

**DEVELOPMENT SERVICES – BUILDING INSPECTION****INSPECTION GUIDELINES:
SPECIAL INSPECTION REQUIREMENTS****INSPECTION CODE:** N/A**SCOPE:** RESIDENTIAL AND COMMERCIAL**APPLICABLE CODES:** 2016 CBC, CRC, CPC, CMC, CEC, CALGreen, CEnC, and PAMC

The information provided in this document is general and intended as a guide only. Each project is unique and additional requirements may be enforced as deemed appropriate.

IMPORTANT

- ☐ Failure to complete the items below prior to the City of Palo Alto (CPA) inspection will result in a re-inspection fee.
- ☐ Address and the construction hours sign shall be posted on all job site prior to inspection. (PAMC 9.10.060, CBC 501.2)
- ☐ Gas and electric utilities will be removed if found to be unsafe at time of inspection. (CBC 3303.6)

DEFINITION OF SPECIAL INSPECTOR

- ☐ A special inspector is defined as a person that holds an ICC Special Inspection Certification for the particular type of construction or operation requiring special inspection. See approved list of “Special Inspection Agencies.”
- ☐ The Engineer of Record (EOR) is not a special inspector unless he or she is ICC certified. (CBC 1704.2.1)
- ☐ The EOR may only observe placement of epoxy anchors for residential construction. (CBC 1704.2.1, CBC 1704.6)
- ☐ City of Palo Alto Building Inspectors are not considered special inspectors. (CBC 1704.2.1)

GENERAL REQUIREMENTS**DOCUMENTATION**

- ☐ At time of inspection, provide the CPA inspector with copies of the special inspection field report. (CBC 1704.2.4)
- ☐ The special inspection agency shall send the special inspector’s reports to the City of Palo Alto and it shall include the job address, permit number, and type of inspection (e.g., shear nailing). (CBC 1704.2.4)

SPECIAL INSPECTOR IDENTIFICATION AND REQUIREMENTS

- ☐ The special inspector shall have a current certificate and photo identification. The City of Palo Alto does not accept an identification card from the testing agency certifying the special inspector.
- ☐ The special inspector shall be certified for the type of inspection he or she is performing.
- ☐ The special inspector shall observe the work assigned for conformance to the approved design drawings and specifications (CBC 1704.3.1, CBC 1705).
- ☐ Shop drawings must be pre-approved by the project engineer and CPA plan check engineer. Shop drawings shall bear the city and engineer stamp. (CBC 1704.1)
- ☐ Daily inspection records shall be provided to the city inspector. (CBC 1704.2.4)
- ☐ Special inspectors shall only use RFIs that have been reviewed and approved by the project engineer and city plan check engineer or city field inspector. (PAMC)

FABRICATED ITEMS

- ☐ Where fabrication of structural, load-bearing or lateral load-resisting members or assemblies is being conducted on the premises of a fabricator's shop, special inspections of the fabricated items shall be performed during fabrication. (CBC 1704.2.5)

ENGINEER OF RECORD (EOR) REPORT/STRUCTURAL OBSERVATION

- ☐ At time of inspection, provide the CPA inspection with copies of the engineer of record (EOR) report. (CBC 1704.6)
- ☐ Structural observations shall be provided for structures assigned to Seismic Design Categories D, E, or F where one or more of the following conditions exist (CBC 1704.6.1):
 - The structure is classified as Risk Category III or IV
 - The height of the structure is greater than 75 ft above the base
 - The structure is assigned to a Seismic Design Category E, is classified as Risk Category I or II, and is greater than two stories above grade plane
 - When designated by the registered design professional responsible for the structural design
 - When specifically required by the building official

STEEL CONSTRUCTION

- ☐ Special inspections shall be in accordance with the quality assurance inspection requirements of AISC 360 and the approved construction documents. (CBC 1705.2.1)
- ☐ Special inspections of structural steel in the seismic force-resisting systems of buildings and structures assigned to Seismic Design Category B, C, D, E, or F per AISC 341. (CBC 1705.12.1.1)
- ☐ Special inspections are required for structural steel elements in the seismic force-resisting systems of buildings and structures assigned to Seismic Design Category B, C, D, E, or F including struts, collectors, chords, and foundation elements per AISC 341. (CBC 1705.12.1.2)

CONCRETE CONSTRUCTION

- ☐ Special inspections and tests of concrete shall be per Table 1705.3 and the items that follow. (CBC 1705.3)

ANCHORAGE REQUIREMENTS

- ☐ Specific requirements for special inspection shall be included in the research report (e.g., ICC ES Report) for the anchor issued by approved source in accordance with 17.8.2 in ACI 318, or other qualification procedures. Where specific requirements are not provided, special requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work. (CBC Table 1705.3, CBC 1707.1)

EXPANSION ANCHORS

- ☐ Special inspection is required for the installation, including torque (verify the manufacturer's specifications for special inspection requirements). (CBC Table 1705.3, CBC 1707.1)
 - Expansion anchor bolts shall have a clearance not less than 2-1/2" from the foundation, the slab, or the CMU edge (2x6 mudsills and larger works with this requirement, 2x4 mudsill does not work.)
 - Verify that the expansion anchor bolt is the correct size for the mudsill, cross check the symbol on top of anchor bolt with the manufacturer's table.
 - Tolerance: Maximum 5 degree offset.

EPOXIED ANCHORS

- ☐ Special inspection is required for epoxy anchor bolt installation (verify the manufacturer's specifications for special inspection requirements). (CBC Table 1705.3, 1707.1)
 - Oversized holes are no longer acceptable or allowed (the maximum oversize tolerance is 1/8").
 - On CMU walls, verify if fire rated walls or systems allow for epoxy anchor bolts (epoxy is not recommended because it melts under high heat and expansion anchor bolts are recommended).

TITEN HD – POST-INSTALLED SILL PLATE ANCHORAGE

- ☐ ICC ESR-2713 report requires Special Inspection OR engineer of record observation report. (CBC 1707.1).

**TABLE 1705.3
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION**

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD ^a	IBC REFERENCE
1. Inspect reinforcement, including prestressing tendons, and verify placement.	—	X	ACI 318 Ch. 20, 25.2, 25.3, 26.5.1-26.5.3	1908.4
2. Reinforcing bar welding: a. Verify weldability of reinforcing bars other than ASTM A706; b. Inspect single-pass fillet welds, maximum $\frac{3}{16}$ " and c. Inspect all other welds.	— X	X X	AWS D1.4 ACI 318: 26.5.4	—
3. Inspect anchors cast in concrete.	—	X	ACI 318: 17.8.2	—
4. Inspect anchors post-installed in hardened concrete members. ^b a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads. b. Mechanical anchors and adhesive anchors not defined in 4.a.	 X	 X	ACI 318: 17.8.2.4 ACI 318: 17.8.2	 —
5. Verify use of required design mix.	—	X	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	—	ASTM C172 ASTM C31 ACI 318: 26.4.5, 26.12	1908.10
7. Inspect concrete and shotcrete placement for proper application techniques.	X	—	ACI 318: 26.4.5	1908.6, 1908.7, 1908.8
8. Verify maintenance of specified curing temperature and techniques.	—	X	ACI 318: 26.4.7-26.4.9	1908.9
9. Inspect prestressed concrete for: a. Application of prestressing forces; and b. Grouting of bonded prestressing tendons.	X X	— —	ACI 318: 26.9.2.1 ACI 318: 26.9.2.3	—
10. Inspect erection of precast concrete members.	—	X	ACI 318: Ch. 26.8	—
11. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	—	X	ACI 318: 26.10.2	—
12. Inspect formwork for shape, location and dimensions of the concrete member being formed.	—	X	ACI 318: 26.10.1(b)	—

For SI: 1 inch = 25.4 mm.

a. Where applicable, see also Section 1705.12, Special inspections for seismic resistance.

b. Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with 17.8.2 in ACI 318, or other qualification procedures. Where specific requirements are not provided, special inspection requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work.

SHOTCRETE

- ☐ A test panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project. The sample panel shall be representative, simulate job conditions, and reproduce the thickest and most congested area. It shall be shot at the same angle, using the same nozzleman and concrete mix design that will be used on the project. The equipment used during testing shall be the same equipment used in the work requiring such testing. Reports shall be submitted to the building official. (CBC 1908.5)
- ☐ All shotcrete work shall be continuously inspected during placing by an approved agency. The special shotcrete inspector shall check the materials, placing equipment, details of construction and construction procedure. (CBC 1705A.19)
- ☐ Specimens shall be taken from the in-place work or from test panels, and shall be taken at least once each shift, but not less than one for each 50 cubic yards of shotcrete. (CBC 1908.10.1)

- ☐ When the maximum-size aggregate is larger than 3/8 inch, the test panels shall have minimum dimensions of 18 inches by 18 inches. When the maximum-size aggregate is 3/8 inch or smaller, the test panels shall have minimum dimensions of 12 inches by 12 inches. (CBC 1908.10.2)

MASONRY

- ☐ Special inspections and tests of masonry shall be performed in accordance with the quality assurance program requirements of TMS 402/ACI 530/ASCE 5 and TMS 602/ACI 530.1/ASCE 6 (e.g., Level A, Level B, or Level C) and the approved construction documents. (CBC 1705.4)
- ☐ The construction documents must specify which special inspections are required. (CBC 2105A.1)

STRUCTURAL WOOD

- ☐ For seismic force-resisting systems of structures assigned to Seismic Design Categories C, D, E, or F, periodic special inspection is required for nailing, bolting, anchoring and other fastening of elements that make up the lateral force-resisting system including wood shear walls, wood diaphragms, drag struts, braces, and hold-downs. Special inspection is required for shear walls where the fastener spacing of the sheathing is 4" or less. (CBC 1705.11.1, CBC 1705.12.2)

COLD-FORMED STEEL LIGHT-FRAME CONSTRUCTIONS

- ☐ For seismic force-resisting systems of structures assigned to Seismic Design Categories C, D, E, or F, periodic special inspection is required for, periodic special inspection is required for welding operations of elements of the seismic force-resisting system and screw attachment, bolting, anchoring, and other fastening elements of the seismic force-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs. (CBC 1705.12.3)

SOILS REPORT

- ☐ At time of inspection, provide the CPA inspection with copies of the soils engineer report. (CBC 1704.6, CBC 1705.6)
- ☐ Special inspections and tests of existing site soil conditions, fill placement, and load-bearing requirements shall be per Table 1705.6. During fill placement, the special inspector shall verify proper materials and procedures are used in accordance with the provisions of the approved geotechnical report. (CBC 1705.6)

**TABLE 1705.6
REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS**

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	—	X
2. Verify excavations are extended to proper depth and have reached proper material.	—	X
3. Perform classification and testing of compacted fill materials.	—	X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	X	—
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	—	X

- ☐ Special inspections and tests shall be performed during installation of driven deep foundation elements per the approved geotechnical report, approved construction documents, and Table 1705.7. (CBC 1705.7)

**TABLE 1705.7
REQUIRED SPECIAL INSPECTIONS AND TESTS OF DRIVEN DEEP FOUNDATION ELEMENTS**

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify element materials, sizes and lengths comply with the requirements.	X	—
2. Determine capacities of test elements and conduct additional load tests, as required.	X	—
3. Inspect driving operations and maintain complete and accurate records for each element.	X	—
4. Verify placement locations and 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 document any damage to foundation element.	X	—
5. For steel elements, perform additional special inspections in accordance with Section 1705.2.	—	—
6. For concrete elements and concrete-filled elements, perform tests and additional special inspections in accordance with Section 1705.3.	—	—
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge.	—	—

- ☐ Special inspections and tests shall be performed during installation of cast-in-place deep foundation elements per the approved geotechnical report, approved construction documents, and Table 1705.8. (CBC 1705.8)

**TABLE 1705.8
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CAST-IN-PLACE DEEP FOUNDATION ELEMENTS**

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	X	—
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes.	X	—
3. For concrete elements, perform tests and additional special inspections in accordance with Section 1705.3.	—	—

SPRAYED FIRE-RESISTANT MATERIALS

- ☐ Special inspections and tests of sprayed fire-resistant materials applied to floor, roof and wall assemblies and structural members shall be based on the fire-resistance design in the approved construction documents. (CBC 1705.14)
- Note: The special inspection shall be performed after the installation of electrical, automatic sprinkler, mechanical and plumbing systems and suspension systems for ceilings, where applicable.

OTHER

- ☐ See the table that follows for other special inspection categories.

SUMMARY OF SPECIAL INSPECTIONS REQUIRED

TYPE	DESCRIPTION	CONT.	PERIODIC	CERTIFICATION
Reinforced Concrete (RC)	- Reinforcement, prestressing tendons, placement	-	X	- Minimum one year experience for reinforced concrete - Minimum six months plus three years' experience in reinforced concrete for prestressed/post-tensioned concrete - Certification by ACI (Field Technician Grade 1) - Certification by ICC (Reinforced Concrete) - Certification by PTI (Post-Tension Concrete) - Certification by ICC (Prestressed Concrete)
	- Reinforcing bar welding	-	X	
	- Anchors cast in concrete	-	X	
	- Anchors post-installed (adhesive)	X	-	
	- Anchors post-installed (mechanical)	-	X	
	- Required mix design	-	X	
	- Concrete placement	X	-	
	- Strength tests	X	-	
Shotcrete (S)	- Shotcrete placement	X	-	
	- Strength tests	X	-	
	- Shotcrete personnel qualification	-	X	
Precast Concrete (PRC)	- Erection of precast concrete members	-	X	
Post-Tension Concrete (PT)	- Placement of tendons	X	-	
	- Strength Tests	X	-	
	- Grouting of prestressing tendons	X	-	
Prestressed Concrete (PSC)	- Application of prestressing forces	X	-	
	- Grouting of prestressing tendons	X	-	
Structural Masonry (SM)	- Strength Tests	X	-	- Minimum one year experience, or six months plus one year experience in reinforced concrete - Certification by ICC (Structural Masonry)
	- Proportions of materials	-	X	
	- Reinforcement	-	X	
Steel Welding (SW)	- Fabrication (mill materials, quality, etc.)	-	X	- Minimum three years' experience for steel welding - Minimum one year experience for steel bolting - Certification by ICC (Structural Welding) - Certification by ICC (Structural Steel & Bolting) - Certification by AWS (Certified Welding Inspector)
	- Visual	X	-	
	- Welding personnel qualification	-	X	
Steel (High Strength) Bolting (HSB)	- Bolting materials	-	X	
	- Torque-tension/Pretension and Observation	-	X	
Structural Wood Construction (SWC) & Cold-Formed Steel (CFS)	- Lateral load force-resisting elements (e.g., shear walls, wood diaphragms, drag struts, braces, hold-downs, etc.)	-	X	- Minimum of two years in direct experience in engineering - Minimum of five years in direct experience as a journeyman - Licensed professional/registered engineer - Certification by ICC (Commercial or Residential Building Inspector, as applicable)
Soils (Including grading, excavation, and filling)	- Depth of excavations	-	X	- Minimum of two years in direct experience in engineering - Licensed professional/registered engineer - Certification by ICC (Commercial or Residential Building Inspector, as applicable)
	- Soil classification and compaction	-	X	
Deep Foundation Elements/Cast-in-Place Elements	- Materials, sizes, lengths	X	-	
	- Driving operations	X	-	
	- Placement of elements	X	-	
	- Drilling operations	X	-	

TYPE	DESCRIPTION	CONT.	PERIODIC	CERTIFICATION
Spray-on Fireproofing	- Floor, roof and wall assemblies and structural members	-	X	- Minimum one year experience - Certification by ICC (Spray-Applied Fireproofing)
Green Building	- Tier 1 and Tier 2	-	X	- Certification by ICC (CALGreen Inspectors/Plans Examiner)
Smoke-Control Systems	- Kitchens	-	X	- Certification as Certified Air Balancing Technician - Licensed professional/registered engineer
Home Energy Rating Systems (HERS)	- Check CA Title 24 Energy Code sheet on approved documents for: heating and cooling systems, ductwork and ventilation, building envelope, lighting, insulation, windows and doors, and domestic hot water heating systems	-	X	- Certified as HERS
Nondestructive Testing (NDT)	- Special cases where required	-	X	- American Society for Nondestructive Testing (ASNT) Level II or Level III certification through the ASNT Central Certification Program (ACCP); or - Personnel qualified in accordance with a nationally-recognized NDT personnel qualifications practice or standard, such as ANSI/ASNT CP-189 or ASNT TC-1A as determined by an ASNT Level III
Special Cases	- Special cases when required by the Building Official or a product evaluation report, such as mold, water proofing, intumescent paint, and alternative materials and systems.	*	*	*

* Depends on the special case