



260 Madison Avenue

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Water chiller (foreground) after being dropped by crane. Photo taken from Madison Avenue, south of East 39th Street, looking north.

photo by Steve Spak

Crane Calamity in Midtown Manhattan

by Assistant Chief Ronald R. Spadafora, Deputy Chief Joseph N. Carlsen and
Battalion Chief Nicholas Borrillo

On Sunday, May 31, 2015, beginning at 1043 hours, 9-1-1 calls began notifying UCT communications dispatchers of a catastrophic event (big bang) on Madison Avenue in midtown Manhattan, between East 38th and 39th Streets. The calls ranged from a building collapse, to a crane collapse, to an explosion. Dispatched on Box 0739 to the location were Engines 65, 26 and 16, Ladders 24 and 7 and Battalion 8. Due to the volume of calls, the Manhattan Fire dispatcher additionally assigned a collapse matrix consisting of Special Operations Command (SOC) units.

Rapid response and size-up

The first unit on the scene, Engine 65, commanded by Captain Matt Murtagh, arrived in fewer than two minutes. Members were confronted with chaos: Dust, glass and debris were in the air and a large crane was observed reaching out more than 300 feet against the façade of a skyscraper. The crane's load (a 15-ton air conditioning unit/water chiller) was lying in the middle of the street, directly in front of the building. Injured pedestrians were screaming and an occupied vehicle in the block was heavily damaged.

The preliminary report providing information to the dispatcher was clear and concise, denoting the situation: Injured civilians in

the street as a result of a crane dropping the load it was lifting to a 30th-floor mechanical equipment room of a high-rise office building located on Madison Avenue, between East 38th and 39th Streets.

Note: A water chiller is a refrigeration machine that produces cold

water or water/glycol mix, to provide comfort cooling for buildings.

Built in 1954, 261 Madison Avenue is a 31-story building, measuring 200- by 120-feet, steel frame/concrete encased (fire-proof) structure with exterior walls substantially tied to all floors

Shoring Operations at 261 Madison Avenue

by Battalion Chief Joseph M. Jardin

Rescue Operations units engage in the shoring and stabilization of compromised structures on a fairly regular basis. Most often, this activity occurs on the ground floor or a below-grade story. Occasionally, units will operate on an upper floor of a “low-rise” structure. In support of operations at 261 Madison Avenue, units shored a compromised portion of an upper floor in a high-rise building.

Erecting shores on high-rise floors adds logistical complexity not realized in a more conventional setting. There were two significant challenges: 1. Communication between teams inside the building and teams at the cutting station in the street. 2. Transporting supplies from the street to the upper floors of the building.

With a “wedding cake” profile, 261 Madison Avenue “stepped out” at several stories. During its descent, the chiller unit struck the façade at multiple levels. The unit made considerable impact with the roof of the 15th-floor step-out. In addition to punching through a sizeable portion of the concrete roof slab, the unit caused considerable structural damage to a concrete-encased steel spandrel girder and a concrete beam perpendicular to it.

The floor on the Madison Avenue side of the 16th floor near the point of impact was sagging as well. On floor 15, in addition to a visible U-shape deformation near one of the supporting columns, the girder itself no longer was “square,” in the respect that the top of the beam appeared to be tilting in toward the building.

Beyond the readily visible damage, the condition of the beam/column connections was a concern, given the force involved in the impact. To prevent further collapse and/or the “kicking out” of any structural members to the exterior, the decision was made to initiate a shoring operation. At the start of the operation, a Paratech™ metal strut was put in place as a temporary safety shore measure. This safety shore allowed members to work in a more confident manner.

In general, Rescue Operations Units follow the *FEMA Urban Search and Rescue Field Operations Guide* (F.O.G. Manual) and the *U.S. Army Corps of Engineers Urban Search and Rescue Shoring Operations Guide* for best practices concerning shoring techniques. The strategic approach to locating shoring, as well as the design and construction of the shoring, is predicated on these references. As 261 Madison Avenue is a steel-framed building, sound shoring practice dictates that two undamaged floors are required to support one damaged floor. As such, Firefighters erected three post vertical shores on floors 14 and 15, given the damage observed on floor 15.

To implement the shoring plan, one Rescue Task Force--consisting of Rescue 1, led by Lieutenant William Ryan, Squad 288, commanded by Lieutenant Matt Szyndor, and Ladder 25, led by Lieutenant Patrick McNiff--was assigned to operate on floor 14. Another Task Force--Rescue 4, led by Lieutenant Ray Strong, Squad 18, commanded by Captain Brian Smith, and Ladder 14, led by Lieutenant Daniel Gonzalez--was assigned to floor 15. Firefighters inside the building took measurements and communicated this information on a secondary tactical channel to the Firefighters operating a cutting station in the street.

Prior to arrival, members cleared the area of debris to permit the proper placement and erection of the shore when the component pieces were delivered. Each team provided members to transport the needed lumber via elevator to the 14th and 15th floors. It was decided to use six- by six-inch lumber to erect standard three post vertical shores (aka “dead shores”) due to the relatively heavyweight concrete and steel construction materials. (See photo above.) Generally, four- by four-inch lumber is used.

Command considerations

- For large and expanding incidents, Command Chiefs should think in



Members working on 15th floor, installing a three-post vertical shore.

Members are urged to review the following references:

- *FEMA Urban Search and Rescue Field Operations Guide* (F.O.G. Manual).
- *U.S. Army Corps of Engineers Urban Search and Rescue Shoring Operations Guide*.
- www.disasterengineer.org

terms of assigning Rescue Task Force packages (Rescue, Squad and SOC Support Ladder companies) to complex and/or labor-intensive incidents.

- For collapse operations and other similarly involved technical rescue operations, consider the assignment of a secondary or tertiary tactical frequency to facilitate operations.
- In taller buildings when multiple trips are necessary, designate an elevator--preferably a freight elevator--exclusively to the shoring (technical rescue) effort, when conditions permit.
- Assign the Rescue Battalion Chief as a Group Supervisor (functional task) as opposed to a Sector Supervisor (geographical responsibility).

About the Author...

Battalion Chief Joseph M. Jardin is a 29-year veteran of the FDNY. He is assigned to Battalion 44, but currently is detailed to the Rescue Battalion. Prior assignments include Battalion 28. As a Firefighter, he served in Engine 210, Ladder 154 and Rescue 2; as a Lieutenant, he served in Battalions 51 and SOC and Squad 252; as a Captain, he served in Division 14 and the Rescue Battalion. He is a registered professional engineer and holds a BS degree in Fire Protection Engineering from the University of Maryland. This is his third article for WNYF.



Photo by Battalion Chief Joseph M. Jardin

(no curtain walls). It does, however, have an exterior lightweight metal façade. The top three floors are dedicated as mechanical equipment rooms.

The building located on the east side of the Avenue spans the entire block. Exposure #1 was the Avenue. On the opposite side of the Avenue is a 21-story, high-rise office building with the address 260 Madison Avenue. Exposures #2 and #4 were streets (38th and 39th), while the rear (exposure #3) was an alley.

The 30,000 pound water chiller was approximately halfway into the enlarged opening of the mechanical equipment room when suddenly it fell to the street. Due to the configuration of the building, the water chiller unit struck several roof setbacks beginning on the 16th floor, causing unknown structural damage before landing in the middle of Madison Avenue. The high-rise office building across the Avenue sustained an abundance of broken windows along its front façade, up to 100 feet, caused by the falling debris.

Treating the injured and search for victims

On arrival, Captain Murtagh split his company into two teams. One was directed to the upper flooring of 261 Madison Avenue to ascertain injuries to two workers who were guiding the water chiller into the building when it fell. The other team was ordered to treat five injured pedestrians. The lobby of 260 Madison Avenue was used as a temporary triage/treatment area. Seven people were hurt, two of whom were construction workers. EMTs, Paramedics and Firefighters quickly treated the injured on-site. EMS also transported patients to Bellevue Hospital and NYU Langone Medical Center emergency rooms. Luckily, none of the injuries was serious in nature.

While responding, Battalion Chief Nicholas Borrillo, Battalion 8, transmitted a 10-75 signal at 1046 hours, based upon the initial reports from Engine 65. Subsequent code signals 7-5 (*all hands*) at 1052 hours and 10-60 No Code at 1101 hours also were given proactively after additional on-scene size-up.

Engines 26 and 16, led by Lieutenants Cornel Vitiello and Dennis Murphy, respectively, were directed to assist in the medical treatment of injured pedestrians, as well as the workers who were in the process of being removed from the 30th floor. Prior to entering the building involved with the water chiller insertion operation (261 Madison Avenue), the Officers of Ladders 7 and 24, Captain Joseph Loftus and Lieutenant Steven Cahill, respectively, were ordered to conduct a primary search of the dropped load and building debris area on Madison Avenue between 38th and 39th Streets within the limits of safety. This included the use of the thermal imaging cameras (TICs) around and in the vicinity of the water chiller unit.

After completing this task, both companies worked together to perform primary searches on the top floors inside 261 Madison Avenue and cutting/securing operations of the sheet metal façade that was in danger of falling down onto the street below. Ladder 2, commanded by Lieutenant John White, was designated the FAST Unit, with members positioning themselves with all needed tools and equipment on the west side of Madison Avenue and East 38th Street.

Initial sectoring of the incident was started in order to enhance



photo courtesy of Darryl Chalmers

Crane operator was hoisting the chiller to one of the top three floors to the mechanical equipment room at 261 Madison Avenue. Approximately halfway up, something went terribly wrong. See photo on facing page.

command and control. Second-arriving Battalion Chief John Buckheit, Battalion 7, was directed to establish a Sector (30th-Floor Sector) and supervise upper-floor operations at 261 Madison Avenue. Rescue 1, under the leadership of Lieutenant William Ryan, also was assigned to this critical position with orders to evaluate structural damage and shore compromised areas of the building at top-floor levels. Subsequently, the two injured crane construction workers were safely brought down to waiting EMS ambulances. Searches of the 30th floor, top floor and floors 29 through 17 were completed and proved negative. Structural elements were shored and secured. Hanging and loose metal façade sheeting was tied back into the building or removed.

Division 3 and the arrival of Command Chiefs

At 1102 hours, Deputy Chief Joseph Carlsen, Division 3 Commander, arrived on the scene and conferred with Chief Borrillo. He was closely followed in by Deputy Assistant Chief Anthony De Vita (Command Chief), who arrived just three minutes after at 1105 hours. Chief De Vita took on the role of Incident Commander, designating Chief Carlsen as Operations Section Chief. A Command



Crane control of the chiller is lost. The result is damage to the building--bouncing off several floors, breaking window glass--before the chiller fell to the ground on Madison Avenue, causing yet more damage.

Channel was established quickly and a Command Post officially was designated at the southwest corner of Madison Avenue and East 38th Street. The Staging Area for fire apparatus and personnel was designated to the north of the incident at Madison Avenue and East 40th Street. Battalion Chief Chris Williamson, Battalion 2, was named the Staging Area Manager.

At 1121 hours, Assistant Chief Ronald Spadafora (fourth-alarm Chief) arrived on-scene and conferred with Chief De Vita concerning unit deployment, operational strategy/tactics and other resource needs. It was determined that four additional Battalion Chiefs and three more ladder companies should be special-called to the scene to properly maintain command and control, as well as accomplish primary and secondary searches, shoring of the structurally damaged building and overhaul within the two affected buildings. The following list briefly describes the approach taken by the ranking Chief Officers at the Command Post.

Medical Branch established with the arrival of EMS Conditions

Car 08, staffed by Lieutenant Bernard Pogrebinsky, who communicated with Chief Borrillo at the Command Post and coordinated initial Medical Branch operations. He was relieved shortly thereafter by Car 513, Deputy Chief Stephen Lincke.

Based on the number and type of injuries and the potential this unique situation presented, EMS Division Chief Roberto Colon, Car 51, also responded. On arrival, he was briefed by Chief Carlsen regarding the number and location of those injured. The Chief was directed to verify the total number of victims, nature of the injuries and report back to the Incident Commander (IC).

Additionally, Chief Colon was tasked with ensuring sufficient resources were available to treat and transport surface victims, as well as the construction workers being brought down from the building. Injuries consisted mainly of minor trauma and lacerations from glass and steel debris that flew through the air.

Chief of EMS James Booth, Car 5, arrived, met with the IC and assumed the role of Medical Branch Director, splitting the Medical Branch into north (East 39th Street) and south (East 38th Street) Groups, reassigning Chiefs Colon and Lincke, respectively. Together, the EMS Chief Officers established a Rescue Medical Task Force, as well as Triage and Treatment Areas.

An EMS Staging Area, approximately 100 yards south of East 38th Street and Madison Avenue, was set up. Information from the Medical Branch was relayed via handie-talkie and face-to-face communication at regular intervals, keeping the Command Post fully informed of medical care activities.

EMS resources that operated at this incident included multiple BLS and ALS ambulances, Rescue Paramedics, EMS Officers, HazTac ambulance, a response physician, a

Logistical Support Unit, Mobile Respiratory Treatment Unit and Major Emergency Response Vehicle (MERV).

Safety Battalion Chief Michael McAndrew was ordered to work in the areas of greatest structural damage to 261 Madison Avenue. He ensured Firefighters were out of harm's way during shoring and securing operations at both the 30th- and 15th-Floor Sectors.

Communications and unit situational awareness were coordinated in an expert manner with the arrival of the Field Communications Unit. Tactical, Command and Secondary Tactical channels were used at this operation. Battalion Chief Thomas Meara, Battalion 9, handled the duties of Resource Unit Leader (RESL) skillfully, keeping the IC fully informed of radio messages. He was assisted in his duties by Deputy Chief Joseph Ferrante, surplus in Division 3. Chief Ferrante focused his energy on monitoring Command channel transmissions. The arrival of the Mobile Command Center, with the ubiquitous Fire Alarm Dispatcher Bill Ladell onboard, provided the Command Post with photographs, maps and building informa-



The Command Post was established on the southwest corner of Madison Avenue and East 38th Street, providing Chief Officers with good oversight of the incident.

tion data, which aided in overall situational awareness.

Battalion Chief Joseph Jardin, Rescue Battalion, was ordered to establish a Sector Post (15th-Floor Sector) at 261 Madison Avenue and named the 15th-Floor Sector Supervisor, responsible for search operations and the evaluation of the structural stability of the roof setbacks spanning floors nine through 16. Subsequently, Battalion Chief Richard Tarello, Battalion 10, also was ordered to the 15th-Floor Sector to take over supervision of the searches. This reduced Chief Jardin's span of control, allowing him to focus on directing shoring operations. Rescue 4, led by Lieutenant Ray Strong, and Squad 18, commanded by Captain Brian Smith, worked in the 15th-Floor Sector, concentrating their efforts on floors 14 and 15, where the building sustained the most damage.

Note: Refer to Battalion Chief Joseph Jardin's sidebar article on page 23 of this issue for more information concerning technical collapse rescue operations at this incident.

The major location of structural damage was to the 16th-floor setback. When the water chiller fell, it first struck this area, collapsing the roof. In addition, sprinkler piping at ceiling level was knocked down to the floor, causing the system to be inoperable. SOC units operating in the 15th-Floor Sector utilized their technical collapse expertise to mitigate structural instability. At several locations in the Sector, it was necessary for Firefighters to install temporary jacks and shoring to support compromised elements of the building. Additionally, SOC members and Department of Buildings (DOB) engineers conducted a floor-by-floor evaluation.

Utility companies were requested to check for potential damage to underground electrical feeder lines; gas, steam and water mains; and building service equipment, valves and piping. A ruptured water main was discovered below Madison Avenue within the affected area and quickly shut down by Department of Environmental Protection (DEP) personnel. This main affected only one fire hydrant.

Suspected damage to underground electrical power, natural gas and steam proved non-existent after arduous examination. Con Edison inspected utility service for damage inside 261 Madison Avenue with negative results.

Firefighters from Hazardous Materials 1 metered 261 and 260

Madison Avenue for possible high readings of natural gas. Normal readings were recorded, however. Haz-Mat Firefighters also inspected two oxyacetylene cylinders discovered on the 30th floor of 261 Madison Avenue to determine if they had been compromised.

No damage or defects were noticed during their analysis.

The Ranking NYPD officer was consulted at the Command Post for assistance in evacuation of the collapse area, site security, barricade placement and traffic control. NYPD liaison to FDNY, Captain Josef Nolte, worked diligently with police command to ensure these objectives were met and provided Chief Officers at the Command Post with ongoing updates.

Information-gathering included summoning New York City Emergency Management (NYCEM) through communications dispatchers to help coordinate meetings with the many City and private agencies working together at the scene. Inter-agency meetings were helpful in focusing Commanders on the priority issues to be accomplished. Moreover, the crane operator was requested to come to the Command Post to speak with Fire Marshals in order to confirm that all his personnel were accounted for and to provide clarity regarding the nature of worker injuries. He also verified that his crane was secured and claimed that there was no refrigerant inside the water chiller. His claim was substantiated by Haz-Mat Battalion Chief Richard Schlueck via the TIC-equipped Firefighters from Haz-Mat 1.

Command and control

Battalion Chief Jack Spillane, Battalion 4, was ordered into 260 Madison Avenue to establish the 260 Sector. He was tasked with supervising unit searches and structural damage determination, as well as the removal/clearing of broken glass from front façade windows. Ladders 3, 5, 25 and 35 were used to perform these vital functions.

All searches proved negative. There was no structural damage to the building and a total of 23 severely damaged windows were removed or cleared for safety reasons. In addition, Engine 44 performed metering for flammable/toxic gases and carbon monoxide in the sub-level floors with negative results.

Battalion Chief David Simms, Battalion 1, was designated the SAE Group Supervisor for 261 Madison Avenue. He was given the responsibility of overseeing the searches and structural survey of all floors, exclusive of the floors under the command of Chief Officers at the 30th- and 15th-Floor Sectors. This ensured that there were no victims or other areas of the building that were damaged.

Battalion Chief Robert Hayes, Battalion 6, was instructed to evaluate sub-level areas of 261 Madison Avenue. He established the Cellar Sector and supervised units under his command, who performed search operations and investigated a report of a steam leak condition in the cellar, which was unsubstantiated.

Battalion Chief William Falkenmayer, Battalion 31, was the designated Street Manager for this incident. He did a superb job of maintaining the collapse/danger zone by using Firefighters to cordon off the Avenue between East 38th and 39th Streets with emergency barrier tape. He also worked with police in coordinating the placement of metal stanchions to enhance deterrence to entry. This task successfully restricted non-essential personnel of all agencies, as well as pedestrians and onlookers from access. Firefighters also were posted at entry points to prevent unauthorized admittance.

Once falling debris hazards from the two buildings were cleared or secured, Chief Falkenmayer supervised a secondary street search of the area with negative results. Using a private company selected

NYCEM, street debris and the water chiller were removed.

The crane mishap was placed *Probably Will Hold* at 1315 hours by Chief Spadafora as FDNY strategy and tactics progressively stabilized the scene. The injured were all treated and transported to local hospitals, searches were concluded and proved negative, utilities were safeguarded and building shoring, securing and window clearing were completed. Chief Spadafora proclaimed the incident *Under Control* at 1915 hours.

Lessons learned/reinforced

- When transmitting a signal *10-60*, the IC should establish a Command channel to ensure a manageable span of control.
- Coordinate patient location, count and type of injuries with the Medical Branch Director.
- Establish an adequate number of Sectors with necessary resources to enhance command and control at large-scale operations.
- Ensure the response and arrival on-scene of needed governmental and private agencies through NYCEM.
- Establish and maintain a collapse zone for the safety of FDNY members, other agency personnel and civilians.
- If feasible, enter/exit buildings sustaining structural damage by using an alternate means located outside the collapse zone.
- The TIC is a versatile tool with more than one application. At this incident, it was used by ladder companies in an attempt to locate possible street surface victims, as well as by Haz-Mat 1 Firefighters to assess water chiller content and analyze oxyacetylene cylinders.
- Maintain contact with responsible building personnel to determine what action already has been taken, occupant load, extent of injuries and, for high-rise office buildings, if any part of the Emergency Action Plan has been implemented.
- Fire protection systems must be examined for serviceability in the aftermath of structural failure. Fire Protection Inspectors from the Bureau of Fire Prevention were summoned to the scene to perform this task. A small section of the sprinkler system at 261 Madison Avenue was deemed compromised as a result of the incident and had to be placed out of service temporarily during repair work on the building.

Note: DOB handed out full vacate orders for both high-rise office buildings--to 261 Madison Avenue for structural damage and to 260 Madison Avenue until such time that a sidewalk shed could be constructed in order to protect pedestrians from falling glass.

Conclusion

NYCEM inter-agency meetings were held on June 1st and 2nd. Battalion Chief John Corcoran, Battalion 8, attended these meetings, reporting back to his superiors that all fire protection systems were back in service and that all fire hydrants were repaired. Avenue restoration was ongoing while building safety netting was being installed. Work sheds were constructed to facilitate building repairs. DOB full building vacate orders gradually were rescinded, floor by floor, in conjunction with repair work progress. Eventually, the Avenue was opened to all traffic.

In terms of technical expertise and job knowledge, this complex incident brought out the best in FDNY members. A tip of the helmet goes out to all who worked at this operation for their dedication to service, bravery and professionalism.



Members are urged to review "Chilling Facts About Chiller Units, *Tactics for Titanium Fires*," by then-Lieutenant John Flynn, PE, in the 2nd/2002 issue of WNYF.



photo by Steve Spack

Damage to roof setbacks and facade is evident in this photo. Arrow denotes mechanical equipment room entry point for the water chiller.

About the Authors...

Assistant Chief Ronald R. Spadafora (top) is a 37-year veteran of the FDNY. He is the Chief of Fire Prevention. He holds a masters degree in Criminal Justice from LIU-C.W. Post Center, a BS degree in Fire Science from CUNY-John Jay College and a BA degree in Health Education from CUNY-Queens College. He is the Senior Instructor at Fire Technology, Inc., as well as an Editorial Advisor and regular contributor to WNYF.

Deputy Chief Joseph N. Carlsen (middle) is a 24-year veteran of the FDNY. He is the Division 3 Commander. Previous assignments include Battalion 43 as a Battalion Chief; Division 15 as a Captain; Ladder 131 as a Lieutenant; and Engine 318 and Ladder 166 as a Firefighter. He holds a BS degree in Fire Science from Columbia Southern University. This is his fourth article for WNYF.

Battalion Chief Nicholas Borrillo (bottom) is a 21-year veteran of the FDNY. He is assigned to Battalion 1. Prior assignments include Ladder 1 as a Firefighter; Battalion 23 and Engine 318 as a Lieutenant; and Division 8 and Engine 158 as a Captain. This is his first article for WNYF.

