



# Portland Maine Retirement Residence

---

Smoke Control Equivalency Letter

**Prepared By:**

Code Unlimited LLC  
12655 SW Center Street, Suite 350  
Beaverton, Oregon 97005

Monday, May 2, 2016

REPORT

# Smoke Control Equivalency Letter

## Overview

<b>Client Name:</b>	Lenity Architecture		
<b>Project Number:</b>	H15-015A	<b>Date:</b>	5.2.2016
<b>Distribution:</b>	Bob Hazleton, Lenity Architecture		
<b>Subject:</b>	Portland Maine Retirement Residence Smoke Control System Equivalency		
<b>Building Name:</b>	Portland Maine Retirement Residence		
<b>Room Area Affected:</b>	Atrium		
<b>Applicable Codes:</b>	<ul style="list-style-type: none"><li>• 2009 International Fire Code</li><li>• 2009 International Building Code (IBC)</li><li>• 2012 NFPA 92– Smoke Management Systems in Malls, Atria and Large Spaces</li><li>• 2007 NFPA 204 – Standard for Heat Venting</li><li>• 2009 NFPA 5000 – Building Construction and Safety Code</li><li>• SFPE/ASHRAE Principles of Smoke Management</li><li>• SFPE/ASHRAE Handbook of Fire Protection Engineering 4th Edition</li><li>• Guide to Smoke Control in the 2006 International Building Code (IBC)</li><li>• 2009 ASHRAE Handbook Fundamentals</li><li>• National Bureau of Standards NBSIR 82-2604 – Upholstered Furniture Heat Release Rates Measured With A Furniture Calorimeter</li></ul>		

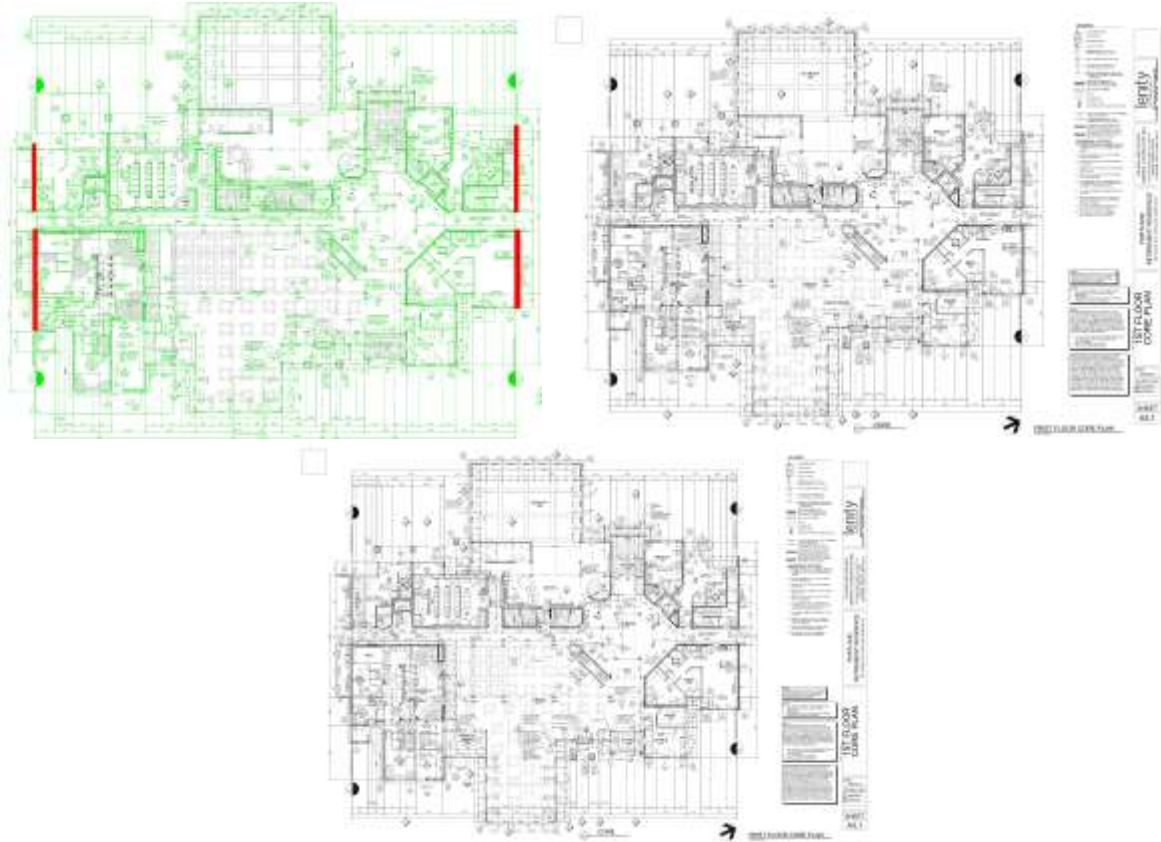
## Overview

A new 4 story type VA retirement residence is being designed for Portland, Maine. The residence is approximately 137,038 sf and is divided into 3 sections by fire barriers as horizontal exits. The center section has an atrium connecting 4 floors. The building atrium is similar in shape and size to a project built in Tallahassee, Florid. Rational analysis per IBC 909.4 indicates that stack, temperature, wind, HVAC, and climate effects over the duration of operation in Portland, Maine will allow a smoke control system in Tallahassee to be as effective in an atrium of similar geometry and volume in Portland, Maine. This letter confirms the equivalency of the Portland Retirement Residence in Portland, Maine to the Tallahassee Retirement Residence Smoke Control Analysis.

## Atria Volume Equivalency

Geometries, surface areas, elevations, and volumes are equivalent between Portland Maine and Tallahassee Retirement Residences. Figure 1 below outlines the overall atria footprint for each building design detailing that there is no difference in overall geometry or square footage. From sheet A6.0 in

the Portland and Tallahassee plans the section view of the Atria indicates ceiling heights above finished floor of both atria are 52'-10 ¾". As a consequence of like geometries, surface areas, and elevations, the volumes in the atria space of the retirement homes are also equivalent. Since the geometry and volume of the atria spaces are identical they shall be considered "equivalent".



**Figure 1.** Comparison of Portland Maine, Tallahassee, and combined overlay 1<sup>st</sup> floor plan with no difference in Atria space.

### Building Code Equivalency

While the atria are identical in geometry, another design change from Tallahassee to Portland Maine is that their building codes are different, but nonetheless equivalent. Sections referenced in the Tallahassee Smoke Analysis by the 2009 *International Building Code* sections referenced were compared to their equivalent sections in the 2007 *Florida Building Code* to search for discrepancies that would affect the smoke control system. The following Table provides a summary of changes in the two official state codes and their impacts.

# Smoke Control Equivalency Letter

**Table 1. Comparison of 2009 IBC and 2007 FBC for Smoke Modeling Equivalency.**

Portland Maine 2009 IBC	Tallahassee Florida 2007 FBC	Summary of Change	Impact to Smoke Control Analysis
§402.10	§402.10	None	No Impact
§710	§710	<p>1 hour fire resistance rating is required for smoke barriers unless constructed of 0.10-inch-thick steel in Group I-3 Buildings</p> <p>The supporting construction shall be protected to afford the required fire-resistance rating of the wall or floor supported in buildings of other than Type IIB, IIIB, or VB construction.</p> <p>Smoke-barrier walls are not required in interstitial spaces where such spaces are designed and constructed with ceilings that provide resistance to the passage of fire and smoke equivalent to that provided by the smoke-barrier walls.</p> <p>Smoke and draft control doors have no leakage rates to mention.</p>	No Impact
§909.4	§909.4	None	No Impact
§907.2.13.1.2	§907.2.13.1.2	None	No Impact
§907.2.15	§907.2.14	References IFC rather than FFPC	No Impact
§909.8	§909.8	None	No Impact
§909.9	§909.9	Separation distance equation is not present	No Impact
§911.1.5	§911.1.5	Elevator fire recall switch in accordance with ASME A17.1 and elevator emergency or standby power selector switch(es), where emergency or standby power is provided.	No Impact

Overall, while some of the changes will impact building construction, these changes will not alter the results of the Tallahassee smoke model or the smoke control analysis. Therefore, building code requirements of the retirement residence designs may be considered “equivalent”.

## Climate

In addition to equivalent geometries and code requirements related to smoke control analysis, the hot conditions that impacted the smoke control modeling in Tallahassee will result in a more conservative analysis than a system designed with the typical climate conditions in Portland ME. The 5-year maximum temperatures for Florida and Maine are 100°F and 95.2°F (ASHRAE), respectively, meaning

## Smoke Control Equivalency Letter

---

the designed system is in a hotter climate. The impact of this temperature difference is that in a fire event, cooler make-up air will push hot buoyant air mixed with smoke up allowing it to be exhausted by the smoke control system at a faster rate. As a result, the system in Maine will operate more effectively than in the Florida model due to favorable climate conditions.

### Summary/Review

The atria geometry, building code and climates of Portland, Maine will be equivalent to smoke modeling design conditions in Tallahassee, Florida. Rational analysis comparison for stack, temperature, wind, HVAC, and climate effects over the duration of operation were conducted and indicated that the Portland, Maine smoke control system matching the system in Tallahassee, Florida will provide equivalent or better protection of the atrium than the approved system in Tallahassee. Please find the attached Portland, Maine Smoke Control report.



Franklin Callfas  
Principal/ Fire Protection Engineer (OR, CA, WA Licensed)  
Code Unlimited