.1 *Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.B.12.3. Switchboards and Panelboards

I.B.12.3.1. Location

I.B.12.3.1.1 Clearance space provided is adequate.

I.B.12.3.1.2 Mounting Height

I.B.12.3.1.3 Distance from handle of top switch or breaker to finish floor not to exceed specified limits.

I.B.12.3.1.4 Isolation of boards per requirements.

I.B.12.3.2. Anchorage (refer to 2.5.1 *Mechanical/Electrical/Plumbing Equipment* on page 159 for additional information, where applicable).

I.B.12.3.3. Conduits do not support boards.

I.B.12.3.4. Spaces are provided as required by approved construction documents for future circuits.

I.B.12.3.5. Spare breakers are provided and installed as required by approved construction documents.

I.B.12.4. Grounding

I.B.12.4.1. Visually inspect all grounding system conductors, connections, and electrodes as work progresses.

I.B.12.4.2. Grounding connectors are accessible for inspection.

I.B.12.4.3. Grounding is protected against mechanical injury.

I.B.12.4.4. If water piping system is used, check that pipe is metallic per requirements.

I.B.12.4.4.1 No insulating fitting is interposed in pipe between round wire connection point and interior or exterior pipe system.

I.B.12.4.5. Contact surfaces are clean and dry.

I.B.12.4.5.1 Metal-To-Metal

I.B.12.4.5.2 Tight Bolt Connections

I.B.12.4.6. Ground Rods

OTHER BUILDING COMPONENTS AND SYSTEMS

I.B.12.4.6.1 Material

I.B.12.4.6.2 Size

I.B.12.4.6.3 Length

I.B.12.4.6.4 Number

I.B.12.4.6.5 Installation

I.B.12.4.7. Connectors are compatible with metal and pipes.

I.B.12.4.7.1 Verify aluminum connectors.

I.B.12.4.8. Grounding conductor is connected to both ends of metallic raceway in which it is installed.

I.B.12.4.8.1 Both grounding and raceway are connected to grounding electrode in accordance per requirements.

I.C. Lighting

I.C.1. Fixtures

I.C.1.1. Fixtures comply with approved shop drawings for fixtures.

I.C.1.2. All accessories are provided.

I.C.1.3. Ballast type is as required fluorescent or high-intensity discharge, voltage, power factor, overload protection, proper rating, low temperature, etc.

I.C.1.3.1. Ballasts are quiet.

I.C.1.4. Lamp type per requirements.

I.C.1.4.1. Wattage

I.C.1.4.2. Energy Saving

I.C.1.4.3. Style

I.C.1.4.4. Color

I.C.1.4.5. Characteristics

I.C.1.4.6. Long Life

I.C.1.4.7. Note fluorescent lamps at start of installation to verify proper operation upon completion.

I.C.1.4.8. Lamps are new and installed before completion, or reinstalled if required.

I.C.1.4.9. Additional new lamps are provided to compensate for contractors use of building lighting system if required.

I.C.1.5. Fixtures are adjusted or aimed as required.

I.C.1.6. Fixtures are suitably protected and cleaned at completion of work.

I.C.1.7. All fixtures are grounded as required.

I.C.2. Frames and accessories per requirements.

I.C.2.1. Confirm compatibility with adjacent surfaces

I.C.2.2. No light leaks

I.C.2.3. Weather Proof

I.C.2.4. Corrosion resistant

I.C.2.5. Finishes Match

I.C.3. Inspect cartons and lens to see whether acrylic or styrene plastic is provided as required.

OTHER BUILDING COMPONENTS AND SYSTEMS

I.C.4. Location

I.C.4.1. Lighting layout is coordinated with architectural drawings and discrepancies are reported.

I.C.4.2. Layout is coordinated with work of other trades, especially mechanical and fire sprinklers.

I.C.4.3. Suspension, supporting, and mounting methods are as required.

I.C.4.3.1. Confirm plumbness and alignment.

I.C.4.4. Mounting height and location are as required.

I.C.5. During installation, see that defective louvers, cracked glass or plastic, chipped porcelain or finish, distortion, or other defects are corrected before completion.

I.C.5.1. Doors are properly aligned, with proper clearance.

I.C.5.2. Retaining devices function properly.

I.D. Grounding

I.D.1. Grounding conductor is securely attached to equipment, devices, etc., and forms complete grounding system.

I.D.1.1.1. Grounding conductor for equipment when run with circuit conductors complies with color coding requirements (commonly specified as either bare or green coded).

I.D.2. GFI receptacles are provided per requirements (see [IR E-2](#) for commonly specified locations).

I.D.3. All grounding complies with the approved construction documents.

I.D.3.1. Where fittings occur, confirm tightness is appropriate to maintain ground continuity.

I.D.3.2. Photovoltaic systems are properly grounded per requirements.

I.E. Penetrations

I.E.1. Electrical penetrations through rated assemblies including floors, roofs, walls and shafts comply with approved construction documents.

I.E.1.1. Electrical racks through rated walls often require special through-penetration details per approved drawings.

I.F. Conflicts

I.F.1. Electrical equipment does not interfere with the normal use and operation of doors, windows, and other required facilities.

I.G. Emergency Requirements

I.G.1. High-voltage spaces have the specified exiting and panic hardware.

I.G.2. Battery storage per the approved construction documents.

I.G.3. UPS, automatic transfer systems, fuel cell, emergency power and stand-by power systems per requirements.

I.G.4. Machinery may require a disconnect; verify per requirements.

I.H. Testing

I.H.1. Grounding tests for relocatable buildings (see [IR E-1](#)).

I.H.2. Test and verify compliance of the electrical system with the approved construction documents.

I.I. Maintenance

OTHER BUILDING COMPONENTS AND SYSTEMS

- I.I.1. Required signs and labeling are provided.
 - I.I.1.1. Photovoltaic systems have specified labeling.
 - I.I.1.2. Signs/labels are not covered by insulation or painted out.
- I.I.2. All electrical equipment and devices have the specified clear work space.
- I.I.3. Verify Owner has received all required literature, reference standards and instructions describing the proper operation and maintenance of the equipment and devices installed.

5.4.1 Emergency and Standby Power Systems

Emergency power systems are essentially fire safety systems (e.g. exit signage and egress illumination), whereas standby power systems focus more on the continued operation of critical equipment in a building (e.g. elevators, fire pumps). Emergency power is typically available in 10 seconds after the primary power fails, whereas standby power is available in 60 seconds.

In addition to the references noted for Electrical Systems, the following apply to emergency and standby power systems::

- CBC Chapter 27
- CFC Chapter 604
- NFPA 110
- NFPA 111

In addition to the testing and inspection items noted for Electrical Systems, the information below applies to emergency and standby power systems.

I. Inspection of the following items:

- I.A. Emergency and standby power is provided at locations specified in the approved construction documents. Common equipment, locations or areas often include:
 - I.A.1. Equipment
 - I.A.1.1. Horizontal Sliding Doors
 - I.A.1.2. Fire Alarm/Detection Systems
 - I.A.1.3. Smoke Control Systems
 - I.A.1.4. Fire Pumps
 - I.A.1.5. Voice/alarm communication systems in:
 - I.A.1.5.1. A-occupancy
 - I.A.1.5.2. Covered Malls
 - I.A.1.6. Means of egress illumination.
 - I.A.1.6.1. Exit Signs
 - I.A.2. Locations/Areas
 - I.A.2.1. Hazardous Materials Areas
 - I.A.2.2. Occupied Areas Underground

OTHER BUILDING COMPONENTS AND SYSTEMS

I.A.2.3. Elevators, including elevator car lighting.

I.A.2.3.1. Accessible means of egress elevators.

I.A.2.4. High-Rise Buildings

I.A.2.5. I-2 occupancy when located at or above 75 feet (e.g. in high-rise buildings)

I.A.2.6. I-3 Occupancy

I.A.2.7. L Occupancy

I.B. Verify special requirements at generators.

I.B.1. Fire barrier rating in high-rise buildings.

I.B.2. Fuel capacity time duration.

I.C. Testing of Emergency and Standby Power Systems shall comply with NFPA 110 and NFPA 111.

OTHER BUILDING COMPONENTS AND SYSTEMS

5.5 Signal

I. Inspection of the following items:

I.A. Location

I.A.1. Underground Installation (Refer to 2.1.1.3 *Underground Utilities* on page 50 for additional information.)

I.A.1.1. Depth

I.A.1.2. Clearances

I.A.1.3. Backfilled per requirements.

I.A.2. Conduit and cable are provided with means to adjust to expansion and contraction where needed and indicated in approved construction documents.

I.A.3. Support and bracing/anchorage per requirements.

I.B. Penetrations

I.B.1. Signal penetrations through rated assemblies including floors, roofs, walls and shafts comply with approved construction documents.

I.B.1.1. Signal racks through rated walls often require special through-penetration details per approved drawings.

I.C. Conflicts

I.C.1. Signal equipment does not interfere with the normal use and operation of doors, windows, and other required facilities.

I.D. Testing

I.D.1. Test and verify compliance of the signal system with the approved construction documents.

I.E. Maintenance

I.E.1. Required signs and labeling are provided.

I.E.1.1. Signs/labels are not covered by insulation or painted out.

I.E.2. Verify Owner has received all required literature, reference standards and instructions describing the proper operation and maintenance of the equipment and devices installed.

APPENDIX A – DSA 103 CORRELATION MATRIX

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
SOILS	2.1 Soils on page 45
1. GENERAL:	
a. Verify that: <ul style="list-style-type: none"> • site has been prepared properly prior to placement of controlled fill and/or excavations for foundations, • foundation excavations are extended to proper depth and have reached proper material, and • materials below footings are adequate to achieve the design bearing capacity. 	2.1.1.1 Site on page 45 2.1.1.2 Building Pad on page 49 2.1.1.3 Underground Utilities on page 50 2.1.3.1 Segmental Retaining Walls on page 54 2.1.3.2 Masonry Retaining Wall on page 57 2.1.3.3 Concrete Retaining Wall on page 58
2. COMPACTED FILLS:	
a. Perform qualification testing of fill materials.	2.1.1.1 Site on page 45 2.1.1.2 Building Pad on page 49 2.1.1.3 Underground Utilities on page 50 2.1.3.1 Segmental Retaining Walls on page 54 2.1.3.2 Masonry Retaining Wall on page 57 2.1.3.3 Concrete Retaining Wall on page 58
b. Verify use of proper materials and inspect lift thicknesses, placement, and compaction during placement of fill.	2.1.1.1 Site on page 45 2.1.1.2 Building Pad on page 49 2.1.1.3 Underground Utilities on page 50 2.1.3.1 Segmental Retaining Walls on page 54 2.1.3.2 Masonry Retaining Wall on page 57 2.1.3.3 Concrete Retaining Wall on page 58
c. Test compaction of fill.	2.1.1.1 Site on page 45 2.1.1.2 Building Pad on page 49 2.1.1.3 Underground Utilities on page 50 2.1.3.1 Segmental Retaining Walls on page 54 2.1.3.2 Masonry Retaining Wall on page 57 2.1.3.3 Concrete Retaining Wall on page 58
3. DRIVEN DEEP FOUNDATIONS (PILES):	2.2.2.1 Driven Deep Foundations (Piles) on page 65
a. Verify pile materials, sizes and lengths comply with the requirements.	2.2.2.1 Driven Deep Foundations (Piles) on page 65
b. Determine capacities of test piles and conduct additional load tests as required.	2.2.2.1 Driven Deep Foundations (Piles) on page 65

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
c. Inspect driving operations and maintain complete and accurate records for each pile.	2.2.2.1 Driven Deep Foundations (Piles) on page 65
d. Verify locations of piles and their plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and record any pile damage.	2.2.2.1 Driven Deep Foundations (Piles) on page 65
e. Steel piles.	2.2.2.1.1 Steel Piles on page 67 2.2.2.1.1.1 Helical Piles on page 67 2.2.2.1.2 Composite Steel Piles on page 68
f. Concrete piles, and concrete filled piles.	2.2.2.1.2 Composite Steel Piles on page 68 2.2.2.1.3 Concrete Piles on page 68 2.2.2.1.3.1 Concrete Filled Piles on page 68 2.2.2.1.3.2 Prestressed Piles on page 68 2.2.2.1.3.3 Precast on page 68
g. For specialty piles, perform additional inspections as determined by the registered design professional in responsible charge.	2.2.2.1 Driven Deep Foundations (Piles) on page 65
4. CAST-IN-PLACE DEEP FOUNDATIONS (PIERS):	2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns on page 72
a. Inspect drilling operations and maintain complete and accurate records for each pier.	2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns on page 72
b. Verify locations of piers.	2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns on page 72
c. Confirm pier diameters, plumbness, bell diameters (if applicable), lengths, and embedment into bedrock (if applicable). Record concrete or grout volumes.	2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns on page 72

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	page 72
d. Confirm adequate end strata bearing capacity.	2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns on page 72
e. Concrete piers.	2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns on page 72
5. RETAINING WALLS:	2.1.3 Earth Retaining Structures on page 53
a. Placement of soil reinforcement, drainage devices, and backfill.	2.1.3.1 Segmental Retaining Walls on page 54 2.1.3.2 Masonry Retaining Wall on page 57 2.1.3.3 Concrete Retaining Wall on page 58
b. Segmental retaining walls; inspect placement of units, dowels, connectors, etc.	2.1.3.1 Segmental Retaining Walls on page 54
c. Concrete retaining walls.	2.1.3.3 Concrete Retaining Wall on page 58
d. Masonry retaining walls.	2.1.3.2 Masonry Retaining Wall on page 57
6. OTHER SOILS:	2.1.4 Anchors on page 58 2.1.4.1 Soil Nails on page 59 2.1.4.2 Tie Backs on page 59 2.1.4.3 Prestressed Rock and Soil Foundation Anchors on page 59 2.2.2.4 Compacted Aggregate Piers/Rammed Aggregate Piers/Vibro Stone Columns on page 72
CONCRETE	2.3.1 Concrete on page 74 2.4.1 Concrete on page 140
7. CAST IN PLACE CONCRETE	2.2.1.1 Concrete Foundations on page 62 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74 2.4.1 Concrete on page 140
Material Verification and Testing:	
a. Verify use of required design mix.	2.1.3.3 Concrete Retaining Wall on page 58

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74 2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.1.4 Concrete Walls on page 85 2.3.1.4.1 CIP on page 85 2.3.1.4.2 Tilt-up on page 85 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141 2.4.1.3 Special Reinforced Moment Frame on page 141
b. Test reinforcing steel.	2.1.3.3 Concrete Retaining Wall on page 58 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74 2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.1.4 Concrete Walls on page 85 2.3.1.4.1 CIP on page 85

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.1.4.2 Tilt-up on page 85 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141 2.4.1.3 Special Reinforced Moment Frame on page 141
c. Perform slump, temperature, and (where required) air content tests.	2.1.3.3 Concrete Retaining Wall on page 58 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74 2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.1.4 Concrete Walls on page 85 2.3.1.4.1 CIP on page 85 2.3.1.4.2 Tilt-up on page 85 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141 2.4.1.3 Special Reinforced Moment Frame on page 141

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
d. Test concrete (compression).	2.1.3.3 Concrete Retaining Wall on page 58 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74 2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.1.4 Concrete Walls on page 85 2.3.1.4.1 CIP on page 85 2.3.1.4.2 Tilt-up on page 85 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141 2.4.1.3 Special Reinforced Moment Frame on page 141
Inspection:	
e. Inspect batching of concrete.	2.1.3.3 Concrete Retaining Wall on page 58 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74 2.3.1.1 Cast In Place (CIP) Concrete on page 74

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.1.4 Concrete Walls on page 85 2.3.1.4.1 CIP on page 85 2.3.1.4.2 Tilt-up on page 85 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141 2.4.1.3 Special Reinforced Moment Frame on page 141
f. Inspect placement of formwork, reinforcing steel, embedded items and concrete. Inspect curing and form removal.	2.1.3.3 Concrete Retaining Wall on page 58 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74 2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.1.4 Concrete Walls on page 85 2.3.1.4.1 CIP on page 85 2.3.1.4.2 Tilt-up on page 85 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.4.1.3 Special Reinforced Moment Frame on page 141
g. Welding of reinforcing steel.	2.1.3.3 Concrete Retaining Wall on page 58 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74 2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.1.4 Concrete Walls on page 85 2.3.1.4.1 CIP on page 85 2.3.1.4.2 Tilt-up on page 85 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141 2.4.1.3 Special Reinforced Moment Frame on page 141
h. Verify in-situ concrete strength prior to removal of shores and forms from beams and structural slabs.	2.1.3.3 Concrete Retaining Wall on page 58 2.2.1.1 Concrete Foundations on page 62 2.2.1.1.1 Footings on page 63 2.2.1.1.2 Concrete Grade Beams/Combined Concrete Footings on page 64 2.2.1.1.3 Concrete Mat on page 64 2.2.1.1.4 Pile Caps on page 64 2.2.2.2 Cast-In-Place Deep Foundations (Piers) on page 69 2.2.2.3 Micropiles on page 71 2.3.1 Concrete on page 74

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.1.4 Concrete Walls on page 85 2.3.1.4.1 CIP on page 85 2.3.1.4.2 Tilt-up on page 85 2.3.1.5 Concrete Columns on page 87 2.3.1.5.1 CIP on page 87 2.3.1.6 Concrete Beams on page 87 2.3.1.6.1 CIP on page 87 2.3.1.7 Concrete Floor/Roof on page 88 2.3.1.7.1 CIP on page 88 2.4.1 Concrete on page 140 2.4.1.1 Special Reinforced Shear Wall on page 140 2.4.1.2 Intermediate Precast Shear Wall on page 141 2.4.1.3 Special Reinforced Moment Frame on page 141
8. PRESTRESSED CONCRETE (in addition to Cast in Place Concrete tests and inspections):	2.3.1.2 Prestressed/Post-tension Concrete on page 83
a. Test prestressing tendons and anchorages.	2.2.2.1.3.2 Prestressed Piles on page 68 2.3.1.2 Prestressed/Post-tension Concrete on page 83 2.3.1.5.2 Prestressed/Post-tension on page 87 2.3.1.6.2 Prestressed/Post-tension on page 87 2.3.1.7.2 Prestressed/Post-tension on page 88
b. Inspect placement of prestressing tendons.	2.2.2.1.3.2 Prestressed Piles on page 68 2.3.1.2 Prestressed/Post-tension Concrete on page 83 2.3.1.5.2 Prestressed/Post-tension on page 87 2.3.1.6.2 Prestressed/Post-tension on page 87 2.3.1.7.2 Prestressed/Post-tension on page 88
c. Verify in-situ concrete strength prior to stressing of tendons.	2.2.2.1.3.2 Prestressed Piles on page 68 2.3.1.2 Prestressed/Post-tension Concrete on page 83 2.3.1.5.2 Prestressed/Post-tension on page 87 2.3.1.6.2 Prestressed/Post-tension on page 87 2.3.1.7.2 Prestressed/Post-tension on page 88
d. Inspect application of prestressing forces and grouting of bonded prestressing tendons.	2.2.2.1.3.2 Prestressed Piles on page 68 2.3.1.2 Prestressed/Post-tension Concrete on page 83 2.3.1.5.2 Prestressed/Post-tension on page 87

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.1.6.2 Prestressed/Post-tension on page 87 2.3.1.7.2 Prestressed/Post-tension on page 88
9. PRECAST CONCRETE (in addition to Cast in Place Concrete tests and inspections):	2.3.1.3 Precast Concrete on page 84
a. Inspect fabrication of precast concrete members.	2.2.2.1.3.3 Precast on page 68 2.3.1.3 Precast Concrete on page 84 2.3.1.4.2 Tilt-up on page 85 2.3.1.5.3 Precast on page 87 2.3.1.6.3 Precast on page 87 2.3.1.7.3 Precast on page 88 2.4.1.2 Intermediate Precast Shear Wall on page 141
b. Inspect erection of precast concrete members.	2.2.2.1.3.3 Precast on page 68 2.3.1.3 Precast Concrete on page 84 2.3.1.4.2 Tilt-up on page 85 2.3.1.5.3 Precast on page 87 2.3.1.6.3 Precast on page 87 2.3.1.7.3 Precast on page 88 2.4.1.2 Intermediate Precast Shear Wall on page 141
10. SHOTCRETE (in addition to Cast in Place Concrete tests and inspections):	2.3.1.4.3 Shotcrete on page 86
a. Inspect shotcrete placement.	2.3.1.4.3 Shotcrete on page 86
b. Test shotcrete (compression).	2.3.1.4.3 Shotcrete on page 86
11. POST-INSTALLED ANCHORS:	
a. Inspect installation of post-installed anchors	2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.3.1 Walls on page 112 2.3.4.2.2.2 Steel Deck on page 136 2.5.1 Mechanical/Electrical/Plumbing Equipment on page 159 2.5.2.1.1.1 Casework/Lockers on page 161 2.5.2.1.2.3 Casework/Lockers on page 163 2.5.2.2.1 Computer Access Floors on page 164 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 5.4 Electrical on page 257

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
b. Test post-installed anchors.	2.3.1.1 Cast In Place (CIP) Concrete on page 74 2.3.3.1 Walls on page 112 2.3.4.2.2.2 Steel Deck on page 136 2.5.1 Mechanical/Electrical/Plumbing Equipment on page 159 2.5.2.1.1.1 Casework/Lockers on page 161 2.5.2.1.2.3 Casework/Lockers on page 163 2.5.2.2.1 Computer Access Floors on page 164 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 5.4 Electrical on page 257
12. OTHER CONCRETE:	Refer to the building specific DSA approved DSA 103 form and appropriate sections in this manual.
MASONRY	2.3.2 Masonry on page 89 2.4.2 Masonry on page 141
13. STRUCTURAL MASONRY:	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
Material Verification and testing:	
a. Test reinforcing steel.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
b. Test masonry units, mortar and grout (unit strength method).	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
c. Test masonry prisms (prism test method).	2.3.2 Masonry on page 89

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
d. Verify proportions of site-prepared, premixed or preblended mortar and grout.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
e. Test core-drilled samples.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
Inspection:	
f. Inspect preparation of prisms.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
g. Verify size, location and condition of all dowels, construction supporting masonry, etc.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
h. Verify specified size, grade, and type of reinforcement.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
i. Welding of reinforcing steel.	2.3.2 Masonry on page 89

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
j. Inspect placement of reinforcement, connectors, masonry units and construction of mortar joints.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
k. Verify protection of masonry during cold weather (temperature below 40 ⁰ F) or hot weather (temperature above 90 ⁰).	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
l. Inspect type, size, and location of anchors and all other items to be embedded in masonry including other details of anchorage of masonry to structural members, frames and other construction.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
m. Inspect grout space prior to grouting and placement of grout.	2.3.2 Masonry on page 89 2.3.2.1 Masonry Walls on page 95 2.3.2.2 Masonry Columns/Pilasters on page 95 2.3.2.3 Masonry Piers on page 95 2.4.2 Masonry on page 141 2.4.2.1 Special Reinforced Shear Wall on page 141
14. VENEER OR GLASS BLOCK PARTITIONS:	2.5.2.1.2.1 Veneer OR Glass Block on page 162
a. Verify proportions of site-prepared mortar and grout and/or verify certification of premixed mortar.	2.5.2.1.2.1 Veneer OR Glass Block on page 162
b. Inspect placement of units and construction of mortar joints.	2.5.2.1.2.1 Veneer OR Glass Block on page 162

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
c. Inspect placement of reinforcement, connectors and anchors.	2.5.2.1.2.1 Veneer OR Glass Block on page 162
d. Inspect type, size, and location of anchors and all other items to be embedded in masonry including details of anchorage of masonry to structural members, frames and other construction.	2.5.2.1.2.1 Veneer OR Glass Block on page 162
e. Verify protection of masonry during cold weather (temperature below 40 ^o F) or hot weather (above 90 ^o).	2.5.2.1.2.1 Veneer OR Glass Block on page 162
f. Test veneer bond strength	2.5.2.1.2.1 Veneer OR Glass Block on page 162
15. POST-INSTALLED ANCHORS IN MASONRY:	
a. Inspect installation of post-installed anchors	2.3.2 Masonry on page 89 2.5.1 Mechanical/Electrical/Plumbing Equipment on page 159 2.5.2.1.1.1 Casework/Lockers on page 161 2.5.2.1.2.3 Casework/Lockers on page 163 2.7.1 Steel Storage Racks on page 174 5.4 Electrical on page 257
b. Test post-installed anchors.	2.3.2 Masonry on page 89 2.5.1 Mechanical/Electrical/Plumbing Equipment on page 159 2.5.2.1.1.1 Casework/Lockers on page 161 2.5.2.1.2.3 Casework/Lockers on page 163 2.7.1 Steel Storage Racks on page 174 5.4 Electrical on page 257
16. OTHER MASONRY:	Refer to the building specific DSA approved DSA 103 form and appropriate sections in this manual.
STEEL	2.3.4 Steel on page 116 2.4.4 Steel on page 148
17. STRUCTURAL STEEL AND COLD-FORMED STEEL USED FOR STRUCTURAL PURPOSES	2.3.4 Steel on page 116 2.4.4 Steel on page 148
Material Verification:	

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
<p>a. Verify that all materials are appropriately marked and that:</p> <ul style="list-style-type: none"> • Mill certificates indicate material properties that comply with requirements, • Material sizes, types and grades comply with requirements. 	<p>2.3.4.1 Structural Steel on page 116</p> <p>2.3.4.1.1 Beams on page 122</p> <p>2.3.4.1.1.1 Composite on page 122</p> <p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123</p> <p>2.3.4.1.2 Columns on page 125</p> <p>2.3.4.1.2.1 Composite on page 125</p> <p>2.3.4.2 Cold Formed Steel on page 125</p> <p>2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130</p> <p>2.3.4.2.1.1 Walls on page 132</p> <p>2.3.4.2.2 Floor/Roof on page 135</p> <p>2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135</p> <p>2.3.4.2.2.2 Steel Deck on page 136</p> <p>2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148</p> <p>2.4.4.1 Structural Steel on page 148</p> <p>2.4.4.1.1 Moment Frame on page 149</p> <p>2.4.4.1.1.1 Special Moment Frame (SMF) on page 151</p> <p>2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154</p> <p>2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154</p> <p>2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154</p> <p>2.4.4.1.2 Braced Frame on page 154</p> <p>2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155</p> <p>2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156</p> <p>2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156</p> <p>2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156</p> <p>2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156</p> <p>2.4.4.1.4 Cantilever Column Systems on page 156</p> <p>2.4.4.2 Cold Formed Steel Light Frame Construction on page 156</p> <p>2.4.4.2.1 Steel Sheet on page 157</p>

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
b. Test unidentified materials	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	<p>page 156</p> <p>2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156</p> <p>2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156</p> <p>2.4.4.1.4 Cantilever Column Systems on page 156</p> <p>2.4.4.2 Cold Formed Steel Light Frame Construction on page 156</p> <p>2.4.4.2.1 Steel Sheet on page 157</p> <p>2.4.4.2.2 Steel Flat Strap Bracing on page 158</p> <p>2.7.1 Steel Storage Racks on page 174</p> <p>2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175</p> <p>2.7.3.1 Elevators on page 176</p> <p>2.7.3.2 Relocatable Buildings on page 176</p> <p>2.7.3.2.1 Single Story Buildings on page 177</p> <p>2.7.3.2.2 Multi-Level Buildings on page 177</p> <p>2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177</p>
c. Examine seam welds of structural tubes and pipes	<p>2.3.4.1 Structural Steel on page 116</p> <p>2.3.4.1.1 Beams on page 122</p> <p>2.3.4.1.1.1 Composite on page 122</p> <p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123</p> <p>2.3.4.1.2 Columns on page 125</p> <p>2.3.4.1.2.1 Composite on page 125</p> <p>2.3.4.2 Cold Formed Steel on page 125</p> <p>2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130</p> <p>2.3.4.2.1.1 Walls on page 132</p> <p>2.3.4.2.2 Floor/Roof on page 135</p> <p>2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135</p> <p>2.3.4.2.2.2 Steel Deck on page 136</p> <p>2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148</p> <p>2.4.4.1 Structural Steel on page 148</p> <p>2.4.4.1.1 Moment Frame on page 149</p> <p>2.4.4.1.1.1 Special Moment Frame (SMF) on page 151</p> <p>2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154</p>

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
Inspection:	
d. Verify member locations, bracing and all details constructed in the field.	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
e. Verify stiffener locations, connection tab locations and all construction details	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
fabricated in the shop.	2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
18. HIGH STRENGTH BOLTS:	
Material Verification of High-Strength Bolts, Nuts, and Washers:	
a. Verify identification markings and manufacturer's certificates of compliance conform to ASTM standards specified in the DSA approved documents.	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
b. Test high-strength bolts, nuts and washers.	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF)

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	<p>on page 154</p> <p>2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154</p> <p>2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154</p> <p>2.4.4.1.2 Braced Frame on page 154</p> <p>2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155</p> <p>2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156</p> <p>2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156</p> <p>2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156</p> <p>2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156</p> <p>2.4.4.1.4 Cantilever Column Systems on page 156</p> <p>2.4.4.2 Cold Formed Steel Light Frame Construction on page 156</p> <p>2.4.4.2.1 Steel Sheet on page 157</p> <p>2.4.4.2.2 Steel Flat Strap Bracing on page 158</p> <p>2.7.1 Steel Storage Racks on page 174</p> <p>2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175</p> <p>2.7.3.1 Elevators on page 176</p> <p>2.7.3.2 Relocatable Buildings on page 176</p> <p>2.7.3.2.1 Single Story Buildings on page 177</p> <p>2.7.3.2.2 Multi-Level Buildings on page 177</p> <p>2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177</p>
Inspection of High-Strength Bolt Installation:	
c. Bearing-type (“snug tight”) connections.	<p>2.3.4.1 Structural Steel on page 116</p> <p>2.3.4.1.1 Beams on page 122</p> <p>2.3.4.1.1.1 Composite on page 122</p> <p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123</p> <p>2.3.4.1.2 Columns on page 125</p> <p>2.3.4.1.2.1 Composite on page 125</p> <p>2.3.4.2 Cold Formed Steel on page 125</p> <p>2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130</p>

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
d. Slip-critical connections.	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
19. WELDING:	
Verification of Materials, Equipment, Welders, etc:	
a. Verify weld filler material identification markings per AWS designation listed on the DSA approved documents and the WPS.	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	<p>2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156</p> <p>2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156</p> <p>2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156</p> <p>2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156</p> <p>2.4.4.1.4 Cantilever Column Systems on page 156</p> <p>2.4.4.2 Cold Formed Steel Light Frame Construction on page 156</p> <p>2.4.4.2.1 Steel Sheet on page 157</p> <p>2.4.4.2.2 Steel Flat Strap Bracing on page 158</p> <p>2.7.1 Steel Storage Racks on page 174</p> <p>2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175</p> <p>2.7.3.1 Elevators on page 176</p> <p>2.7.3.2 Relocatable Buildings on page 176</p> <p>2.7.3.2.1 Single Story Buildings on page 177</p> <p>2.7.3.2.2 Multi-Level Buildings on page 177</p> <p>2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177</p>
<p>b. Verify weld filler material manufacturer's certificate of compliance.</p>	<p>2.3.4.1 Structural Steel on page 116</p> <p>2.3.4.1.1 Beams on page 122</p> <p>2.3.4.1.1.1 Composite on page 122</p> <p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123</p> <p>2.3.4.1.2 Columns on page 125</p> <p>2.3.4.1.2.1 Composite on page 125</p> <p>2.3.4.2 Cold Formed Steel on page 125</p> <p>2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130</p> <p>2.3.4.2.1.1 Walls on page 132</p> <p>2.3.4.2.2 Floor/Roof on page 135</p> <p>2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135</p> <p>2.3.4.2.2.2 Steel Deck on page 136</p> <p>2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148</p> <p>2.4.4.1 Structural Steel on page 148</p> <p>2.4.4.1.1 Moment Frame on page 149</p> <p>2.4.4.1.1.1 Special Moment Frame (SMF) on</p>

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
c. Verify WPS, welder qualifications and equipment.	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
19.1 SHOP WELDING:	
a. Inspect groove, multi-pass, and fillet welds > 5/16"	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
b. Inspect single-pass fillet welds $\leq 5/16$"	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	<p>2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156</p> <p>2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156</p> <p>2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156</p> <p>2.4.4.1.4 Cantilever Column Systems on page 156</p> <p>2.4.4.2 Cold Formed Steel Light Frame Construction on page 156</p> <p>2.4.4.2.1 Steel Sheet on page 157</p> <p>2.4.4.2.2 Steel Flat Strap Bracing on page 158</p> <p>2.7.1 Steel Storage Racks on page 174</p> <p>2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175</p> <p>2.7.3.1 Elevators on page 176</p> <p>2.7.3.2 Relocatable Buildings on page 176</p> <p>2.7.3.2.1 Single Story Buildings on page 177</p> <p>2.7.3.2.2 Multi-Level Buildings on page 177</p> <p>2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177</p>
<p>c. Inspect welding of stairs and railing systems.</p>	<p>2.3.4.1 Structural Steel on page 116</p> <p>2.3.4.1.1 Beams on page 122</p> <p>2.3.4.1.1.1 Composite on page 122</p> <p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123</p> <p>2.3.4.1.2 Columns on page 125</p> <p>2.3.4.1.2.1 Composite on page 125</p> <p>2.3.4.2 Cold Formed Steel on page 125</p> <p>2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130</p> <p>2.3.4.2.1.1 Walls on page 132</p> <p>2.3.4.2.2 Floor/Roof on page 135</p> <p>2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135</p> <p>2.3.4.2.2.2 Steel Deck on page 136</p> <p>2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148</p> <p>2.4.4.1 Structural Steel on page 148</p> <p>2.4.4.1.1 Moment Frame on page 149</p> <p>2.4.4.1.1.1 Special Moment Frame (SMF) on page 151</p> <p>2.4.4.1.1.2 Intermediate Moment Frame (IMF)</p>

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	<p>on page 154</p> <p>2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154</p> <p>2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154</p> <p>2.4.4.1.2 Braced Frame on page 154</p> <p>2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155</p> <p>2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156</p> <p>2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156</p> <p>2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156</p> <p>2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156</p> <p>2.4.4.1.4 Cantilever Column Systems on page 156</p> <p>2.4.4.2 Cold Formed Steel Light Frame Construction on page 156</p> <p>2.4.4.2.1 Steel Sheet on page 157</p> <p>2.4.4.2.2 Steel Flat Strap Bracing on page 158</p> <p>2.7.1 Steel Storage Racks on page 174</p> <p>2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175</p> <p>2.7.3.1 Elevators on page 176</p> <p>2.7.3.2 Relocatable Buildings on page 176</p> <p>2.7.3.2.1 Single Story Buildings on page 177</p> <p>2.7.3.2.2 Multi-Level Buildings on page 177</p> <p>2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177</p>
d. Verification of reinforcing steel weldability	<p>2.3.4.1 Structural Steel on page 116</p> <p>2.3.4.1.1 Beams on page 122</p> <p>2.3.4.1.1.1 Composite on page 122</p> <p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123</p> <p>2.3.4.1.2 Columns on page 125</p> <p>2.3.4.1.2.1 Composite on page 125</p> <p>2.3.4.2 Cold Formed Steel on page 125</p> <p>2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130</p> <p>2.3.4.2.1.1 Walls on page 132</p> <p>2.3.4.2.2 Floor/Roof on page 135</p>

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
e. Inspect welding of reinforcing steel.	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
19.2 FIELD WELDING:	
a. Inspect groove, multi-pass, and fillet welds > 5/16"	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
b. Inspect single-pass fillet welds $\leq 5/16$"	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135 2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
c. Inspect end-welded studs (ASTM A-108) installation (including bend test)	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame Construction on page 130 2.3.4.2.1.1 Walls on page 132 2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	2.3.4.2.2.2 Steel Deck on page 136 2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156 2.4.4.2 Cold Formed Steel Light Frame Construction on page 156 2.4.4.2.1 Steel Sheet on page 157 2.4.4.2.2 Steel Flat Strap Bracing on page 158 2.7.1 Steel Storage Racks on page 174 2.7.2 Walk-In Freezers and Cold Storage Boxes on page 175 2.7.3.1 Elevators on page 176 2.7.3.2 Relocatable Buildings on page 176 2.7.3.2.1 Single Story Buildings on page 177 2.7.3.2.2 Multi-Level Buildings on page 177 2.7.3.3 Reviews Stands, Grandstands, and Bleachers on page 177
d. Inspect floor and roof deck welds	2.3.4.2.2 Floor/Roof on page 135 2.3.4.2.2.2 Steel Deck on page 136
e. Inspect welding of structural cold-formed steel	2.3.4.2 Cold Formed Steel on page 125 2.3.4.2.1 Cold Formed Steel Light Frame

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	<p>Construction on page 130</p> <p>2.3.4.2.1.1 Walls on page 132</p> <p>2.3.4.2.2 Floor/Roof on page 135</p> <p>2.3.4.2.2.1 Studs, Joists, Rafters, Trusses on page 135</p> <p>2.3.4.2.2.2 Steel Deck on page 136</p> <p>2.4.3.1.2 Cold Formed Steel Light Frame Construction on page 148</p> <p>2.4.4.2 Cold Formed Steel Light Frame Construction on page 156</p> <p>2.4.4.2.1 Steel Sheet on page 157</p> <p>2.4.4.2.2 Steel Flat Strap Bracing on page 158</p>
f. Inspect welding of stairs and railing systems	<p>2.3.4.1 Structural Steel on page 116</p> <p>2.3.4.1.1 Beams on page 122</p> <p>2.3.4.1.1.1 Composite on page 122</p> <p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123</p> <p>2.3.4.1.2 Columns on page 125</p> <p>2.3.4.1.2.1 Composite on page 125</p>
g. Verification of reinforcing steel weldability	<p>2.3.1 Concrete on page 74</p> <p>2.3.2 Masonry on page 89</p>
h. Inspect welding of reinforcing steel.	<p>2.3.1 Concrete on page 74</p> <p>2.3.2 Masonry on page 89</p>
20. NONDESTRUCTIVE TESTING:	
a. Ultrasonic	<p>2.3.4.1 Structural Steel on page 116</p> <p>2.3.4.1.1 Beams on page 122</p> <p>2.3.4.1.1.1 Composite on page 122</p> <p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123</p> <p>2.3.4.1.2 Columns on page 125</p> <p>2.3.4.1.2.1 Composite on page 125</p> <p>2.4.4.1 Structural Steel on page 148</p> <p>2.4.4.1.1 Moment Frame on page 149</p> <p>2.4.4.1.1.1 Special Moment Frame (SMF) on page 151</p> <p>2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154</p> <p>2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154</p> <p>2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154</p> <p>2.4.4.1.2 Braced Frame on page 154</p> <p>2.4.4.1.2.1 Special Concentric Braced Frame</p>

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	(SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156
b. Magnetic Particle	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.1 Composite on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.3.4.1.2.1 Composite on page 125 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156
21. STEEL JOISTS AND TRUSSES:	

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
<p>a. Verify size, type and grade for all chord and web members as well as connectors and weld filler material; verify joist profile, dimensions and camber (if applicable); verify all weld locations, lengths and profiles; mark or tag each joist.</p>	<p>2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154</p>
<p>22. SPRAY APPLIED FIRE-PROOFING:</p>	
<p>a. Examine structural steel surface conditions, inspect application, take samples, measure thickness, and verify compliance of all aspects of application with DSA approved documents.</p>	<p>2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156</p>
<p>b. Test bond strength.</p>	<p>2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on</p>

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame (BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156
c. Test density.	2.3.4.1 Structural Steel on page 116 2.3.4.1.1 Beams on page 122 2.3.4.1.1.2 Steel Joists/Joist Girders/Trusses on page 123 2.3.4.1.2 Columns on page 125 2.4.4.1 Structural Steel on page 148 2.4.4.1.1 Moment Frame on page 149 2.4.4.1.1.1 Special Moment Frame (SMF) on page 151 2.4.4.1.1.2 Intermediate Moment Frame (IMF) on page 154 2.4.4.1.1.3 Ordinary Moment Frame (OMF) on page 154 2.4.4.1.1.4 Special Truss Moment Frame (STMF) on page 154 2.4.4.1.2 Braced Frame on page 154 2.4.4.1.2.1 Special Concentric Braced Frame (SCBF) on page 155 2.4.4.1.2.2 Ordinary Concentric Braced Frame (OCBF) on page 156 2.4.4.1.2.3 Eccentric Braced Frame (EBF) on page 156 2.4.4.1.2.4 Buckling Restrained Braced Frame

APPENDIX A – DSA 103 CORRELATION MATRIX

DSA 103 Correlation Matrix	
DSA 103 Section	DSA 152 Manual Section
	(BRBF) on page 156 2.4.4.1.3 Special Plate Shear Wall (SPSW) on page 156 2.4.4.1.4 Cantilever Column Systems on page 156
23. OTHER STEEL:	Refer to the building specific DSA approved DSA 103 form and appropriate sections in this manual.
WOOD	2.3.3 Wood on page 96 2.4.3 Wood on page 142
24. PREFABRICATED WOOD STRUCTURAL ELEMENTS:	
a. Inspect fabrication of structural glued-laminated timber.	2.3.3 Wood on page 96 2.3.3.2 Floor/Roof on page 115
b. Inspect fabrication of manufactured open-web trusses.	2.3.3 Wood on page 96 2.3.3.2 Floor/Roof on page 115
25. OTHER WOOD:	Refer to the building specific DSA approved DSA 103 form and appropriate sections in this manual.
OTHER	
27. SKYLIGHT LOAD TEST	Refer to the building specific DSA approved DSA 103 form and appropriate sections in this manual.

Table A0-1: DSA 103 Correlation Matrix

APPENDIX B – REFERENCED DSA FORMS

APPENDIX B – REFERENCED DSA FORMS

Form DSA-121		Revised 9-10-02	
CALIFORNIA DEPARTMENT OF GENERAL SERVICES DIVISION OF THE STATE ARCHITECT			
CHECKLIST FOR SITE INSPECTION OF RELOCATABLE BUILDINGS			
To be completed by the Project Inspector when the construction work is 100% complete For use on single-story relocatable projects only, in lieu of semi-monthly reports			
School		DSA File Number	
Inspector		DSA Application Number	
Number of buildings on site under this application		Date	
Building Serial Numbers			
Note: The Inspector of Record must complete and submit a copy of this checklist to DSA for each site along with a Verified Report (Form DSA-6) by the date of the building's occupancy.			
	YES	NO	N/A
1. Received DSA-approved plans and specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Building location same as shown on approved plans.(Any deviation requires DSA approval.).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I.D. tag has correct application number; for new construction, application number and serial numbers match in-plant inspector's form 6, and correct floor, roof, and wind load for site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Received DSA-approved Test & Inspection Form, verified material testing and special inspections listed were performed.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Finish floor elevation with respect to grade is same as shown on approved plans or within limits of DSA IR 16-1.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Underfloor vent size and location same as shown on approved plans and are unobstructed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Wood foundation plates are pressure-treated and identified with tags having appropriate treatment identification.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Wood foundation plate size and layout and steel pipes per approved plans.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Shear transfer plates or connectors or structural plywood skirting and nailing per approved plans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Concrete foundation per approved plans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Fire alarm system installed per approved plans and testing passed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Ramp slope starts a minimum of 42 inches from the door strike	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. All disabled access requirements per approved plans, such as path of travel, toilet upgrading, signage, ramp transitions, parking, etc.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Electrical bonding between steel frame modules and ramp.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Electrical grounding and testing – specify results: ohms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Important: Read before using this form Section 4-337, Part 1, Title 24 California Code of Regulations requires inspectors to submit semi-monthly reports. This checklist is an acceptable alternate to this requirement for site inspections of single-story, factory-built relocatable building projects only. Failure to submit a semi-monthly report or this alternate checklist may be grounds for DSA to withdraw your approval. This alternate will reduce the total amount of paperwork generated and reviewed. It will also provide DSA a means for a timely and effective visit to the job site, evaluation of the inspector, and closing of the application. This checklist must be completed and promptly submitted to DSA by the date of occupancy. If the construction is complete and in compliance with approved plans and specifications, attach a 100% (final) verified report (Form DSA-6). If the construction is not complete and/or there are outstanding deviations, attach a verified report that notes the percentage complete and includes a list of deviations.			
FORM DSA-121 (rev 09-10-02)	CALIFORNIA DEPARTMENT OF GENERAL SERVICES	Page 1 of 1	

APPENDIX B – REFERENCED DSA FORMS



Division of the
State Architect
CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM
DSA-130
Revised 01-12

Certificate of Compliance – Approved Bleacher / Grandstand Fabricator

Certification form to be completed by the manufacturer of the Bleacher or Grandstand at the completion of fabrication.
Completed form is to be submitted to the owner, project inspector, the engineer or architect in general responsible charge, and DSA

(Use this form only for bleachers whose overall height is 20' or less from the top of the foundation at the front to the uppermost seatboard)

DSA File # _____ - _____

Application # _____ - _____

Bleacher/Grandstand ID: _____

I certify (or declare) under the penalty of perjury that the following statements are true: (All boxes must be checked for the submittal to be considered complete.)

- I have personal knowledge, as defined in Title 24, Part 1, Section 4-336, of the fabrication of the bleacher/grandstand identified above.
- The materials and works performed for the fabrication of the bleacher/grandstand identified above are in accordance with DSA approved construction documents.

Attachments:

- Proof of accreditation of the fabrication shop where the bleacher/grandstand identified above was fabricated
- Welding inspection reports for shop welds
- Certificates for seatboards and footboards, i.e. mill certification.

Signed: _____ **Date:** _____
Engineer LEA Lab. Engineer

Print Name: _____ **CA Reg./ License No.:** _____

Engineer Stamp:



APPENDIX B – REFERENCED DSA FORMS



Division of the State Architect

CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM
DSA-202
Rev. 02/11

SIEVE ANALYSIS TEST REPORT

School District: _____ LEA #: _____ DSA FILE #: _____ - _____
 Attn: _____ Exp. Date: _____ DSA APPL #: _____ - _____
 Address: _____ Lab Facility: _____
 _____ CA Lab Doc. #: _____ Lab Job #: _____
 Project Name: _____ Structure: _____
 Location in Structure: _____ Report Date: _____
 Sampled Location: _____ By: _____ Sample Date: _____

TESTING INFORMATION

Sample weight before wash (g): _____
 Sample weight after wash (g): _____
 Total loss after sieving, <0.3% (%): _____

Sieve size	Weight Retained (grams)	Cumulative Weight Retained (g)	% Retained Each Sieve	% Passing	Specification
2.5" (63.5 mm)					
2" (50 mm)					
1.5" (37.5 mm)					
1" (25 mm)					
0.75" (19 mm)					
0.5" (12.5 mm)					
0.375" (9.5 mm)					
No.4 (4.75 mm)					
No.8 (2.36 mm)					
No.16 (1.18 mm)					
No.30 (600 μm)					
No.50 (300 μm)					
No.100 (150 μm)					
No.200 (75 μm)					

Applicable ASTM Test Methods: _____
 REMARKS: _____
 ADDITIONAL COMMENTS (DSA-211) ATTACHED.

The Material WAS WAS NOT
 SAMPLED AND TESTED IN ACCORDANCE WITH
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

The Material Tested MET DID NOT MEET
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

cc: Project Architect
 Structural Engineer
 Project Inspector
 DSA Regional Office

Signature _____ Date _____
 Print Name / Title _____

APPENDIX B – REFERENCED DSA FORMS



Division of the State Architect

CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM
DSA-203
Rev. 11/12

TENSION / BEND TEST REPORT

School District: _____ LEA #: _____ DSA FILE #: _____ - _____
 Attn: _____ Exp. Date: _____ DSA APPL #: _____ - _____
 Address: _____ CA Lab Facility: _____
 Lab Doc. #: _____ Lab Job #: _____
Project Name: _____ **Structure:** _____
Sample Location: _____ **By:** _____ **Report Date:** _____
Sample Date: _____

TESTING INFORMATION

ASTM Specification _____ **Specified Grade** _____

Specimen ID:							
Date Tested:							
Manufacturer:							
Heat Number:							
Bar No.:							
Yield Point, lbs.:							SPEC.
Maximum Load, lbs.:							
Yield (psi):							
Tensile Strength (psi):							
Elongation Spec (%):							
Elongation (%):							
Bend Results							
Pass/Fail							

Full Size Specimen(s) Reduced Size Specimen(s)

Applicable ASTM Test Methods: _____

REMARKS:

ADDITIONAL COMMENTS (DSA-211) ATTACHED.

The Material WAS WAS NOT
 SAMPLED AND TESTED IN ACCORDANCE WITH
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

The Material Tested MET DID NOT MEET
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

cc: Project Architect
 Structural Engineer
 Project Inspector
 DSA Regional Office

Signature _____ Date _____

 Print Name / Title

APPENDIX B – REFERENCED DSA FORMS



Division of the
State Architect
 CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM
DSA-204
 Rev. 05/11

COMPRESSION TEST REPORT

School District: _____ LEA #: _____ DSA FILE #: _____ - _____
 Attn: _____ Exp. Date: _____ DSA APPL #: _____ - _____
 Address: _____ Lab Facility: _____
 CA Lab Doc #: _____ Lab Job #: _____

Project Name: _____ Structure: _____
 Location in Structure: _____ Report Date: _____
 Sampled By: _____ Sample Date: _____

SAMPLING INFORMATION Specified Strength _____ psi @ _____ days

Material: Concrete Grout Mortar Prisms Cores Other _____

	Actual	Spec.	Pass/ Fail?
Slump (inches)			
Percent Air (%)			
Unit Weight (pcf)			
Air Temperature (°F)			
Mix Temperature (°F)			

Mix Number: _____ Load #: _____
 Concrete Supplier: _____
 Truck #: _____ Ticket #: _____
 Time Batched: _____ Time Sampled: _____
 Set #: _____ of _____ yds of _____ total yds
 Sampled from: Chute Hose Other _____

TESTING INFORMATION Date Samples Received _____ Curing Method _____

Identification						
Date Tested						
Age in Days						
Diameter/Size (in.)						
Correction Factor						
Cross Sect. Area (in. ²)						
Maximum Load (lbs.)						
Compr. Strength (psi)						
Fracture Type						

Applicable ASTM Test Methods: _____ Concrete: Average of 2 (28 day) tests: _____ psi
 Tested by: _____ Mortar, Grout, Shotcrete: Average of 3 (28 day) tests: _____ psi

REMARKS:

 ADDITIONAL COMMENTS (DSA-211) ATTACHED.

The Material WAS WAS NOT SAMPLED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.
 The Material Tested MET DID NOT MEET THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

cc: Project Architect
 Structural Engineer
 Project Inspector
 DSA Regional Office

Signature _____ Date _____
 Print Name / Title _____

APPENDIX B – REFERENCED DSA FORMS



Division of the
State Architect
 CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM
DSA-205
 Rev. 06/11

CONCRETE MASONRY UNIT TEST REPORT

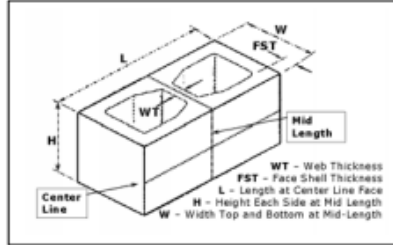
School District: _____ LEA #: _____ DSA FILE #: _____ - _____
 Attn: _____ Exp. Date: _____ DSA APPL # _____ - _____
 Address: _____ CA _____ Lab Facility: _____
 Lab Doc. #: _____ Lab Job #: _____

Project Name: _____ Structure: _____
 Report Date: _____ Sampled At: _____ Sampled By: _____
 Block Manufacturer: _____ Sample Date: _____

Material Description: _____
 Physical Properties of Units (Average) _____ Date Received: _____

Length (in.)	**Received Weight (lbs.)	Lightweight	<input type="checkbox"/>	Specimen Size: <input type="checkbox"/> Full <input type="checkbox"/> Reduced <input type="checkbox"/> Coupon
Width (in.)	Moisture Content (%)	Medium Weight	<input type="checkbox"/>	
Height (in.)	Density (pcf)	Normal Weight	<input type="checkbox"/>	

Summary of Tests -	Results	Specified	Conformance
Net Compressive Strength (psi):			<input type="checkbox"/> Yes <input type="checkbox"/> No
Absorption (pcf)			<input type="checkbox"/> Yes <input type="checkbox"/> No
Min. Faceshell Thickness (in.)			<input type="checkbox"/> Yes <input type="checkbox"/> No
Minimum Web Thickness (in.)			<input type="checkbox"/> Yes <input type="checkbox"/> No
Equivalent Web Thickness (in.)			<input type="checkbox"/> Yes <input type="checkbox"/> No
Equivalent Thickness (in.)			<input type="checkbox"/> Yes <input type="checkbox"/> No



Compressive Strength - Individual Test Results

Unit #	Net Area (in ² .)	Max. Load (lbs.)	Net Compressive Strength (psi)	Reason, if Specimen is less than full size	
1				Faceshell Projections	<input type="checkbox"/>
2				Unsupported Projections	<input type="checkbox"/>
3				Test Machine Capacity	<input type="checkbox"/>

** Received weight determined at time of delivery to the job site or from units sampled at the time and delivered to the laboratory in sealed containers for moisture content determination.

Absorption & Received Moisture - Individual Test Results

Unit #	Ave. Width (in.)	Ave. Height (in.)	Ave. Length (in.)	Absorption (pcf)	Density (pcf)
4					
5					
6					

ASTM C90 Requirements:
 (Water Absorption max pcf - Average of 3 Units)
 Lightweight - Less than 105 pcf
 Medium Wt. - 105 to Less Than 125 pcf
 Normal Wt. - 125 pcf or more

Applicable ASTM Test Methods: _____
 REMARKS: _____

ADDITIONAL COMMENTS (DSA-211) ATTACHED.

The Material WAS WAS NOT
 SAMPLED AND TESTED IN ACCORDANCE WITH
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

The Material Tested MET DID NOT MEET
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

cc: Project Architect
 Structural Engineer
 Project Inspector
 DSA Regional Office

Signature _____ Date _____
 Print Name / Title _____

APPENDIX B – REFERENCED DSA FORMS



Division of the
State Architect
 CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM
DSA-207
 Rev. 02/11

MASONRY CORE TEST REPORT

School District: _____ LEA #: _____ DSA FILE #: _____ - _____
 Attn: _____ Exp. Date: _____ DSA APPL #: _____ - _____
 Address: _____ Lab Facility: _____
 _____ CA _____ Lab Doc #: _____ Lab Job #: _____
 Project Name: _____ Structure: _____
 Location in Structure: _____ Report Date: _____
 Sampled By: _____ Sample Date: _____

TESTING INFORMATION

	Core # 1		Core # 2		Core # 3		Core # 4	
--	----------	--	----------	--	----------	--	----------	--

	Core # 1		Core # 2		Core # 3		Core # 4	
Core Number								
Ave. Diameter (in.)								
Length (Rec'd) (in.)								
Date Grouted								
Core Location								
Material Description								
Date Received								
Shear Bond Strength (psi)	inside	outside	inside	outside	inside	outside	inside	outside
Load (lbs.)								
Shear Strength (psi)								
Specified Strength (psi)								
Date Tested								
Pass/Fail?								
Core Condition Summary								

REMARKS: _____

 ADDITIONAL COMMENTS (DSA-211) ATTACHED.

The Material WAS WAS NOT
 SAMPLED AND TESTED IN ACCORDANCE WITH
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

The Material Tested MET DID NOT MEET
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

cc: Project Architect
 Structural Engineer
 Project Inspector
 DSA Regional Office

Signature _____ Date _____

 Print Name / Title

APPENDIX B – REFERENCED DSA FORMS



Division of the
State Architect
 CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM
DSA-208
 Rev. 02/11

HIGH STRENGTH BOLT TEST REPORT

School District: _____ LEA #: _____ DSA FILE #: _____ - _____
 Attn: _____ Exp. Date: _____ DSA APPL #: _____ - _____
 Address: _____ CA Lab Facility: _____
 Lab Doc #: _____ Lab Job #: _____

Project Name: _____ Structure: _____
 Location in Structure: _____ Sample Date: _____
 Sampled By: _____ Report Date: _____

TESTING INFORMATION

Applicable ASTM Test Methods: _____

Material Identifiable- Attach Certificates Material Unidentifiable

SPECIMENS

TYPE	MANUFACTURER	LOT NO.	ASTM SPEC.	HEAT #	GRADE	DIAMETER	LENGTH
BOLTS							
NUTS							
WASHERS							

Fastener Component	ROCKWELL HARDNESS				PROOF LOAD		ELONGATION		WEDGE TENSILE	
	HRB		HRC		Lbs.		In.		Lbs.	
	Lbs.	Spec.	Lbs.	Spec.	Test	Spec.	Test	Spec.	Test	Spec.
Bolt #1										
Bolt #2										
Bolt #3										
Nut #1										
Nut #2										
Nut #3										
Washer #1										
Washer #2										
Washer #3										

REMARKS: _____

ADDITIONAL COMMENTS (DSA-211) ATTACHED.


The Material WAS WAS NOT
 SAMPLED AND TESTED IN ACCORDANCE WITH
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

The Material Tested MET DID NOT MEET
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS.

cc: Project Architect
 Structural Engineer
 Project Inspector
 DSA Regional Office

Signature _____ Date _____
 Print Name / Title _____

APPENDIX B – REFERENCED DSA FORMS

	Division of the State Architect CALIFORNIA DEPARTMENT OF GENERAL SERVICES	FORM DSA-211 Rev. 09/11
	ADDITIONAL COMMENTS	
LEA #: <input type="text"/>	Lab Doc. #: <input type="text"/>	Lab Job #: <input type="text"/>
		DSA FILE #: <input type="text"/> - <input type="text"/>
		DSA APPL #: <input checked="" type="checkbox"/> <input type="text"/>
Attachment to form: Check one	Report Date: <input type="text"/>	
<input type="checkbox"/> DSA-201	<input type="checkbox"/> DSA-204	<input type="checkbox"/> DSA-207
<input type="checkbox"/> DSA-202	<input type="checkbox"/> DSA-205	<input type="checkbox"/> DSA-208
<input type="checkbox"/> DSA-203	<input type="checkbox"/> DSA-206	<input type="checkbox"/> DSA-209
		<input type="checkbox"/> DSA 210
		<input type="checkbox"/> DSA 250
		<input type="checkbox"/> DSA 292
Any additional comments that will not fit in remarks section of DSA Test or Inspection report forms should be written below. Attach to respective form.		
		Technician's Initials <input type="text"/>
FORM DSA-211 (rev 09/22/11) Additional Comments		PAGE 1 OF 1

APPENDIX B – REFERENCED DSA FORMS



Division of the
State Architect
 CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM
DSA-250
 Rev. 02/11

SPECIAL INSPECTION REPORT

School District: _____ LEA #: _____ DSA FILE #: _____ - _____
 Attn: _____ Exp. Date: _____ DSA APPL #: _____ - _____
 Address: _____ Lab Facility: _____
 CA Lab Doc. #: _____ Lab Job #: _____

Special Inspection Reports must be distributed to the parties listed below within 14 days of the inspection. Reports of non-compliant conditions must be distributed immediately. Separate reports shall be prepared for each type of special inspection on a daily basis. Each report shall be completed and signed by the special inspector conducting the inspection.

Project Name: _____ Report Date: _____
 Project Location: _____
 Contractor: _____ Fabricator: _____

Type of Inspection

<input type="checkbox"/> Engineered Fill	<input type="checkbox"/> Batch Plant	<input type="checkbox"/> Masonry	<input type="checkbox"/> Fireproofing
<input type="checkbox"/> Deep Foundation	<input type="checkbox"/> Prestressed Concrete	<input type="checkbox"/> High Strength Bolting	_____
	<input type="checkbox"/> Shotcrete	<input type="checkbox"/> Welding	_____

DSA Approved Documents: _____

Work Inspected:

ADDITIONAL COMMENTS (DSA-211) ATTACHED.

The Work WAS WAS NOT
 INSPECTED IN ACCORDANCE WITH THE REQUIREMENTS
 OF THE DSA APPROVED DOCUMENTS

The Work Inspected MET DID NOT MEET
 THE REQUIREMENTS OF THE DSA APPROVED DOCUMENTS

Material Sampling WAS WAS NOT N/A
 PERFORMED IN ACCORDANCE WITH DSA APPROVED DOCUMENTS

 Signature of Special Inspector Date

cc: Project Architect
 Structural Engineer
 Project Inspector
 DSA Regional Office
 School District

 Print Name / Title

CERTIFICATION # _____

APPENDIX B – REFERENCED DSA FORMS