

SPECIAL INSPECTION MANUAL

Prepared by
the
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INTRODUCTION

Special Inspection, as required by the 1994 Uniform Building Code (U.B.C.) Section 1701, 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 approved 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 practice and technology.

This manual is a descriptive procedure for special inspection administration. It defines the duties and responsibilities of the engineer or architect of record, special inspector, contractor, building official, and project owner.

This manual is divided into six sections as follows:

1. **Special Inspection - An Overview**

Gives an overview of jobsite quality control through special inspection.

2. **General Program Guidelines**

Describes overall purposes for special inspection, and respective duties and responsibilities of project owners, engineer or architect of record, special inspectors, building officials and contractors.

3. **Procedures for Special Inspection - Job Task Analysis**

Lists job tasks required of special inspectors.

4. **Procedures for Materials Sampling and Testing**

Lists basic tests in use locally that supplement or alter the national standards and are considered local standard practice.

5. **Special Inspector Qualifications**

Lists competency and experience standards, and references performance standards for special inspectors. These suggested qualifications are designed to assist the building official in determining the special inspector's competence to perform specific tasks as listed in the 1994 U.B.C. Section 1701.5.

6. **Special Inspection Forms**

SECTION 1. SPECIAL INSPECTION - AN 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 local jurisdiction and in addition to periodic site visits provided by the architect/engineer.

The use of special inspectors is not discretionary. The 1994 U.B.C. Section 1701 clearly states 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.

The code intent is to provide continuous inspection at all times work requiring special inspection occurs except "some inspections may be made on a periodic basis and satisfy the requirements of continuous inspection, provided this periodic scheduled inspection is performed as outlined in the project plans and specifications and is approved by the building official". Additionally, some exceptions are specifically listed in the inspection codes as indicated in the 1994 UBC (see Section 1701.5).

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:

INSPECTION CODE (as listed in the 1994 UBC 1701.5)

1. **Concrete** - during the taking of test specimens and placing of reinforced concrete and pneumatically placed concrete.
2. **Bolts Installed in Concrete** - during installation of bolts and placing of concrete around such bolts.
3. **Special Moment Resisting Concrete Frames.**
- 4.1 **Prestressing Steel Tendons** - during stressing and grouting of prestressed concrete and placing of reinforcing steel, placing of tendons, and prestressing steel.
- 4.2 **Reinforcing Steel** - prior to placement of concrete.
- 5.0 **Structural Welding** - of ductile moment-resisting steel frames for structural welding and for lateral diaphragm metal decks.
- 5.1 General welding - any member designed to resist loads and forces.
- 5.2 Special moment resisting frames.
- 5.3 Welding of reinforcement steel.
6. **High-strength Bolting** - during all bolt installations and tightening operations.

- 7.0 **Structural Masonry** - during preparation of masonry wall prisms, sampling and placing of masonry units, placement of reinforcement, inspection of grout spaces, and during all grouting operations.
 - 7.1 Masonry other than fully grouted open-end hollow unit block.
 - 7.2 Masonry fully grouted open-end hollow unit block.
8. **Reinforced Gypsum Concrete** - when cast-in-place Class B gypsum concrete is being mixed and placed.
9. **Insulating Concrete Fill** - during the application of insulating concrete fill when used as part of a structural system.
10. **Spray-applied Fireproofing.**
11. **Piling, Drilled Piers and Caissons** - during driving and testing of piles and construction of cast-in-place drilled piles or caissons.
12. **Shotcrete** - during the taking of test specimens and placing of shotcrete.
13. **Special Grading, Excavation and Filling.**
14. **Smoke Control System**
15. **Adhered Veneer.**
16. **Anchored Veneer.**
17. **Accessibility for the Disabled.**
18. **Complex Electrical Installation.**
19. **Special Cases** - Work, when in the opinion of the Building Official involves special conditions or unusual hazards. (Examples: poke through penetrations, window and spandrel walls, architectural precast connections, structural light gauge metal structures.)

SECTION 2. GENERAL GUIDELINES

A. DUTIES AND RESPONSIBILITIES OF THE ENGINEER OR ARCHITECT OF RECORD (E/AR).

The Engineer or Architect of Record (E/AR) shall be the design professional who sealed the calculations and plans for the types of work requiring special inspection as defined in Section 1 of this document. Structural special inspectors are required for work types 1,2,3,4A,4B,5,6,7,8,9,12, 15 and 16. Architectural special inspectors are required for Inspection Codes 10 and 17. Geotechnical special inspectors are required for Inspection Codes 11 and 13. Electrical special inspectors are required for work type 18. Mechanical and fire special inspections are required for Inspection Code 14. Duties and responsibilities of the E/AR shall include the following:

1. Identify the need for special inspection services.

The project plans which 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. Determine the qualification(s) of all special inspectors.

3. Coordination of inspection activities.

- a. The E/AR shall be responsible for designation and coordination of the activities of the Special Inspector for the items for which he is responsible.
- b. The E/AR shall certify his special inspector(s) as meeting Stage 1 minimum qualification requirements. (See Staging Criteria, page 6-3)

4. Chair pre-construction meeting.

Coordinate attendees with General Contractor per C1, Page 2-4. Establish agenda, review duties and responsibilities of attendees, establish reporting requirements, and review special cases.

5. Site visits required.

The E/AR(s) shall visit the site at least monthly during the construction of the inspection code items for which he is responsible. This is in addition to the special inspections performed by the field inspector(s).

6. Specification of testing and test procedures.

The E/AR shall be responsible for defining and specifying tests and testing procedures as may be required for the E/AR's work.

7. Submission of required reports.

The E/AR shall submit, under his seal, all the required reports to the Building Department.

8. Document all revisions.

The E/AR shall document all plan revisions to the Building Department.

9. Designated Engineer of Record. (DE/AR)

With concurrence of the Building Official and the E/AR, or Project Owner, a Designated Engineer(s) of Record may assume the responsibilities and duties of items 2,3,4,6, and 9 for E/AR.

10. Submit Special Inspection Certificate.

Upon completion of all requirements, the E/AR shall submit the signed Special Inspection Certificate and other documentation as may be necessary to the Building Department for all items for which this professional was responsible. The Special Inspection Certificate shall be signed by the E/AR.

B. DUTIES AND RESPONSIBILITIES OF THE SPECIAL INSPECTOR.

[Code reference: The 1994 U.B.C. Section 1701]

The special inspector shall be the E/AR or his designated representative(s) working under his direct supervision who observes those critical features which they are qualified to inspect. Duties of special inspectors, include the following:

1. Signify presence at jobsite.

Special inspectors shall notify contractor personnel of their presence and responsibilities at the jobsite.

2. Inspect all work for which they are responsible.

Special inspectors shall inspect all work for conformance with the official building department approved drawings and specifications, and applicable provisions of the Construction Code.

3. Separately identify all nonconforming work.

Special inspectors shall bring all nonconforming items to the immediate attention of the contractor. If any such item is not resolved in a timely manner or is about to be incorporated in the work, the building official and the E/AR 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 jobsite. 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 approved plans/specifications.
- c) Name and title of each individual notified and method of notification; and
- 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 jobsite 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; and
- d) List unresolved items.
- e) Provide daily reports to contractor for retention on jobsite.

6. Provide semi-monthly report.

Building Department and Owner shall receive copies of the following documents mailed each month on the 15th and last day of the month.

- a) Sealed form commenting on testing results and listing the dates of all special inspections made.
- b) Attached all special documents and testing results received to date.
- c) All current design changes and corrections documented and sealed.

7. Provide Final Reports.

- a) When construction reaches the point that inspections are only required to verify discrepancy corrections, the semi-monthly report shall be noted "Final Report". This Final Report shall list all unresolved discrepancies.
- b) E/AR or D/EAR will only sign Special Inspection Certificate after all outstanding issues are resolved.

C

DUTIES AND RESPONSIBILITIES OF THE GENERAL CONTRACTOR.

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

1. Responsible for setting up the pre-construction conference.

- a. Prior to construction establish date and location for meeting. Coordinate attendee list with E/AR. Attendees shall include: all E/AR's for required inspection codes, General Contractor, building official, Special Inspector and others as necessary.
- b. In cases where the earthwork begins before the building permit is issued, the General Contractor shall call two meetings. The first meeting shall include the Geotechnical E/AR, General Contractor, Special Inspector, Building Structural Engineer, Earthwork Subcontractor and others as necessary. The second meeting is after the building permit is issued and is the same as paragraph a.
- c. In case of multiple building permits more than two meetings 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 access to the jobsite and the work.

4. Retain records on jobsite.

The contractor is responsible for retaining at the jobsite approved city drawings, 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

The contractor shall, in addition to calling for special inspections, will notify the building department of all other required inspections in accordance with U.B.C. Section 305 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 official plans approved 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 official plans, this conflict will immediately be brought to the attention of the E/AR.

D. DUTIES AND RESPONSIBILITIES OF THE BUILDING OFFICIAL.

The specific provisions of providing for special inspection services are mandatory under Section 108.1 which states, "All construction or work for which a permit is required shall be subject to inspection by the building official." In addition, certain types of construction shall have continuous or periodic inspection as specified in Section 1701.5 in addition to local required inspections.

1. **Review and examine plans, specifications and other contract documents for compliance with special inspection requirements.**

The building official is charged with the legal authority to review the plans and specifications for compliance with the requirements of the U.B.C. [Code reference: U.B.C. Sections 302b, 303a, AND 306A.].

2. **Communicate special inspection requirements to the E/AR, contractor and project owner.**

Once special inspection requirements are identified in the plan approval process, the building official shall require the owner and E/AR to sign the Special Inspection Certificate.

3. **Monitor the special inspection activities.**

The building official shall monitor the jobsite to see that special inspection is provided as required and that an adequate number of special inspection staff is present depending upon extent and complexity of the project. [Code reference: U.B.C. Section 108.1 and 1701.5.]

4. **Review inspection reports.**

The building official receives and makes the semi-monthly inspection reports part of the inspection records. [Code reference: U.B.C. Section 1701.3.]

5. **Inspection of jobsite.**

The building official shall perform all inspections required under Section 108. 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.

6. **Issue Certificate of Occupancy/Final Acceptance.**

The building official shall perform a final inspection and issue a Certificate of Occupancy or final acceptance, where applicable. This inspection and issuance shall not be done until after the final report has been received and accepted by the building official and the Special Inspection Certificate has been signed and sealed by the E/AR.

E. DUTIES AND RESPONSIBILITIES OF THE PROJECT OWNER.

The project owner is responsible for employing special inspection services. [Code reference: U.B.C. Section 1701.1.]

1. Participate in choosing the special inspector when designated engineer or architect is assigned.
2. Notify the design engineer in the event a D/EAR is chosen to provide the special inspection duties as described in paragraph A.8, Duties and Responsibilities of the E/AR.
3. Amend the Special Inspection Certificate and forward to the building official.

F. PRE JOB CONFERENCE.

For Determination of Responsibility

1. Refer to duties of the E/AR, page 2-1.
2. Refer to duties of the Contractor, page 2-4.

SECTION 3. 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 analysis consult your local codes or regulations applicable to the task in question. Inspection codes shown refer to inspection codes listed on pages 1-1, 1-2.

A. REINFORCED AND PRESTRESSED CONCRETE JOB TASKS
U.B.C. Codes 1, 2, 3, 4A & B.

1. Concrete Preparation

a. Mix Design

Check with the E/AR in order to verify concrete product codes.

b. Batch Plant

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

c. Trip Ticket

Determine that mixer truck delivery ticket specifies required mix and batch time.

2. Concrete Reinforcement

a. Rebar Type and Grade

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

b. Rebar Condition

Inspect that rebar is free of oil, dirt, excessive rust and from damage in shipment to jobsite.

c. Rebar Tying and Bracing

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

d. Rebar Clearance

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

e. Rebar Placement

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

f. Rebar Welding

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

3. Concrete Formwork and Embedded Items

a. Concrete Construction Joints

Inspect proper preparation of construction joint surface prior to placing.

b. Formwork Construction

Inspect that the formwork is tight to prevent leakage. Generally inspect inside dimensions of formwork.

c. Embedded Items

Inspect that embedded items are properly spaced and sized.

d. Prestressing Steel Anchorage

Inspect location, size and placement of prestressing steel anchorage as detailed in plans and specifications.

4. Concrete Preparation, Placement, Curing and Protection

a. Prepour Base Moisture

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

b. Concrete Placement

Inspect that concrete conveyance and depositing avoids segregation due to rehandling or flowing and proper joint construction.

c. Concrete Vibrated

Inspect that concrete is vibrated.

d. Concrete Curing

Inspect that appropriate curing is performed.

e. Protection

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

5. **Samples and Tests**

a. **Test Type**

Determine the type and number of concrete, grout and reinforcing steel tests required.

b. **Test Samples**

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

c. **Hardened Concrete Test Samples**

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

d. **Specimen Handling/Protection**

Observe proper handling, field curing and place specimens in protected area after preparation and arrangement for transportation of specimens to test facility.

6. **Prestressing Steel.**

a. **Prestressing Steel Type and Grade**

Determine that prestressing steel type, size and grade, and tendon fabrication in conformance with specifications.

b. **Prestressing Steel Condition**

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

c. **Prestressing Steel Ties and Supports**

Determine that prestressing steel tendons and post-tensioning ducts are adequately tied, chaired and supported to prevent displacement during concrete placement, and are adequate for intended stresses.

d. **Prestressing Steel Clearance**

Inspect for minimum and maximum clear distances between prestressing steel and minimum structural distance to outside of concrete and to surface of concrete.

e. **Prestressing Steel Placement**

Inspect placement of prestressing steel, tendons or ducts as detailed in plans and specifications.

f. **Post-tensioning Ducts**

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

g. **Prestressing Steel Anchorage**

Inspect location, size and placement of prestressing steel anchorage as detailed in plans and specifications.

7. **Prestressing and Grouting**

a. **Calibration of Stressing Ram**

Review the calibration documentation for the steel stressing ram.

b. **Steel Stressing**

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

c. **Grout Mix Design and Placement**

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

d. **Tendon Finishing**

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

B. STRUCTURAL MASONRY JOB TASKS
U.B.C. Inspection Code 7

1. Masonry Material - Storage and Certifications

a. 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.

b. Storage of Materials

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

c. 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.

2. Mortar Mix.

a. Mortar Aggregate

Determine sand is clean.

b. Mortar Cement

Inspect mortar cement for dryness, type and conformance to specified requirements.

c. Mortar Water

Inspect that clean water and only approved additives and admixtures are used.

d. Job-mix Mortar Proportioning and Mixing

Inspect job-mix mortar proportioning of cement, aggregates and admixtures for quantity and mixing time.

e. Ready-mix Mortar

Inspect ready-mixed mortar for type and conformance to specified requirements.

3. **Masonry Preparation and Placement.**

a. **Dowels/Anchors**

Inspect alignment of dowels and anchors extending out of the footings for masonry walls.

b. **Base Conditions**

Inspect that masonry footing surfaces are clean.

c. **Condition of Units**

Inspect that masonry units are clean and sound.

d. **Placement**

Inspect the laying of masonry units, checking temperature, laying of masonry units, for stack or running bond or variations as per plans. Check that there is no deep furrowing of bed joints. Inspect mortar joints for proper thickness and tooling.

e. **Joints**

Inspect construction, expansion and contraction joints in accordance with details on approved drawings.

4. **Masonry Reinforcement.**

a. **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.

b. **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.

c. **Ties**

Inspect ties in masonry for straightness, embedment, spacing and size.

d. **Anchor Connections**

Inspect the installation of masonry anchor bolts, joist anchors, insert and straps.

5. **Grout Mix.**

a. **Ready-mix Grout**

Inspect ready-mixed grout for conformance with mix design and workability.

b. **Grout Use**

Determine elapsed time since mixing of grout.

6. **Masonry Grouting.**

a. **Grout Spaces**

Inspect that grout spaces are correctly sized and clean, cleanouts, when required, are closed after inspection and grout barriers are in place before grouting.

b. **Grouting**

Inspect proper grouting technique including mechanical vibration to approved height of grout space.

c. **Dry Packing**

Inspect proper application of dry packing.

7. **Samples and Tests.**

a. **Test Prisms**

Inspect the construction of test prisms including those required prior to beginning construction. Check that test prisms contain the same masonry units, moisture content, mortar and workmanship as used in the building.

b. **Tests and Specimens**

Determine the type and number of masonry, mortar, grout and reinforcing steel tests required.

c. **Specimen Handling/Protection**

Observe protection of test specimens and arrangements for pickup or delivery of specimens to appropriate persons.

d. **Masonry Samples**

Observe removal of test specimens from completed masonry.

C. STRUCTURAL STEEL AND WELDING JOB TASKS
U.B.C. Inspection Code 5, 6

1. Steel and Welding Materials.

a. Structural Steel Materials

Review mill test reports (MTR), steel identification markings, or other documentation of structural steel for compliance with plans and specifications. Visually inspect bolts, nuts and washers for conformance.

b. 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.

2. Welding.

a. Qualification of Welders

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

b. Welding Consumable Storage

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.

Review procedures for maintaining maximum atmospheric exposure times for Low Hydrogen consumable utilization.

c. 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.

d. Welding Procedures

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

e. Weld Repairs and Heat Straightening

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

f. 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.

3. Steel Erection.

a. Base Plates and Anchor Bolts

Inspect anchor bolt size and pattern size of base plates and anchor bolt hole pattern and size. Inspect the setting of the base plate for proper nut tightening and thread projection.

b. Members

Inspect to determine size and dimensions for weight, determine the weight, general location, shape and proper connection of structural members.

c. Faying Surfaces

Inspect faying surfaces on connections utilizing high-strength bolts for compliance to applicable standards.

d. Bolts

1. Inspect correct type, location and size of bolts, size of bolt holes and alignment in connections.

2. Inspect tightness of high strength bolts to applicable standards.

4. Samples and Nondestructive Tests.

a. Bolt and Nut Sampling

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

b. Nondestructive Testing

Observe nondestructive testing in accordance with approved procedures.

D. ANCHORED VENEER JOB TASKS
U.B.C. Inspection Code 16

1. Veneer Material - Certifications and Storage.

a. Veneer Material Certifications

Inspect veneer material certifications including material strength test results, or other documentation of veneer units, cement, lime, additives, and stone backing. Determine materials are in acceptable condition.

b. Construction Documents

Inspect installation design documents to determine that they have been properly sealed and approved by the Engineer of Record and the City.

c. Veneer Connection Material Certifications

Review veneer connection material certifications, or other documentation of connectors and corrosive protection. Determine that connection materials and connectors are in acceptable condition.

d. Storage of Materials

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

2. Mortar Mix.

Requirements same as structural masonry Section 2.b.

3. Veneer Preparation and Placement.

a. Dowels/Anchors/Ties

Inspect alignment of dowels, anchors and ties extending out of the footing or walls.

b. Base Conditions

Determine that bearing surfaces are clean and level.

c. Condition of Units

Determine that veneer units are the required size and thickness, clean, sound, and free of cracks or chips that may adversely effect their attachment.

d. Placement

Inspect the setting of veneer units, for stack or running bond or variations as per plans. Determine that there is no deep furrowing of bed joints. Inspect mortar joints for proper thickness and tooling. Do not allow the installation of saturated or frozen veneer.

e. Joints

Inspect construction, expansion and contraction joints for locations and as detailed.

4. Veneer Connectors.

a. Inspect the placement and alignment of connectors for size, type material and spacing. Inspect for required bearing lengths and widths, size and depth of embedment, straightness, edge and end distances of dowels and connectors in both the veneer and backup structural supports.

b. Inspect mortar spot backups at connectors for size, location, and soundness.

c. Inspect epoxy anchorages for type epoxy to be used and manufacturer's requirements for installation. Inspect size, depth of embedment, straightness and cleanness of surfaces to receive epoxy.

5. Veneer Ventilation.

Inspect the placement, size, type of material and location of weep holes. Inspect that weep holes are not clogged or obstructed preventing their use.

6. Veneer Dampproofing.

a. Inspect veneer backing for compliance with manufacturer's requirements.

b. Inspect flashing, gauge, shape, material, and installation.

7. Samples and Tests.

a. Field Mockup

Inspect the materials and construction of field mockup, when required, prior to commencing with installation of veneer on structure.

b. **Test Prisms**

Witness the construction, when required, of test specimens including those required prior to beginning construction.

E. ADHERED VENEER JOB TASKS
U.B.C. Inspector Code 15

1. Pre-application Verification.

- a. Inspect the backing membrane for preparation and weatherproofing. Verify that height of adhered veneer does not exceed 30 feet, or size and weight limitations.

2. Application.

- a. Inspect the mortar and epoxy bed for code and manufacturer conformance and check for absorption.
- b. Observe the placement of units closely for workmanship and provide necessary testing to determine adequacy of unit strength.

F. ACCESSIBILITY FOR THE DISABLED JOB TASKS
U.B.C. Inspection Code 17

1. At this time, there are no specific requirements for job tasks. Generally the E/AR is responsible to provide inspection of the entire project for conformance with applicable local laws for compliance with handicap provisions.
2. Specialty areas requiring systems not generally inspected by the Building Official (e.g. hearing impairment, braille, audio visual).

G. ELECTRICAL INSTALLATION JOB TASKS
U.B.C. Inspection Code 18

1. Ground-Fault Protection Performance Test

a. Visual Inspection

Inspect for physical damage and compliance with engineered drawings and specifications.

Verify proper nameplate markings and ratings.

Verify integrity of grounded conductor.

Verify pickup and time delay settings are in accordance with settings provided by the engineer.

b. Mechanical Inspection

Inspect for proper mechanical operation.

c. Electrical Tests

Tests shall comply with engineered plans and specifications.

Tests shall be performed in accordance with manufacturers recommendations or nationally recognized standards and practices.

Test grounded conductor insulation resistance to ground.

Test relay pickup current by current injection at the sensor and operate the circuit interrupting device.

Test relay timing.

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.

a. Visual Inspection

Inspect for physical damage and compliance with engineered drawings and specifications.

Verify proper nameplate markings and ratings.

Inspect for proper anchorage, support and alignment.

Verify barrier installation.

Verify connection and termination points for proper torque and alignment.

b. Mechanical Inspection

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

c. Electrical Tests

Tests shall comply with engineered plans and specifications.

Tests shall be performed in accordance with manufacturers recommendations or nationally recognized standards and practices.

Test grounded conductor insulation resistance and verify continuity of equipment grounding system.

Perform insulation resistance test on each bus and protective device. Test phase-to-phase and phase-to-ground.

Perform dielectric voltage-withstand test on each bus and protective device. Test phase-to-phase and phase-to-ground.

Perform phase test on double ended systems.

Test control power transformer, control power circuits and potential circuits.

Test control and protective devices for proper operation.

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

a. Visual Inspection

Inspect for physical damage and compliance with engineered drawings and specifications.

Verify proper nameplate markings and ratings.

Inspect for proper anchorage and support.

Inspect for proper equipment and core grounding.

Verify compliance with manufacturers installation requirements.

b. Mechanical Inspection

Inspect auxiliary devices for proper mechanical operation.

c. Electrical Tests

Tests shall comply with engineered plans and specifications.

Tests shall be performed in accordance with manufacturers recommendations or nationally recognized standards and practices.

Perform insulation resistance test on each winding. Test winding-to-winding and windings-to-ground.

Perform a turns-ratio test for each winding at all tap settings.

Test control power transformer, control power circuits and potential circuits.

Test control and protective devices for proper operation.

4. Conductors that supply equipment rated at 1000 Amperes or more, or over 600 Volts

a. Visual Inspection

Inspect for physical damage and compliance with engineered drawings and specifications.

Verify proper markings and ratings.

b. Electrical Tests

Tests shall comply with engineered plans and specifications.

Tests shall be performed in accordance with manufacturers recommendations or nationally recognized standards and practices.

Perform insulation resistance test on each conductor. Test phase-to-phase and phase-to-ground.

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

a. Visual Inspection

Inspection for physical damage and compliance with engineered drawings and specifications.

Verify proper markings, ratings and signs.

Inspect equipment for proper anchorage and support.

Inspection for proper barriers, separation, protection and location.

Verify instruction manuals, special tools, testing devices, and manufacturer recommended spare parts are available.

Verify maintenance and operational testing program is in place and maintained on the premises.

b. Mechanical Inspection

Inspect equipment for proper mechanical operation.

Verify functional operation of system. Perform manual transfer operation.

c. Electrical Tests

Tests shall comply with engineered plans and specifications.

Tests shall be performed in accordance with manufacturers recommendations or nationally recognized standards and practices.

Test control and protective devices for proper operation.

Perform phase rotation test.

Perform insulation resistance test on feeder conductors and equipment. Test phase-to-phase and phase-to-ground.

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.

Conduct operational test on system under load conditions.

H. SPECIAL CASES JOB TASKS

U.B.C. Inspection Code 19

1. The special case shall be identified by the building official before obtaining permits.
 - a. The building official, with the E/AR's assistance, shall establish, prior to the special case construction, a job task analysis in writing for the specific area concerned.
2. The building official reserves the right to require special inspection when unusual or unanticipated conditions arise **during** the course of construction. The building official, with assistance from the E/AR, shall establish the job tasks required in these situations.
3. **Sewer Installation** - This Special Inspection shall apply to the installation of sewer lines where it is impractical due to the depth of the street sewer or to the structural features or to the arrangement of any building or structure, to obtain the minimum slope required by the Uniform Plumbing Code, Section 1106.
 - a. Inspect sewer for proper material, support, alignment and uniform slope.
 - b. Verify that the sewer has been installed in accordance with the approved design and to the grades shown on the approved plans.
4. **Unlisted Mechanical Equipment** - Reports which are submitted to the building official, as an alternative to a listing agency approval for those products or equipment which require approval, are not acceptable unless they provide at least the following:
 - a. Date issued.
 - b. Address at which the product or equipment is installed.
 - c. General description of the product or equipment which is the subject of the report.
 - d. Proposed objective to be achieved as a result of this examination.
 - e. Data plate information which shall include at least the following:
 1. Manufacturer's name
 2. Model and serial number
 3. Type of fuel for fuel burning devices - input/output ratings
 4. Electrical rating - volts, amps, phase (if applicable)
 5. Operating pressures (if applicable)

- f. Listing of specific test criteria:
- ASTM Standards
 - ANSI Standards
 - UL Standards
 - AGA Standards
 - Other Standards
- g. Description of specific tests performed.
- h. Evaluation of the product examined, including recommendations regarding correction of deficiencies if appropriate, or a statement that the device was in compliance with all applicable standards at the time of examination.
- i. Submit drawing or photograph of the equipment which this report addresses.
- j. Sign and seal all documents and other submittals.

I. PILING, DRILLED PIERS AND CAISSONS JOB TASKS
U.B.C. Inspection Code 11

1. Driven Piles

a. Materials and Equipment Verification

To inspect pile material, splices, tip reinforcement, pile type, pile sizes, length, quality and straightness are as specified, and that leads, hammers, cushioning and other equipment are as specified.

b. Pile Installation Verification

Verify that horizontal and vertical locations of the piles are as specified, and that pile orientation and plumbness are as specified.

c. 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.

2. Auger-Cast-Piles

a. 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.

b. 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 as specified.

3. Drilled Piers and Caissons

a. Installation Verification

Inspect and verify that all drilling and cleaning operations are as specified, that shaft diameter, shaft length, shaft plumbness, underreamed diameter, underreamed height, underreamed shape are as specified, that bearing surface is cleaned as specified, and that the bearing material and penetration into the bearing material are as specified.

b. Material Verification

Inspect so the steel reinforcement and concrete placement are as specified in accordance with sections of this part.

J. SPECIAL GRADING, EXCAVATION AND FILLING
SPECIAL INSPECTIONS JOB TASKS
U.B.C. Inspection Code 13

1. Site Preparation Verification

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

2. Overexcavation and Scarification Verification

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

3. Fill Placement Verification

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

4. 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.

5. Foundation Excavation Verification

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

6. Material Verification

Inspect the steel reinforcement and concrete placement as specified in accordance with sections of this part.

K. REINFORCED GYPSUM CONCRETE JOB TASK
U.B.C. Inspection Code 8

The inspection of reinforced gypsum concrete shall be as determined by the E/AR and the building official and be defined at the pre-job conference.

L. SHOTCRETE JOB TASKS
U.B.C. Inspection Code 12

1. General.

- a. Shotcrete shall be defined as mortar or concrete pneumatically projected at high velocity onto a surface.
- b. Shotcrete placed for swimming pools and shotcrete work fully supported on earth and minor repairs, when in the opinion of the building official presents no special hazard, shall be exempt from special inspection.

2. Concrete Mix Verification.

a. 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.

b. Preconstruction 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 representative of the 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.

c. Delivery Ticket

Redi-mix Concrete: Determine that mixer truck delivery ticket specifies required mix and batch time.

d. 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.

e. Storage of Materials

Reject cement or additives that have been exposed to excessive moisture. Reject aggregate that are contaminated.

d. **Reinforcing Material Certifications**

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

M. SPRAY APPLIED FIREPROOFING JOB TASKS
U.B.C. Inspection Code 10

1. General

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

2. Application

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

3. Inspection Procedures

a. 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.

b. Thickness of application.

Thickness of spray applied fire protection shall be determined in accordance with ASTM E605-77.

c. Floor and Wall Sections.

A thickness test shall be conducted for every 2500 square feet. Each unit or bay shall be divided into quarters. In each quarter a 12 inch square shall be laid out and thickness measurements as described in ASTM E605-77 taken at each corner, averaged and reported as a single measurement.

d. Beams and Columns.

Four sets of random measurements shall be taken for each bay or unit. The test locations on individual members shall be conducted as described in ASTM E605-77.

e. Density.

Density of the fire protection material shall be tested in accordance with ASTM E605-77. Samples for density determination shall be one for each 10,000 square feet of floor area, but shall be no less than two per floor.

4. 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.

5. Patching.

The special inspector shall insure 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.