



Wall/Floor Intersections in Wood-Framed Construction

Building Division Policy

Index Number:	IBC-2023-003
Issue Date:	5/24/2023
Code:	2018 IBC
Section:	Chapter 6; 705.5; 707

Background

Fire-resistance rated wall/floor intersections are not clearly addressed in the building code. While there are standard fire tests for wall and floor/ceiling assemblies, there is no standard fire test for the intersection of these elements. This policy is intended to address typical detailing of fire-rated wood-framed wall/floor intersections in Type III and V buildings.

Type III construction requires exterior walls to be built with non-combustible materials or fire retardant-treated (FRT) lumber and to have a fire-resistance rating of 2-hours. Interior building elements are permitted to be of combustible materials and are either not fire-resistance rated (V-B, III-B) or rated for 1 hour (V-A, III-A). Historically this has created an issue for platform-framed buildings that have a 1-hour rated floor framing into a 2-hour fire-rated wall.

Type V construction often contains fire-rated shafts with intersecting floors being non-rated or rated for only 1-hour. This creates a similar problem as in Type III construction when the floors are platform-framed around the shafts.

The American Wood Council (AWC) Design for Code Acceptance – Fire-resistance-Rated Wood-Frame Wall and Floor/Ceiling Assemblies (DCA-3) provides methodology and examples for construction of fire-rated exterior wall/floor intersections. This policy utilizes the DCA-3 document and provides examples that apply not only to exterior fire-rated wood-framed walls but also to shaft walls.

Design Parameters

Where the design includes details based on the DCA-3 document, the building plans should identify which example detail and ceiling membrane case from the DCA-3 that are the basis of design and indicate the required char depth.

Where a wall or floor/ceiling assembly is used that is not listed in the DCA-3 assembly tables, the assembly is required to be in compliance with any of the methods listed in IBC Section 703.3. The city will review these assemblies to determine if they are in line with the intent of the DCA-3 guidelines.

Many listed wall assemblies require a reduction in the structural capacity of framing members. Verify the requirements of any assembly chosen and coordinate with the structural designer to ensure compliance.

Plan Submittal Considerations

This policy allows for the use of sacrificial wood to provide the required char depth. This sacrificial wood must be in addition to any framing that is required for the structural design. Due to this, it is important that the structural plans and the architectural plans are coordinated to provide consistency. Some items to consider are:

- The required location of FRT framing should be specified on both structural and architectural plans.
- The structural design should account for reduced design values for FRT lumber based on known or assumed adjustment factors.
- Fasteners for FRT framing should be specified as required in IBC 2304.10.5.3.
- Bearing walls should be clearly identified on both the structural and architectural plans.
- Where sacrificial wood is specified on the architectural plans, the design and detailing of the structural should account for the effective char depth per NDS 16.2.

Firestopping of Penetrations

The use of this policy may create a situation where penetrations are needed to run into the wall assemblies through the exposed sacrificial lumber. These penetrations are required to be protected per IBC 714. The majority of listed firestopping assemblies are tested installed into an assembly that is enclosed in gypsum board. In order to maintain the integrity of the rating the penetration is required to be firestopped following one of the methods below:

- A listed firestop system that is tested installed in exposed lumber.
- The exposed lumber is covered by a gypsum board patch into which the firestop can be installed per the listing.
- An engineering judgement is provided for any firestop system used that is not in accordance with the listing.

Rated Exterior Walls in Type III & Type V Construction

IBC Section 601 requires exterior walls of Type III construction to be of non-combustible or FRT wood. Based on the DCA-3 document, the City of Bellevue does not require rim joists, rim boards and blocking located within the floor assembly to be FRT lumber.

For exterior walls where the Fire Separation Distance (FSD) is greater than 10 feet, IBC 705.5 allows the exterior wall to be fire-resistance rated for exposure from the interior of the building only. This is often incorrectly interpreted as the ability to remove the layers of gypsum board from the exterior side of the exterior wall. **Note:** Where a listed wall assembly is used, the removal of the exterior gypsum board is not permitted unless the assembly is listed/tested with the exterior layer(s) removed (i.e., typically designed as an asymmetrical assembly).

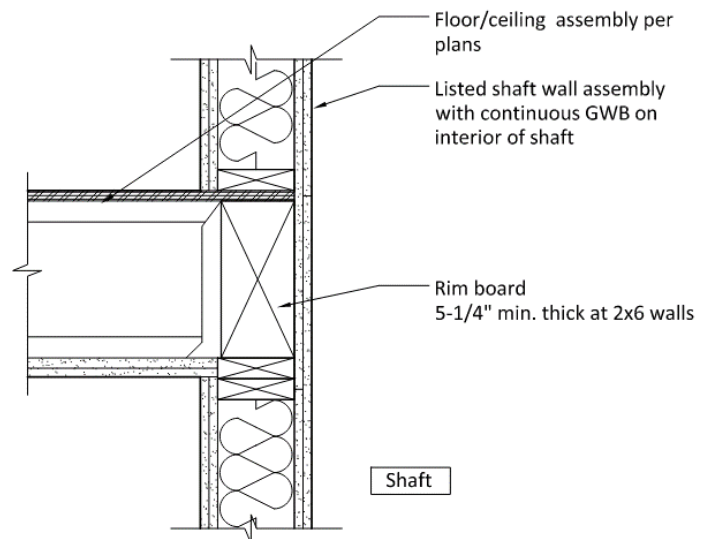
Interior Shaft Walls

(Note: for information on exhaust, grease, and utility shaft requirements see the Bellevue Shaft Requirements policy found [here](#))

Typically, the code treats shafts more conservatively than other fire-resistance rated walls with additional code requirements in IBC 713 and 716. Where located between floor assemblies, IBC 707.5 requires that a fire barrier be continuous from the top of the floor assembly below to the underside of the slab or deck above. Where floors are platform framed, the gypsum board layers terminate at the underside of the floor framing instead of at the underside of the floor sheathing. This does not meet the code requirements of 707.5. For fire-rated shaft walls it is acceptable to terminate the gypsum board layers at the underside of the ceiling assembly in accordance with one of the options below. Note that all options require that the floor/ceiling assembly be enclosed on the underside by gypsum board.

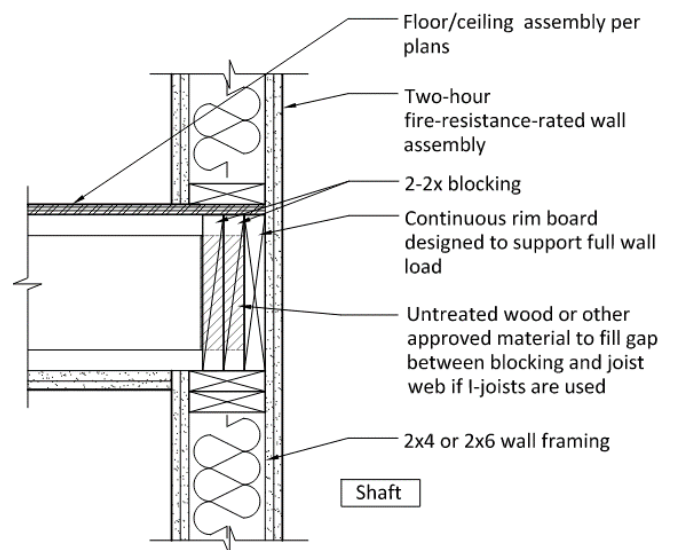
Two-Hour Rated Shaft Walls Option A:

1. The gypsum board layers are continuous on the shaft side of the assembly in accordance with the assembly listing.
2. The rim board is a minimum 5 ¼ inch thickness in a 2x6 wall.
3. Where the rim board acts as a structural beam, the design of the beam accounts for a 2-hour effective char depth in accordance with NDS Section 16.2.1.



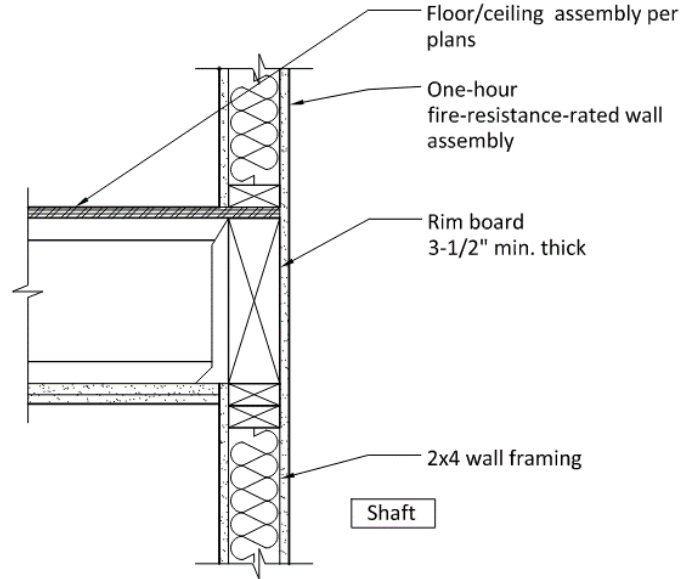
Two-Hour Rated Shaft Walls Option B:

1. The gypsum board layers are continuous on the shaft side on the shaft side of the assembly in accordance with the assembly listing.
2. Solid blocking is provided between the joists to provide for 2-hours of char depth calculated in accordance with NDS Section 16.2.1. A minimum of Two 2x blocking is required.
3. Where I-joists are used, untreated wood or other approved material is required to completely fill the gap between the blocking and joist web.



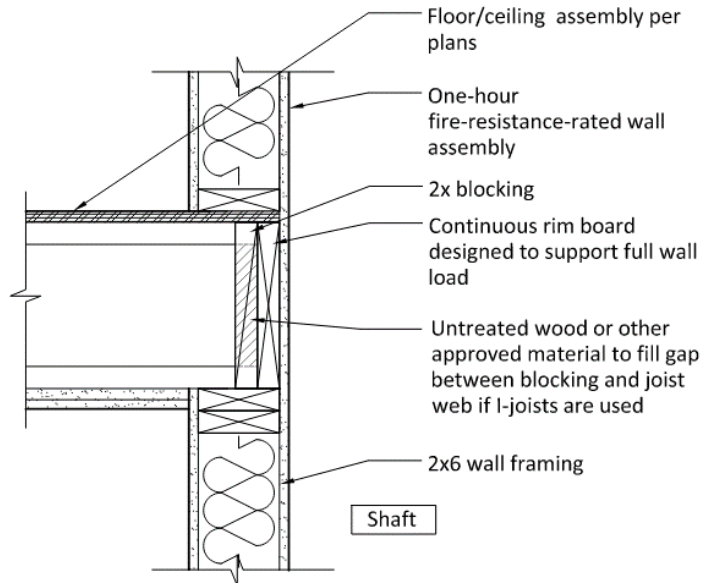
One-Hour Rated Shaft Walls with 2x4 framing:

1. The gypsum board layers are continuous on the shaft side of the assembly in accordance with the assembly listing.
2. The rim board is a minimum 3.5-inch thickness in a 2x4 wall.
3. Where the rim board acts as a structural beam, the design of the beam accounts for 1-hour effective char depth in accordance with NDS Section 16.2.1.



One-Hour Rated Shaft Walls with 2x6 framing:

1. The gypsum board layers are continuous on the shaft side of the assembly in accordance with the assembly listing.
2. Solid blocking is provided between the joists to provide 1-hour of char depth calculated in accordance with NDS Section 16.2.1. A minimum of one 2x sacrificial blocking is required.
3. Where I-joists are used, untreated wood or other approved material is required to completely fill the gap between the blocking and joist web.



Signature Gregg Schrader

Date: 05/24/2023

Gregory H. Schrader, PE, SE, Building Official

Attachments

Supersedes: _____