Subject:
From: "rgmorse" <rgmorse@mzaconsulting.com>
To: <wtc@nist.gov>

We checked our inspection records and found the fireproofing thickness on the joists in the WTC to be substantially thinner than the ¾" indicated in the report. Please see attached report and photographs.

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fireproofing thickness report 050406.pdf

Fireproofing Thickness Evaluation
World Trade Center Towers 1 & 2

New York, N.Y

By:

Roger G. Morse and

Dominique R. Washock

April 2005

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Summary:

World Trade Centers One and Two (WTC1 & WTC2) were high rise office towers located on West Street in Lower Manhattan, NYC. WTC1 & WTC2 were 1,368 feet and 1,362 feet respectively. Each tower had 110 floors and approximately 4.7 million square feet of gross floor area. WTC1 & WTC2 were constructed in 1969 using structural steel framing, structural joists and non-composite steel deck with poured, lightweight concrete floors. The exterior, perimeter walls were load bearing, built-up box columns. Dryspray fireproofing was applied to the structural steel and joists as well as the underside of the metal decking throughout each of the towers. The purpose of this evaluation was to determine the thickness of the fireproofing on the joists.

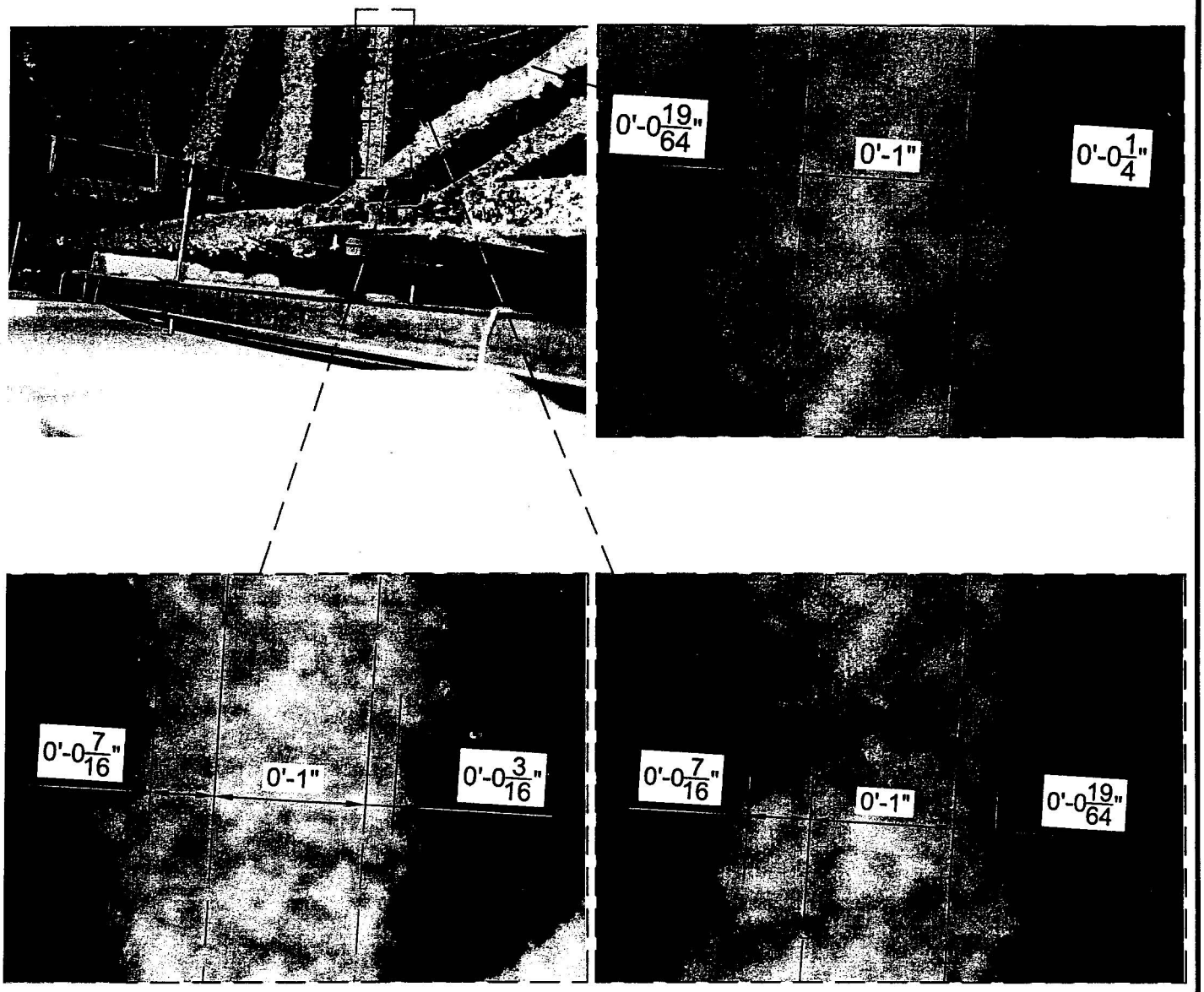
Photos used in this evaluation were obtained during a series of site inspections performed between August 1990 and July 1993. Examination of the site inspection records produced eighty (80) photographs of joists located in WTC1 and WTC2. Joists were categorized as being parallel or perpendicular to the decking. A third category labeled "miscellaneous" was used for members that were photographed at a range too close to allow for identification as either parallel or perpendicular. Assessment of these photos showed that, exposed metal was found on 47% of the joists parallel to the decking, 50% of the joists perpendicular to the decking, and 86% of the miscellaneous joists (see Table – 1).

Close review of the site inspection photos reveal areas of missing or thin dryspray fireproofing coverage on the structural steel joists (see Photos 1 through 10). These photos were chosen because they show enough exposed webbing to allow for an accurate measurement of the one-inch diameter web members. Using the one-inch dimension as a reference, it was possible to determine the thickness of the fireproofing adjacent to the bare metal area on the web members as well as on web members shown in the same plane within the photo. Fireproofing thicknesses ranged from 0" (Photo 7) to 0.55" (35/64" Photo 3), with an average thickness of 0.30" (see Table – 2). Photo 6 includes a web located in the foreground that was not included in the evaluation. This particular web is atypical in that it is almost entirely exposed and if included in the evaluation it would have skewed the resulting average.

Evaluation of dryspray fireproofing located on structural joists in WTC1 & WTC2, through existing site inspection photos, reveals many areas of thin or non-existent fireproofing.

Photos

Fireproofing Thickness



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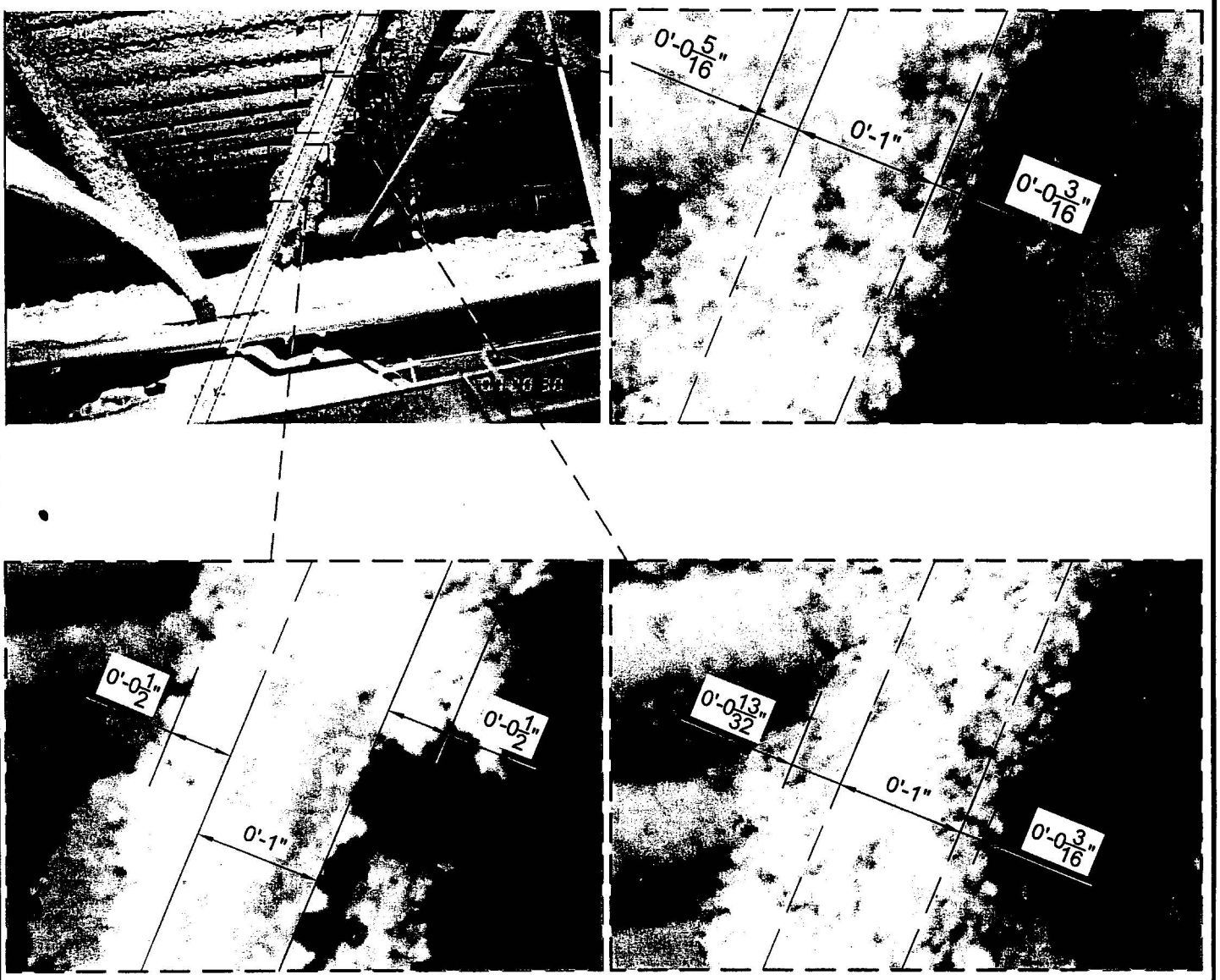
WORLD TRADE CENTER

NEW YORK, NY

FIREPROOFING THICKNESS
WTC1-FLR.23-TRUSS 1-WEB 1

DATE: DEC. 30, 2004
SCALE: NTS
DRAWN BY: DRW
APPV'D. BY: RGM



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WORLD TRADE CENTER

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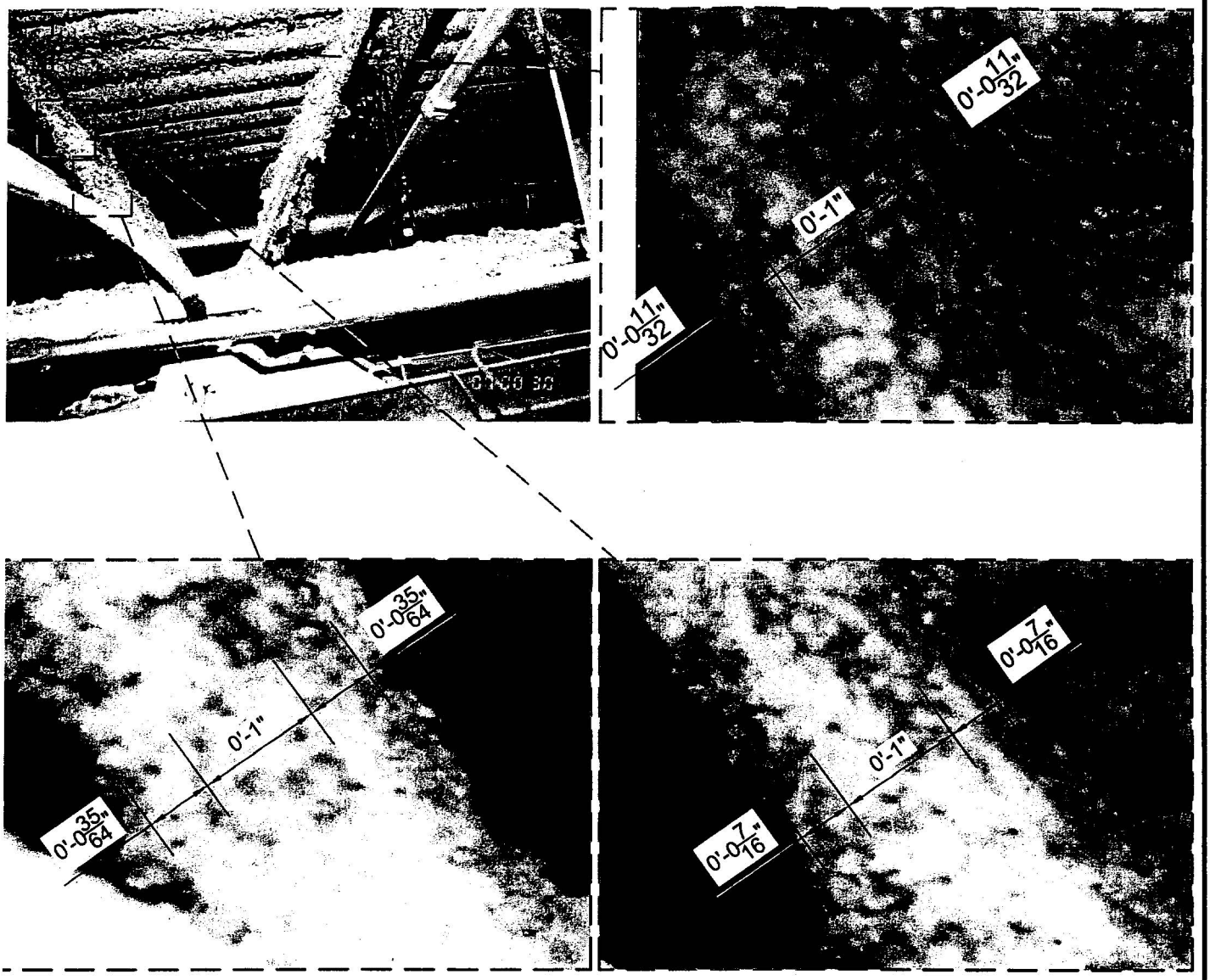
FIREPROOFING THICKNESS
WTC1-FLR.27-TRUSS 1-WEB 1

DATE: DEC. 30, 2004
SCALE: NTS
DRAWN BY: DRW
APPV'D. BY: RGM



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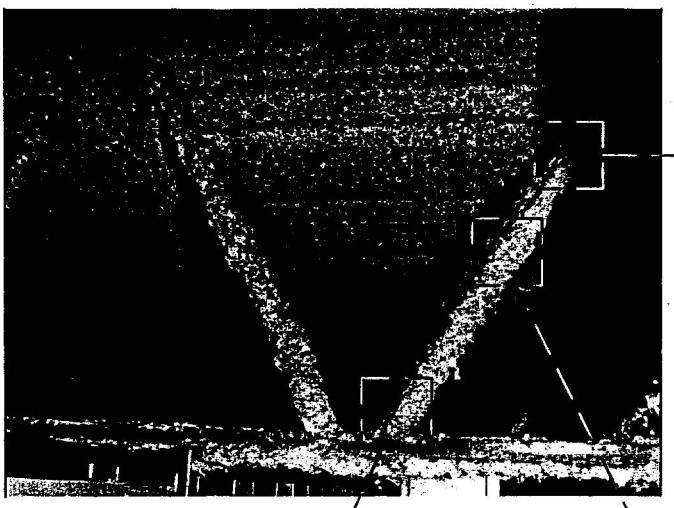
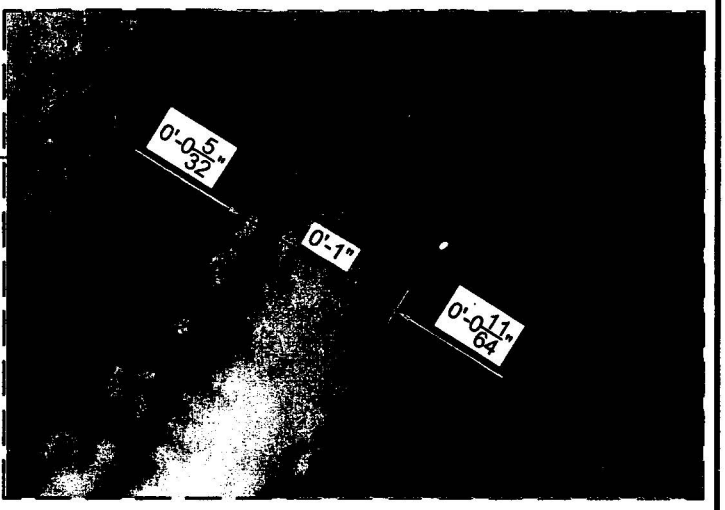
WORLD TRADE CENTER

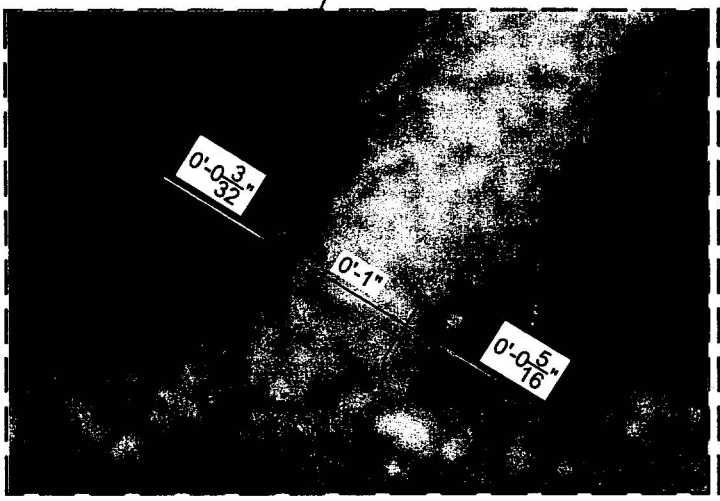
NEW YORK, NY

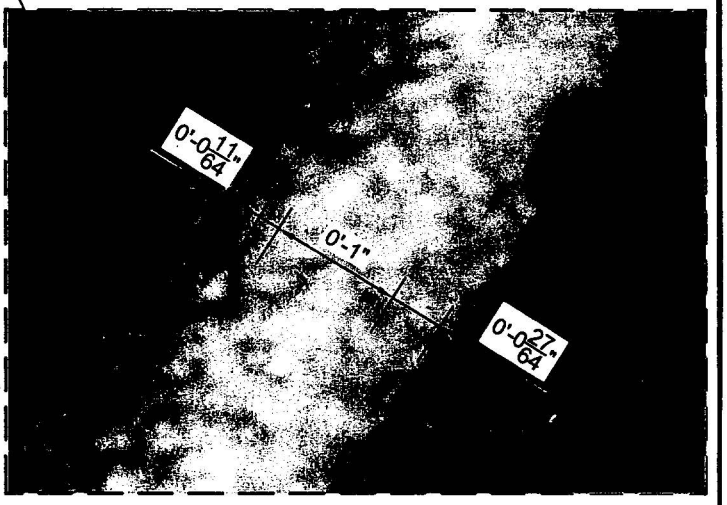
FIREPROOFING THICKNESS
WTC1-FLR.27-TRUSS 1-WEB 2

DATE: DEC. 30, 2004
SCALE: NTS
DRAWN BY: DRW
APPV'D. BY: RGM









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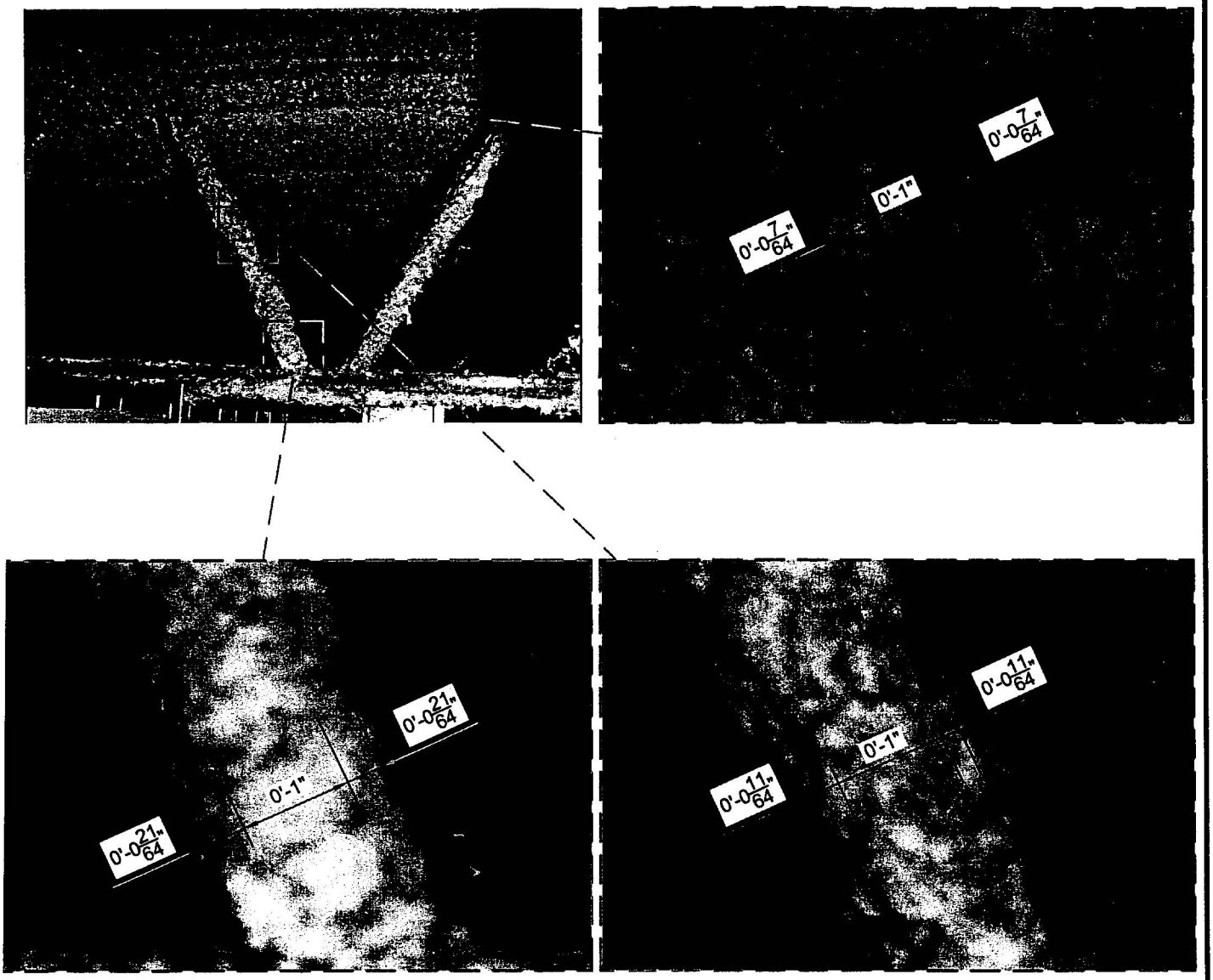
WORLD TRADE CENTER

NEW YORK, NY

FIREPROOFING THICKNESS
WTC1-FLR.27-TRUSS 2-WEB 1

DATE: DEC. 30, 2004
SCALE: NTS
DRAWN BY: DRW
APPV'D. BY: RGM



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WORLD TRADE CENTER

NEW YORK, NY

FIREPROOFING THICKNESS
WTC1-FLR.27-TRUSS 2-WEB 2

DATE: DEC. 30, 2004
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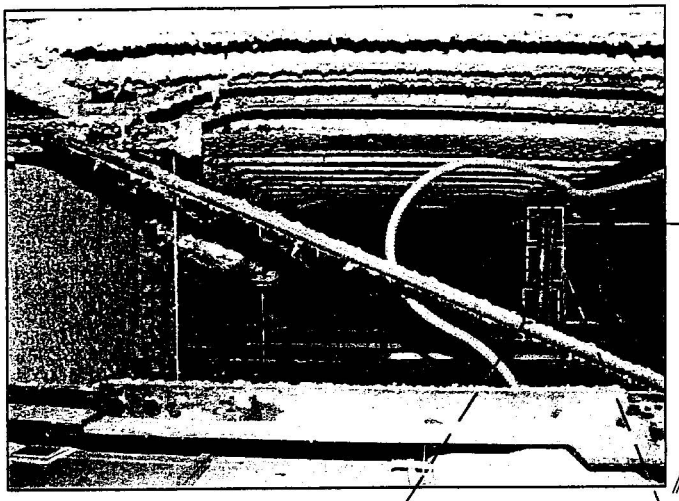

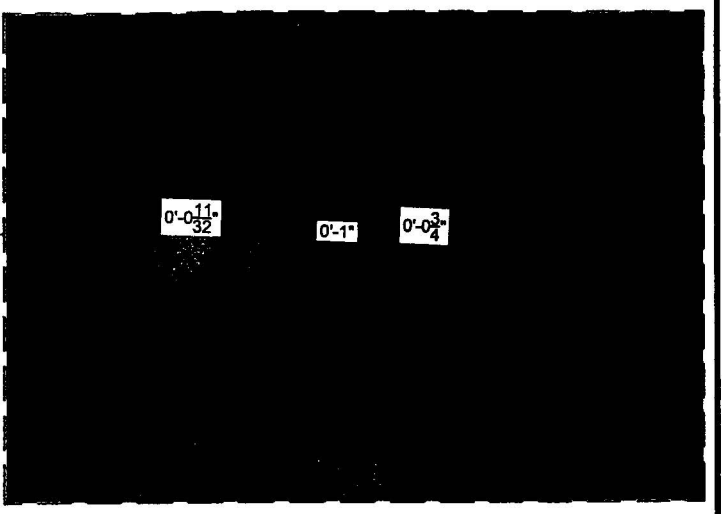

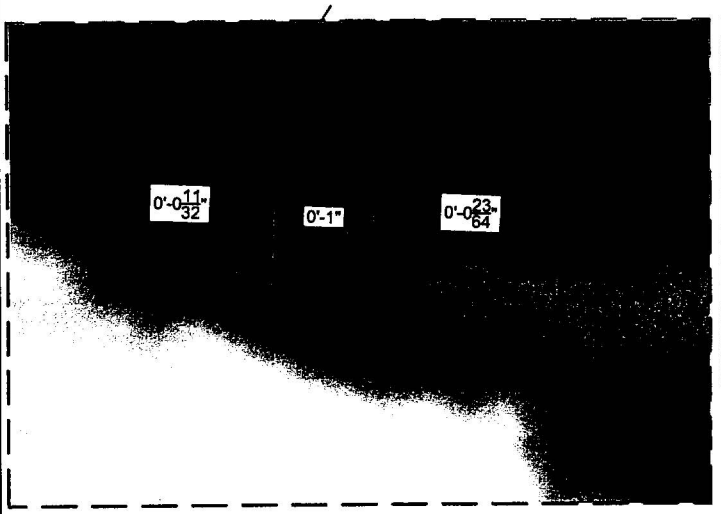

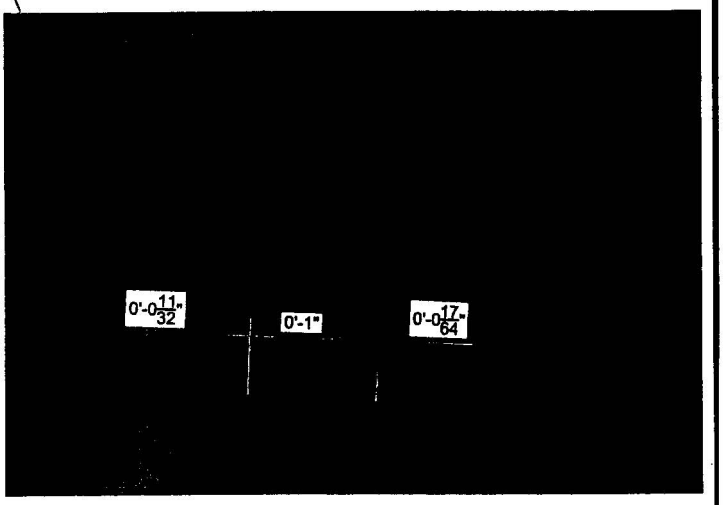

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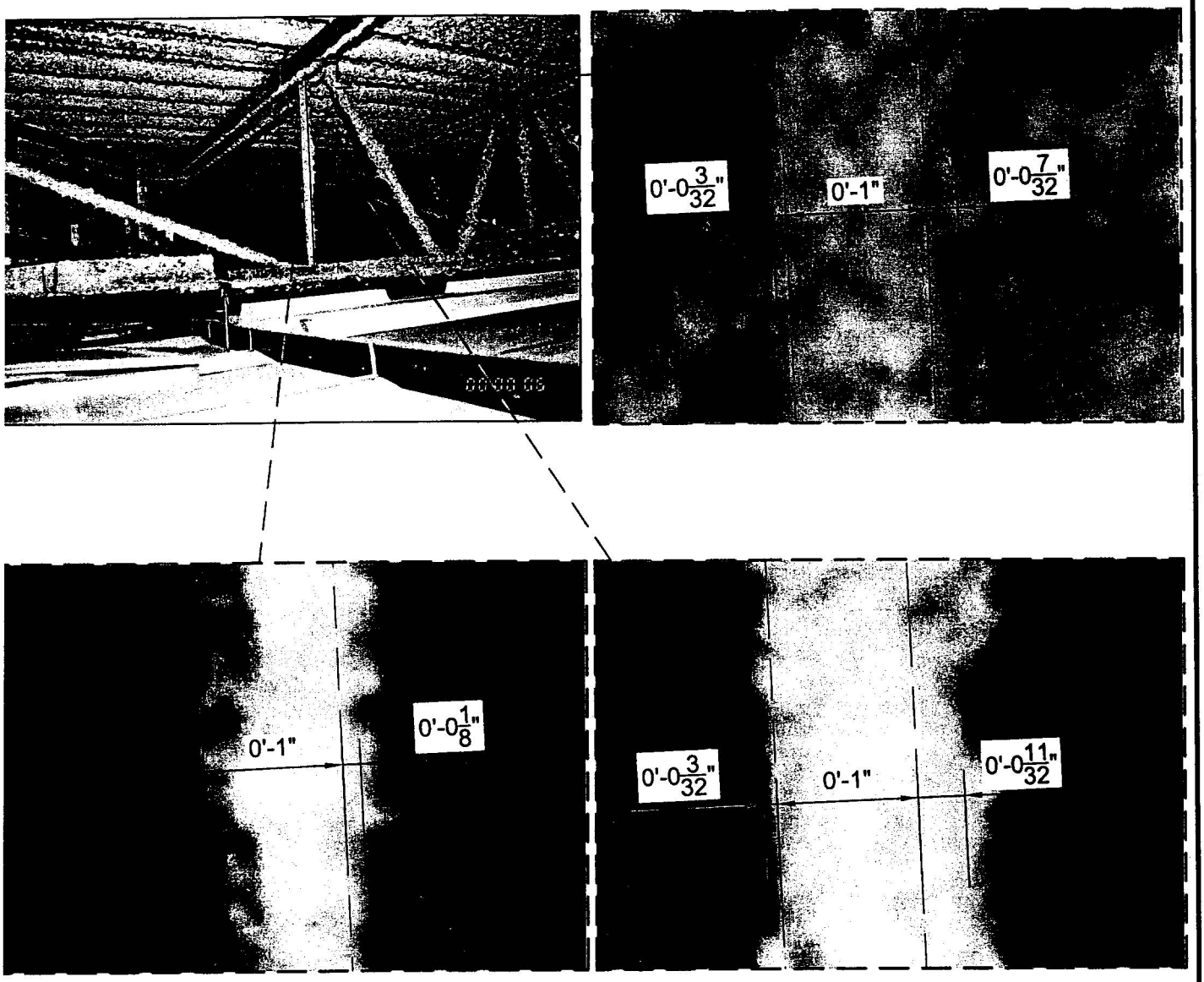
WORLD TRADE CENTER

NEW YORK, NY

FIREPROOFING THICKNESS
WTC1-FLR.27-TRUSS 3-WEB 1

DATE: DEC. 30, 2004
SCALE: NTS
DRAWN BY: DRW
APPV'D. BY: RGM



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WORLD TRADE CENTER

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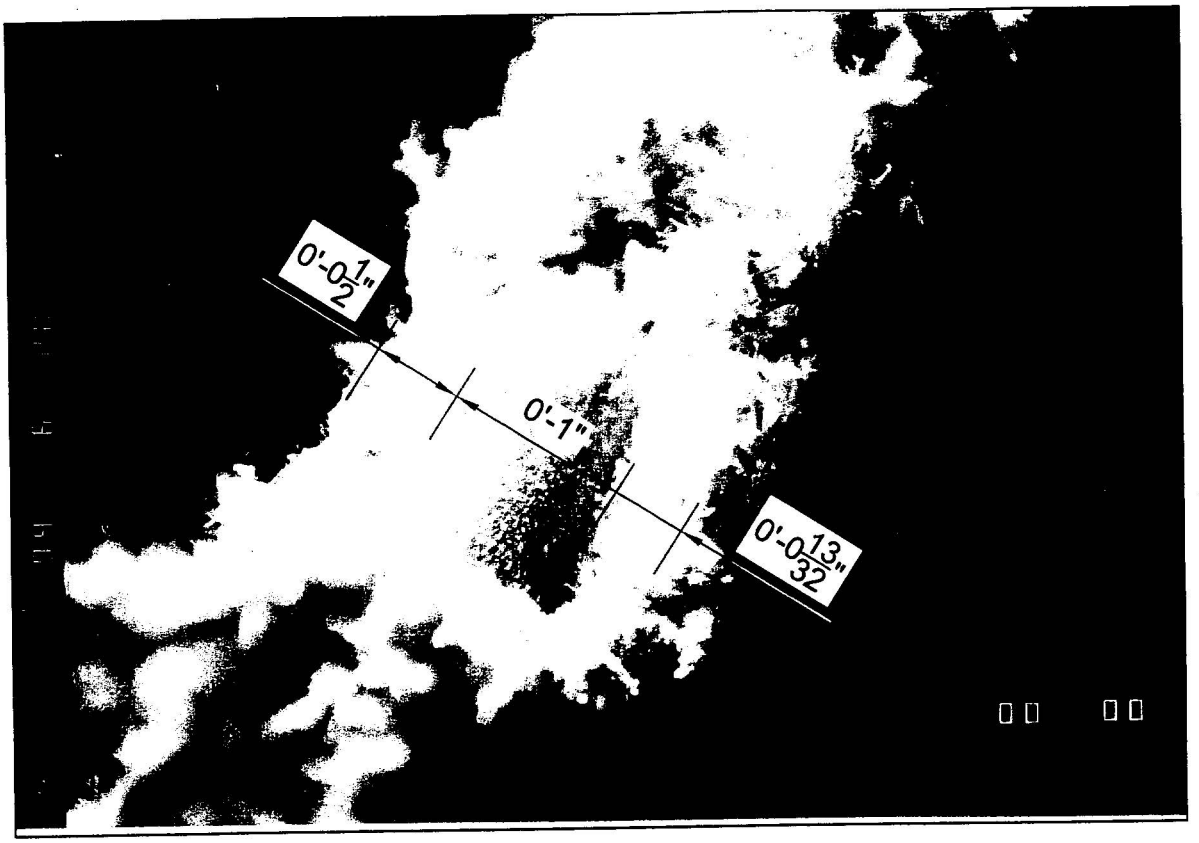
FIREPROOFING THICKNESS
WTC1-FLR.27-TRUSS 4-WEB 1

DATE: DEC. 30, 2004
SCALE: NTS
DRAWN BY: DRW
APPV'D. BY: RGM



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WORLD TRADE CENTER

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FIREPROOFING THICKNESS

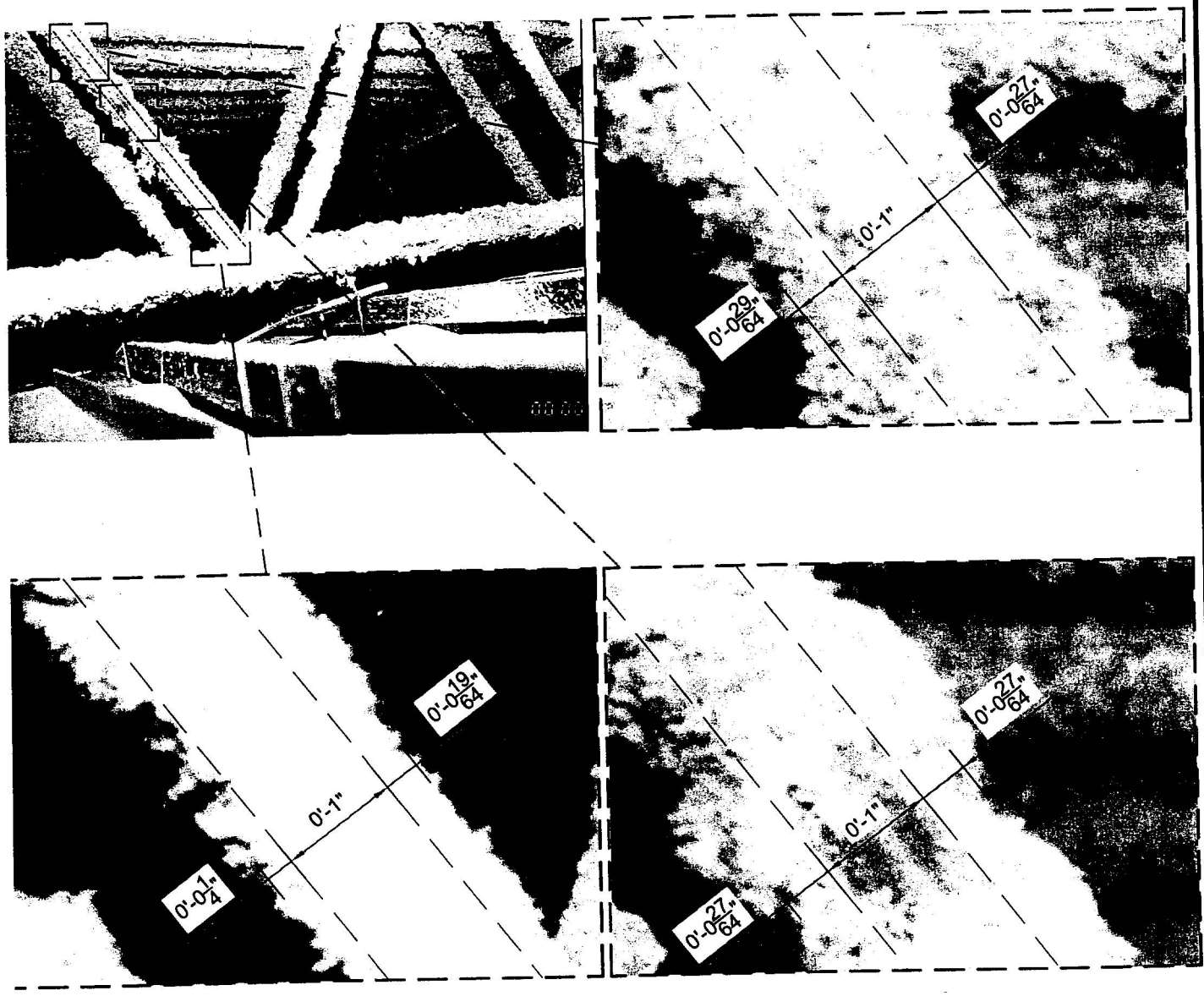
WTC1-FLR.27-TRUSS 5-WEB 1

DATE: DEC. 30, 2004

SCALE: NTS

DRAWN BY: DRW

APPV'D. BY: RGM



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WORLD TRADE CENTER

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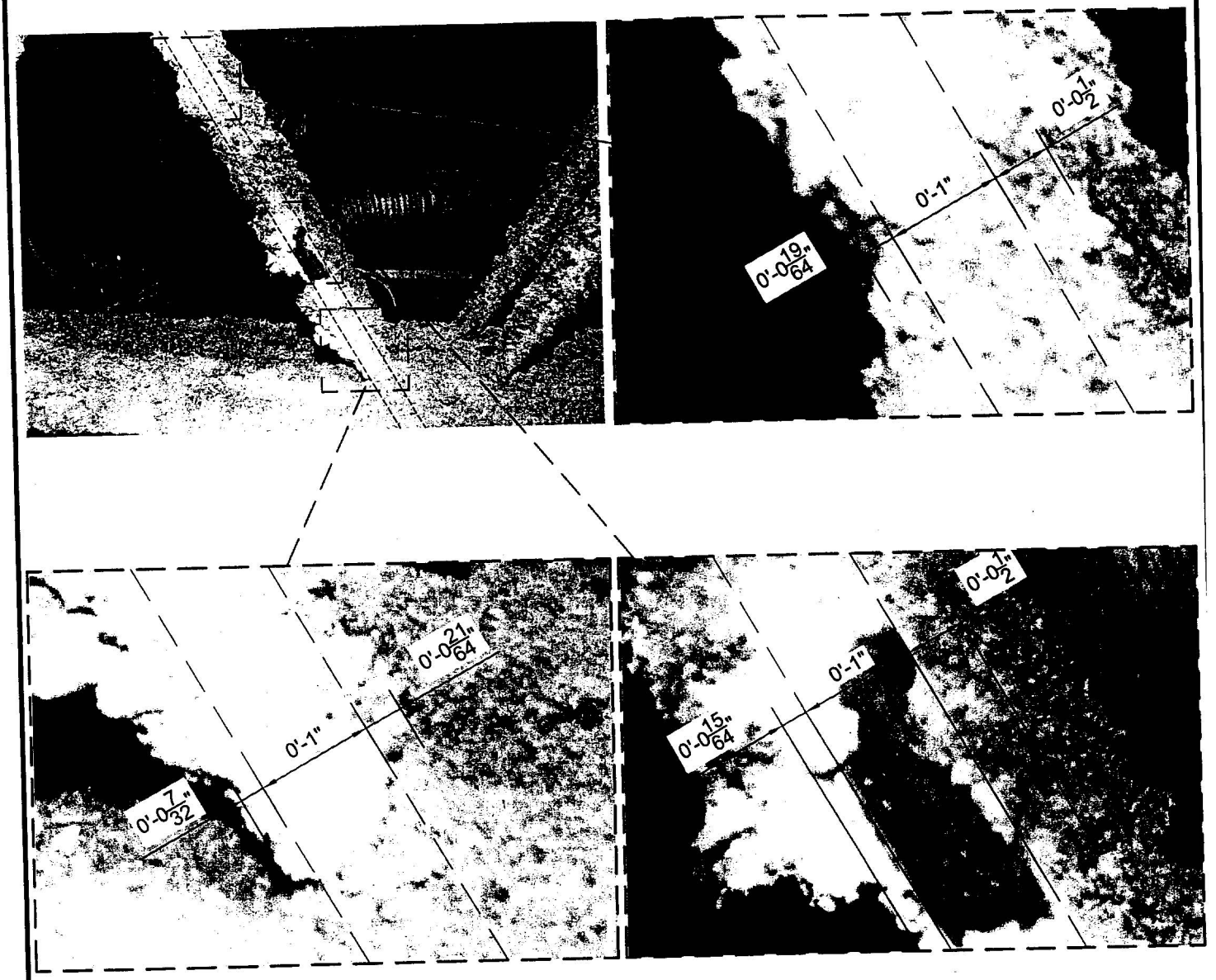
FIREPROOFING THICKNESS
WTC 2-FLR.26-TRUSS 1-WEB 1

DATE: DEC. 30, 2004
SCALE: NTS
DRAWN BY: DRW
APPV'D. BY: RGM



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WORLD TRADE CENTER

NEW YORK, NY

FIREPROOFING THICKNESS
WTC2-FLR.26-TRUSS 2-WEB 1

DATE: DEC. 30, 2004
SCALE: NTS
DRAWN BY: DRW
APPV'D. BY: RGM

Table - 1

WTC 1&2-Fireproofing Thickness Evaluation

Table -1

WORLD TRADE CENTER 1 & 2 FIREPROOFING COVERAGE

Photo No.	Photo Date	Location	Number of Visible Joists Parallel to Decking	Number of Visible Joists Parallel to Decking With Exposed Metal	Number of Visible Joists Perpendicular to Decking	Number of Visible Joists Perpendicular to Decking With Exposed Metal	Number of Misc. Visible Joists	Number of Misc. Visible Joists With Exposed Metal
48	8/8/1990	WTC1, Flr-12	1	0				
49	8/8/1990	WTC1, Flr-12	1	1	1	0		
50	8/8/1990	WTC1, Flr-12					1	0
51	8/8/1990	WTC1, Flr-12	2	0	1	1		
52	8/8/1990	WTC1, Flr-12	3	2				
59	8/8/1990	WTC1, Flr-12	2	1	1	1		
201	7/7/1993	WTC1, Flr-22	1	0	1			
202	7/7/1993	WTC1, Flr-22	1	0	1	0		
203	7/7/1993	WTC1, Flr-22	2	1				
204	7/7/1993	WTC1, Flr-22	1	0	1	1		
205	7/7/1993	WTC1, Flr-22	2	0	1	0		
206	7/7/1993	WTC1, Flr-17	2	2	1	0		
207	7/7/1993	WTC1, Flr-17	2	1	1	1		
208	7/7/1993	WTC1, Flr-17	1	1	1	0		
212	7/7/1993	WTC1, Flr-17	1	1	1	1		
213	7/7/1993	WTC1, Flr-17	1	0				
214	7/7/1993	WTC1, Flr-17	1	1	1	1		
101	7/7/1993	WTC1, Flr-22					1	1
107	7/7/1993	WTC1, Flr-22			1	0		
109	7/7/1993	WTC1, Flr-22	1	1				
111	7/7/1993	WTC1, Flr-22	1	1	1	1		
112	7/7/1993	WTC1, Flr-22	1	1	1	0		
118	7/7/1993	WTC1, Flr-22	1	0				
120	7/7/1993	WTC1, Flr-22	2	0	1	0		
121	7/7/1993	WTC1, Flr-22	2	1				
122	7/7/1993	WTC1, Flr-22	1	0	1	0		
123	7/7/1993	WTC1, Flr-22	2	1				
1	8/8/1990	WTC1, Flr-23	1	1	1	1		

WORLD TRADE CENTER 1 & 2 FIREPROOFING COVERAGE

Photo No.	Photo Date	Location	Number of Visible Joists Parallel to Decking	Number of Visible Joists Parallel to Decking With Exposed Metal	Number of Visible Joists Perpendicular to Decking	Number of Visible Joists Perpendicular to Decking With Exposed Metal	Number of Misc. Visible Joists	Number of Misc. Visible Joists With Exposed Metal
2	8/8/1990	WTC1, Flr-23	1	1				
3	8/8/1990	WTC1, Flr-23	1	0				
4	8/8/1990	WTC1, Flr-23	1	0				
7	8/8/1990	WTC1, Flr-23	1	1	1	0		
8	8/8/1990	WTC1, Flr-23	1	1	1	0		
9	8/8/1990	WTC1, Flr-23	2	0	1	1		
10	8/8/1990	WTC1, Flr-23	3	3				
11	8/8/1990	WTC1, Flr-23			1	1		
15	8/8/1990	WTC1, Flr-23	1	1	1	1		
16	8/8/1990	WTC1, Flr-23	1	1	1	0		
20	8/8/1990	WTC1, Flr-23			1	1		
22	8/8/1990	WTC1, Flr-23	1	1			1	1
23	8/8/1990	WTC1, Flr-23					1	1
24	8/8/1990	WTC1, Flr-23			1	1		
25	8/8/1990	WTC1, Flr-23	1					
26	8/8/1990	WTC1, Flr-23	2	2				
27	8/8/1990	WTC1, Flr-23	1	1	1			
28	8/8/1990	WTC1, Flr-23	3	1				
3	1/9/1995	WTC1, Flr-27	2		1	1		
4	1/9/1995	WTC1, Flr-27	2	2				
6	1/9/1995	WTC1, Flr-27	1	1	1	1		
7	1/9/1995	WTC1, Flr-27	2	0	1	1		
10	1/9/1995	WTC1, Flr-27	2	1				
15	1/9/1995	WTC1, Flr-27	3	2				
16	1/9/1995	WTC1, Flr-27	2	1	1	1		
17	1/9/1995	WTC1, Flr-27	1	1	1	1		
18	1/9/1995	WTC1, Flr-27	1	1				
28	1/9/1995	WTC1, Flr-27	1	0	1	1		
29	1/9/1995	WTC1, Flr-27	2	1				

WORLD TRADE CENTER 1 & 2 FIREPROOFING COVERAGE

Photo No.	Photo Date	Location	Number of Visible Joists Parallel to Decking	Number of Visible Joists Parallel to Decking With Exposed Metal	Number of Visible Joists Perpendicular to Decking	Number of Visible Joists Perpendicular to Decking With Exposed Metal	Number of Misc. Visible Joists	Number of Misc. Visible Joists With Exposed Metal
33	1/9/1995	WTC1, Flr-27	1	1	1	0		
42	1/9/1995	WTC1, Flr-27					1	1
47	6/20/1994	WTC2, Flr-26					1	1
102	12/9/1991	WTC2, Flr-26	1	1				
103	12/9/1991	WTC2, Flr-26	2	2				
104	12/9/1991	WTC2, Flr-26	1	0				
105	12/9/1991	WTC2, Flr-26	1	0	1	1		
106	12/9/1991	WTC2, Flr-26	2	1				
107	12/9/1991	WTC2, Flr-26	2		1			
108	12/9/1991	WTC2, Flr-26	2	0				
110	12/9/1991	WTC2, Flr-26	2	0	1	0		
113	12/9/1991	WTC2, Flr-26	2	1				
115	12/9/1991	WTC2, Flr-26	2	1				
116	12/9/1991	WTC2, Flr-26	1	0	1	0		
118	12/9/1991	WTC2, Flr-26					1	1
120	12/9/1991	WTC2, Flr-26	2	1	1	0		
122	12/9/1991	WTC2, Flr-26	1	0				
201	12/9/1991	WTC2, Flr-26	1	0				
202	12/9/1991	WTC2, Flr-26	1	0				
203	12/9/1991	WTC2, Flr-26	1	0				
205	12/9/1991	WTC2, Flr-26	1	0				
206	12/9/1991	WTC2, Flr-26	1	0	1	0		
207	12/9/1991	WTC2, Flr-26	1	0				
Total Number of Visible Joists			**103**		**40**		**7**	
Total Number of Visible Joists With Exposed Metal			**48**		**20**		**6**	
Percentage With Exposed Metal			**47%**		**50%**		**86%**	

Table - 2

WTC 1&2 Fireproofing Coverage

Table - 2

WORLD TRADE CENTER 1 & 2 - FIREPROOFING THICKNESS EVALUATION

Photo/File Name	Drawing Description	Thickness (in)	Thickness (in)	Thickness (in)	Thickness (in)	Thickness (in)	Thickness (in)	Average Thickness (in)	Average Thickness (in)
900808 - 08	WTC1-FLR.23-TRUSS 1-WEB 1	19/64	1/4	7/16	3/16	7/16	19/64	27/85	0.32
950109 - 30	WTC1-FLR.27-TRUSS 1-WEB 1	5/16	3/16	1/2	1/2	13/32	3/16	15/43	0.35
950109 - 30	WTC1-FLR.27-TRUSS 1-WEB 2	11/32	11/32	35/64	35/64	7/16	7/16	27/61	0.44
950109 - 10	WTC1-FLR.27-TRUSS 2-WEB 1	5/32	11/64	3/32	5/16	11/64	27/64	2/9	0.22
950109 - 10	WTC1-FLR.27-TRUSS 2-WEB 2	7/64	7/64	21/64	21/64	11/64	11/64	13/64	0.20
950109 - 15	WTC1-FLR.27-TRUSS 3-WEB 1	11/32	3/4	11/32	23/64	11/32	17/64	2/5	0.40
950109 - 06	WTC1-FLR.27-TRUSS 4-WEB 1	3/32	7/32	0	1/8	3/32	11/32	7/48	0.15
940620 - 53	WTC1-FLR.27-TRUSS 5-WEB 1	1/2	13/32					8/53	0.15
911209 - 103	WTC2-FLR.26-TRUSS 1-WEB 1	29/64	27/64	1/4	19/64	27/64	27/64	37/98	0.38
911209 - 106	WTC2-FLR.26-TRUSS 1-WEB 2	19/64	1/2	7/32	21/64	15/64	1/2	9/26	0.35
								AVERAGE FIREPROOFING THICKNESS	0.30