



DEPT OF BLDGS 121184841

Job Number



ES029091933

Scan Code

CCD1: Construction Code Determination Form

☒ Orient and affix BIS
job number label here ☒

Must be typewritten.

Do not use this form for Zoning Resolution determination requests - use ZRD1 form

1 Location Information Required for all requests on filed applications.

House No(s) 550

Street Name WEST 34TH STREET

Borough Manhattan

Block 705

Lot 1

BIN 1089412

CB No. 104

2 Applicant Information Required for all requests on filed applications.

Last Name POMERANTZ

First Name GARY

Middle Initial H

Business Name WSP PARSONS BRINCKERHOFF

Business Telephone (212) 465-5000

Business Address ONE PENN PLAZA, 2ND FL, 250 W. 34TH ST

Business Fax () -

City NEW YORK

State NY

Zip 10019

Mobile Telephone () -

E-Mail GARY.POMERANTZ@WSPGROUP.COM

License Number 062597

License Type ☒ P.E. ☐ R.A. ☐ RLA

DOB PENS ID # (if available)

3 Attendee Information Required if different from Applicant in section 2 or no Applicant.

Relationship to the property: ☐ Attorney (Predetermination Only) ☒ Filing Representative (Class 2) ☐ Other

Last Name MATTY

First Name ADAM

Middle Initial J

Business Name KM ASSOCIATES OF NY, INC.

Business Telephone (212) 563-6760

Business Address 158 WEST 29TH STREET 7TH FLOOR

Business Fax (212) 563-6753

City NEW YORK

State NY

Zip 10001

Mobile Telephone (646) 423-7655

E-Mail amatty@kmaofny.com

License/Registration # (if P.E./R.A./R.L.A./Attorney) 001820

4 Nature of Request Required for all requests. Only one request may be submitted per form.

Determination request is for: ☐ Determination ☒ PredeterminationDetermination request issued to: ☒ Borough Commissioner's Office ☐ Technical AffairsJob associated with this request? ☒ Yes (provide job # / doc # / obj # / examiner name below) ☐ No

Job #: 121184841

Document #: 01

Objection #:

Examiner: DAMIAN TITUS

Has this request or a similar one been previously denied? ☒ Yes (attach all denied request form(s) and attachment(s)) ☐ No

Enter short description of Technical Topic (5 words or less): As-Built Fuel Oil Vault Construction

Construction Code (if applicable): ☐ 2014 Code ☒ 2008 Code ☐ 1968 Code ☐ Prior to 1968 Code

Enter All Control #(s) for related CCD1/ZRD1 requests:

TPPN, Memo:

Zoning District(s): C6-4

MDL:

Zoning Overlay(s):

BBs:

Special District(s): HY

Other:

ZR Section:

Code Section: MC 1305.11.1.2

Rule #:

Indicate all Buildings Department
officials that you have previously
reviewed this issue with (if any):

☐ Borough Commissioner☐ Code & Zoning Specialist☐ General Counsel's Office☐ Deputy Borough Commissioner☐ Chief Plan Examiner☐ Other

ADMINISTRATIVE USE ONLY

Control #: 48765

Appointment Scheduled With:

Comments:

Review Team Members:

Reviewed By:

REVIEWED BY
Appointment date:
Marshall A. Kaminer, PE
Executive Engineer
Technical Affairs

M.Kaminer, E.Mattfield, J.Kim

Date

APPROVED
WITH CONDITIONS

Control No.: (48765)
Date: 6/21/2017
Page: 1 of 18

See comments on
pages 4 to 5

5	Description of Request (utilize page 3 / section 7 if additional space is needed to properly describe this request)
<p>This is a request for:</p> <p><input type="checkbox"/> Interpretation or clarification</p> <p><input checked="" type="checkbox"/> Variation of Building Code or Rules per § 28-103.3 (please state in detail the practical difficulty that is specific to this project, and provide the analysis as to equally safe alternative, as per NYC Charter Section 645(b)(2))</p> <p><input type="checkbox"/> Variation of Multiple Dwelling Law (MDL) § 277.16 for Article 7B Buildings (please state in detail the practical difficulty that is specific to this project and provide the analysis as to equally safe alternative, as per NYC Charter Section 645(b)(2))</p> <p><i>Note: Variations of any other MDL provisions must be filed with the Board of Standards and Appeals (BSA) per MDL § 310.</i></p>	

Please itemize all attachments, including plans/sketches, submitted with this form. (**attachment may not be larger than 11" x 17"**)
 If request is based on a plan examiner objection, type in the applicable objection text exactly as it appears on the Objection sheet and include a copy of the Objection sheet in the submitted Pdf.

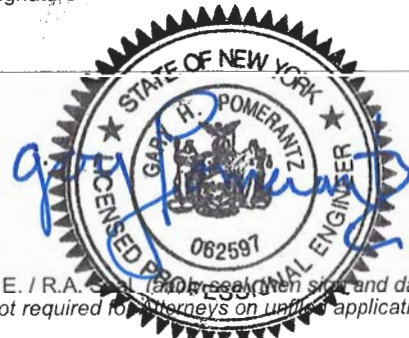
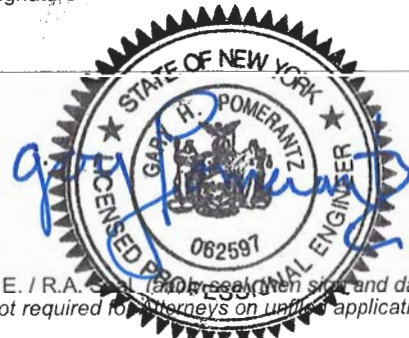
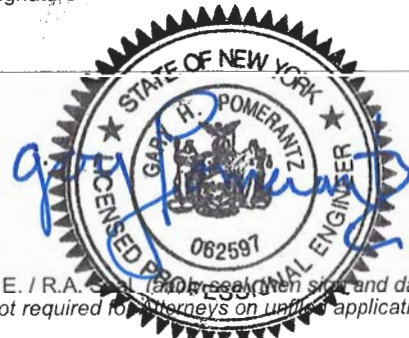
Re: 550 West 34th Street aka 55 Hudson Boulevard, Manhattan
 Summary / Itemization of Attachments:

1. SKM-20170509-1
2. SKM-20170509-2
3. Report Issued by Jensen Hughes dated 5/2/2017

The Project Site is located in Subarea A2 of the Special Hudson Yards District on the west side of the new Hudson Boulevard on the north side of West 33rd Street. The Project Site is an approximately 40,000 sf parcel bounded by Eleventh Avenue on the west, West 33rd Street on the south, West 34th Street on the north, and Hudson Boulevard on the east. The New (51) story Building application #121184841 has been filed, approved and permitted under the 2008 building code. At this time we respectfully request clarification as it relates to the Fuel Oil Storage within buildings as follows:

Section 1305.11.1.2 Exception #3 of the 2008 New York City Mechanical Code states where a limit of 100,000 gallons of fuel oil is desired that the fuel oil tanks, not exceeding 25,000 gallons each, shall be "enclosed in a vault with walls, floor, and top having a fire resistance rating of not less than 3 hours, with such top and walls independent of the building structure....The vault shall be located in a dedicated room or area of the building that is cut off vertically and horizontally from other areas and floors of the building by assemblies having a fire resistance rating of not less than 2 hours."

Note: Buildings Department Determination will be issued on the CCD1 Response Form

6	Statements and Signature Required for all requests (If Attorney, include "Esquire" or "Esq." in signature)								
<p>I hereby state that all of the above information is correct and complete to the best of my knowledge. Falsification of any statement is a misdemeanor and is punishable by a fine or imprisonment, or both. It is unlawful to give to a City employee, or for a City employee to accept, any benefit, monetary or otherwise, either as a gratuity for properly performing the job or in exchange for special consideration. Violation is punishable by imprisonment or fine, or both.</p>									
<table border="1" style="width: 100%;"> <tr> <td style="width: 60%;">Name (please print) GARY POMERANTZ</td> <td style="width: 40%;">Date</td> </tr> <tr> <td colspan="2">Signature</td> </tr> <tr> <td colspan="2" style="text-align: center;">  </td> </tr> <tr> <td colspan="2"> PE. / R.A. (Not required for attorneys on uniform applications) </td> </tr> </table>		Name (please print) GARY POMERANTZ	Date	Signature				PE. / R.A. (Not required for attorneys on uniform applications)	
Name (please print) GARY POMERANTZ	Date								
Signature									
									
PE. / R.A. (Not required for attorneys on uniform applications)									
<table border="1" style="width: 100%;"> <tr> <td style="width: 60%;"> REVIEWED BY Marshall A. Kaminer, PE Control #: Executive Engineer Technical Affairs </td> <td style="width: 40%;"> Date: </td> </tr> </table>		REVIEWED BY Marshall A. Kaminer, PE Control #: Executive Engineer Technical Affairs	Date:						
REVIEWED BY Marshall A. Kaminer, PE Control #: Executive Engineer Technical Affairs	Date:								

ADMINISTRATIVE USE ONLY
Reviewed By:

APPROVED WITH CONDITIONS Control No.: (48765) Date: 6/21/2017 Page: 2 of 18
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**See comments on
pages 4 to 5**

7 Description of Request (use this section if additional space is required for description)

Re: 550 West 34th Street aka 55 Hudson Boulevard, Manhattan

The current vault which is already constructed and is an existing "as-built" condition will be used to house four (4) 8,000 gallon fuel oil tanks for a total storage of 32,000 gallons on the lowest level. The as-built ceiling of the vault is currently a 24" deep concrete slab and the walls are currently 3 hour rated masonry. Based on the previously denied CCD-1 (see attached) it had been requested to utilize the the existing 24" deep ceiling slab without any additional remediation as an equivalent to the intent of the code. It was also stated that additional 3 hour partitions would be erected inside the three hour masonry walls on the existing vault. The following two hardships have been encountered when attempting to bring the as-built vault in concurrence with the 2008 Mechanical Code:

1. A horizontal 3 hour partition can not be constructed to augment the as-built ceiling construction as a self-supported UL listed 3 hour partition does not exist, and based on the as-built construction of the current vault a cast in place concrete slab is not currently feasible to construct.
2. In an effort to follow the aforementioned code section as closely as possible a two hour rated ceiling partition was evaluated (as indicated in the attached sketch) however the addition of the partition construction posed a maintenance clearance issue with the fuel oil tanks. The resultant clearance of nominally 1'-7" from the top of the tank man-way to the new partition is not enough for proper service of the tank. A minimum of 2' is required to open the man way hatch on top of the tank.


Based on these hardships we are seeking either relief or a code variation to the MC section 1305.1.2 to provide a structurally independent fuel oil vault. We are asking that the existing 24" thick concrete slab be accepted as the sole ceiling system for the vault. As part of the submission of this CCD-1 as an attachment, a report produced by Jensen Hughes provides documentation indicating the fire rating of the existing 24" deep slab exceeds the cumulative fire rating of the code prescribed 2 hour and three hour vault envelope requirements at a thickness of less than 8". As such we are asking that the as-built 24" thick vault ceiling be used as an equivalent to the construction indicated within the code. 3 hour rated wall partitions (also structurally attached to the 24" deep ceiling slab) shall still be erected to the inside of the existing three hour rated masonry wall in an effort to comply with the intention of the Mechanical Code with regards to the adjacent spaces in the sub cellar (per the attached sketches SKM-20170509-1 and -2).

Based on the above we look forward to your favorable decision. _____

Note: Buildings Department Determination will be issued on the CCD1 Response Form

8 Statements and Signature Required for all requests (If Attorney, include "Esquire" or "Esq." in signature)

I hereby state that all of the above information is correct and complete to the best of my knowledge. Falsification of any statement is a misdemeanor and is punishable by a fine or imprisonment, or both. It is unlawful to give to a City employee, or for a City employee to accept, any benefit, monetary or otherwise, either as a gratuity for properly performing the job or in exchange for special consideration. Violation is punishable by imprisonment or fine, or both.

Name (please print) GARY POMERANTZ	
Signature	Date
	
P.E. / R.A. Seal (apply seal, then sign and date over seal - not required for attorneys on unfilled applications)	

SIGN & SEAL

ADMINISTRATIVE USE ONLY	Reviewed By: _____	Date: _____
	<p>REVIEWED BY Marshall A. Kaminer, PE Control #: _____ Executive Engineer Technical Affairs</p>	

APPROVED WITH CONDITIONS

Control No.: **(48765)**

Date: **6/21/2017**

Page: **3 of 18**

See comments on pages 4 to 5

ZRD1/CCD1 Response Form

Location Information (To be completed by a Buildings Department official if applicable)

House No(s) 550

Street Name W 34th aka 55 Hudson Blvd

Borough Manhattan

Block 705

Lot 1

BIN 1089412

Job No. 121184841

DETERMINATION (To be completed by a Buildings Department official)

Request has been: ☐ Approved ☐ Denied ☒ Approved with conditions

Follow-up appointment required? ☐ Yes ☒ No

Primary Zoning Resolution or Code Section(s): BC Section 703, MC Section 1305, BC Section 721

Other secondary Zoning Resolution or Code Section(s):

Control Number: 48765

Comments:

In consideration of the NYC Mechanical Code ("MC") 1305.11.1.2(3) requirements and the supplementary information submitted by the applicant, the applicant's proposed construction of the fuel oil tank room is hereby conditionally approved.

Pursuant to MC 1305.11.1.2(3), "buildings of any type construction with a total limit of 100,000 gallons, the maximum size of each individual tank shall be 25,000 gallons (94 625 L) provided that all such tanks are enclosed in a vault (i) with walls, floor and top having a fire resistance rating of not less than 3 hours, (ii) with such walls bonded to the floor, and (iii) with such top and walls of the vault independent of the building structure." Subsection 3 continues to state that "the vault shall be located in a dedicated room or area of the building that is cut off vertically and horizontally from other areas and floors of the building by assemblies having a fire-resistance rating of not less than 2 hours."

The applicant proposes a ceiling assembly design UL K506, comprised of a triple layer of 5/8" Type X gypsum board attached to the 24" normal weight concrete structural slab with 20 ga 6" steel c-channels. A fourth layer of 5/8" Type X gypsum board is hung below using 26 ga 7/8" steel straps, 16" on center. Pursuant to NYC Building Code ("BC") Section 703.2, "The fire-resistance rating of building elements, components or assemblies shall be determined in accordance with the test procedures set forth in ASTM E119 or UL 263 or in accordance with Section 703.3." This proposed ceiling assembly design is certified by UL after testing to UL 263 standards and therefore provides a two-hour fire resistance rating that meets BC 703 requirements.

Pursuant to the BC 721.2.1.4(2) table of fire resistance ratings, the proposed installation of an additional pair of 5/8" Type X gypsum board layers directly to the underside (face of fire exposure) of the UL K506 ceiling assembly will add 80 minutes to the required 2 hour rating of the ceiling assembly.

continued on page 5.

Name of Authorized Reviewer (please print): Marshall A. Kaminer, P.E.

Title (please print): Chair, Code and Zoning Task Force

Authorized Signature:

RENEWED BY
Marshall A. Kaminer, PE

Date:

Executive Engineer

Technical Affairs

Issuers: write signature, date, and time on each page of the request forms, and attach this form.

Note: Determination will expire if construction document approval is not obtained within 12 months of issuance.

APPROVED
WITH CONDITIONS
Control No.: (48765)
Date: 6/21/2017
Page: 4 of 18

See comments on
pages 4 to 5

12/15

ZRD1/CCD1 Response Form

Location Information (To be completed by a Buildings Department official if applicable)

House No(s) 550

Street Name W 34th aka 55 Hudson Blvd

Borough Manhattan

Block 705

Lot 1

BIN 1089412

Job No. 121184841

DETERMINATION (To be completed by a Buildings Department official)

Request has been: ☐ Approved ☐ Denied ☒ Approved with conditions

Follow-up appointment required? ☐ Yes ☒ No

Primary Zoning Resolution or Code Section(s): BC Section 703, MC Section 1305, BC Section 721

Other secondary Zoning Resolution or Code Section(s):

Control Number: 48765

Comments:

Continued from page 4.

The applicant also proposes walls for the fuel oil tank room. In compliance with MC 1305.11.1.2(3), the walls will be constructed of 3-hour fire resistance rated UL U415 System G or H designs. UL U415 is certified by UL in accordance with the test procedures set forth in standard UL 263 and is therefore in compliance with BC Section 703.2 requirements.

Finally, the applicant proposes to utilize an existing 24" concrete slab (The switchgear room) directly above the fuel oil tank room. This complies with the MC 1305.11.1.2(3) requirements for the building structure surrounding the fuel oil tank room. However, per Table BC 720.1(3), applicant must confirm at least 3/4" concrete cover on the rebar. In consideration of the above information, the proposed fuel oil tank room walls and ceiling and the existing adjacent structure comply with the New York City Construction Code fire resistance rating requirements. Therefore, the applicant's request is hereby approved with the following conditions:

1. Applicant must submit revised documents, to be verified by examiner, incorporating clarification on 24" slab directly above fuel oil tank room and the building structure surrounding fuel oil tank room, to ensure that at least a 3/4" concrete cover on rebar is provided in accordance with BC Table 720.1(3).
2. Applicant must utilize either System G or H of the selected UL design UL U415.

Name of Authorized Reviewer (please print): Marshall A. Kaminer, P.E.

Title (please print): Chair, Code and Zoning Task Force

Authorized Signature:

Marshall A. Kaminer, PE
Executive Engineer

Date:

Issuers: write signature, date, and time on each page of the request forms, and attach this form.

Note: Determination will expire if construction document approval is not obtained within 12 months of issuance.

**APPROVED
WITH CONDITIONS**
Control No.: (48765)
Date: 6/21/2017
Page: 5 of 18

**See comments on
pages 4 to 5**

12/15

Elizabeth Mattfield (Buildings)

From: Pomerantz, Gary <Gary.Pomerantz@wsp.com>
Sent: Tuesday, June 13, 2017 5:35 PM
To: Elizabeth Mattfield (Buildings)
Cc: Marshall A. Kaminer (Buildings); Schurott, Louis P.
Subject: RE: CCD1 (48765) - Manhattan Determination Request for 550 W 34th Street, MN
Attachments: 20170605_Fuel Oil Tank Room_PLAN.PDF; 20170605_Fuel Oil Tank Room_SECTION.PDF; 20170605_Fuel Oil Tank Room_DETAIL.PDF

Dear Elizabeth,

The following is our response to the DOB questions regarding our CCD for fuel oil tank room construction. Supplemental information describing the room construction in the form of sketches is attached.

Referring to the sketches, the fuel oil storage is constructed with a 3 hour rated enclosure inside of a 3 hour rated room. The inner room is constructed of gypsum board. The ceiling assembly consists of a 2 hour rated membrane in accordance with UL K506. In-board of this assembly is a gypsum board assembly that provides an additional 80 minutes of fire resistance. The inner assembly is constructed in accordance with NYC BC 721.2.1.4(2). The overall assembly has a fire resistance in excess of 3 hours.

The inner walls are constructed of gypsum board and have a 3 hour fire resistance. The walls are in accordance with UL DES U415.

The outer ceiling is constructed of a 24" concrete slab and has a fire resistance rating of 3 hours. The outer walls are constructed of 8" concrete block and have a 3 hour fire resistance.

Access to the fuel oil room is through 2 vestibules. The inner and outer doors of the vestibule have a fire resistance rating of 3 hours. The doors and the vestibule walls maintain the continuous rating of a 3 hour inner enclosure fire resistance within a 3 hour outer room fire resistance.

In our professional opinion, the proposed design meets the intent of the NYC Mechanical Code. The design of the fuel oil tank room consists of a room with a 3 hour resistance rating inside of a room with a 2 hour resistance rating.

We request that the design described in the attached sketches be approved as an alternate to the prescriptive method described in the NYC Mechanical Code.

Thank you for your consideration.

Gary Pomerantz, PE, LEED
Executive Vice President
Building Systems



Direct: +1 (212) 951-3970
Main: +1 (212) 465-5000
Mobile: +1 (917) 865-6176



**See comments on
pages 4 to 5**

WSP USA
One Penn Plaza, 2nd floor
250 W 34th Street
New York, NY 10119

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**See comments on
pages 4 to 5**

55 HUDSON YARDS

Address
550 W 34th St.
New York, NY 10001



Client
Related Companies
60 Columbus Circle
New York, NY 10023
Tel: 212.301.1000 Fax: 212.301.1048

General Contractor
Oshkosh Properties Group
320 Park Avenue, 17th Floor
New York, NY 10022
Tel: 212.386.7514 Fax: 212.386.7510

MEP Engineer
Mitsui Hudson America, Inc.
111 West 42nd Street, 10th Floor
New York, NY 10018
Tel: 212.401.5000 Fax: 212.401.5057

Architect
Kohn Pedersen Fox Associates PC
11 West 42nd Street, 10th Floor
New York, NY 10018
Tel: 212.377.6500 Fax: 212.377.6526

Structural Engineer
WSP
111 West 42nd Street, 1st Floor
New York, NY 10017
Tel: 212.687.9888 Fax: 646.487.5501

Mechanical, Electrical, Plumbing, Fire Protection
Engineer
McGraw Hill Construction
312 Seventh Avenue
New York, NY 10018
Tel: 212.512.1000

Date Created 06/05/2017

Project No.

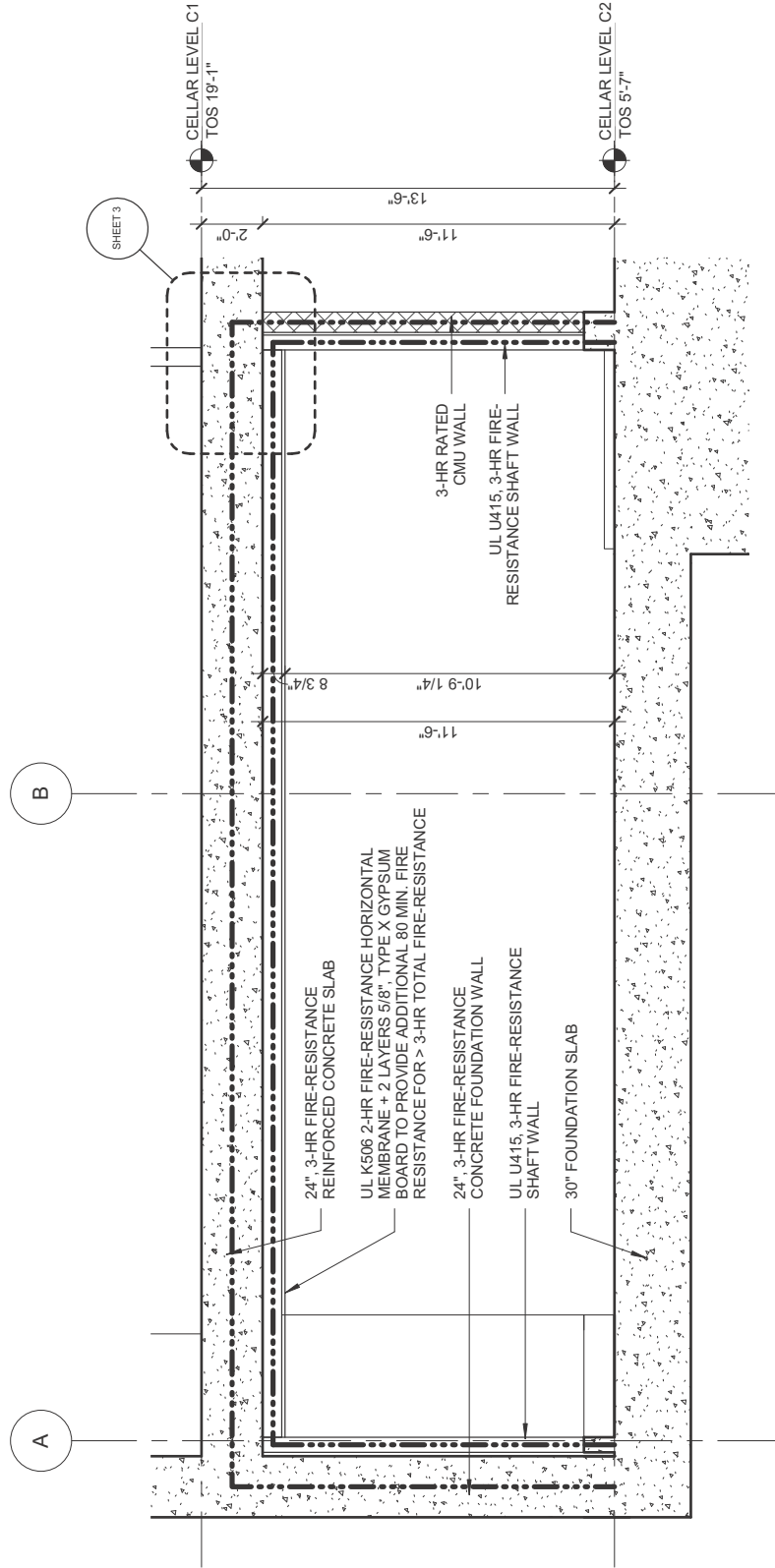
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Drawn By

Checked By

Drawing Title
FUEL OIL TANK ROOM -
SECTION

See Comments on
SHEET 2 OF 3
pages 4 to 5



REVIEWED BY
Marshall A. Kaminer, PE
Executive Engineer
Technical Affairs

APPROVED
WITH CONDITIONS
Control No.: (48765)
Date: 6/21/2017
Page: 8 of 18

55 HUDSON YARDS

Address
550 W 34th St.
New York, NY 10001



Client
Related Companies
60 Columbus Circle
New York, NY 10023
Tel: 212.301.1000 Fax: 212.301.1048

Owner
Oakland Properties Group
230 Park Avenue, 17th Floor
New York, NY 10022
Tel: 212.386.7244 Fax: 212.386.7250

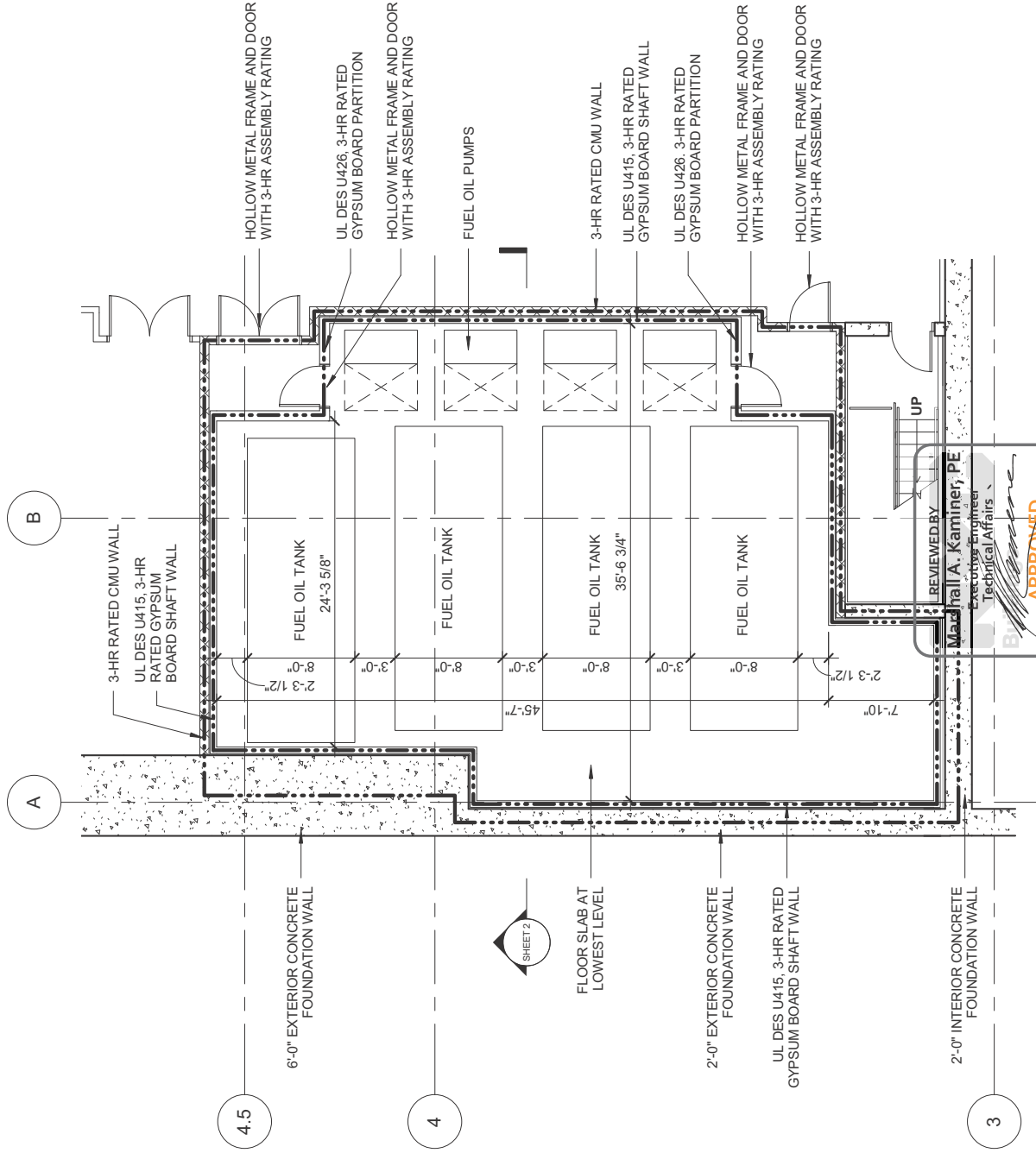
Architect
Skidmore, Owings & Merrill
111 West 42nd Street
New York, NY 10036
Tel: 212.377.6500 FAX: 212.366.2526

Structural Engineer
WSP
300 West 45th Street, 3rd Floor
New York, NY 10017
Tel: 212.687.9888 Fax: 646.487.5501

Mechanical, Electrical, Plumbing, Fire Protection
312 Seventh Avenue
New York, NY 10018
Tel: 212.332.0600

Date Created 06/05/2017
Project No.
Scale 1/8" = 1'-0"
Drawn By
Checked By
Drawing Title
FUEL OIL TANK ROOM -
PLAN

See Comments on
SHEET 1 OF 5
pages 4 to 5



REVIEWED BY
Maxwell A. Kaminer, PE
Executive Engineer
Technical Affairs

APPROVED
WITH CONDITIONS
Control No.: (48765)
Date: 6/21/2017
Page: 9 of 18

442'±
550 W 34th St.
New York, NY 10001



Client:
Related Companies
60 C. Columbus Circle
New York, NY 10023
Tel: 212.301.1000 Fax: 212.301.1048

Contractor:
Oshkosh Properties Group
320 Park Avenue, 17th Floor
New York, NY 10022
Tel: 212.686.7244 Fax: 212.686.7250

Architect:
Mott MacDonald Architects, Inc.
11 West 42nd Street
New York, NY 10018
Tel: 212.977.6500 Fax: 212.977.6526

Structural Engineer:
WSP
312 Seventh Avenue
New York, NY 10018
Tel: 212.332.0000

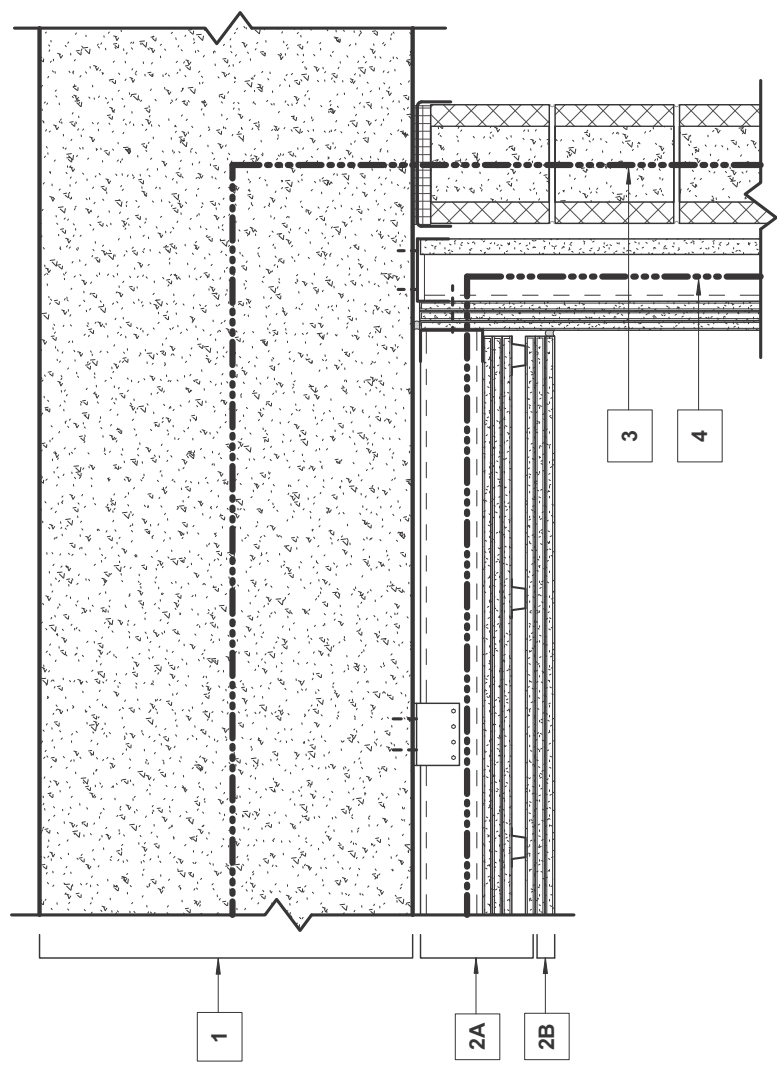
Mechanical, Electrical, Plumbing, Fire Protection:
McGraw Hill Construction
11 West 42nd Street
New York, NY 10018
Tel: 212.332.0000

CEILING CONSTRUCTION

1. 24" 3-HR FIRE-RESISTANCE RATED REINFORCED CONCRETE SLAB - PRIMARY STRUCTURE.
- 2A. UL K506 2-HR FIRE-RESISTANCE HORIZONTAL MEMBRANE:
 - 4" x 1 5/8" 20 GA. STEEL STUDS @ 24" O.C.
 - (3) LAYERS 5/8" TYPE X GYPSUM BOARD
 - 25GA. 7/8" RESILIENT OR FURRING CHANNEL, 16" O.C.
 - (1) LAYER 5/8" TYPE X GYPSUM BOARD
- 2B. (2) LAYERS 5/8" TYPE X GYPSUM BOARD TO PROVIDE ADDITIONAL 80 MIN. FIRE RESISTANCE PER NYC BC 721.2.1.4(2)

WALL CONSTRUCTION

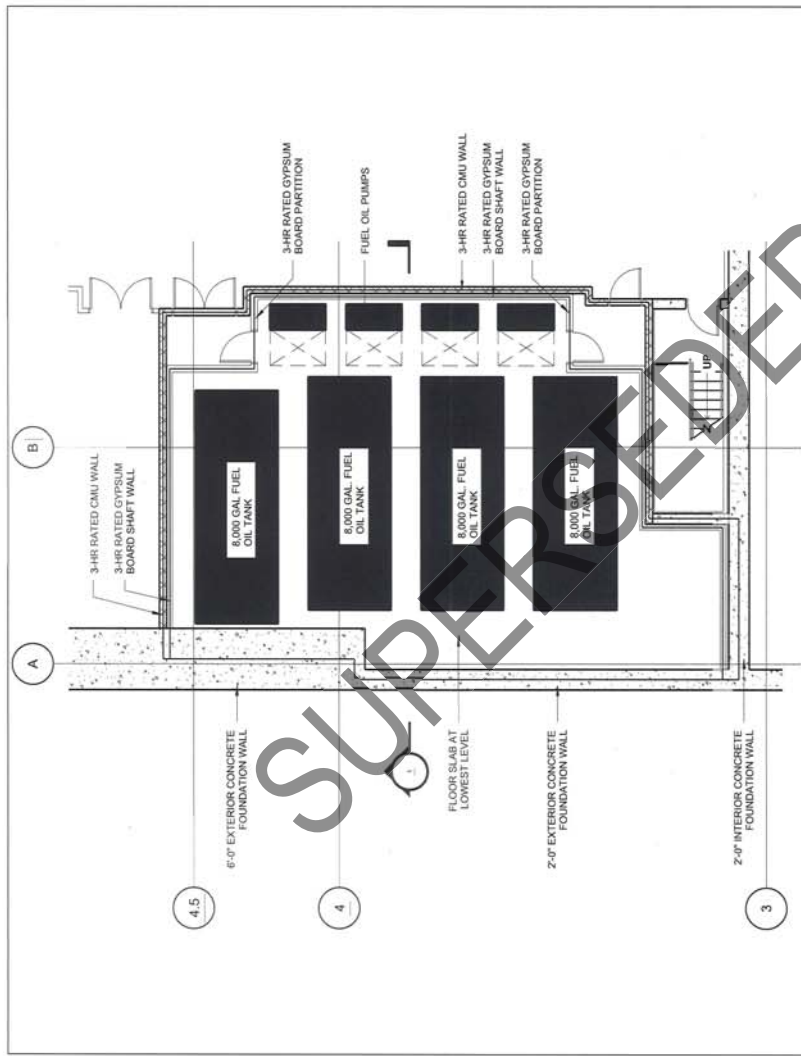
3. 3-HR FIRE-RESISTANCE RATED, 8" CMU BLOCK WALL
4. UL DES U415 3-HR FIRE-RESISTANCE RATED SHAFT WALL
 - 1" GYPSUM LINER PANELS
 - 4" C-H STUD, 25GA @ 24" O.C.
 - (3) LAYER 5/8" TYPE X GYPSUM BOARD



REVIEWED BY
Marshall A. Kaminer, PE
Executive Engineer
Technical Affairs

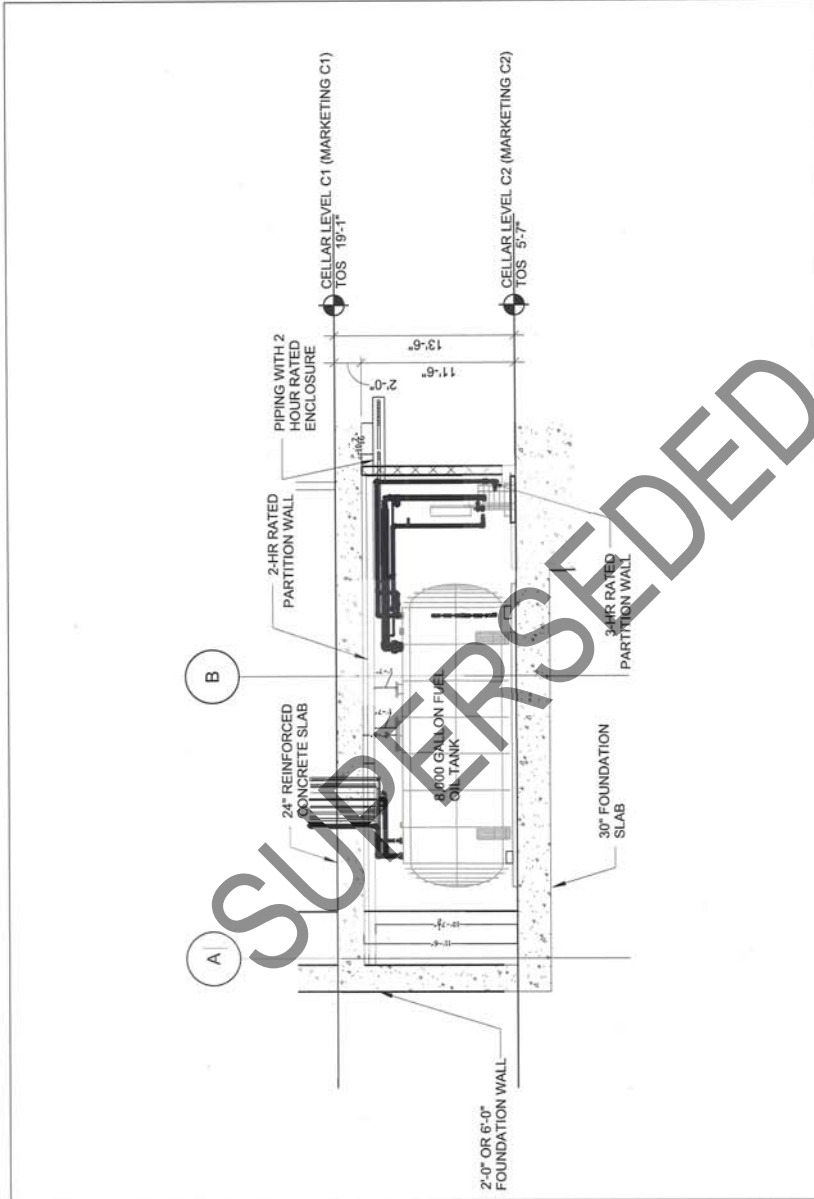
APPROVED
WITH CONDITIONS
Control No: (48765)
Date: 6/21/2017
Page: 10 of 18

Date Created	06/05/2017
Project No.	
Scale	1 1/2" = 1'-0"
Drawn By	
Checked By	
Drawing Title	FUEL OIL TANK ROOM - WALL TO CEILING DETAIL



REVIEWED BY
Marshall A. Kaminer, PE
Executive Engineer
Project
New York City
APPROVED
WITH CONDITIONS
Control No.: 148765
Date: 6/21/2017
Page: 11 of 18

Revision Description/Sketch Name	Project No.	Date:	Reference Drawing No.
FUEL OIL TANK ROOM PLAN	N13.06980.00	05/09/2017	---
55 HUDSON YARDS	By: KPF	Scale: NTS	Detail Drawing No.
SKM-20170509-1 See comments on pages 4 to 5			



REVIEWED BY
Marshall A. Kaminer, PE
Executive Engineer
Project No. N1306980-00
Date: 6/21/2017
Control No. 48765
12 of 18

WSP
New York State
Professional Engineer
Control No. 48765
WITH 4300 HOURS

HUDSON YARDS		Revision Description/Sketch Name FUEL OIL TANK ROOM SECTION	Project No. N13.06980.00	Date: 05/09/2017	Reference Drawing No. ---
			By: CM	Scale: NTS	Detail Drawing No. SKM-20170509-2

See comments on
pages 4 to 5

May 2, 2017

VIA EMAIL: christopher.malanga@wspgroup.com

Mr. Christopher Malanga
WSP | Parsons Brinckerhoff
One Penn Plaza, 2nd Floor
250 W. 34th Street
New York, NY 10119



Fuel Oil Tank Room – Fire-Resistance Rating Assessment
55 Hudson Yards
New York, New York
Jensen Hughes Project No. 1ERL17004

Dear Mr. Malanga:

This letter provides a summary of the findings and conclusions of the analysis conducted by JENSEN HUGHES ENGINEERING, P.C., for the 55 Hudson Yards project located in Manhattan, New York. The objective of the analysis was to compare the fire-resistance rating of the proposed walls assemblies and ceiling assembly in the fuel oil tank room to the fire-resistance ratings for that space required by the applicable 2008 New York City Mechanical Code (NYCMC).

1. Project Description

The 55 Hudson Yards project site is located on the west side of the new Hudson Boulevard to the north of West 33rd Street in Manhattan, New York. The building is of Type I-A construction and will extend 51 stories above grade level, with two (2) cellar levels. In accordance with Table 601 of the 2008 New York City Building Code (NYCBC), the building's structural frame is required to have a minimum 3-hour fire-resistance rating and the floor construction (including supporting beams and joists) is required to have a minimum 2-hour fire-resistance rating (Table 601). Exit stair enclosure, elevator hoistways, and other shaft enclosures are required to have a 2-hour fire-resistance rating (NYCBC Section 707.4).

A fuel oil tank room is provided on Cellar Level C2, the lowest level in the building. The room will contain four (4) 8,000-gallon fuel oil tanks, resulting in a maximum capacity of 32,000 gallons of diesel fuel. Four (4) fuel oil pumps will also be located in the fuel oil tank room. Two (2) exit access doors are provided from the room. The slab-to-slab height in the fuel oil tank room is 11.5 feet.

The following is a general description of the walls enclosing the fuel oil tank room:

- West wall - Exterior concrete foundation wall ranging from two (2) feet to six (6) feet in thickness. The wall is a part of the building structure.

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- North wall and East wall – Comprised of a 3-hour fire-resistance rated gypsum board shaft wall on the interior (room) side, with a 3-hour concrete masonry unit (CMU) wall located immediately adjacent to the gypsum board shaft wall (i.e. the shaft wall is between the fuel oil tank room and the CMU wall). Vestibules are provided in the northeast and southeast corner of the room. The vestibules are located between the gypsum board shaft wall and the CMU wall. The CMU wall is part of the building structure. The gypsum board shaft wall is not part of the building structure.
- South wall (east) – Similar to the North and East walls, a combination of a 3-hour fire-rated gypsum board shaft wall and a 3-hour fire-rated CMU wall separate the fuel oil tank room from a stair enclosure. The CMU wall is part of the building structure. The gypsum board shaft wall is not part of the building structure.
- South wall (west) – Interior concrete foundation wall with a thickness of two (2) feet. The wall is a part of the building structure.

See Figure No. 1 for a plan view of the fuel oil tank room, prepared by WSP | Parsons Brinckerhoff.

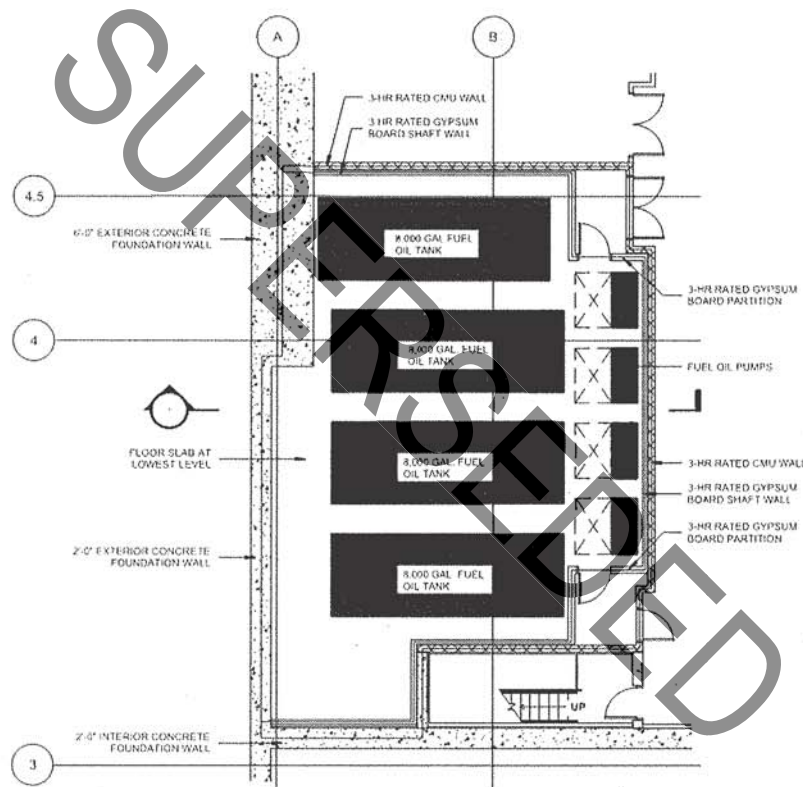


Figure No. 1: Fuel Oil Tank Room – Plan View

The ceiling assembly in the fuel oil tank room is a 24-inch thick reinforced concrete slab. The slab is 6,000 psi normal weight concrete and was designed to support the switchgears and other electrical equipment on the floor above. The ceiling assembly is part of the building structure. See Figure No. 2 for a section view of the fuel oil tank room, prepared by WSP | Parsons Brinckerhoff, showing the ceiling assembly.

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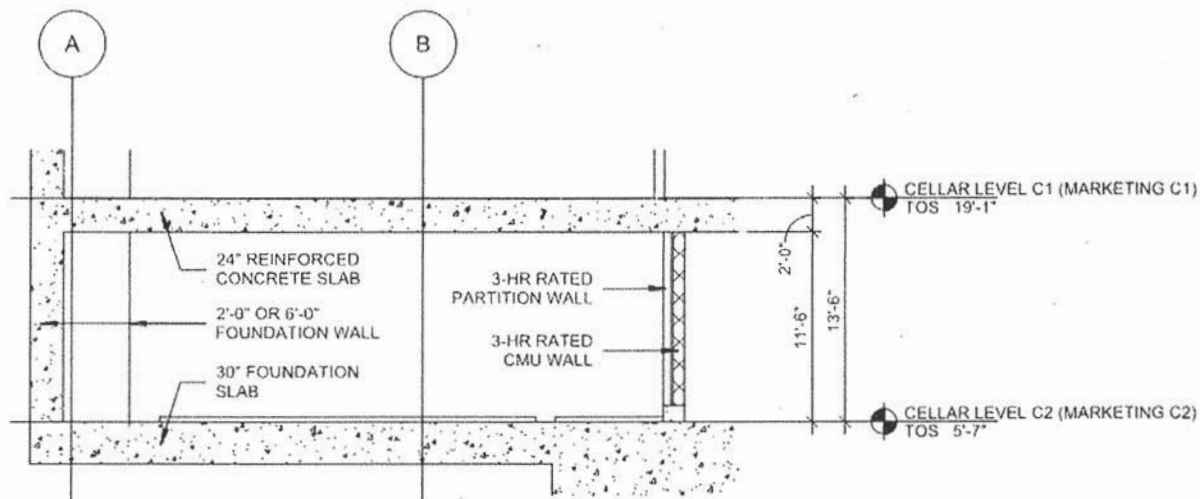


Figure No. 2: Fuel Oil Tank Room – Section View

2. Background on Fire-Resistance Rating

The term "fire-resistance rating" is defined as "The period of time a building element, component or assembly maintains the ability to withstand fire exposure, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703" (NYCBC Section 702.1).

The 2008 NYCBC is largely based on the 2003 International Building Code (IBC). Section 702.1 of the Commentary to the 2003 IBC clarifies that "fire-resistance rating is developed using standardized test methods (e.g., ASTM E119). Assemblies rated under these tests are deemed to be able to perform their function for a specified period of time under specific fire conditions (standard time-temperature curve)."

ASTM E119 is titled "Standard Test Methods for Fire Tests of Building Construction and Materials." During the ASTM E119 test, a test specimen is put in a furnace and the temperature is raised over a given period in accordance with the standard time-temperature curve shown in Figure No. 3.

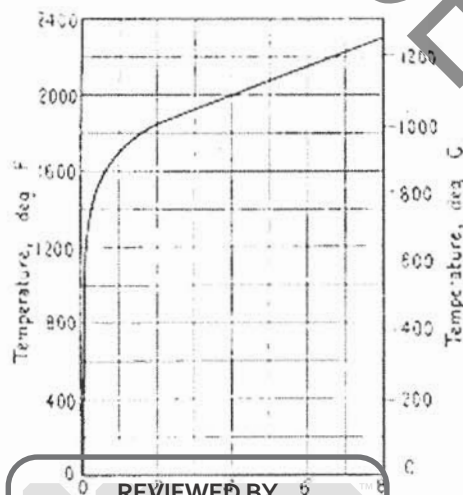


Figure No. 3: ASTM E119 Time-Temperature Curve

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For floor/ceiling assemblies, the test is concluded and the fire resistance (endurance) of the specimen is established when any of the following conditions occurs:

- 1) The temperature of the unexposed surface rises an average of 250°F above its initial temperature or 325°F at any location.
- 2) Cotton waste placed on the unexposed side of the assembly is ignited through holes, cracks, or fissures which develop in the specimen during the test.
- 3) The test assembly fails to sustain the applied load.
- 4) For certain restrained and all unrestrained floors, roofs and beams, the reinforcing steel temperature rises to 1,100°F.

The heat transmission end point is the point at which the average temperature on the unexposed side of the assembly rises 250°F above the initial temperature and/or the maximum rise at one point rises 325°F above the initial temperature. "For solid concrete slabs, the heat transmission end point is primarily a function of slab thickness and aggregate type. Other factors that affect heat transmission to a lesser degree are moisture content of the concrete, aggregate size, mortar content and air content. Factors that have very little effect on heat transmission are cement content and strength; type; amount and location of reinforcement, provided these items are within the normal range of usage" (Commentary to the 2015 IBC, Section 722.2.2.1).

It should be noted that the ASTM E119 test is performed without sprinklers. The presence of an automatic sprinkler system would have significant effects on the temperatures an assembly is exposed to during an actual fire scenario.

3. Code Required Fire-Resistance Rating

The project is required to comply with the applicable provisions of the 2008 NYCBC and 2008 NYCMC. Chapter 13 of the 2008 NYCMC covers Fuel-Oil Piping and Storage, with Section 1305 discussing Fuel-Oil System Installation. The limitations on quantities of fuel-oil storage are identified in Section 1305.11. A total of not more than 100,000 gallons of fuel oil is permitted to be stored inside of a building (Section 1305.11.1.).

To have a total quantity of 32,000 gallons of fuel oil in the building, as proposed, the NYCMC requires the following (NYCMC Section 1305.11.1.2 Item 3):

- 1) Each individual tank may not exceed a maximum size of 25,000 gallons.
- 2) All tanks are enclosed in a vault with walls, floor, and top having a fire-resistance rating of not less than three (3) hours, with such walls bonded to the floor, and with such top and walls of the vault independent of building structure (an exterior building wall with a fire-resistance rating of not less than three (3) hours is permitted to serve as a wall of the vault).
- 3) The vault is in a dedicated room or area of the building "cut off" vertically and horizontally from other areas and floors of the building by assemblies having a fire-resistance rating of not less than two (2) hours.

Since the aggregate fuel oil storage will not exceed 50,000 gallons, such storage is not required to be provided with an alternate fire extinguishing system complying with NYCBC Section 904 (NYCMC Section 1305.11.1.2 Item 3).

4. Proposed Assembly Fire-Resistance Rating

The wall assemblies around the fuel oil tanks appear to be compliant with vault requirements of NYCMC Section 1305.11.1.2 Item 3.

Regarding the ceiling assembly, the design proposes to use the 24-inch thick ceiling slab of the fuel oil tank room as both the vault enclosure and room protection. The vault is required to provide a 3-hour fire-resistance rating and the room protection is required to provide a 2-hour fire-resistance rating. The 24-

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inch thick concrete floor slab provides well in excess of the cumulative 5-hour fire-resistance rating provided by these components.

NYCBC Table 721.2.2.1 identifies the minimum thicknesses of reinforced and pre-stressed concrete floor slabs to achieve a specific fire-resistance rating. The slab is normal weight siliceous concrete where the aggregate of the concrete is primarily silica or sand based.

The required concrete slab thickness is identified in Table 721.2.2.1 for 1-hour, 1.5-hour, 2-hour, 3-hour and 4-hour fire-resistance ratings. The fire-resistance rating increases exponentially with the thickness of concrete slab provided. The relationship between slab thickness versus hourly fire-resistance rating is presented in Figure No. 4.

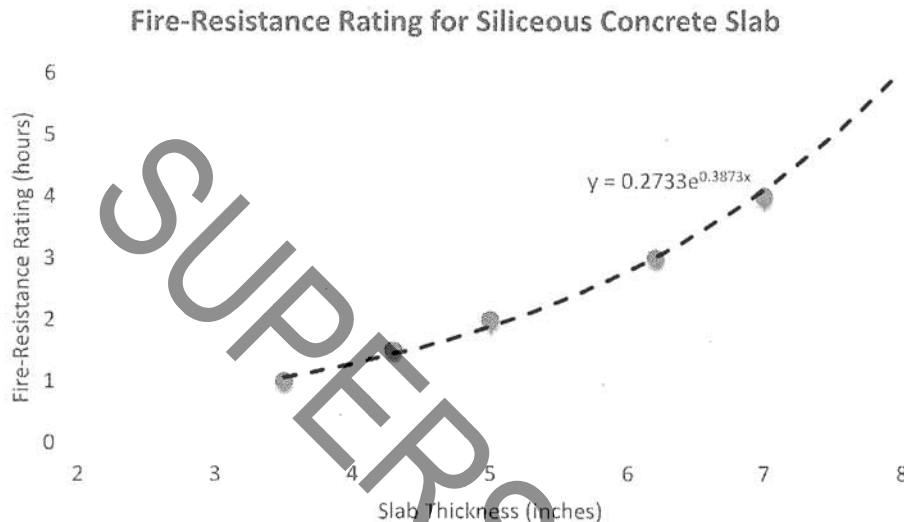


Figure No. 4: Fire-Resistance Rating for Siliceous Concrete

The exponential relationship between slab thickness and hourly fire-resistance rating can be estimated with the following formula:

$$y = 0.2733e^{0.3873x} \quad \text{Equation (1)}$$

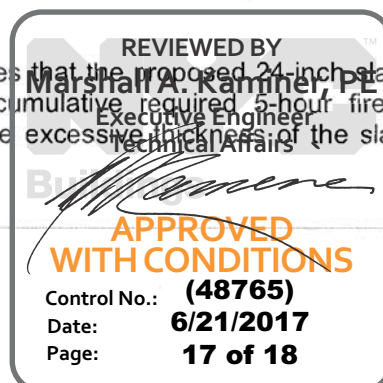
Considering the cumulative required fire-resistance rating of five (5) hours, a 7.6-inch slab would adequately provide this rating. As slab thickness increases above eight (8) inches, there is a diminishing return on fire-resistance due to the exponential relationship and lack of data points beyond four (4) hours.

The lack of data points beyond the 4-hour time frame is largely due to the fire tests ending prior to structural failure of the assembly. A significant reason for this is that codes such as the IBC (which the NYCBC is based on) do not require fire-resistance ratings more than four (4) hours for building elements, and components in code-required means of egress systems are not typically required to have fire-resistance ratings exceeding two (2) hours.

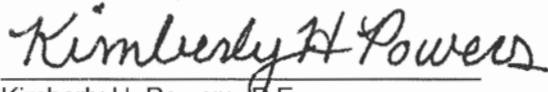
5. Conclusion

The wall assemblies around the fuel tanks are compliant with vault requirements of NYCMC Section 1305.11.1.2 Item 3.

It is the opinion of Jensen Hughes that the proposed 24-inch slab construction of the fuel oil tank room ceiling meets or exceeds the cumulative required 5-hour fire-resistance rating of NYCMC Section 1305.11.1.2 Item 3, based on the excessive thickness of the slab and well documented fire-resistance testing of concrete slabs.



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