

**Federal Building and Fire Safety Investigation
of the World Trade Center Disaster**

Visual Data Collection and Analysis

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Visual Collection and Time Line Development for WTC 1, 2, and 7

Purpose: To utilize photographs, videos, and other relevant information to develop detailed time lines for the spread and growth of fires at the peripheries of World Trade Center Buildings 1, 2, and 7 and to organize the information such that it can be utilized by other investigation team members.

TASK MEMBERS

Leader: Bill Pitts

Professionals: Kathy Butler
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NIST Expert: Val Junker

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Other Important Contributors:

Doug Walton	Ron Rehm
Darren Lowe	Glenn Forney
Bud Nelson	Kevin McGratten

TOPICS


- Collection and Data Basing Efforts
- Timing
- Initial Damage Patterns
- Fire Spread in Towers

Collection of Visual Material

- Material collected in a variety of ways
 - Direct contacts with individuals and organizations
 - Public appeal
 - Transfer of material from other organizations
 - Video recordings from broadcast television
- Immense amount of material collected
 - Over 6100 photographs catalogued (in excess of 185 photographers represented)
 - Approximately 150 hour of videotape digitized and clipped (5726 clips) from more than twenty individuals, news organizations, and documentaries

Information for Asset "Myers_plane_strike.avi" of "WTCVideo"

Asset Edit Help

Field Name	Field Content
Categories	Scott Myers
Record Name	Myers_plane_strike.avi
Thumbnail	
Photographer	Scott Myers
Content	WTC 9/11 footage
Use Limited	<input type="checkbox"/>
Copyright?	<input checked="" type="checkbox"/>
Copyright Agreem...	
Shot From	12 John St.
Date Recorded	9/11/2001 9:02:53 AM
End Recording	9/11/2001 9:03:07 AM
Duration	14.246667
Time Uncertainty (s)	2
View Direction	east
WTC 1 Faces	
WTC 1 North F...	<input type="checkbox"/>
WTC 1 East Face	<input checked="" type="checkbox"/>
WTC 1 South F...	<input type="checkbox"/>
WTC 1 West Fa...	<input type="checkbox"/>
WTC 2 Faces	



Cumulus - [WTCVideo]

File Edit View Catalog Category Collection Asset Special Window Help

PBS_Heroes of Ground Zero Report from Ground Zero ABC Richard Peskin Sam Riegel Scott Myers Sekani Compilation of Clips from Skidmore, Owings and Merrill Sorensen WTC Special/Important Clips Steve Spak 8mm Steve Spak Mini DV Stevens - 2 Tapes Tim Main and Mike Ballou TLC_WTC_Anatomy_of_the_Cc Unknown Source - Short Clips of Vince Dementri CBS WTC7 WABC Broadcast WABC_Helicopter Shots of WTC WCBS NIST Dub #1_Damas hom WCBS NIST Dub #2 WCBS NIST Dub #3 - Behrle, Mill WCBS NIST Dub #4 - WCBS Heli William Cirone WNBC NIST Dub #1 WNBC NIST Dub #10 - WT Comp WNBC NIST Dub #2 WNBC NIST Dub #3 WNBC NIST Dub #4 WNBC NIST Dub #5 WNBC NIST Dub #6 - WNBC Heli WNBC NIST Dub #7 - StJohn, He WNBC NIST Dub #8 - Sumner Gli WNBC NIST Dub#9, Foster, Anc WNYW_Broadcast WPIX NIST Dub #3 - FDR Drive WPIX NIST Dub #4 - Helicopter WTC 7 - 2 parts WTC Clips - FOX 10-00 News, AF WTC_A Modern Marvel 1973-20	Myers_plane_strike.avi 9/11/2001 9:02:53 AM 9/11/2001 9:03:07 AM	Myers_clip10.avi 9/11/2001 9:16:26 AM 9/11/2001 9:16:43 AM	Myers_clip2.avi 9/11/2001 8:48:36 AM 9/11/2001 8:48:54 AM	
	Myers_clip3.avi 9/11/2001 8:49:39 AM 9/11/2001 8:53:38 AM	Myers_clip4.avi 9/11/2001 8:53:29 AM 9/11/2001 8:57:39 AM	Myers_clip5.avi 9/11/2001 8:57:29 AM 9/11/2001 9:01:39 AM	

116 of 134 Categories (1 Selected)
 11 of 5726 Records (1 Selected)

Video clips used with permission of Scott Myers.

TIMING

- Digital Photographs and Video (EXIF and meta data)
- Comparison of details (e.g., shadows, smoke and fire patterns)
- Goal has been one second accuracy relative to second plane strike time defined to be 9:02:54 am
- Timed to ± 3 seconds: photos (2552 of 6194); videos (2197 of 5726)

TIMES FOR MAJOR EVENTS

Tower 1 Plane Strike: **8:46:31 am**

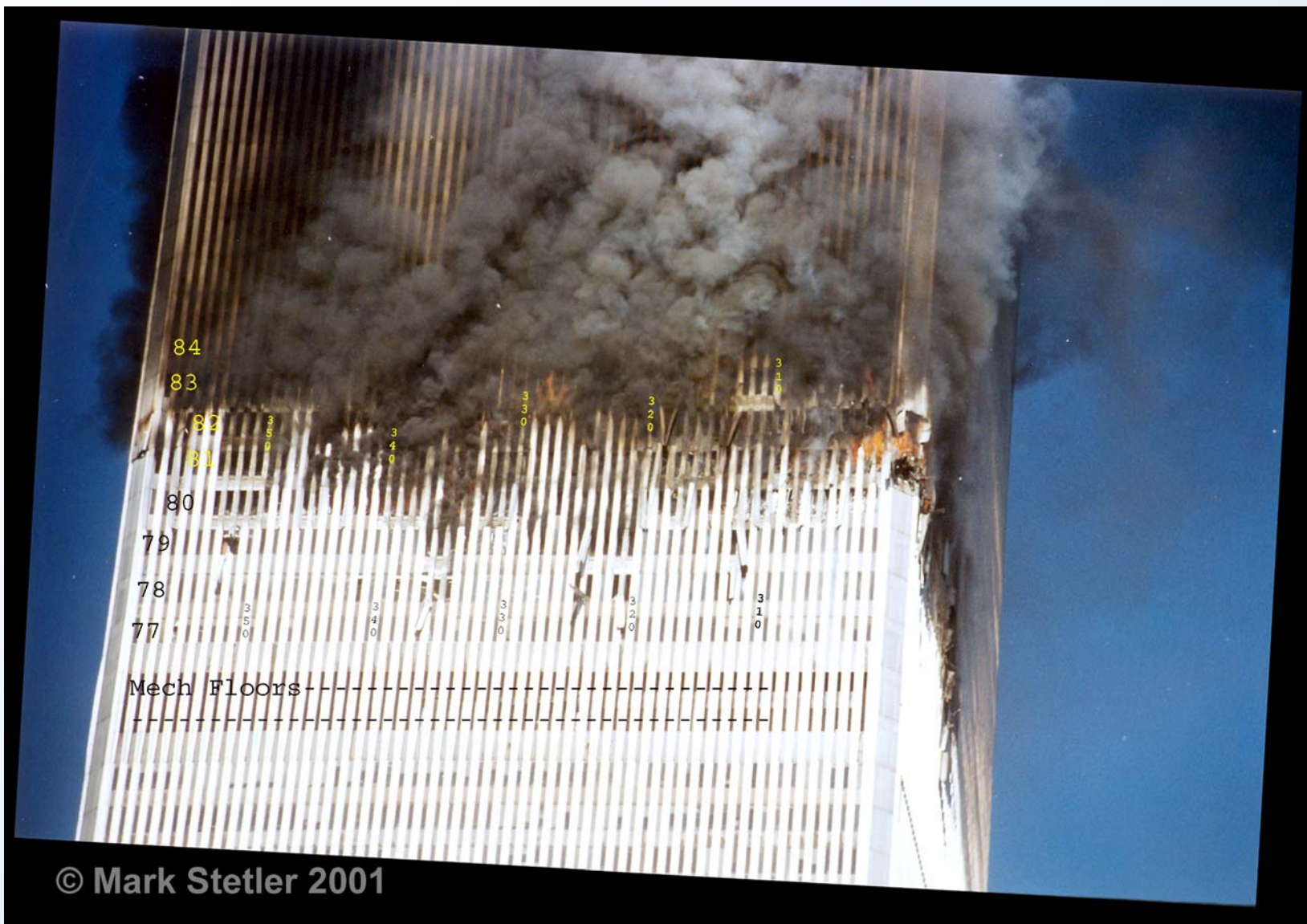
Tower 2 Plane Strike: **9:02:59 am**

Tower 2 Collapse: **9:58:59 am**

Tower 1 Collapse: **10:28:25 am**

Tower 7 Collapse: **5:20:52 pm**

East Face of WTC 2, 9:26:15 am



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KEY FOR TEST ANALYSIS

Sheet #1: Fire Visible

- 0 No fire
- 1 Spot fire
- 2 Fire visible inside
- 3 External flaming
- 9 Can't see

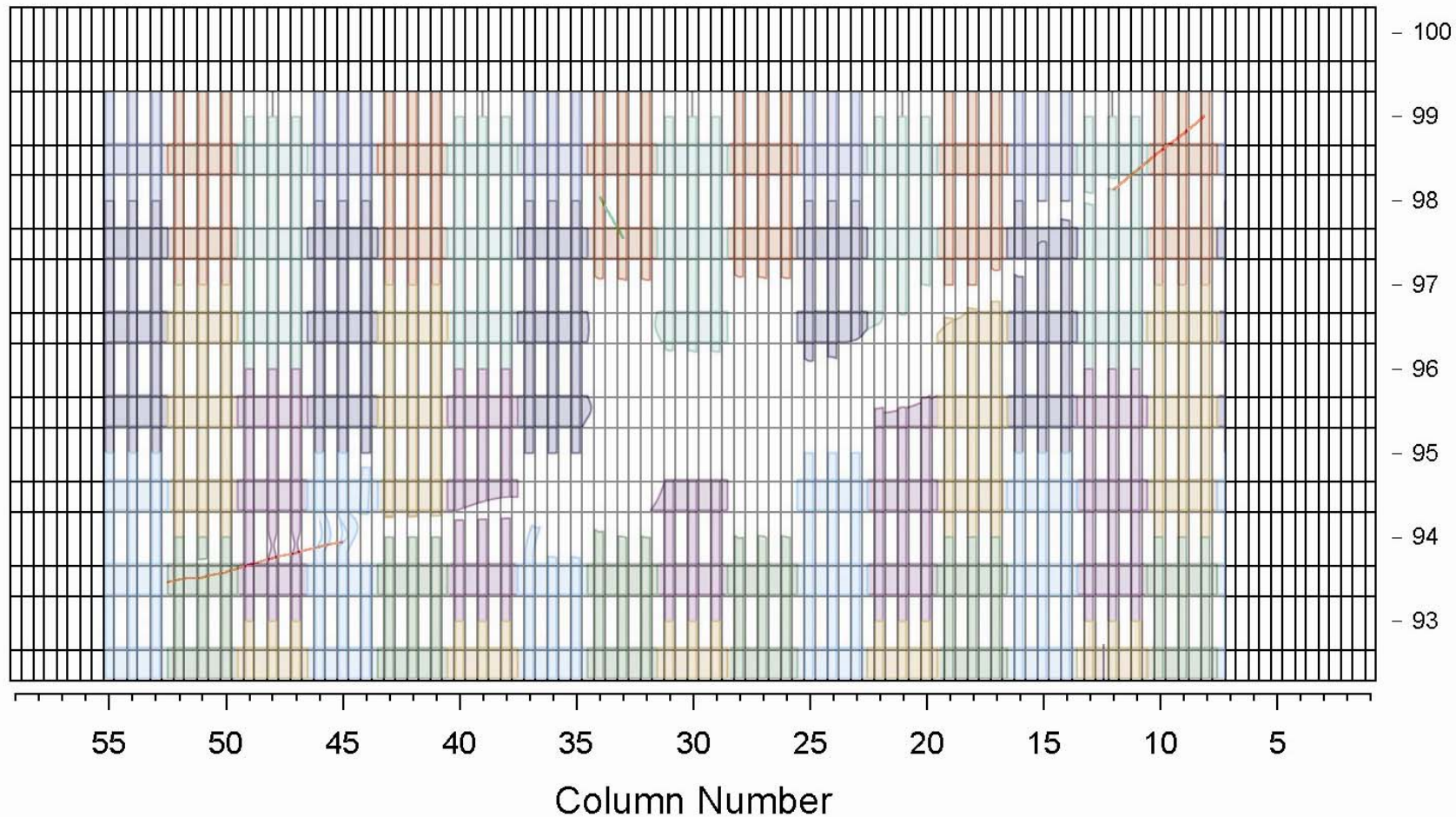
Sheet #2: Smoke

- 0 No smoke evident
- 1 "Light smoke"
- 2 "Heavy smoke"
- 9 Can't see

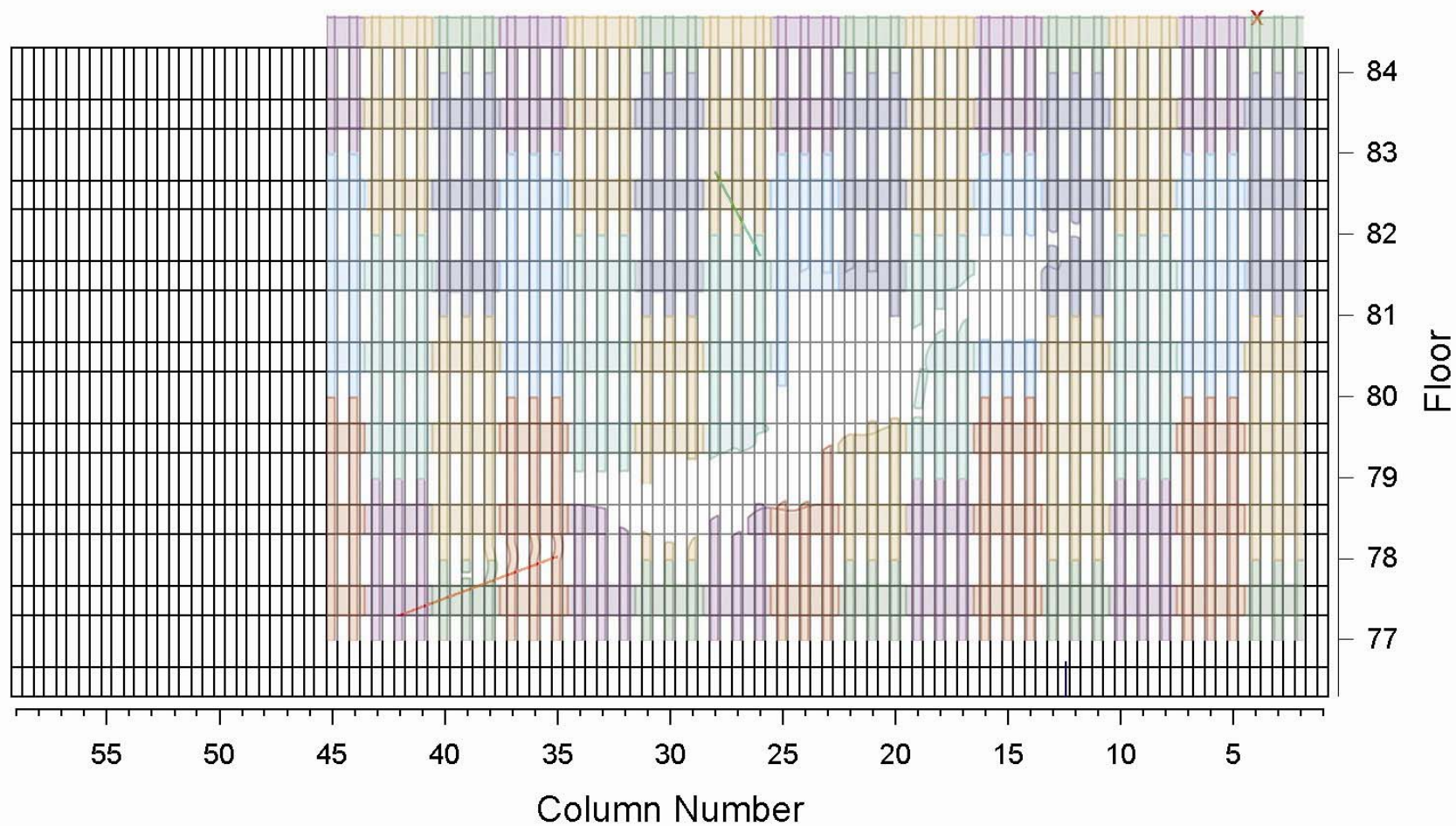
Sheet #3: Windows

- 0 Window open
- 1 Window in place
- 9 Can't see

	A	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
1		233	232	231	230	229	228	227	226	225	224	223	222	221	220
2	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	109	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	108	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	107	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	106	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	105	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	104	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	101	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	99	0	0	0	0	0	0	0	0	0	3	3	0	0	0
14	98	0	0	0	0	0	0	3	3	3	3	3	0	0	0
15	97	0	0	0	0	0	0	3	3	0	3	3	0	0	0
16	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	95	0	0	0	0	0	0	3	3	0	0	0	0	0	0
18	94	0	0	0	2	2	3	3	3	3	0	2	0	0	3
19	93	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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Plane Wing and Tail Marks on the North Face of Tower 1
Left Wing: 94th, Tail: 98th, Right Wing: 99th

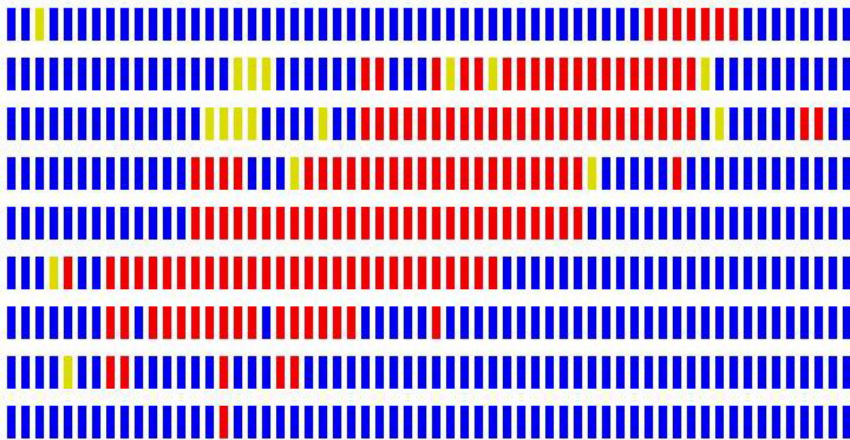


Plane Wing and Tail Marks on the South Face of Tower 2
Left Wing: 77th, Tail: 83rd, Right Wing: 85th

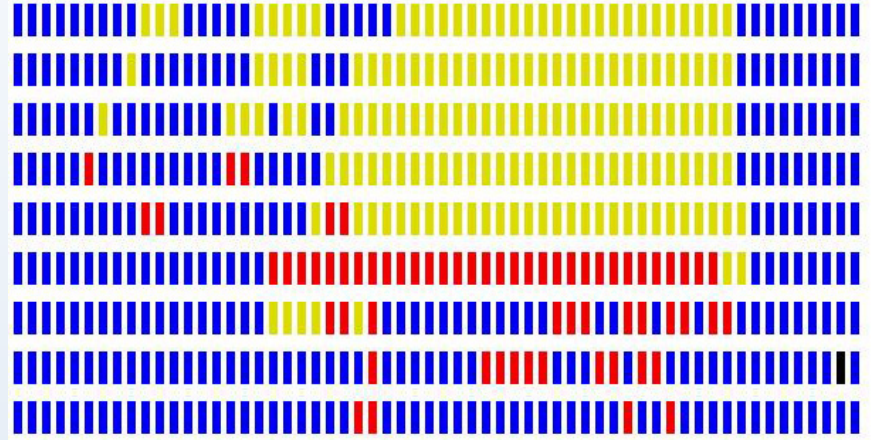
WTC 1 Initial Windows Missing

- Windows intact
- Windows missing
- Hidden

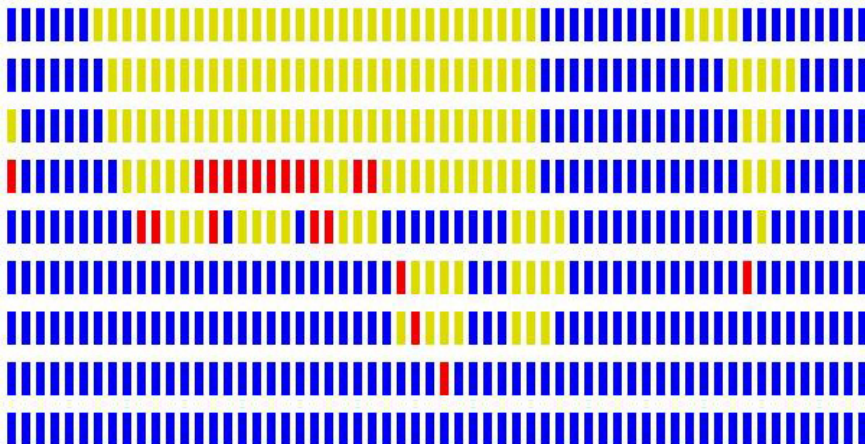
North



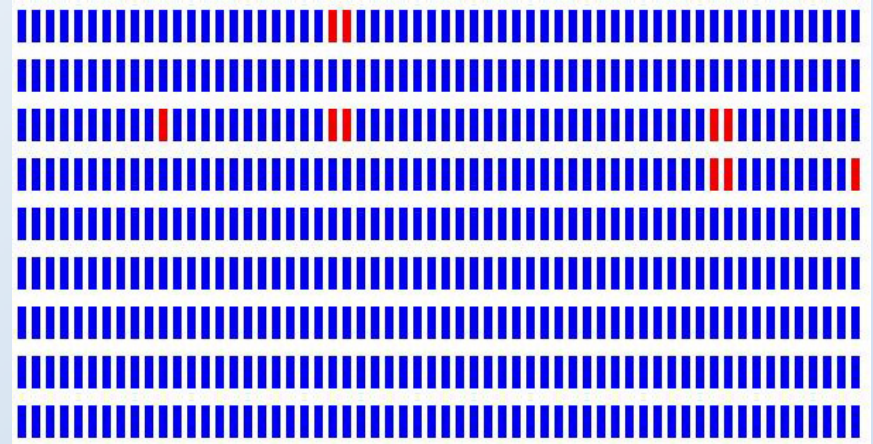
East



South



West





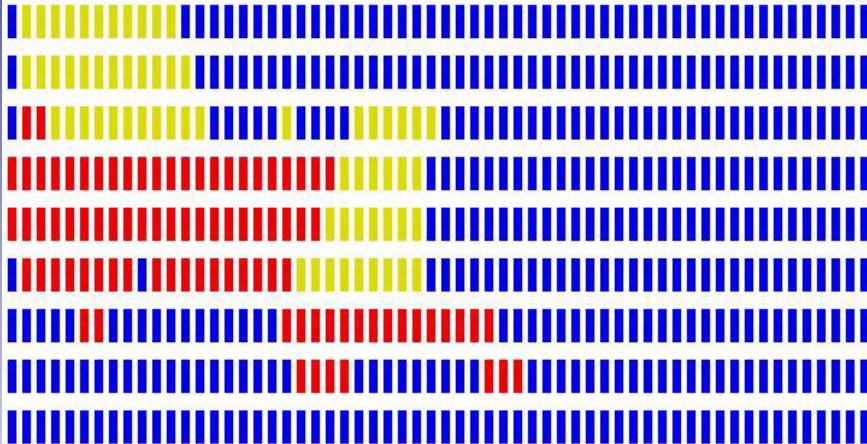
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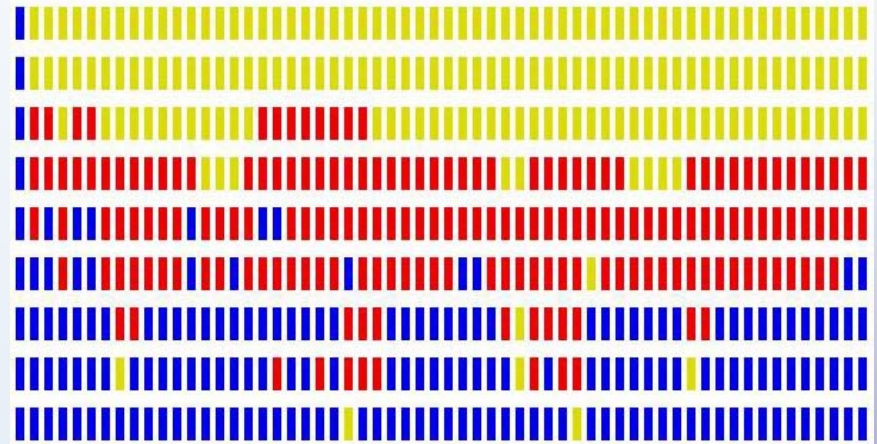
WTC 2 Initial Windows Missing

- Windows intact
- Windows missing
- Hidden

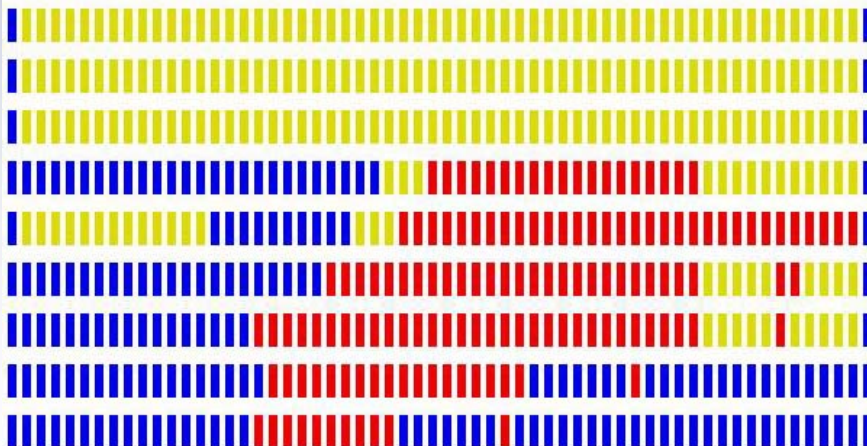
North



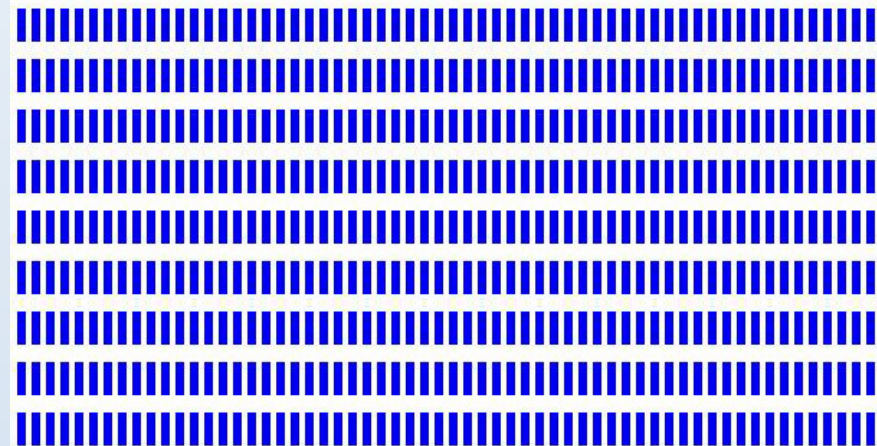
East



South

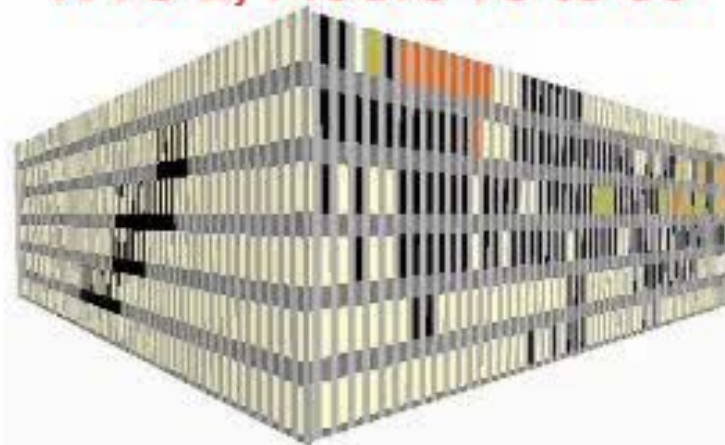


West



NIST

WTC 2, Floors 78 to 83



9:02

SOME RELEVANT VISUAL OBSERVATIONS FOR TOWER 1 (Part 1)

- Initial damage and subsequent fire development is highly asymmetric (plane strike centered on north face)
 - Fireballs following plane strike on north, east, and south
 - Fires “damped down” shortly after initial fireballs
 - Significant damage and early fire growth on north face, center of east face, and western side of south face
 - Fires on east side of south face are not observed until after 10:00 am
- Rapid and extensive fire spread on 97th floor of west face starting at 8:56:08 am; by 9:00 am large fires on 96th and 97th floors on north face, center of east face on 94th and 97th floors, and west side of south face on 96th floor
- Fires develop and start to spread across east face of 92nd floor after 9:00 am

SOME RELEVANT VISUAL OBSERVATIONS FOR TOWER 1 (Part 2)

- Areas of “typical” fire spread observed
 - Fires moving south on east face of 92nd, 94th, 96th, and 97th floors
- Areas of sudden fire development observed
 - Some associated with flashover in offices (e. g, northeast corner on 96th floor around 9:19 am)
 - Some occur in open areas (west side of 96th floor on north face around 9:54 am)
 - Fires burning on 98th floor on all four faces at 10:00 am
 - Large fire appeared suddenly on 104th floor of south side of west face shortly after 10:00 am
 - Large fires grew on multiple floors of east side of south face after 10:10 am
 - Sudden release of smoke from 92nd floor of north face at 10:18:48 am followed by rapid appearance of flame over much of floor

SOME RELEVANT VISUAL OBSERVATIONS FOR TOWER 2 (Part 1)

- Initial damage and fire locations are highly asymmetric (plane strike off center to the east)
 - Fireballs following plane strike on north, east, and south
 - Large sections of curtain wall removed on north and east faces, broken column on north face
 - No visible damage to west face
 - Fires don't "damp" down to low levels of Tower 1 after fireballs
 - Large debris piles seen in northeast corners of 80th and 81st floors and close to center of north face on 79th floor
 - Small fires only on south face, extensive fires on 81st, 82nd, and 83rd floors of east face
 - Fires located on debris piles on east and north faces burn for long periods
 - There is a "cold" area between the debris piles on the north face that is roughly 45 feet wide and covers the 80th, 81st, and 82nd floors

SOME RELEVANT VISUAL OBSERVATIONS FOR TOWER 2 (Part 2)

- Fires are less active than observed for Tower 1, but there are changes
 - Heavy flames erupt on 83rd floor of north face just to the right of the “cold” area at 9:29:10 am, at 9:35:45 am flames suddenly appear on this floor near the center of the face
 - Heavy smoke and flames suddenly appear on east face over large extent of 79th and 80th floors around 9:35:45 am and decrease abruptly around 9:36:30 am, fires then slowly grow back
 - Flames appear on the 82nd floor just to right of the cold spot on the north face around 9:54 am
 - Flames spread across most of the 79th floor on north face prior to collapse
 - Release of heavy smoke and rapid growth of fire over the western half of the 80th floor occurs on the south face starting at 9:56:37 am

SOME RELEVANT VISUAL OBSERVATIONS FOR TOWER 2 (Part 3)

- Visual evidence for collapsed floors
 - Photos and videos show a hanging object that appears to be the 83rd floor draped across windows on the 82nd floor, this object sinks lower at later times
 - Similar objects, likely localized portions of the 81st, 82nd, and 83rd floors, are visible through windows on the east side of the north face
 - Molten material pours from the upper region of window 80-255 starting at 9:51:52 am