

**Glanda Thomas**

**From:** Bhol, Saroj [sbhol@panynj.gov]  
**Sent:** Wednesday, December 08, 2010 11:32 AM  
**To:** Fatma Amer  
**Cc:** James Colgate; Keith Wen; Lin, C. John; Palmieri, Mario  
**Subject:** WTC-Fire proofing of Oculus frame  
**Attachments:** WTC HUB.PDF

Fatma,

I would appreciate an opinion from DOB on a fire proofing question. I left you a message morning. I thought it may be easier for you if I send you the details.

The WTC transportation Hub is designed as Construction Class 1-C per the 1968 code. For 1-C construction, columns, girders, trusses (other than roof trusses) require 1-1/2 hr fireproofing, as per Table 3-4, but the roof construction that is 20 feet or more above floor may not require fireproofing except for occupancy groups A, B-1, B-2 and D-1. IBC also has similar provision for roof and the IBC commentary (attached) clarifies that the fire resistance rating of columns must be continuous for the full height of the column and not reduced or eliminated at height of 20 feet. The oculus at the WTC Transportation Hub is a unique structure (See attachment for cross section) and the portal frames rise more than 160 feet above the plaza level. These are the main supporting members and are designed to be fireproofed for the full height based on the fireproofing requirements for columns, girders, and framing in Table 3-4.

Please let me know your thoughts on the fire proofing of the portal frames.

Thanks

Saroj

<<WTC HUB.PDF>>

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*Glanda,  
Set up a conf.  
call w/*

*Saroj*

*+ James  
Palmieri*

12/8/2010

Figure 3

Exposure Fire Separation Distances

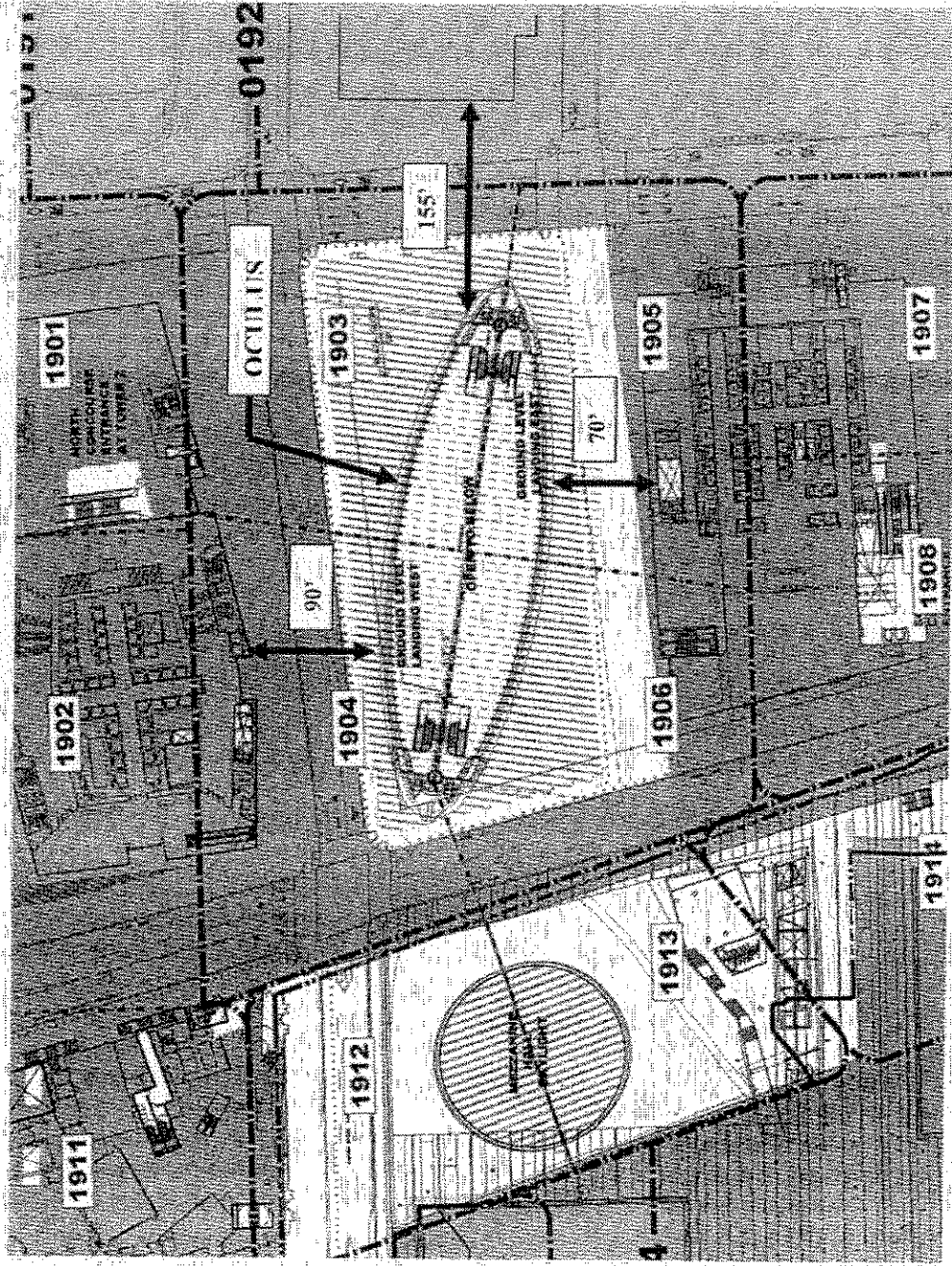


Figure 1  
Lateral Section Through Oculus

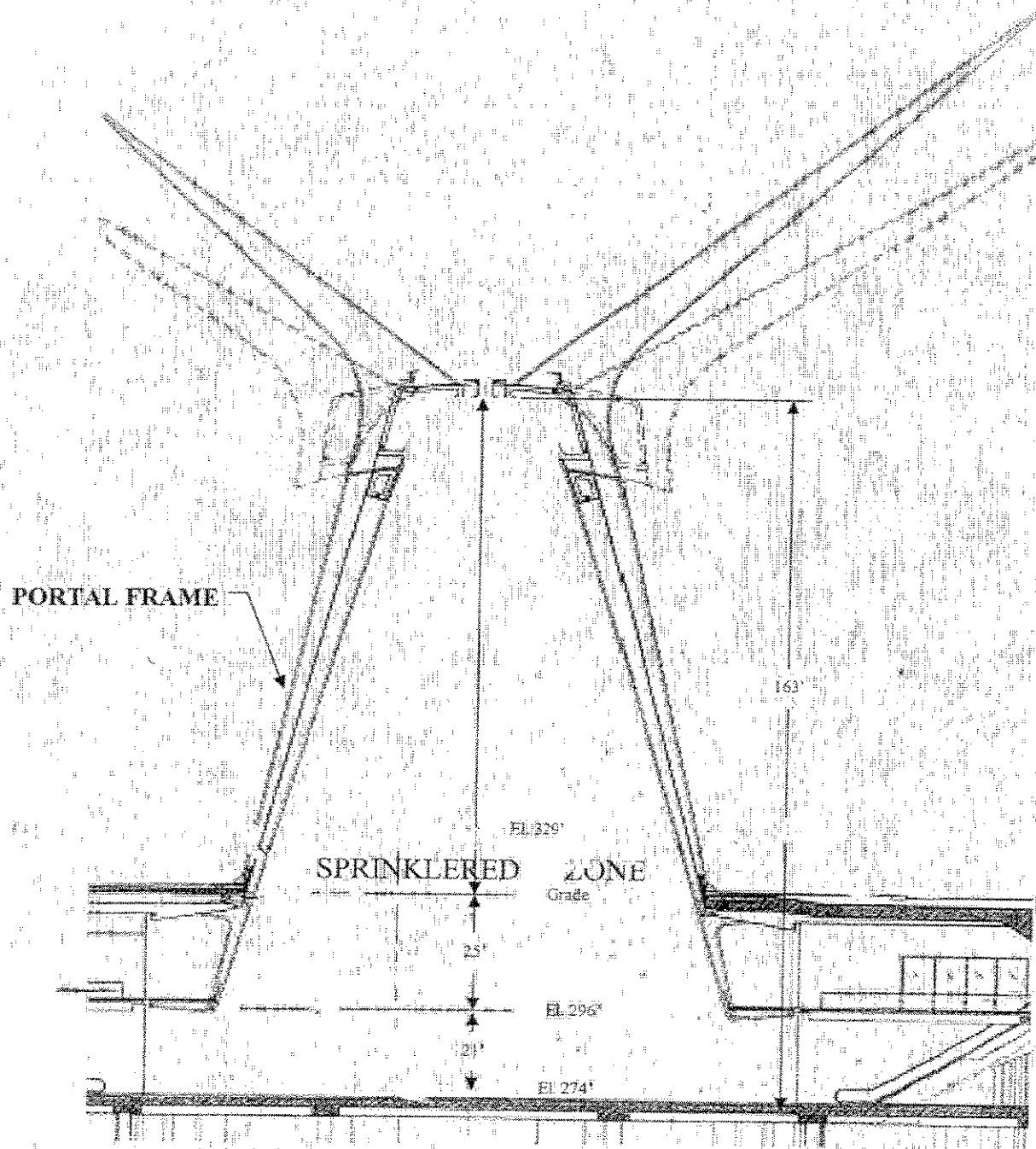


Figure 2

BCCNY Table 3-4

TABLE 3-4		TABLE 3-4											
TABLE 3-4 CONSTRUCTION CLASSIFICATIONS	CONSTRUCTION ELEMENT	CLASS I-A		CLASS I-B		CLASS I-C		CLASS I-D		CLASS I-E		CLASS I-F	
		Rating in Hrs.	Ext. Openings	Rating in Hrs.	Ext. Openings	Rating in Hrs.	Ext. Openings	Rating in Hrs.	Ext. Openings	Rating in Hrs.	Ext. Openings	Rating in Hrs.	Ext. Openings
CONSTRUCTION GROUP 1 NONCOMBUSTIBLE	Bearing 3'-0" or less	1	N.P.	2	N.P.	2	N.P.	2	N.P.	2	N.P.	2	N.P.
	Non-bearing More than 3'-0" but less than 15'-0"	1	3 1/3 %	2	3 1/3 %	2	3 1/3 %	2	3 1/3 %	2	3 1/3 %	2	3 1/3 %
	Non-bearing 15'-0" or more but less than 30'-0"	2	protected	2	protected	2	protected	2	protected	2	protected	2	protected
	Non-bearing 30'-0" or more	2	3 1/3 %	2	3 1/3 %	2	3 1/3 %	2	3 1/3 %	2	3 1/3 %	2	3 1/3 %
	Non-bearing Interior bearing walls and bearing partitions	1	N.L.	2	N.L.	2	N.L.	2	N.L.	2	N.L.	2	N.L.
Required fire-resistance ratings of construction elements in hours, based on the test procedures of reference standard RS 3-1.	Enclosure of vertical exit, exit passageway, highway, and shaft, Fire divisions and fire separations	2		2		2		2		2		2	
	Columns, girders, trusses (other than roof trusses) and framing	2		2		2		2		2		2	
	Supporting one floor	2		2		2		2		2		2	
	Supporting more than one floor	2		2		2		2		2		2	
	Structural members supporting a wall	2		2		2		2		2		2	
Key: N.P. - Not permitted. N.L. - No limit. Noncombustible Materials	Floor construction including beams	2		2		2		2		2		2	
	Roof construction, including rafters, trusses and framing	2		2		2		2		2		2	
	Roof construction, including rafters, trusses and framing	2		2		2		2		2		2	
	Roof construction, including rafters, trusses and framing	2		2		2		2		2		2	
	Roof construction, including rafters, trusses and framing	2		2		2		2		2		2	

Notes:  
1. The use of openings permitted in exterior walls at any story shall be obtained by multiplying the percentage shown to the right by the exterior separation distance in feet, and then multiplying the product by the square foot area of the hole. Requirements for protected exterior openings shall not apply to openings in exterior walls of buildings classified in Occupancy Groups 1-3 and 1-3 provided, however, said openings do not extend in roof area 10% of the depth of the story in which they are located. The opening, however, may not be closed in such manner as to prevent light or ventilation requirements of Art. 12. Protection of openings with an exterior separation of 3 ft to 30 ft shall not be required for 1-3 and 1-3 occupancy groups. 1-4  
2. Notwithstanding to occupancy groups 1-3 and 1-3. See section 27-331 of subchapter of subchapter 1-4 of this chapter for additional requirements for exterior walls and openings. 1-4  
3. Upon special application, the commissioner may permit exterior wall openings to be constructed in excess of the permitted area established by table 3-4 if such openings, in the case of their construction for fireproofing, are intended to be enclosed. 1-4  
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98. Occupancy groups 1-3 and 1-3. 1-4  
99. Occupancy groups 1-3 and 1-3. 1-4  
100. Occupancy groups 1-3 and 1-3. 1-4

lural partitions are required to maintain a minimum degree of fire resistance. Structural frame elements supporting such walls must comply with Table 601 as well as have at least the same degree of fire resistance as the wall supported.

**Row 4. Floor construction.** Floor construction provides a natural fire compartment in a building by means of a horizontal barrier that retards the vertical passage of fire from floor to floor. In order to accomplish this, floor assemblies, including the beams and structural members supporting the floor, must comply with Table 601 and Section 710. Ceilings are included if they are part of the tested assembly.

**Row 5. Roof construction.** Proper roof construction is necessary to prevent collapse from fire as well as potential impingement on adjacent buildings. Roof construction must comply with Table 601 and Section 710. It should be noted that when a portion of the roof construction is located below the height limitation, the entire structural member must be protected to meet the minimum fire-resistance rating requirements (see Figure 601). Additionally, the fire-resistance rating of a column must be continuous for the full height of the column and not reduced or eliminated at a height of 20 feet (6096 mm) and above (see Note c, Item 1).

Note a clarifies the extent of the structural frame of the building or structure. Any structural item that provides direct connections to

columns and bracing members which are designed to carry a gravity load is considered part of the structural frame. Secondary members (e.g., floor or roof panels without connection to the column) are not considered part of the structural frame and as such, are not required to be rated in accordance with Table 601.

Note b permits the fire-resistance ratings of structural frame and interior load-bearing walls in buildings of Type I and II construction to be reduced by 1 hour if the members are supporting only the roof.

Note c, Item 1 permits the roof construction to not have a fire-resistance rating when all structural members of the roof are at least 20 feet (6096 mm) above the floor immediately below. This alternative is applicable for all use groups except Groups F-1, H, M and S-1. In buildings of Type I and II construction, fire-retardant-treated wood may be utilized for the unprotected roof members.

Note c, Item 2 permits heavy timber construction to be utilized in the roof construction as an alternative to having a fire-resistance rating of 1 hour or less.

Note c, Item 3 permits roof construction in buildings of Type I and II construction to include FRTW as long as the building is no greater than two stories in height.

Note d permits buildings of Type IIA, IIA and VA construction to use an automatic sprinkler system in compliance with NFPA 13 as an alternative to 1-hour fire-resistance-rated construction. In order to utilize the

