

SPECIAL INSPECTION* AND OBSERVATION MANUAL

**PBCC
(Based on 2018 “I” Codes)**

*** Special Inspections are in addition to the inspections required by the Phoenix Building Construction Code (PBCC 1704)**

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INTRODUCTION

Special Inspection, as required by the P.B.C.C. Sections 1704 and 1705 is best defined as the monitoring of the materials and workmanship which are critical to the integrity of the building structure or building service equipment and require special attention. This requires inspection by persons with specially developed skills to check the material and workmanship against the city-reviewed plans, specifications and contract documents.

This document will be revised from time to time as dictated by experience gained in its implementation and as necessary due to changing building codes, practice and technology.

This manual is a descriptive guideline for special inspection administration. It defines the duties and responsibilities of the Registered Design Professional in Responsible Charge (RDPRC), special inspector, contractor, Building Official, and project owner. The manual applies to all work requiring special inspections and observations within the city of Phoenix, however; the programs will vary depending on the scope of work requiring special inspections and observations. Special inspections and observation programs shall be identified by the Engineer and Architect of Record during design and by the plan review staff during plan review.

This manual is divided into six sections as follows:

- 1. Observation**
- 2. Special Inspection – An Overview**
Gives an overview of job-site quality control through special inspection.
- 3. General Program Guidelines**
Describes overall purposes for special inspection, and respective duties and responsibilities of project owners, RDPRC, special inspectors, Building Officials and contractors.
- 4. Procedures for Special Inspection – Job Task Analysis**
Lists job tasks required of special inspectors.
- 5. Special Inspector Qualifications**
Lists competency and experience standards, and references performance standards for special inspectors. These minimum qualifications are designed to assist the Building Official in determining the special inspector's competence to perform specific tasks as listed in the P.B.C.C. Section 1704 and 1705.
- 6. Special Inspection Forms**
Forms provided are representative of the minimum information required by the administrative authority.

SECTION I. OBSERVATION

A. Structural Observation for Special Conditions

In addition to the Inspections required by Section 110 and the special inspections required by Section 1704, structural observation shall be provided when required by Section 1704.6. The following items are included in Section 1704.6.1 and copied in their entirety:

1. The structure is classified as Risk Category IV.
2. The structure is a high-rise building.
3. Such observation is required by the registered design professional responsible for the structural design.
4. Such observation is specifically required by the building official.
5. The height of the structure is greater than 75 feet (22,860mm) above the grade plane.
6. The structure has more than three stories above the grade plane.
7. Elevated post-tensioned concrete structures.
8. Prefabricated deferred units and their connections when such units are utilized structurally in the lateral force-resisting systems of a structure.

The owner shall employ a Registered Design Professional to perform structural observations as defined in Section 202. Deficiencies shall be reported in writing to the owner and the Building Official. At the conclusion of the work included in the permit, the structural observer shall submit to the Building Official a written statement that the site visits have been made and identify any reported deficiencies, which to the best of the structural observer's knowledge have not been resolved.

The owner shall employ the Registered Design Professional responsible for the structural design, or another engineer designated by the engineer responsible for the structural design, to perform structural observation as defined in Section 202. Observed deficiencies shall be reported in writing to the owner's representative, special inspector, contractor and the Building Official. The structural observer shall submit to the Building Official a written statement that the site visits have been made and identifying any reported deficiencies which, to the best of the structural observer's knowledge, have not been resolved.

B. Electrical Observation

In addition to the inspections required by Section 110 of the *Phoenix Building Construction Code* and the special inspections required by Section 1704.7, electrical observation shall be provided when one of the following conditions exist:

1. Installation or alteration of that portion of healthcare facility electrical systems which falls within the scope of Essential Electrical Systems in Article 517 of the *National Electrical Code*, including such systems installed in facilities where outpatient surgical procedures are performed.
2. Installation or alteration of electrical systems over 600V.
3. Installation or alteration of electrical systems within locations classified as hazardous by provisions of the *National Electrical Code*, except for gasoline dispensing installations and systems located within storage garages, repair garages or lubricatoriums.
4. When such observation is specifically required by the Building Official.

The owner shall employ a Registered Design Professional responsible for the electrical design, or another Registered Design Professional to perform visual observation of complex electrical equipment and systems for general conformance to the approved plans and specifications, including but not limited to placement and interconnection of equipment as the Designated Registered Design Professional. Electrical observation shall be performed at significant stages of the construction and when the installation is complete and ready to be inspected by the Building Official.

C. Mechanical or Plumbing Observation

In addition to the inspections required by Section 110 of the *Phoenix Building Construction Code* and the special inspections required by Section 1704.8 and 1704.9, Mechanical or plumbing observation shall be provided when one of the following conditions exist:

1. When such observation is specifically required by the Building Official.

The owner shall employ engineer responsible for the mechanical or plumbing design, or another engineer designated by the engineer responsible for the mechanical or plumbing design, to perform visual observation of complex mechanical or plumbing equipment and systems for general conformance to the approved plans and specifications, including, but not limited to, placement and interconnection of equipment. Mechanical or plumbing observation shall be performed at significant stages of the construction and when the installation is complete and ready to be inspected.

D. Observation Procedures

When a project has been identified as requiring observation, the owner shall employ a Registered Design Professional of Record (RDPR) responsible for design or another RDPR to perform observation as the Designated Registered Design Professional.

When a project has been identified as requiring observation, the following tasks shall be the responsibility of the **RDPR**:

1. Clearly outline the Observation Plan on the drawings. The plan shall include the items or elements that require observation.
2. Complete and return the Certificate of Observation to the Building Official. *
3. Review the plans with the contractor and indicate when the contractor is to call the Registered Design Professional of Record (RDPR) for Observation requirements.
*This can take place during the pre-construction meeting as outlined on Section III-D of this manual.
4. Perform site visits and prepare reports as stated in the code. *
5. Designate a RDPR for Observation IF a Designated Registered Design Professional is to be employed for Observations.

*When a Designated RDPR is to perform observation, this responsibility rests with the Designated RDPR.

When a project is identified as requiring observation, the following tasks shall be the responsibility of the **Designated RDPR** for Observations when a Designated RDPR is to perform observations:

1. Arrange a meeting with the RDPR responsible for design to review the plans and calculations.
2. Complete and return the Certificate of Observation to the Building Official.
3. Review the plans with the contractor and indicate when the contractor is to call the Designated RDPR for Observation requirements. This can take place during the pre-construction meeting as outlined on Section III-D of this manual.
4. Perform site visits and prepare reports as stated in the code. When a project has been identified as requiring observation, the following tasks shall be the responsibility of the **Contractor**:
 - a. Meet with the RDPR responsible for design or the Designated RDPR for observation to review the plans. This can take place during the pre-construction meeting as outlined on Section III-D of this manual.

- b. Notify the RDPR or Designated RDPR as determined in the pre-construction meetings for the observation of the identified elements and/ or systems.
- c. Keep all work requiring observation uncovered and clearly visible for the engineer to perform the observation.
- d. Provide OSHA Compliant access to the work requiring observation.

When a project has been identified as requiring observation, the following tasks shall be the responsibility of the **Building Official**:

1. Plan Reviewer:

- a. Review the Observation Program on the plans and ensure the Certificate of Observation is accurate.

2. City Inspector:

- a. Review the Observation Program form and plans.
- b. Attend any pre-construction conferences related to the observation program and address any concerns of the engineer or contractor.
- c. Review observation reports.
- d. Review discrepancies reported by RDPR or Designated RDPR.

E. Certificate of Compliance

Upon completion of the portions of the work requiring observation, a Certificate of Compliance shall be issued to the Building Official over the seal and signature of the engineer responsible for such observation. A Certificate of Occupancy will not be issued until the Building Official receives all required observation reports and the Certificates of Compliance.

The Certificates of Compliance for observation shall read as follows:

For the Electrical Observation

"I certify to the best of my knowledge the electrical requirements of the Phoenix Building Construction Code and approved plans and specifications have been complied with insofar as the portion of the work requiring electrical observation is concerned, except for those deviations that have been previously reported. A guarantee that the contractor has constructed the building in full accord with the plans and specifications is neither intended nor implied."

For the Structural Observation

"I certify to the best of my knowledge the structural requirements of the Phoenix Building Construction Code and approved plans and specifications have been complied with insofar as the portion of the work requiring structural observation is concerned, except for those deviations that have been previously reported. A guarantee that the contractor has constructed the building in full accord with the plans and specifications is neither intended nor implied."

For the Mechanical or Plumbing Observation

"I certify to the best of my knowledge the mechanical / plumbing requirements of the Phoenix Building Construction Code and approved plans and specifications have been complied with insofar as the portion of the work requiring mechanical or plumbing observation is concerned, except for those deviations that have been previously reported. A guarantee that the contractor has constructed the building in full accord with the plans and specifications is neither intended nor implied."

SECTION II – SPECIAL INSPECTION OVERVIEW

Under this program, the owner is required to provide specially qualified inspectors for inspection during construction in addition to called inspections provided by the Building Official.

The use of special inspectors is not discretionary. The P.B.C.C. Sections 1705, 1705.19, 1705.20, and 1705.21 clearly state the conditions under which they must be utilized, but there is a provision for the Building Official to waive special inspection for work of a minor nature.

Continuous special inspection: Special inspection by the special inspector who is present continuously when and where the work to be inspected is being performed. P.B.C.C. 202

Periodic special inspection: Special inspection by the special inspector who is intermittently present where the work to be inspected has been or is being performed. P.B.C.C. 202

Continuity of inspection is very important and is best provided by using one individual as Special Inspector for each discipline that requires special inspection. This paragraph is intended to discourage the use of multiple inspectors performing a given task.

An additional provision allows the Building Official to use discretion for the requirement of a special inspector in other cases where it is deemed appropriate.

The use of special inspectors is reserved for complex installations requiring certain specially developed inspection skills for the following types of work as listed in the P.B.C.C. 1705):

1. Inspection of Fabricated Items

(P.B.C.C. 1704.2.5)

2. Structural

Special Cases (1705.1.1)

Wall panels

Curtain walls

Veneers

Steel Construction (1705.2)

High Strength bolting

Welding

Cold-formed steel trusses spanning 60' or greater (1705.2.4)

Concrete Construction (1705.3)

Pre-stressed/precast

Reinforced concrete

Post-installed structural anchors in concrete

Masonry Construction (1705.4)

Wood Construction (1705.5)

Testing for Seismic Resistance (1705.13)

3. Geotechnical

- Soils (1705.6)
- Driven deep foundations (1705.7)
- Cast-in-place deep foundations (1705.8)
- Helical Pile Foundations (1705.9)

4. Architectural

- Spray fire-resistant materials (1705.14)
- Mastic and intumescent fire-resistant coatings (1705.15)
- Exterior insulation and finish system (EFIS) (1705.16)
- Fire-resistant penetrations and joints (1705.17)

5. Mechanical

- Smoke control (1705.18)
- Duct smoke detectors (1705.20)
- Fire, smoke, fire smoke, and ceiling radiation dampers (1705.20)
- Installation of grease duct enclosure (1705.20)

6. Electrical

- Ground fault performance tests (1705.19)
- Switchboards, panelboards, motor control centers and other equipment rated 1000A or more, over 600V (1705.19)
- Transformers rated 100 KVA single phase or 300 KVA or more 3-phase (1705.19)
- Conductors for equipment rated 1000A or more, or over 600V (1705.19)
- Emergency and standby power systems (1705.19)
- Selective Coordination (1705.19)

7. Plumbing

- Medical Gas and Vacuum Systems (1705.21)

SECTION III – GENERAL GUIDELINES

A. Duties and Responsibilities of the Project Owner

The project owner is responsible for employing special inspection services. [Code reference: P.B.C.C. Section 1704]. Although the payment of inspection services may be included in the project specifications as a responsibility of the contractor, the inspection services are employed by the owner.

The Project Owner Shall:

1. Notify the Registered Design Professional in Responsible Charge (RDPRC) in the event a Designated RDPRC chosen to provide the special inspection services as described in Section III-A, Duties and Responsibilities of the RDPRC.
2. Once a permit has been issued and the owner wishes to change the RDPRC for special inspection, the owner shall obtain a new completed Special Inspection Certificate and forward to the Building Official. This shall be done in accordance with sections 105.8 and 105.8.4 of the P.B.C.C.

B. Duties and Responsibilities of the Registered Design Professional in Responsible Charge (RDPRC) (P.B.C.C. 107.3.4).

The **RDPRC** shall be responsible for coordinating the types of work requiring special inspection as defined in Section II of this document. Structural special inspectors are required for work types 1 & 2. Geotechnical special inspectors are required for work type 3. Architectural special inspectors are required for work type 4. Mechanical special inspectors are required for work type 5. Electrical special inspectors are required for work type 6. Plumbing special inspectors are required for work type 7.

* A **Designated RDPRC**, with the approval of the Building Official, **RDPRC** and the Project Owner, may assume the responsibilities and duties of all inspection items for the **RDPRC** as identified in items 2 through 6 below. The Designated RDPRC may not change the design of the building.

Duties and responsibilities of the RDPRC shall include the following:

1. **Identify the need for special inspection services.**
The project plans that are submitted to the Building Official shall clearly indicate the design parameters, material selection and where special inspection is necessary in accordance with the Code.
2. **Submit Special Inspection Certificate(s) to the Building Official as a part of the Plan Submittal Process.** Complete the information related to the project, owner, and professional, indicate the types of work requiring special inspection, and seal, sign, and date the center of the certificate.

3. Determine inspection activities.

The **Registered Design Professional in Responsible Charge (RDPRC)** shall be responsible for the designation of the activities and items for which the Special Inspector is responsible to inspect.

4. Specification of testing and test procedures.

During the pre-construction meeting, the **RDPRC** shall be responsible for defining and specifying tests and testing procedures (such as those not specifically included in P.B.C.C. Standards, ASTM's, etc.) as may be required for the **RDPRC** work.

5. Identify individual responsible for conducting special inspection(s). This section of the certificate does not need to be completed prior to permit issuance; however, it must be completed prior to the special inspection being performed.

6. Provide Final Report.

When Construction reaches the point that Special Inspections are no longer required, the Final Report shall be submitted to the building Official and to the **RDPRC**.

C. Duties and Responsibilities of the Special Inspector

The owner or the registered design professional in responsible charge acting as the owner's agent shall employ one or more special inspectors to provide inspections during construction on the types of work listed in the Special Inspections Manual. [Code Reference: The P.B.C.C. Section 1704]

The duties of the special inspectors include the following:

1. Signify presence at job-site.

Special inspectors shall notify contractor personnel of their presence and responsibilities at the job-site.

- a. Attend the Pre-Construction Conference.

2. Inspect all work for which they are responsible.

Special inspectors shall inspect all work for conformance with the **city reviewed drawings** and specifications, and applicable provisions of the Phoenix Building Construction Code.

3. Separately identify all nonconforming work.

Special inspectors shall bring all nonconforming items to the immediate attention of the contractor and the **RDPRC**. If any such item is not resolved in a timely manner or is about to be incorporated in the work, the Building Official shall be notified immediately by telephone or in person, and the special inspector shall issue a discrepancy notice.

4. Issue Discrepancy Notice.

The special inspector shall post the discrepancy notice at the job-site with the permit. This notice shall contain, as a minimum, the following information about each nonconforming item:

- a. Description and exact location.
- b. Reference to applicable detail of city reviewed plans/specification.
- c. Name and title of each individual notified and method of notification.
- d. Resolution or corrective action.

5. Provide Daily Reports.

The special inspector shall complete written inspection reports for each inspection visit. These reports shall be organized on a daily format and a copy **shall remain at the job-site** with the contractor. Special inspectors shall:

- a. Describe inspections and tests made with applicable locations.
- b. List all nonconforming items; parties notified, time and method of notification.
- c. Indicate how nonconforming items were resolved
- d. List unresolved items
- e. Provide daily reports to contractor for retention on job-site.
- f. Provide a daily report to the Registered Design Professional in Responsible Charge (RDPRC).

6. Provide Final Reports.

When the construction reaches the point that Special Inspections are no longer required, the **final report** shall be submitted to the Building Official and to the Registered Design Professional in Responsible Charge (P.B.C.C. Section 1704.2.4)

D. Duties and Responsibilities of the Contractor

The contractor's (as designated on the building permit) duties include the following:

1. Set up the pre-construction conference.

- a. Prior to construction, establish date and location for meeting. Attendees shall include all Special Inspectors for required work types, the Contractor, Building Official, RDPRC, Designated RDPRC and others as necessary.
- b. In case of multiple building permits, more than one meeting may be required.

2. Notify the Special Inspector.

The contractor is responsible for notifying the special inspector of the work progress and when construction items are ready for inspection. Adequate notice shall be provided so that the special inspector has time to schedule all inspections.

3. Provide access to the project.

The Contractor is responsible for providing the Special Inspector OSHA Approved access to the job-site and the work.

4. Retain records on job-site.

The Contractor is responsible for retaining at the job site city reviewed plans and Specifications, all special inspection records, and reports by the special inspector. Upon request he shall provide these documents for review by the Building Official.

5. Notification of the Building Official

The contractor shall, in addition to calling for special inspections, notify Planning and

Development Department of all other required inspections in accordance with P.B.C.C. Section 110.5 which will result in an inspection by the Building Official.

6. Performance of the work.

The contractor is charged with the construction of the project in compliance with the city reviewed plans city reviewed by the Building Official. The contractor is responsible for installation of all items in accordance with applicable Codes and Standards. If a conflict arises between the Code and the city reviewed plans, this conflict will immediately be brought to the attention of the Building Official.

E. Duties and Responsibilities of the Building Official

The specific provisions of providing for special inspection services are mandatory under Section 1704.2 that states, "Where all application is made for construction as described in Section 105, the owner or the registered design professional in responsible charge acting as the owner's agent shall employ one or more special inspectors to provide inspections during construction on the types of work listed under Section 1705."

1. Review and Examine Plans Including the Special Inspection Plan, Specifications and other Contract Documents for Compliance with all Code Requirements.

The Building Official is charged with the legal authority to approve the plans and specifications for compliance with the requirements of the P.B.C.C. [Code reference: P.B.C.C. Sections: 107.1, 105.3, and 1704.

2. Notify the Contractor of the Requirement for a Pre-Construction Meeting.

3. Communicate Special Inspection and Engineer Report Requirements to the Registered Design Professional in Responsible Charge (RDPRC), Contractor and Project Owner.

Once special inspection requirements are identified in the plan approval process, the Building Official shall require **RDPRC** or **Designated RDPRC** to sign the Special Inspection Certificate.

4. Monitor the Special Inspection Activities.

The Building Official shall monitor the jobsite to see that qualified special inspectors are provided as required and that an adequate number of qualified special inspection staff is present depending upon extent and complexity of the project. Code reference: P.B.C.C. Section 1704.2.

5. Review Inspection Reports.

The Building Official reviews the daily inspection reports. Code reference: P.B.C.C. Section 1704.2.4.

6. Inspection of Jobsite.

The Building Official shall perform all inspections required under P.B.C.C. Section 110. Failure to have the required Special Inspector's inspection reports available to the Building Official shall be cause for the Building Official to **stop work** on those items requiring special inspection until such time that all required reports are provided.

7. Issue Certificate of Occupancy / Certificate of Completion.

The Building Official shall perform a final inspection and issue a Certificate of Occupancy or Certificate of Completion, where applicable. This inspection and issuance shall not be done until after the **final report(s) and/or engineer report(s)** have been received and accepted by the Building Official. Code Reference: P.B.C. C. Section 1704.

SECTION IV – SPECIAL INSPECTOR JOB TASK LISTINGS

The job tasks listed in this section are intended to represent the basic inspection tasks and do not necessarily describe every detail of the job descriptions. For more specific tasks, consult specifications and codes, such as ACI, ASTM, AISC, etc., applicable to the task in question. Work types shown refer to inspection codes listed in Section II.

A. Geotechnical

1. Special Grading, Excavation and Filling

Work Type 3, P.B.C.C. 1705.6

a. Site Preparation Verification

Inspect clearing and grubbing for conformity to plans and specifications and that excavation slopes are as specified.

b. Material verification

Review and test native and borrow materials to verify characteristics which conform to plans and specifications.

c. Over-excavation

d. Scarification Verification

Inspect, observe and test as required that all over excavations required in foundation areas are to the size, location and depths as specified. Inspect that scarification, moisture conditioning and compaction are as specified.

e. Fill Placement Verification

Inspect, observe and test as required all fill placement. Verify that moisture conditioning, compactions and fill materials are as specified and that all fill slope configurations are as specified.

f. Utility Excavations and Backfilling Verification

Inspect, observe and test as required the location, placement, moisture conditioning and compaction of backfills within specified areas of the site for conformance with plans and specifications.

g. Foundation Excavation Verification

Inspect, observe and test as required that all foundation excavations as to depth, size, bearing material, depth into bearing material, and cleaning of bearing surface for conformance with plans and specifications.

h. Final Grading Report

The Special Geotechnical Inspector, upon completion of the building pad grading, shall submit a final report to the Building Official certifying that the provisions of the soil investigation report have been met and that the recommended maximum bearing value, and the foundation minimum depth and width applicable to that bearing value have been achieved. The report must clearly indicate these values and dimensions and should contain any additional recommendations for tests during construction.

Rationale:

The Building inspector must obtain a copy of this soils certification before allowing foundation to be poured or constructed. It is difficult to pick out all of the recommendations from the original soils investigation if the document is even available on the jobsite. This can result in

concrete being rejected and delays to the contractor and extra unnecessary expense to the Project Owner.

2. Piling, Drilled Piers and Caissons

Work Type 3, P.B.C.C. 1705.8

a. Driven Piles

1) Materials and Equipment Verification:

To inspect pile material, splices, the reinforcement, pile type, pile sizes, length, quality and straightness are as specified, and that leads, hammers, cushioning and other equipment are in conformance with the plans and specifications.

2) Pile Installation Verification:

Verify that horizontal and vertical locations of the piles are as specified, and that pile orientation and plumbness are in conformance with the plans and specifications.

3) Pile Driving:

Inspect the driving of the piles by recording the blow counts per foot of penetration, that the terminating blow count and/or pile tip elevation are as specified and that no damage, defects or variation of specifications are observed during driving.

b. Auger-Cast-Piles

1) Materials and Equipment Verification:

Inspect all materials, quality of material and equipment type and size are as specified. Have all concrete materials sampled and tested as required in section of this part.

2) Pile Installation Verification:

Verify and inspect that vertical and horizontal pile locations are as specified, that plumbness, size and tip elevation are as specified and that installation procedure, pump pressure and auger withdrawal during casting are in conformance with the plans and specifications.

c. Drilled Piers and Caissons

1) Installation Verification:

Inspect and verify that all drilling and cleaning operations areas specified, that shaft diameter, shaft length, shaft plumb-ness, under-reamed diameter, under-reamed height, under-reamed shape are as specified, that bearing surface is cleaned as specified, and that the bearing material and penetration into the bearing material are in conformance with the plans and specifications.

d. Helical Pile Foundations

1) Inspect and verify the installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required by the RDPRC.

e. Pile log

A daily log verifying the inspections as outlined in ab, c, and d above shall be maintained and a copy kept at the job site.

B. Structural

1. Reinforced and Pre-stressed Concrete Job Tasks

Work Type 2, P.B.C.C. 1705.3 (INCLUDES POST TENSIONING)

a. Concrete

1) Mix Design:

Check with the **Registered Design Professional in Responsible Charge (RDPRC)** in order to verify concrete product codes.

2) Batch Plant:

Verify that batch plant has current annual inspection by an accepted inspection agency for conformance to National Ready Mixed Concrete Association recommendations.

3) Trip Ticket:

Determine that mixer truck delivery ticket identifies mix and batch time.

b. Concrete Reinforcement

1) Rebar Type and Grade:

Inspect type, grade and visual conformity of rebar with specifications.

2) Rebar Condition:

Inspect that rebar is undamaged, free of oil, dirt and excessive rust.

3) Rebar Tying and Bracing:

Inspect that rebar is adequately tied, chaired and supported to prevent displacement during concrete placement.

4) Rebar Clearance:

Inspect minimum and maximum clear distances between bars and minimum structural distance to outside of concrete and to surface of concrete.

5) Rebar Placement:

Inspect the size, location and spacing quantity of rebar. Verify bar laps for proper length and stagger, and bar bends for minimum diameter, slope and length.

6) Rebar Welding:

Inspect that welding of rebar is with proper rods and procedures.

c. Concrete Formwork and Embedded Items

1) Concrete Construction Joints:

Inspect proper preparation of construction joint surface prior to placing.

2) Formwork Construction:

Generally inspect inside dimensions of formwork.

3) Embedded Items:

Inspect that embedded items are properly spaced, sized and anchored.

d. Concrete, Placement, Curing and Protection

1) Pre-Placement:

Inspect that the base to receive concrete is properly wetted and standing water is removed before concrete is placed.

2) Concrete Placement:

Inspect that concrete conveyance and depositing avoids segregation due to re-handling or flowing.

3) Concrete Vibration:

Inspect that concrete is properly vibrated.

4) Concrete Curing:

Inspect that appropriate curing is performed.

5) Protection:

Determine that appropriate hot-and cold-weather measures are taken for protection of the concrete and grout.

e. Samples and Tests

1) Test Type:

Verify that the type and number of concrete, grout and reinforcing steel tests are being performed in conformance with plans and specifications.

2) Test Samples:

Observe sampling of fresh concrete and grout, slump tests, and molding of test specimens.

3) Hardened Concrete Test Samples:

Observe removal of test samples and other test procedures on hardened concrete.

4) Specimen Handling/Protection:

Observe proper handling, initial curing and placement of specimens in protected area after preparation.

f. Pre-stressing Steel

1) Pre-stressing Steel Type and Grade:

(Unless casting a PCI Approved plant) Determine that pre-stressing steel type, size and grade, and tendon fabrication are in conformance with specifications.

2) Pre-stressing Steel Condition:

Determine that pre-stressing steel is free of oil, dirt, scale, and pitting, excessive rust; is free from damage; and is properly wrapped as required.

3) Pre-stressing Steel Ties and Supports:

Determine that pre-stressing steel tendons and post-tensioning ducts are adequately tied, chaired and supported to prevent displacement during concrete placement, and profiles are in conformance with plans, and that exposed strands at the anchors are properly taped.

4) Pre-stressing Steel Clearance:

Inspect for minimum and maximum clear distances between pre-stressing steel and minimum structural distance to outside of concrete and to surface of concrete. Inspect for city reviewed and satisfactory routing of tendons around openings or embedments.

5) Pre-stressing Steel Placement:

Inspect placement of pre-stressing steel, tendons or ducts as detailed in plans and specifications. Inspect for correct number, size, spacing and chair heights.

6) Post-tensioning Ducts:

Verify that post-tensioning ducts are correctly sized, are mortar-tight and non-reactive with concrete, tendons and filler materials.

7) Pre-stressing Steel Anchorage:

Inspect location, size and placement of pre-stressing steel anchorage as detailed in plans and specifications.

g. Pre-stressing and Grouting

1) Calibration of Stressing Ram:

Review the calibration documentation for the steel-stressing ram.

2) Steel Stressing:

Inspect that steel is stressed at the proper time using proper techniques, including stressing locations, sequence, and with proper records of stressing and steel elongations.

3) Grout Mix Design and Placement:

Determine that mixer truck delivery ticket identifies required grout mix and batch time. Inspect placement of grout into post-tensioning ducts for bonded pre-stressing tendons.

4) Tendon Finishing:

Inspect correct trimming of excess tendon length after stressing. Inspect filling of stressing pockets.

h. Post Installed Anchors

1) Installed per manufacturers installation specifications.

2. Structural Steel

Work Type 2, P.B.C.C. 1705.2

a. General

1) Conduct inspections in accordance with AISC 360.

b. High Strength Bolts

1) The inspection of high-strength A 325 and A 490 bolts shall be in accordance with approved nationally recognized standards and the requirements of this section. While the work is in progress, the special inspector shall determine that the requirements for bolts, nuts, washers and paint; bolted parts; and installation and tightening in such standards are met. Such inspections may be performed on a periodic basis in accordance with the requirements of PBCC Section 2204.2. The inspector shall observe the calibration procedures when such procedures are required by the plans or specifications and shall monitor the installation of bolts to determine that all plies of connected materials have been drawn together and that the selected procedure is properly used to tighten all bolts.

a) Samples and Nondestructive Tests

i. Bolt and Nut Sampling:

Observe and sample bolts, nuts and washers for testing, if required.

ii. Nondestructive Testing:

Observe nondestructive testing in accordance with approved procedures.

3. Welding Job Tasks

a. Welding Materials

1) Welding Consumables:

Review welding consumables for identification markings, or other documentation of welding materials for compliance with plans and specifications. Inspect rod containers for damage.

b. Welding

1) Qualification of Welders:

Review qualification of welders, welding operators and tackers for conformance with the appropriate AWS code and the plans and specifications.

2) Welding Consumable Storage:

- a) Review low hydrogen electrode storage conditions to determine material has been purchased in a hermetically sealed container and that storage ovens meet the minimum temperature and utilization requirements.
- b) Review procedures for maintaining maximum atmospheric exposure times for low hydrogen consumable utilization.

3) Welding and Joint Preparation:

Inspect that the material to be welded is smooth, uniform, free from fins, tears and cracks, and that cut edges are acceptable and free of foreign material.

4) Welding Procedures:

Visually review that welding is done in conformance with AWS requirements for process, materials, workmanship, number of passes, preheat and inter-pass temperatures, cleaning between passes, weld lengths, welding technique and welding sequence. Review specifications for unusual requirements.

5) Weld Repairs and Heat Straightening:

Inspect weld repairs and heat straightening of structural members is done in compliance with approved procedures and AWS standards.

6) Welding of Reinforcing Steel:

Review the Welding Procedure Specification and the Welding Procedure Qualification for compliance with AWS D1.4 and the contract documents.

Note: There are no pre-qualified welding procedures for welding reinforcing bars. A Procedure Qualification Record (PQR) is required.

4. Structural Masonry Job Tasks

Work Type 2, P.B.C.C. 1705.4

a. Masonry Material - Storage and Certifications

1) Masonry Material Certifications:

Inspect masonry material certifications or other documentation of masonry units, cement, lime and additives for compliance with plans and specifications. Determine materials are in acceptable condition, per section 2103 of the PBCC.

2) Storage of Materials:

Reject cement and lime that has been exposed to excessive moisture. Reject aggregates that are contaminated.

- 3) Masonry Reinforcing Material Certifications:**
Inspect masonry reinforcing materials certifications, or other documentation of masonry reinforcement, for compliance with codes, plans and specifications. Check that reinforcing materials are in acceptable condition.
- b. Mortar Mix:**
- 1) Mortar Aggregate:**
Determine sand is clean.
 - 2) Mortar Cement:**
Inspect mortar cement for dryness, type and conformance to specified requirements.
 - 3) Mortar Water:**
Inspect that potable water and only approved additives and admixtures are used.
 - 4) Job-mix Mortar Proportioning and Mixing:**
Inspect job-mix mortar proportioning of cement, aggregates and admixtures for quantity and mixing time.
 - 5) Ready-mix Mortar:**
Inspect ready-mixed mortar for type and conformance to specified requirements.
- c. Masonry Preparation and Placement**
- 1) Dowels/Anchors:**
Inspect alignment of dowels and anchors extending out of the footings for masonry walls.
 - 2) Base Conditions:**
Inspect that masonry footing surfaces are clean.
 - 3) Condition of Units:**
Inspect that masonry units are clean and sound.
 - 4) Placement:**
Inspect the laying of masonry units, checking temperature, and inspect for variations as per plans. Check that there is no deep furrowing of bed joints. Inspect mortar joints for proper thickness and tooling. Such inspections may be on a periodic basis.
 - 5) Joints:**
Inspect construction, expansion and contraction joints in accordance with details on approved drawings.
- d. Masonry Reinforcement**
- 1) Vertical Reinforcement:**
Inspect the placement and alignment of vertical bars and dowels for size, grade and spacing. Inspect length of lap splices, clearances between bars, clearances to masonry units and positioning of steel.
 - 2) Horizontal Reinforcement:**
Inspect horizontal joint reinforcement (HJR) steel and stagger, bond beam reinforcement bars for size, length of lap splices, dowels, clearances between bars, clearance to masonry units and positioning of steel.

- 3) **Ties:**
Inspect ties in masonry for straightness, embedment, spacing and size.
- 4) **Anchor Connections:**
Inspect the installation of masonry anchor bolts, joist anchors, insert and straps.

e. Grout Mix

- 1) **Ready-mix Grout:**
Inspect ready-mixed grout for conformance with mix design and workability.
- 2) **Grout Use:**
Determine elapsed time since mixing of grout.

f. Masonry Grouting

- 1) **Grout Spaces:**
Inspect that grout spaces are correctly sized and clean, clean-outs, when required, are closed after inspection and grout barriers are in place before grouting.
- 2) **Grouting:**
Inspect proper grouting technique including mechanical vibration to approved height of grout space.
- 3) **Dry Packing:**
Inspect proper application of dry packing.

g. Samples and Tests

- 1) **Tests and Specimens:**
Verify the type and number of masonry, mortar, grout and reinforcing steel tests are required.
- 2) **Specimen Handling/Protection:**
Review the procedure by which test specimens are stored on site and transported to the materials testing lab.

5. Shotcrete Job Tasks

Work Type 2, P.B.C.C. 1705.3

a. Materials Verification

- 1) **Mix Design:**
Review proposed concrete mix design, that cement type is as specified, That aggregate type, weight and size are as specified and that admixtures are correct.
- 2) **Delivery Ticket:**
Redi-mix Concrete: Determine that mixer truck delivery ticket. Identifies required mix and batch time.
- 3) **On-site Materials:**
Concrete mixed on-site: Review certifications or other documentation of aggregates, cement and additives for compliance with plans and specifications. Determine that materials are in acceptable condition.
- 4) **Storage of Materials:**
Reject cement or additives that have been exposed to excessive moisture. Reject aggregates that are contaminated.

5) Reinforcing Material Certifications:

Inspect reinforcing materials certifications, or other documents for compliance with codes, plans and specifications. Check reinforcing materials for acceptable conditions.

b. Placement

1) Pre-construction Verification:

A test panel shall be shot, cored, examined and tested prior to commencement of operations for the purpose of verifying the mix design and to qualify the nozzleman. The test panel shall be a representative of project and simulate job conditions as closely as possible. The panel thickness and reinforcing shall reproduce the thickest and most congested area specified in the structural design. It shall be shot at the same angle, using the same concrete mix design, the same equipment, and the same nozzleman that will be used on the project.

6. Reinforced Gypsum Concrete Job Tasks

Work Type 2, P.B.C.C 1705.3

The inspection of reinforced gypsum concrete shall be as determined by the RDRP and the Building Official and be defined at the pre-constructions conference.

7. Insulating Concrete Fill Job Tasks

Work Type 3, P.B.C.C. 1705.3

The inspection of Insulating concrete fill shall be as determined by the RDRP and the Building Official and be defined at the pre-construction conference.

C. Architectural

1. Spray Applied Fire Resistant Materials Job Tasks

Work Type 4, P.B.C.C. 1705.14

a. General

This inspection shall apply to direct contact spray applied fire protection materials, such as "sprayed fiber" or "cementitious mixtures."

b. Application

Sprayed products shall be inspected and tested when applied to members such as beams, columns, floor systems and related components.

c. Inspection Procedures:

1) Condition of substrates

Surfaces of substrates to receive the sprayed fire protection material shall be free of dirt, oil, grease, release agents, loose scale, loose paint and any extraneous materials.

2) Standard

Spray applied fire proofing shall be inspected and installed in accordance with PBCC Section 722.5.1.3.

d. Condition of Finished Application:

Inspect sprayed fire protection materials upon drying and curing. They shall be free of deep or wide cracks, voids, spalls, or any exposure of the substrate.

e. Patching:

The Special Inspector shall observe that corrective measures have been applied to areas requiring re-spraying or patching where materials have been deliberately removed for testing, been damaged, or removed by other trades.

2. MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS 1705.15

The inspection of reinforced gypsum concrete shall be as determined by the RDRP and the Building Official and be defined at the pre-constructions conference.

3. EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)

The inspection of reinforced gypsum concrete shall be as determined by the RDRP and the Building Official and be defined at the pre-constructions conference.

D. Electrical

1. Ground-Fault Protection Performance Test

Work type 6, P.B.C.C. 1705.19

a. Visual Inspection:

- 1) Inspect for physical damage and compliance with engineered drawings and specifications.
- 2) Verify proper nameplate markings and ratings.
- 3) Verify integrity of grounded conductor.
- 4) Verify pickup and time delay settings are in accordance with settings provided by the engineer.

b. Mechanical Inspection:

- 1) Inspect for proper mechanical operation.

c. Electrical Tests:

- 1) Tests shall comply with engineered plans and specifications.
- 2) Tests shall be performed in accordance with manufacturers recommendations or nationally recognized standards and practices.
- 3) Test grounded conductor insulation resistance to ground.
- 4) Test relay pickup current by current injection at the sensor and operate the circuit interrupting device.
- 5) Test relay timing.
- 6) Test primary control voltage at not more than 57 percent of its rated voltage.

2. Switchboards, Panelboards, Motor Control Centers and Other Equipment Rated 1000 Amperes or more, or over 600 volts.

Work type 6, P.B.C.C. 1705.19

a. Visual Inspection:

- 1) Inspect for physical damage and compliance with engineered drawings and specifications.
- 2) Verify proper nameplate markings and ratings.
- 3) Inspect for proper anchorage, support and alignment.
- 4) Verify barrier installation.
- 5) Verify connection and termination points for proper torque and alignment.

b. Mechanical Inspection:

- 1) Inspect interlocks, switches, draw-out breakers, and auxiliary devices for proper mechanical operation.

c. Electrical Tests:

- 1) Tests shall comply with engineered plans and specifications.
- 2) Tests shall be performed in accordance with manufacturers' recommendations or nationally recognized standards and practices.
- 3) Test grounded conductor insulation resistance and verify continuity of equipment grounding system.
- 4) Perform insulation resistance test on each bus and protective device. Test phase-to-phase and phase-to-ground.
- 5) Perform dielectric voltage-withstand test on each bus and protective device. Test phase-to-phase and phase-to-ground.
- 6) Perform phase test on double-ended systems.
- 7) Test control power transformer, control power circuits and potential circuits.
- 8) Test control and protective devices for proper operation.

3. Transformers rated 100 KVA or more Single Phase and 300 KVA or more three phase.

Work type 6, P.B.C.C. 1705.19

a. Visual Inspection:

- 1) Inspect for physical damage and compliance with engineered drawings and specifications.
- 2) Verify proper nameplate markings and ratings.
- 3) Inspect for proper anchorage and support.
- 4) Inspect for proper equipment and core grounding.
- 5) Verify compliance with manufacturer installation requirements.

b. Mechanical Inspection:

- 1) Inspect auxiliary devices for proper mechanical operation.

c. Electrical Tests:

- 1) Tests shall comply with engineered plans and specifications.
- 2) Tests shall be performed in accordance with manufacturer recommendations or nationally recognized standards and practices.
- 3) Perform insulation resistance test on each winding. Test winding-to-winding and windings-to-ground.
- 4) Perform a turns-ratio test for each winding at all tap settings.
- 5) Test control power transformer, control power circuits and potential circuits.
- 6) Test control and protective devices for proper operation.

4. Conductors that Supply Equipment Rated at 1000 Amperes or More, or Over 600 Volts

Work type 6, P.B.C.C. 1705.19

a. Visual Inspection:

- 1) Inspect for physical damage and compliance with engineered drawings and specifications.
- 2) Verify proper markings and ratings.

b. Electrical Tests:

- 1) Tests shall comply with engineered plans and specifications.
- 2) Tests shall be performed in accordance with manufacturer recommendations or nationally recognized standards and practices.
- 3) Perform insulation resistance test on each conductor. Test phase-to-phase and phase-to-ground.
- 4) Perform dc high-potential test on each conductor. Test phase-to-phase and phase-to-ground.

5. Emergency and Standby Power Systems: Switchboards, Panelboards, Distribution Boards, Transfer Equipment, Power Source, Conductors, Fire Pumps, Exhaust and Ventilation Fans.

Work type 6, P.B.C.C. 1705.19

a. Visual Inspection:

- 1) Inspection for physical damage and compliance with engineered drawings and specifications.
- 2) Verify proper markings, ratings and signs.
- 3) Inspect equipment for proper anchorage and support.
- 4) Inspection for proper barriers, separation, protection and location.
- 5) Verify instruction manuals, special tools, testing devices, and manufacturer recommended spare parts are available.
- 6) Verify maintenance and operational testing program is in place and maintained on the premises.

b. Mechanical Inspection:

- 1) Inspect equipment for proper mechanical operation.
- 2) Verify functional operation of system. Perform manual transfer operation.

c. Electrical Tests:

- 1) Tests shall comply with engineered plans and specifications.
- 2) Tests shall be performed in accordance with manufacturer recommendations or nationally recognized standards and practices.
- 3) Test control and protective devices for proper operation.
- 4) Perform phase rotation test
- 5) Perform insulation resistance test on feeder conductors and equipment. Test phase-to-phase and phase-to-ground
- 6) Perform automatic load transfer test. Test normal and emergency power, or normal and standby power, or both. Simulate loss of emergency and normal power or standby and power, or both. Simulate all forms of single-phase conditions.
- 7) Conduct operational test on system under load conditions.

6. Selective Coordination.

Work type 6, P.B.C.C. 1705.19

a. On Electrical Plans - Prior to Permit:

1) Identify all overcurrent protective devices that require selective coordination.

b. Special Inspection:

1) Verify overcurrent protective device types and settings as required by coordination study.

E. Mechanical and Plumbing

1. Smoke Control Systems

Work Type 5, P.B.C.C. 1705.18

a. General Requirements:

Phoenix Building Construction Code (PBCC) Section 1705.18 requires Smoke Control Special Inspection for the types of work specified in **Section 1705.20**. Smoke Control Special Inspection includes, but is not limited to, observation of the work assigned for conformance with the approved design drawings and specifications, and submission of appropriate inspection reports to the city of Phoenix Planning & Development Department's (P&D) Fire Protection Engineer; and Mechanical Plans Engineer or Mechanical Field Inspector.

The Smoke Control Special Inspector(s) shall be a qualified person(s) who demonstrates competence to the satisfaction of the Building Official for the type of works requiring Special Inspection(s). The Building Official shall rely on the engineer or architect responsible for the special inspection(s) to determine the individual(s) or Registered Design Professional qualified to perform each type of test or inspection. These individual(s) or Registered Design Professional shall be responsible for performing the special inspection tasks and preparing the report(s) as required by the code and regulations.

The Smoke Control Special Inspector(s) shall be employed by the owner or the registered design professional in responsible charge acting as the owner's agent, but not the contractor or any person responsible for the work.

b. Registered Design Professional in Responsible Charge:

Complete all information requested on the Smoke Control Special Inspections Certificate. Indicate the types of work requiring Smoke Control Special Mechanical Inspections and the Individual(s) or Registered Design Professional qualified and authorized to perform each such inspection. Seal, sign and date the Certificate. Submit the completed certificate to the city of Phoenix with the permit application and prior to project final inspection with the final report.

c. Special Inspector:

The individual(s) or Registered Design Professional responsible for the Smoke Control Special Inspections shall complete a signed written report after each site visit requiring Special Inspection. The Special Inspector(s) shall ensure that all reports are posted with the permit at the job site and are available to the city of Phoenix P&D Fire Protection Engineer; and Mechanical Plans Engineer or Mechanical Field Inspector for review. All discrepancies shall be brought to the immediate attention of the contractor for correction and, if uncorrected, to the registered design professional in responsible charge to the city of Phoenix P&D Fire Protection Engineer; and Mechanical Plans Engineer or Mechanical Field Inspector.

d. The Smoke Control Special Mechanical Inspector shall, during construction:

- 1) Review the smoke-control system design package and Fire/Life-Safety Report.
- 2) Inspect the erection of ductwork, and prior to concealment for the purposes of leakage testing and recording of devices location.
- 3) The duct material and joints shall be inspected and documented to ensure that they can withstand the probable temperatures to which they are exposed as determined per IBC Section 909.10.1 Equation 9-2.
- 4) Ensure and record that duct installations are constructed and supported in accordance with the Mechanical Code. The supports shall be substantial and noncombustible.
- 5) Record the nameplate data of all dampers and fans and location in the ductwork that may supply air or exhaust smoke. Ensure that they are listed for the intended use and conform to approved recognized standards. Damper shall be a minimum Class II, 250 of and listed in accordance with approved recognized standards.
- 6) Check and record the location of all smoke control inlets and outlets as to minimize the potential for introducing smoke or flame into the building and to limit exposure of the building or adjacent building to an additional fire hazard.
- 7) Test smoke-control ducts for a leakage at 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of the design flow. These results shall be documented in the final report.
- 8) Ensure that all fans have a minimum of two belts and/or have 1.5 times the number of belts required for the design duty. Calculation and manufacturer's fan curves shall be documented. Ensure that the fans are supported and restrained by noncombustible devices. Record nameplate data and test actual

current draw to ensure that the fans do not operate beyond their nameplate horsepower (kW). Motors driving the fans shall have a minimum service factor of 1.15.

e. The Special Smoke Control Inspector shall, prior to occupancy and after sufficient completion for the purpose of pressure difference testing, flow measurements, and detection and control verification:

- 1) Review the smoke-control system design package and the Fire/Life-Safety Report.
- 2) The following shall be tested, verified and recorded for all three methods (pressurization, airflow, and exhaust):
 - a) The standby power source and its transfer switches shall be in a separate room from the normal power transformers and switchgear and shall be enclosed in a room of not less than one-hour fire-resistive construction, ventilated directly to and from the exterior. Power distribution from the two sources shall be by independent routes.
 - b) Transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power.
 - c) Elements relying on volatile memories or the like shall be supplied with uninterruptible power sources of sufficient duration to span 15-minute primary power interruption.
 - d) Elements susceptible to power surges shall be suitably protected by conditioners, suppressors or other approved means.
 - e) All wiring shall be fully enclosed within continuous raceway.
 - f) Fire-detection and control systems shall be supervised at the fire control panel and provide positive confirmation of actuation, testing of devices, manual override mechanisms and the presence of power downstream of all disconnects.
 - g) Sensing of damper position shall be by limit or proximity switches.
 - h) Sensing of airflow shall be by differential pressure transmitters.
 - i) Smoke-control system shall activate in accordance with the design package and the Fire/Safety Line Report.
 - j) Smoke detector and other fire alarm devices that activate the smoke-control system shall be listed, installed and tested in accordance with the Fire Code.
 - k) Control air tubing shall be metallic and adequately supported and protected from damage. Tubing other than for smoke-control shall be isolated by automatic isolation valves or be an independent system. All tubing shall be tested at three-time operating pressure for not less than 30 minutes without any noticeable loss in gage pressure.
 - l) All detection and control system shall be clearly marked at all junctions, accesses and terminations.

2. Final Report:

The Smoke Control Special Mechanical Inspector shall submit a final signed

report to the Registered Design Professional in Responsible Charge (RDPRC) and to the city of Phoenix PDD Fire Protection Engineer; and Mechanical Plans Engineer or Mechanical Field Inspector. The report must include the identification of all devices by manufacturer, nameplate data, design values, measured values, and identification tag or mark. The report shall be reviewed by the responsible designer, and when satisfied that the design intent and construction has been achieved, the responsible designer shall affix the designer's seal, signature and date to the report with the following statement provided:

I have reviewed this report and by personal knowledge and on-site observation certify that the smoke-control system is in substantial compliance with the design intent, and to the best of my understanding complies with the requirements of the city of Phoenix Construction Code.

Final inspection approval and/or issuance of a Certificate of Occupancy will not occur until all Special Inspection Reports have been received and found to be acceptable by the city of Phoenix PDD Fire Protection Engineer.

3. Automatic Shutoff for Air Distribution Systems

Work Type 5, IMC 606, PBCC 1705.20

a. General Requirements:

When automatic shutoff is required by IMC Section 606 the owner or the engineer or architect of record acting on behalf of the owner shall employ a qualified third party special inspector or testing agency to verify that all required automatic shutoff's have been installed and function properly. The special inspector/testing agency shall be an Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB) certified Air Balancing Firm, or the Engineer of Record, or shall otherwise demonstrate qualifications to the engineer or architect of record. The special inspector/testing agency shall be independent from the installing contractor.

b. Registered Design Professional in Responsible Charge:

Complete all information requested on the Mechanical and Plumbing Special Inspections Certificate. Indicate the types of work requiring Mechanical and Plumbing Special Inspections and seal, sign and date the Certificate. Submit the completed certificate to the city of Phoenix with the permit application and prior to project final inspection with the final report.

c. Special Inspector or Testing Agency Shall Perform the Following Tasks:

1) Visual Inspection

- a) Verify installation of an automatic shutoff device in each location shown on the approved plans.
- b) Identify all automatic shutoff devices by manufacturer, nameplate data, and listing identifications or marks.

- c) Inspect for proper anchorage, support, alignment and location in compliance with manufacturer's installation instructions and listing requirements.

2) Electrical Inspection

- a) Verify installation of system controls (smoke detector, duct detector, smoke detection system and any associated electrical wiring) are in compliance with the manufacturer's installation instructions and listing requirements and the Electrical Code.

3) Functional Tests

- a) Test each automatic shutoff device individually for proper operation.
- b) Verify signal from the appropriate smoke detector, duct detector, or smoke detection system.
- c) Verify that the automatic shutoff device interrupts the power and de-energizes all air-handling unit(s) and/or air distribution systems served.

4) Reports

- a) The special inspector shall furnish site visit inspection reports to the Building Official (mechanical inspector) the engineer or architect of record, and other designated persons. All discrepancies shall be brought to the immediate attention of the contractor for correction, then, if uncorrected, to the proper design authority and to the city mechanical inspector.

5) Final Report:

- a) Prior to final inspection, a final report prepared by the Special Inspector shall be provided to the city of Phoenix Mechanical Inspector and registered design professional in responsible charge certifying that the duct smoke detectors have been installed as per the approved plans and design and denote if the tested devices passed their inspection. A copy of the completed original, or revised, Mechanical and Plumbing Special Inspections Certificate and the Special Inspectors NEBB or AABC Certification shall be attached to the final report.
- b) The Special Inspection report shall be received and found to be acceptable by the city of Phoenix Mechanical Inspector and the registered design professional in responsible charge prior to the city issuance of final inspection approval or occupancy approval, including conditional occupancy approval.

4. Installation and Testing of Fire/Smoke, Fire, Smoke, and Ceiling Radiation Dampers

Work Type 5, IMC 607.5, PBCC Section 1705.20

a. General Requirements:

Where fire/smoke, fire, smoke, and ceiling radiation dampers are required by IMC Section 607.5, the owner or the engineer or architect of record acting on behalf of the owner shall employ a qualified third party special inspector or testing agency to verify that all required fire/smoke, fire, smoke, and ceiling radiation dampers have been installed and function properly. The special inspector/testing agency shall be an Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB) certified air balancing firm, or the engineer of record, or shall otherwise demonstrate qualifications to the engineer or architect of record. The

special inspector/testing agency shall be independent from the installing contractor.

b. Registered Design Professional in Responsible Charge (RDPRC):

Complete all information requested on the Mechanical and Plumbing Special Inspections Certificate. Indicate the types of work requiring Mechanical and Plumbing Special Inspections and seal, sign and date the Certificate. Submit the completed certificate to the city of Phoenix with the permit application and prior to project final inspection with the final report.

c. Special Inspector or Testing Agency Shall Perform the Following Tasks:

1) Visual Inspection

- a) Verify installation of fire/smoke, fire, smoke, and ceiling radiation dampers in the locations shown on the approved plans.
- b) Identify each fire/smoke, fire, smoke, and ceiling radiation damper by manufacturer, nameplate data, and listing marks.
- c) Verify access and identification marking for each fire/smoke, fire, smoke, and ceiling radiation damper.
- d) Inspect for proper anchorage, support and alignment in compliance with manufacturer's installation instructions and listing requirements.

2) Electrical Inspection

- a) Verify installation and correct wiring of fire/smoke, fire, smoke, and ceiling radiation damper and activating device (smoke detector or smoke detection system).

3) Functional Tests

- a) Test each smoke damper individually for proper operation.
- b) Verify that each fire/smoke, fire, smoke, and ceiling radiation damper receives a signal from the appropriate smoke detector or smoke detection system.
- c) Verify that the fire/smoke, fire, smoke, and ceiling radiation damper closes completely and seals tightly.

4) Reports

- a) The Special Inspector shall furnish site visit inspection reports to the Building Official (mechanical inspector) the engineer or architect of record, and other designated persons. All discrepancies shall be brought to the immediate attention of the contractor for correction, then if uncorrected, to the proper design authority and to the city mechanical inspector.

5) Final Report:

- a) Prior to final inspection, a final report prepared by the Special Inspector shall be provided to the city of Phoenix Mechanical Inspector and the registered design professional in responsible charge certifying that the fire/smoke, fire, smoke, and ceiling radiation dampers have been installed as per the approved plans and design and denote if the tested devices passed their inspection. A copy of the completed original, or revised, Mechanical and Plumbing Special Inspections Certificate and the Special Inspectors NEBB or AABC Certification shall be attached to the final report.
- b) The special inspection report shall be received and found to be acceptable by the city of Phoenix Mechanical Inspector and the registered design

professional in responsible charge prior to the city issuance of final inspection approval or occupancy approval, including conditional occupancy approval.

5. Medical Gas and Vacuum Systems

Work Type 5, UPC 319.0, IPC 1202, PBCC 1705.21

a. General Requirements:

When Medical Gas Systems are required by the UPC Section 319.0 or the IPC Section 1202, the owner or engineer or architect of record acting on behalf of the owner shall employ a qualified third party special inspector or testing agency to verify medical gas and vacuum systems have been installed and function properly. The special inspector/testing agency shall be:

- 1) American National Standard Institute (ANSI) / American Society of Sanitary Engineers (ASSE) standard 6020 & 6030 certified firm or the Engineer of Record, or shall otherwise demonstrate qualifications to the engineer or architect of record. The inspector/testing agency shall be independent from the installing contractor.
- 2) The special certification shall be appropriate to the inspections and are subject to Building Official approval.
- 3) RDPRC or Designated RDPRC.
- 4) Facilitate an initial preconstruction meeting at which time qualified installers with ASSE 6010 certifications, and process and procedures are presented. This shall include their ASME IV Brazing process and procedures for pipe sizes ½" to 3" type L & K copper, and 4" and above brazing process and procedures per ASME IV QB-451. Review NFPA 99 Section 5.1.12.1.2 so as to prepare for and understand what will be expected during the inspection process.

b. Registered Design Professional in Responsible Charge:

Complete all information requested by the Mechanical and Plumbing Special Inspections Certificate. Indicate the types of work requiring Mechanical and Plumbing Special Inspections and seal, sign and date the Certificate. Submit the completed certificate to the city of Phoenix with the permit application and prior to project final inspection with the final report.

c. Engineer or Architect:

1) Visual Inspection

- a) Verify installation of medical gas and vacuum systems in each location shown on the approved plans.
- b) Identify each device by manufacturer, nameplate data, and listing marks.
- c) Inspect for installation in compliance with manufacturer's installation instructions and listing requirements.

2) Electrical Inspection

- a) Verify installation of system controls comply with the manufacturer's installation instructions and listing requirements and the Electrical Code.

3) Functional Tests

- a) NFPA Section 5.1.12.2.2 Initial Blow Down test

- b) NFPA 99 Section 5.1.12.2.3 Initial Pressure Test.
- c) NFPA 99 Section 5.1.12.2.4 Initial Cross Connection Test.
- d) NFPA 99 Section 5.1.12.2.5 Initial Piping Purge Test.
- e) NFPA 99 Section 5.1.12.2.6.7 24-hour Standing Pressure test of positive pressure systems
- f) NFPA 99 Section 5.1.12.2.7.6 24-hour Standing pressure test of the Vacuum System.
- g) NFPA 99 Section 5.1.12.3 System Verification. This section in its entirety by an ASSE 6030 Medical Gas System Verifier.

4) Reports

- a) The Special Inspector shall furnish site visit inspection reports to the Building Official (Plumbing/Mechanical Inspector) the **Registered Design Professional in Responsible Charge (RDPRC)**, and other designated persons. All discrepancies shall be brought to the immediate attention of the contractor for correction, then if uncorrected, to the proper design authority and to the city Plumbing / Mechanical Inspector.

5) Final Report:

- a) Prior to final inspection, a final report prepared by the Special Inspector shall be provided to the city of Phoenix Plumbing/Mechanical Inspector and registered design professional in responsible charge of certifying that the Medical Gas Systems have been installed as per the approved plans and design and denote if the tested devices passed their inspection. A copy of the completed original, or revised, Plumbing and Mechanical Inspections Certificate and the Special Inspector(s) ANSI/ASSE 6020 & 6030 certificate(s) shall be attached to the final report.
- b) The Special Inspection report shall be received and found to be acceptable by the city of Phoenix Plumbing/Mechanical Inspector and the **Registered Design Professional in Responsible Charge (RDPRC)** prior to the city issuance of the final inspection approval or occupancy approval, including conditional occupancy approval.

6. Grease Duct Shaft Alternatives

Work Type 5, PBCC Section 2801, IMC Section 506.3.11

a. General Requirements:

The International Mechanical Code (IMC) Section 506.3.11 requires that a grease duct serving a Type I hood which penetrates a ceiling, wall or floor shall be enclosed in a duct enclosure from the point of penetration to the outlet terminal. Ducts shall be enclosed in accordance with the International Building Code requirements for shaft construction. There are two exceptions in the code that will allow the use of grease duct shaft alternatives, such as fire-resistive duct wraps and prefabricated grease duct systems. Products are to be correctly classified and labeled to the appropriate standards (ASTM E 2336, UL 2221) as fire-resistive shaft alternatives and/or grease ducts. As a condition of acceptance, special inspection shall be provided by an **RDPRC**. Additionally, there will be Planning and Development Department (PDD) inspections to determine IMC and IBC code compliance with all other aspects of the mechanical and building system(s) for

which the construction permit covers. The special inspector shall be independent from the installing contractor.

b. Registered Design Professional in Responsible Charge:

Complete all information requested on the Mechanical and Plumbing Special Inspections Certificate. Indicate the types of work requiring Mechanical and Plumbing Special Inspections and seal, sign and date the Certificate. Submit complete certificate to the city of Phoenix with the permit application and prior to project final inspection.

c. Special Inspector:

- 1) Verify the product matches the approved mechanical and building construction drawings.
- 2) Inspect and verify that the installation of the grease duct shaft alternative has been installed as per its listing(s), applicable evaluation report(s), manufacturer installation instructions and the approved construction drawings.

i. Final Report:

- 1) Prior to concealment and/or final inspection, a final report prepared by the Special Inspector shall be provided to the city of Phoenix Mechanical Inspector and the registered design professional in responsible charge of certifying that the installation of the grease duct shaft alternative has been installed as per its listing(s), evaluation report(s), manufacturer installation instructions and the approved construction drawings, and is found to be in a safe working condition. A copy of the completed original, or revised, Mechanical and Plumbing Special Inspections Certificate shall be attached to the final report.
- 2) The special inspection final report shall be received and found to be acceptable by the city of Phoenix Mechanical Inspector and the **Registered Design Professional in Responsible Charge (RDPRC)** prior to the city of Phoenix issuance of final inspection approval or occupancy approval, including conditional occupancy approval.

F. Special Cases Job Tasks

1. Identification

Work Type 5

The special case shall be identified by the Building Official before obtaining permits.

a. General Requirements

The Building Official, with the **RDPRC** assistance, shall establish, prior to the special case construction, a job task analysis in writing for the specific area concerned.

The Building Official reserves the right to require special inspection and/or an engineer report when unusual or unanticipated conditions arise during the course

of construction. The Building Official, with assistance from the RDRP, shall establish the job tasks required in these situations.

SECTION V – SPECIAL INSPECTOR MINIMUM QUALIFICATIONS

A. Identification

In order to ensure uniformity of the special inspector qualifications in a manner that would be verifiable by the Building Official, the approved special inspectors list shall be the basis for determining acceptability of special inspectors. The Registered Design Professional in Responsible Charge (RDPRC) or Designated RDPRC may act as the approved agency for special inspectors on projects for which they are responsible.

B. Special Inspector Visual

1. Special Inspector shall meet at least one of the following criteria:

- a. An individual who possesses a certification card from the city of Phoenix for the specific work to be inspected.
- b. The **RDPRC** who has determined they are qualified to inspect any of their own design.
- c. The **Designated RDPRC** who has determined they are qualified to inspect design by others.

C. Special Inspectors

1. Application

Individuals possessing the minimum qualifications, and wishing to become designated as an approved special inspector shall submit applications on forms provided by the Building Official for each type of inspection for which approval is sought.

Accompanying each application shall be the following:

- a. A copy of the applicant's certification or registration papers for the category of inspection being applied for.
- b. Verification of the applicant's work experience.

2. Examination of Application

The Building Official shall review the applications sufficient to justify approval and listing. In making this determination, the Building Official shall consider the certifications, experience, education, and training of the applicant, and other pertinent factors.

3. Pre-Approval Interview.

Following review of the application and prior to approval of an inspector, the Building Official may conduct, or cause to be conducted, a personal interview.

The personal interview shall evaluate the applicant's work experience and suitability to be a special inspector.

4. Rejected Application

Any applications rejected by the Building Official shall be returned to the applicant together with the reason(s) for rejection in writing.

5. Term of Approval

Approval of a special inspector shall be valid for three years from application approval.

6. Suspension, Revocation or Termination.

Approvals may be suspended, revoked or terminated if:

- a. The special inspector exhibits a pattern of consistently providing inspections below the standards specified in the Job Task Listing on file with the city of Phoenix.
- b. The special inspector engages in conduct that violates the statutes, rules or regulations of the Arizona Registrar of Contractors and/or the Arizona Board of Technical Registration.
- c. The certification or registration required for approval has been suspended, revoked, terminated or has expired.
- d. The Building Official determines that any activity of the special inspector creates a hazard to the health, safety or welfare of the public.

7. Action Taken by the Building Official

The process for determining the action the Building Official may take concerning action for the above behaviors shall be as follows:

The Building Official may, depending upon the circumstances and investigation, use any of the following:

- a. Verbal warning may be used and shall involve the special inspector and the directing registrant.
- b. Written warning issued to the special inspector and the directing registrant.
- c. Assign a probationary period that allows the special inspector to perform inspection only under the supervision of another special inspector or the directing registrant.
- d. Suspension for a period of time. The special inspector may not perform special inspection nor may be limited to certain categories for which he/she is qualified.
- e. Revocation of the ability to perform special inspection may apply in serious circumstances.

D. Minimum Qualifications for Special Inspector

	Discipline (Code Section)	Required Inspections	Required Certifications
<input type="checkbox"/>	Structural (1705.1.1)	Special Cases Wall panels, curtain walls and veneers	ICC Commercial Building Inspector or ICC Residential Building Inspector or ICC Fire Inspector
<input type="checkbox"/>	Structural (1705.2)	Steel High Strength Bolting	ICC Structural Steel and Bolting SI
<input type="checkbox"/>	Structural (1705.2.1)	Steel Welding	AWS, CWI or ICC Structural Welding Special Inspector
<input type="checkbox"/>	Structural (1705.2.2) (1705.2.4)	Structural cold-formed steel, cold-formed steel trusses spanning 60' or greater	ICC Commercial Building Inspector or ICC Residential Building Inspector
<input type="checkbox"/>	Structural (1705.3)	Reinforced Concrete	ICC Reinforced Concrete SI or ACI Concrete SI

<input type="checkbox"/>	Structural (1705.3)	Pre-stressed / Precast Concrete Construction	ICC Reinforced Concrete SI or ACI Concrete SI and ICC Pre-tressed SI or PTI Level 1&2 Un-bonded PT Inspector
<input type="checkbox"/>	Structural (1705.3)	Post-installed structural anchors in concrete	ICC Reinforced Concrete SI or ACI Concrete SI or Manufacturers approved installer
<input type="checkbox"/>	Structural (1705.4)	Masonry construction including veneer	ICC Structural Masonry SI
<input type="checkbox"/>	Structural (1705.5)	Wood Construction	ICC Commercial Building Inspector or ICC Residential Building Inspector
<input type="checkbox"/>	Geotechnical (1705.6) (1705.7) (1705.8) (1705.9)	Soils, Driven deep foundations, Cast-in-place deep foundations, Helical piles foundations	ICC Soils SI or NICET II (geotechnical or construction, or construction material testing or soils) or ATTI Field Technician
<input type="checkbox"/>	Architectural (1705.14) (1705.15)	Spray fire-resistant materials Mastic and intumescent fire-resistant coatings	ICC Spray-applied Fireproofing SI or ICC Fire Inspector
<input type="checkbox"/>	Architectural (1705.16)	Exterior insulation and finish system (EIFS)	AWCI EIFS Inspector
<input type="checkbox"/>	Architectural (1705.17)	Fire-resistant Penetrations and Joints	UL or FM firestop examination
<input type="checkbox"/>	Mechanical (1705.18)	Smoke control	Nationally Recognized Certification in air balance, smoke control, life safety or mechanical inspections. Recognized organizations include ICC, IAPMO, AABC, NEBB, TABB, NFPA, OSHA, IFC and CSP. Other organizations will be considered.
<input type="checkbox"/>	Mechanical (1705.20)	Automatic Shutoff for Air Distribution Systems	ICC or IAPMO Commercial Mechanical Inspector or SI working for AABC or NEBB certified testing agency, or TABB Life Safety Level 2 Technician
<input type="checkbox"/>	Mechanical (1705.20)	Fire, smoke, fire smoke, and ceiling radiation dampers	ICC or IAPMO Commercial Mechanical Inspector or SI working for AABC, or NEBB certified testing agency, or TABB Life Safety Level 2 Technician
<input type="checkbox"/>	Mechanical (1705.20)	Installation of grease duct enclosure Other cases	ICC or IAPMO Commercial Mechanical Inspector Factory trained technician
<input type="checkbox"/>	Plumbing (1705.21)	Medical Gas and Vacuum Systems	ANSI/ASSE Standard 6020 for inspections only, 6030 for inspections and verification certified firm
<input type="checkbox"/>	Electrical (1705.19)	Ground fault performance tests, Switchboards, panelboards, motor control centers and other equipment rated 1000A or more, or over 600V, Transformers rated 100 KVA or more 1-phase or 300 KVA or more 3-phase, Conductors for equipment rated 1000A or more, or over 600V, Emergency and standby power systems Selective Coordination	ICC Electrical Commercial Inspector or IAEI Commercial Electrical Inspector or ICC Electrical Plan Review or IAEI Electrical Inspector, Plan Review or NETA Level III or IV Certified Technician and an employee of a NETA accredited testing agency

Registered Design Professionals, PEs, or licensed Architects are exempt from *Required Certification(s)* listed in the table above; but are subject to on-site assessment of competence by the authority having jurisdiction.

E. Minimum Experience Requirements

Applicants shall comply with one of the following education and experience requirements:

1. Professional Engineer, Architect, or Registered Design Professional and a minimum three months of relevant work experience; or

2. Bachelor of Science Degree in Engineering, Architecture, or Physical Science and a minimum of six months of relevant work experience; or
3. Two years of verified college or technical school and a minimum of two years of verified relevant work experience; or
4. High school or equivalent graduate and a minimum of two years of verified relevant work experience; or
5. A minimum of three years of verified relevant work experience.

Reference Abbreviations:

AABC	Associated Air Balance Council
ACI	American Concrete Institute
ANSI	American National Standards Institute
ASSE	American Society of Safety Engineers
ATTI	Arizona Technical Testing Institute
AWS	American Welding Society
AWCI	Association of the Wall and Ceiling Industry
CWI	Certified welding inspector
FM	Factory Mutual Global
IAEI	International Association of Electrical Inspectors
IAPMO	International Association of Plumbing and Mechanical Officials
ICC	International Code Council
NEBB	National Environmental Balancing Bureau
NETA	International Electrical Testing Association
SI	Special Inspector
UL	Underwriters Laboratories

SECTION VI – SPECIAL INSPECTION FORMS

The information and sequences are intended to be incorporated into any re-print of these forms.

The report forms may be reproduced exactly as printed in this manual or may be modified as approved by the Building Official. The city of Phoenix Planning and Development Department supplies the Special Inspection Certificates. This manual and the most current version of each form can be found online at

<https://www.phoenix.gov/pdd/development/inspections/inspecttypes/special-inspections>

The following are forms that may be modified and the guidelines as to what modifications may be made:

1. Special Inspector Final Report

- a. Addition of Company Title Block is acceptable
- b. Retain all information shown on city provided form

2. Special Inspector Daily Report

- a. Addition of Company Title Block is acceptable
- b. Retain all information shown on city provided form

The forms appended to this manual are in the following order. Remember, it is always best to download the forms from the web at

<https://www.phoenix.gov/pdd/development/inspections/inspecttypes/special-inspections>

to ensure you have the most current version.

A. Municipal Agency Forms

1. [Special Inspection Certificate, Architectural](#) 42-43
2. [Special Inspection Certificate, Electrical](#) 44-45
3. [Special Inspection Certificate, Geotechnical](#) 46-47
4. [Special Inspection Certificate, Mechanical Plumbing](#) 48-49
5. [Special Inspection Certificate, Structural](#) 50-51

B. Certificates of Observation

1. [Certificate of Observation, Electrical](#) 52-53
2. [Certificate of Observation, Mechanical](#) 54-55
3. [Certificate of Observation, Plumbing](#) 56-57
4. [Certificate of Observation, Structural](#) 58-59
5. [Certificate of Observation, Airport Sound Mitigation](#) 60-61