Detailed Smoke Control Submittal

7/15/08

The city may require additional information as needed. For preparation information, see description sheet # 1, *Standards for Plans and Drawings*. If you have any questions concerning your application, please visit or call Development Services (425-452-6800) between 8 a.m. and 4 p.m., Monday through Friday (Wednesday, 10 to 4). Assistance for the hearing impaired: dial 711 (Telecommunications Relay Service).

Because of the complexity of smoke control systems, it is important that the design documents clearly identify the expected performance of the system. These documents must also clearly identify the expected performance of *each component* in the smoke control system. Components include all passive and active elements that work together to provide smoke control in accordance with International Building Code (IBC) Section 909.

To more clearly identify the systems involved on design plans, the background systems and floor plans should be in light line weight, with the pertinent systems in heavy line weight. Smoke control system component drawings shall be submitted on current architectural backgrounds.

To obtain the smoke control permit, documentation containing the following details/ specifications is required. **This submittal checklist must be completed and submitted with the application. *Submit 2 sets of documents*.**

1. **Detailed Design Report** (including the smoke control system rational analysis), based on the conceptual design report, and must be prepared by a Professional Engineer competent in the design of smoke control systems.
   - ☐ The Detailed Design Report must be a bound document, independent of design plans, and minimally include the following:
     - ☐ The signature, date and stamp of the professional engineer responsible for the rational analysis/design.
     - ☐ General narrative description of the building. This description will include identification of building uses and occupancies as well as passive and active fire protection features that will work together with the smoke control system.
     - ☐ Narrative description of each passive and active smoke zone. Every space in a building requiring smoke control must be identified as an active or passive smoke zone, with measurable performance criteria identified. This description will include such items as:
       - ☐ Description of which methods will be used for each active smoke-control zone, and supporting rational analysis in accordance with IBC Section 909.4. This description will include such items as minimum required fan size, expected fire loads, ceiling heights, computer modeling, calculations, locations of operable windows and/or doors, etc.
       - ☐ Specific discussion of how smoke control will be initiated in each zone and the associated system responses. Provide a simple and clear event matrix.
       - ☐ The sequence of operations (including timing, if necessary, to provide for proper door operation or prevent duct implosion or rupture) and the positioning of each damper for every fire scenario.
       - ☐ Measurable performance criteria for each shaft.
       - ☐ Description of smoke dampers and fire/smoke dampers, including which dampers will be supervised for damper position, the position of unsupervised dampers when smoke control system is active, damper positions upon loss of power, actuation temperature of fire and fire/smoke dampers.
     - ☐ Calculations associated with the smoke control system design including addressing wind, stack and temperature effects (IBC 909.4.1 – 909.4.6).
     - ☐ Computer Modeling such as CONTAM
     - ☐ Fan capacity calculations and belt requirements.

- ☐ Identification of the anticipated system performance, especially with regard to pressurized stairwells/hoistways, during stack effect conditions. Provide calculations demonstrating minimum and maximum pressure differentials to be observed during and in the absence of any stack effect.
- ☐ Description of smoke dampers and fire/smoke dampers, including which dampers will be supervised for damper position, the position of unsupervised dampers when smoke control system is active, damper positions upon loss of power, actuation temperature of fire and fire/smoke dampers.
- ☐ Identification of coordinated zones for sprinkler and fire alarm systems with regard to smoke control zones.
- ☐ Identification of where variable frequency drives are to be used for smoke control equipment and method of control.
- ☐ The piston effect of elevators.
- ☐ Description of fire modeling or other performance-based analysis utilized in the design of the smoke control system. The purpose of the analysis as well as associated assumptions and conclusions must be clearly identified.
- ☐ Any related material that supports the design of the smoke control system.
- ☐ The signature and stamp of the professional engineer responsible for the rational analysis.
- ☐ Calculations associated with the system design and fan capacities.
- ☐ Description of how the periodic self test required in IBC Section 909.12 will be accomplished.

2. **Detailed Event Matrix / Sequence of Operations** must include:
   - ☐ Every initiating device by address down one column.
   - ☐ Every smoke control device (i.e. fans, dampers, etc.), and every other event that must occur in order for proper operation of the smoke control system (i.e., HVAC shutdown, etc.) across the top; with prior approval, some devices may be combined.
   - ☐ Design submittals must include the sequence of operations (including timing, if necessary, to provide for proper door operation or prevent duct implosion or explosion) and the positioning of each damper for every fire scenario.

3. **Drawings:** The following drawings must be included in a drawing package designated as “Smoke Control System” to differentiate them from any other plans for that job or project:
   - ☐ To clearly identify the smoke control systems, the background systems and floor plans should be in light line weight, with the pertinent systems in heavy line weight.
   - ☐ Smoke control system component drawings shall be submitted on current architectural backgrounds.
   - ☐ Smoke control zone drawings clearly identifying (colored, hatched, etc.) the active smoke control zones.
   - ☐ Drawings identifying the fire rating of associated smoke barriers.
   - ☐ Location of fire-fighter’s smoke control panel/controls, <u>and</u> room layout.
   - ☐ The fire-fighter’s Smoke Control Panel must be submitted, depicting fan/damper controls and status indication as per Fire Department Development Standard Chpt. 11. For final approval, Fire-fighter’s Smoke Control Panel must be submitted in color at full-scale for Fire Department review with the fire alarm plans.
   - ☐ Smoke control mechanical equipment and ductwork drawings.
   - ☐ Control diagrams must be provided as referenced by IBC Section 909.15.
   - ☐ Location and design of the emergency generator and transfer switch rooms per IBC Section 909.11.
   - ☐ Drawings demonstrating all emergency system wiring methods associated with the pressurization system, from the source (generator) to the device (damper, fan, etc).
     - ☐ Drawings must clearly demonstrate pressurization <u>control</u> <u>and</u> <u>power</u> wiring routing and 2-hour protection.
     - ☐ Drawings must clearly demonstrate fire alarm wiring routing and 2-hour protection when used to control the pressurization system.

4. **A Special Inspector Test Procedures document** must be submitted with the smoke control permit in accordance with IBC Section 909.3, and as described in City of Bellevue Fire Department Development Standards, Chapter 11.

- ☐ The architect, engineer of record or special inspector must prepare this as a bound document, independent of the design plans and smoke control report, and minimally address the following:
  - ☐ Qualifications of the special inspector and special inspection agency.
  - ☐ Summary of the testing to be performed, including:
    - ☐ A general description of each smoke control component and zone to be evaluated, and
    - ☐ The applicable performance criteria as identified in the smoke control report and IBC Section 909.18.
    - ☐ Each of the testing requirements outlined in IBC 909.18.1 -. 9.
  - ☐ Provide representative test forms and inspection reports that will be used.
  - ☐ Anticipated testing schedule, minimally addressing IBC Section 909.18.
  - ☐ If testing will occur in absence of stack effect (with similar interior and exterior temperatures) the procedures must identify the range of acceptable test pressures to ensure system pressures will be maintained in the presence of anticipated stack effect.
  - ☐ Method of testing of passive barriers, such as door fan testing. The special inspection program must include the random testing of an approved percentage or quantity and distribution of passive smoke zones. Where multiple passive zones exist on multiple floors, such as residential units, a minimum of 1 unit per floor and a maximum of 10 percent per floor must be evaluated, whichever is greater, unless otherwise approved.
  - ☐ Every fire alarm initiating device which activates any portion of the smoke control system must be tested to verify all applicable output functions in accordance with IBC 909.18.7.

Note: Approval of the smoke control system ***does not*** constitute approval of each component system. Separate fire alarm, sprinkler, building, mechanical, and electrical approvals are required.