Development Services

Existing Suspended Ceiling Inspection

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Introduction and Scope

Use this information as a guideline on the maintenance and repair of existing ceilings. This document does not address the specifics of any above-ceiling fire-stopping or other building systems that may be inspected in conjunction with ceiling inspections.

The architect/designer must perform a thorough evaluation of the existing ceiling system with a ceiling contractor or ceiling specialist prior to applying for a permit and prior to putting the job out to bid. Review and approval by a qualified design professional is necessary because there are so many aspects of the integration of new products into existing building systems that are uniquely within the scope of responsibility of the architect and construction manager. These include all structural issues, fire protection, aesthetics and many others.

The manufacturer will typically not accept liability for incidental and consequential damages directly sustained, or for any loss caused by application of goods not in accordance with current printed instructions or for other than the intended use. All the conditions, remedies and specifications must be reviewed and completely evaluated by the owner's design professional to verify the suitability of a design for a given structure.

For suspended ceiling assemblies, you must provide the original assembly by which the original ceiling was installed and maintain/repair accordingly. If this is not possible, there are four options available for the maintenance/repair and subsequent inspection of existing ceiling systems:

1. Provide an alternate ceiling system that closely matches the on-site conditions, type of construction and rating. This system may be required to be submitted as revision to the approved plans.
2. Maintain/repair the suspended ceiling system as detailed in the Existing Ceiling System Checklist.
3. Submit an Alternate Materials, Methods, or Modification Request (AMMMR) Form detailing and justifying an alternate system design that meets or exceeds the code requirements in effect at the time of the original installation. The AMMMR form must be submitted to the Building Official of the City of Bellevue for review and approval prior to the installation.
4. Install the suspended-ceiling system as required by the current Building Code in effect at the time of permit application. A revision may be required for this option.

Inspections

Ceiling inspections will cover any work in or below the ceiling in the room or area being worked on and may include areas of the ceiling within six feet of the permitted scope of work having a direct effect on the ceiling system. Upgrades may be triggered depending on the condition of the ceiling system in these areas.

Examples of this work include but are not limited to:

- The addition or relocation of light fixtures.
- The addition or relocation of mechanical diffusers and/or dampers directly connected to the ceiling system.
- The addition or removal of partition walls, soffits, etc.
- The addition, removal or reconfiguration of the suspended-ceiling grid and/or the support system, having a direct effect on the ceiling system.

Other items beyond the six feet permitted scope that can be incorporated into current inspection and permit scoping based on the inherent level of danger they present:

- Firestopping incomplete at horizontal or vertical exit enclosures within or immediately adjacent to the space.
- Tenting on lights incomplete at rated ceiling assemblies.
- Lights installed with no slack wires.
- Perimeter wires not installed.
- Radiation dampers not installed in rated ceiling HVAC penetrations.

The six-foot rule may also be applied to common areas adjacent to the tenant space, such as corridors, restrooms, etc., where a serious and obvious life-safety threat is present. Full upgrades in these types of neighboring areas are not required unless it is determined that the ceiling was never installed legally per the code in effect at the time of installation, that the ceiling condition has not been maintained, that the ceiling has been damaged to such an extent that it no longer meets the intended design and installation requirement in effect at the time of the installation, or that the modifications to the ceiling have compromised the overall integrity of the ceiling as it was originally designed to perform.

Triggers for Ceiling Inspection

Items that qualify as a trigger for full ceiling inspection:

- Suspension wires not installed per typical system requirements current or in affect at the time of the initial installation.
- Unrated ceiling system installed when rated system is required.
- Where a tenant improvement involves work in a substantial portion of the area ceiling.
- Ceiling system that did not meet code requirements in effect at the time of the initial installation.
- Replacement of 50-100 percent of ceiling tiles as part of an overall tenant improvement.

Items *not* qualifying for a full ceiling inspection:

- Replacement of individual ceiling tiles, replacement of existing damaged tiles, or replacement of less than 50 percent of the overall tenant improvement.
- Installation of mechanical, electrical, plumbing or fire systems not connected directly to the suspended-ceiling system. (Where work is done that affects, alters, or degrades the ceiling system, a building permit is required.)
- Ceilings installed without vertical struts, providing the splay wires are installed in a 12-foot by 12-foot layout. (The City of Bellevue had allowed, in the past, the strut portion of the seismic pod to be omitted. A ceiling installed and approved in that manner would not trigger a ceiling upgrade.)

Existing Ceiling System Checklist

1997 Uniform Building Code

The following sections are for suspended ceiling systems based on the 1997 Uniform Building Code in accordance with the prescriptive requirements of Section 2504 and Table 25-A, or UBC Standard 25-2. NOTE: UBC requirements are listed with brackets [...] at the end of each item, whereas COB policies and IBC requirements (as needed, such as fire sprinklers, etc.) are listed with parenthesis (...). Please refer to the last page of this handout for suspended ceiling systems installed using the 2003—2012 IBCs.

Perimeter and Attachment of Members to the Perimeter

☐ Ends of main runners and cross tees shall be tied together to prevent their spreading. [25.212.4]

☐ Main runners and cross tees may be attached to the perimeter member at two adjacent walls with clearance between the wall and the runners maintained at the other two walls. [25.212.5]

Perimeter Hangers

- ☐ Terminal ends of each main runner and cross tee are supported within eight inches of each wall or ceiling discontinuity with 12-gauge wire or approved wall support. [25.212.1, 25.212.2]
- ☐ These wires are plumb to within one in six and may attach to the adjacent wall structure or ceiling structure above grid. [25.212.1]

Suspension System

- ☐ Cross tees supporting light fixtures or mechanical services must have a load carrying capacity greater than or equal to 8 lbs./linear feet or be supported with supplemental hanger wires within three inches of intersection. (See Light Fixtures and Mechanical Services sections for additional information.) [25.202; 25.213]
- ☐ Suspension wires are minimum 12-gauge and spaced at four feet. [25.212.1]
- ☐ Hanger wire attached devices must support 100 lbs. [25.212.1]
- ☐ Connections at main runner and at structure are secured with a minimum of three complete turns within three inches. [25.212.1]
- ☐ Suspension wires are installed at each side of the main runner breaks for field-made splices. (COB Policy)
- ☐ Wires are permitted to be supported by cold-rolled channel (CRC) when obstructions do not allow for the hanger wires to be directly attached to the supporting structure. CRC shall be minimum 16 gauge, 1-1/2-inches deep with 9/16-inch flanges. When the length of the CRC exceeds 5 feet, two CRC must be placed back-to-back and tied together with a double strand of 18-gauge steel wire at 24 inches on center. (COB Policy)
- ☐ Main runners are produced with round hanger wire holes in the tee web at regular intervals. There are also rectangular (convenience) holes located in the tee bulb at regular intervals. The typical location for the hanger and bracing (splay) wires is in the round holes. Unless allowed by the manufacturer, the rectangular (convenience) holes may not be used. (COB Policy)

Lateral Force Bracing

- ☐ For ceilings installed prior to the 2003 IBC, in areas greater than 144 square feet, lateral-force bracing must be installed. (COB Policy)
  Exception: Those ceilings previously installed and approved without seismic struts per the City of Bellevue policy in effect at the time of the install will not be required to have struts added.
- ☐ Seismic strut dimensions are per attached Table 1. (COB Policy)
- ☐ Rigid bracing may be used instead of diagonal splay wires. [25.212.3]

- ☐ Splay-wire bracing shall be clusters of four 12-gauge wires within two inches of the cross-tee intersection. [25.212.3]
- ☐ Wires are arrayed 90 degrees from each other at an angle not exceeding 45 degrees from the plane of the ceiling. Wires do not have to run parallel to mains or cross tees. [25.212.3]
- ☐ Horizontal restraint points (e.g., seismic pods) shall be no more than 12 feet on center in each direction, and the first point shall be within 6 feet of each wall. [25.212.3]
- ☐ Bracing wire shall be attached to the grid and to the structure in such a manner that they can support a load of not less than 200 lbs. [25.212.3]

Fire-Resistance Rated Suspended Ceilings

- ☐ A precon is required for fire-resistance rated suspended ceiling systems. (COB Policy)

General List for Fire-Resistance Rated Suspended Ceilings

- ☐ Verify the listed assembly or evaluation report (ESR) for the grid system that closely resembles the existing system (e.g., Armstrong ESR 1308, USG ESR 1222, etc.).
- ☐ Main runners must have vertical support hanger wires within 3 inches of the main runner fire expansion relief.
- ☐ Hanger wires must occur at all four corners of light fixtures, at midspan of cross tees adjacent to 4-foot light fixtures and air duct outlets, and adjacent to each main runner splice.
- ☐ The total area of duct openings must not exceed the area indicated in the listed assembly or evaluation report per each 100 square feet of ceiling area. The maximum opening dimension shall be per the assembly or the evaluation report.
- ☐ The spacing and supports of the air duct shall be per the assembly or the evaluation report.
- ☐ Duct openings are protected with ceiling radiation dampers or as required by the mechanical inspector. [713.10; 713.11; 713.12]
- ☐ Ceiling penetrations are fire-stopped above the grid at the tile penetration(s), including but not limited to those originating from partition walls. [710.3]
- ☐ Light fixtures must be spaced so that their total area does not exceed the area indicated in the listed assembly or evaluation report per each 100 square feet of ceiling area.
- ☐ Protect light fixtures and other penetrations, such as speakers, by following the listed assembly or evaluation services report. If these are not available, follow the prescriptive methods in the pages that follow.
- ☐ Also see the section for Light Fixtures and Mechanical Services.

- ☐ Penetrations through fire-resistance rated suspended ceilings are required to be firestopped, including but not limited to, electrical wires, wall bracing, low voltage conduits, plumbing, etc.
- ☐ Be sure that any replacement tiles are fire-resistance rated tiles.

Noncombustible Construction: Fire-Resistance Rated Suspended Ceilings

When an assembly or evaluation report is not available, use the following for fixture protection:

- ☐ Can lights, speaker boxes, and/or other similar equipment are protected with five-sided boxes constructed from 5/8-inch drywall or with fire-resistance rated acoustical material. The corners of boxes are pinned together with metal corners and drywall screws. The corners of the boxes are fire-taped and penetrations fire-caulked. (COB Policy)
- ☐ 2-foot by 2-foot and 2-foot by 4-foot steel-housed fluorescent lights are protected with like-sized 5/8-inch drywall or with fire-resistance rated acoustical material on 1-1/4-inch spacers over light housing. (COB Policy)
  Exception: Lights installed in tandem are to be protected as detailed in the next section under Combustible Construction.

Combustible Construction: Fire-Resistance Rated Suspended Ceilings

When an assembly or evaluation report is not available, use the following for fixture protection:

- ☐ Can lights are protected with five-sided boxes constructed from 5/8-inch drywall or with fire-resistance rated acoustical material. The corners of the boxes are pinned together with metal corners and drywall screws. Corners of box are fire-taped and penetrations fire-caulked when installed in rated corridors or exit passageways. (COB Policy)
- ☐ 2-foot by 2-foot and 2-foot by 4-foot steel-housed fluorescent lights protected with 5/8-inch drywall or with fire-resistance rated acoustical material cut and fit to form a five-sided box around the fixture. Install 1-1/4-inch spacers over the top of the housing between the fixture and drywall or tile. Pieces pinned together with 5d nails or equivalent. Allow one inch of air space along each narrow end for heat dissipation. (COB Policy)

Light Fixtures

(Requirements in addition to those listed under Fire-Resistance Rated Suspended Ceilings.)

- ☐ All fixtures must be positively attached to the suspension system. [25.213]
- ☐ Cross runners supporting the ends of lighting have a minimum carrying capacity of 8 lbs./linear feet or require supplemental 12-gauge hanger wires attached to the grid members within three inches of each corner of each fixture supported by a cross tee. [25.213]

- ☐ Fixtures weighing 56 lbs. or less must have two 12-gauge wires attached at diagonal corners. These wires may be slack. Fixtures weighing more than 56 lbs. must be independently supported from the building structure. [25.213]
- ☐ Pendant-mounted fixtures must be supported directly from the structure using 9-gauge wire. The ceiling suspension system may not be used for support. [25.213]

Mechanical Services

(Requirements in addition to those listed under Fire-Resistance Rated Suspended Ceilings.)

- ☐ Must be positively attached to the suspension system main runners or to cross tees with the same load carrying capacity. [25.214]
- ☐ Cross tees supporting mechanical services have a minimum carrying capacity of 8 lbs./linear feet or require supplemental hanger wires within three inches of each corner of each fixture supported by the cross tee. * [25.213; 25.214]
  ** The City of Bellevue has determined that it is acceptable practice to apply the same supplemental wire application as is allowed for light fixtures to mechanical services in addition to the requirements in the Mechanical Services section of this checklist.*
- ☐ Terminals or services weighing 20 lbs. to 56 lbs. must have two 12-gauge wires connecting them to the ceiling-system hangers or to the structure above. [25.214]
- ☐ Terminals or services weighing more than 56 lbs. must be independently supported. [25.214]
- ☐ Maintain required working clearances as required by mechanical, electrical and plumbing codes. (COB Policy)

Flexible Sprinkler Hose Fittings

- ☐ For ceilings installed prior to the 2003 IBC and where flexible fire sprinklers are attached, they shall be installed per the 2015 IBC requirements. (COB Policy)
- ☐ Flexible sprinkler hose fittings weighing less than or equal to 20 lbs. shall be positively attached to the ceiling main runners or to cross runners that have the same carrying capacity as the main runners. (E580 5.4.1)
- ☐ Flexible sprinkler hose fittings weighing 20 lbs. to 56 lbs. must have two 12-gauge wires connecting them to the ceiling-system hangers or to the structure above. (E580 5.4.2)

Penetrations

- ☐ Ceilings without rigid bracing shall have 2-inch oversized trim rings to allow 1-inch horizontal movement in all horizontal directions at sprinkler heads and other penetrations. Alternatively, a swing joint that can accommodate one inch of ceiling movement in all horizontal directions at the top of the sprinkler head extension. (E580 5.2.8.5)

Partition Attachment

- ☐ Partitions attached to the ceiling-suspension system shall be laterally braced to the building structure. This bracing is to be independent of any ceiling's splay wire bracing. [25.215]
  Exception: Partitions not taller than nine feet, if the horizontal seismic load does not exceed five lbs. per square foot.

Height Transitions

- ☐ For ceilings installed prior to the 2003 IBC and where new changes in plane elevation are installed, they shall be installed per the 2015 IBC requirements by providing positive bracing (this may require engineering analysis). (E580 5.2.8.6)

Plenums

- ☐ No combustibles in plenums used for return air (e.g., plastic plumbing pipe, insulation with exposed facing, non-fire-resistant treated wood, etc.). (COB Policy)

Draftstopping

- ☐ Unless the building is equipped with a fire sprinkler system, in other than Group R occupancies, draftstopping shall be installed to subdivide combustible floor/ceiling assemblies so that horizontal floor areas do not exceed 1,000 square feet. (IBC 718.3)
- ☐ Unless the building is equipped with a fire sprinkler system, in other than Group R, draftstopping shall be installed to subdivide combustible attic spaces and combustible concealed roof spaces such that any horizontal area does not exceed 3,000 square feet. (IBC 718.4)
- ☐ For Type I and Type II construction, draftstopping materials shall be not less than 1/2-inch gypsum board, cement fiberboard, batts or blankets of mineral wool or glass fiber, or other approved materials adequately supported. The integrity of draftstops shall be maintained. (IBC 718.3.1)
- ☐ For Type III, IV, and V construction, drafstopping materials shall be not less than 1/2-inch gypsum board, 3/8-inch wood structural panel, 3/8-inch particleboard, 1-inch nominal lumber, cement fiberboard, batts or blankets of mineral wool or glass fiber, or other approved materials adequately supported. The integrity of draftstops shall be maintained. (IBC 718.3.1)
- ☐ Ensure that the drafstopping is as close as possible to the ceiling tiles. (COB Policy)

Marking and Identification of Fire-Resistance Rated Walls Above Ceilings

- ☐ Per IBC 703.7, where there is an accessible concealed floor, floor-ceiling or attic space, fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling in the concealed space. Such identification shall:
    - Be located within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition.
    - Include lettering not less than 3 inches in height with a minimum 3/8-inch stroke in a contrasting color incorporating the suggested wording, "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," or other wording.
      Exception: See COB's Policy for smaller size characters.

Concealed Insulation

- ☐ Per IBC 720.2, insulating materials, where concealed as installed in buildings of any type of construction, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.

Miscellaneous

- ☐ Remove construction debris from the ceiling. Where unused items, including but not limited to wires, wall bracing, mechanical, electrical, plumbing, etc., hinder the inspection, these items may be required to be removed at the discretion of the inspector. (COB Policy)

Electrical Wiring, Conduits and Cable Trays

- ☐ Electrical wiring, conduits, and cable trays are independently supported and braced independently of the ceiling. (NEC 392.20, 300.11(A)&(B); WCEC 300.11(A)1-10)
- ☐ VAVs and other similar electrical disconnects require a clear working space of 30 inches wide by 36 inches deep for existing equipment. (NEC 110.26)
- ☐ Install removable cross tees and label them *Removable Cross Tee*, where installed within the clear working space. (COB Policy)
- ☐ New walls or ceiling modifications don't encroach on working clearance. (COB Policy)

Table 1
Maximum Compression Strut Lengths for 180 lb. Seismic Load

Material	Length
¾ inch X ½ inch X 0.059 inches CHANNEL	26 inches
1½ inches X 9/16 inches X 0.059-inch CHANNEL	33 inches
(2) ¾ inch X ½ inch X 0.059inch CHANNEL, BACK TO BACK	39 inches
(2) 1½ inches X 9/16 inches X 0.059-inch CHANNEL, BACK TO BACK	44 inches
1-5/8 inches X 1¼ feet x 0.0197-inch CHANNEL	106 inches
(Two) 1-5/8 inches X 1¼ inches X 0.0197-inch CHANNEL, BACK TO BACK	141 inches
½ inch Diameter EMT Conduit, 0.042-inch Wall Thickness	47 inches
¾ inch Diameter EMT Conduit, 0.049-inch Wall Thickness	61 inches
One-inch Diameter EMT Conduit, 0.057-inch Wall Thickness	78 inches
1¼ inches Diameter EMT Conduit, 0.065-inch Wall Thickness	102 inches
1½ inches Diameter EMT Conduit, 0.065-inch Wall Thickness	118 inches
Engineering is required for struts longer than 120 inches and is to include the maximum height, type of material, and the connection to the grid and structure above.	-

2003 – 2012 International Building Codes

Under the 2003 - 2012 International Building Codes, suspended ceiling systems are installed in accordance with the prescriptive requirements of Chapter 16, ASCE 7, ASTM 635, ASTM C636, ASTM E580, and CISCA Guidelines Zones 3-4 (for Seismic Design Categories D-F). If the design team does not know the applicable code for the suspended ceiling system in question, the requirements for the 2015 IBC will be used for ceilings installed under the 2003 – 2012 IBC; refer to the Suspended Ceiling Checklist for all requirements in upgrading these systems.

IBC	2003	2006	2009	2012	2015	2018
ASCE 7	7-02	7-05	7-05	7-10	7-10	7-16
CISCA	Zones 3-4	Zones 3-4	Zones 3-4	*	*	*
ASTM	C635, C636	C635, C636	C635, C636	C635, C636, E580	C635, C636, E580	C635, C636, E580

** Referenced under ASTM E580*