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1.0 *FEATURED ARTICLE* :

1.1 Interview with Michael Rawlings, Director of Engineering at NYU Downtown Hospital : "Physical Plant Issues at NYU Downtown Hospital During the Attack on the World Trade Center"

The September issue of our newsletter is focused on the challenges faced by one of our clients, Michael Rawlings, Director of Engineering & Project Executive at NYU Downtown Hospital during the September 11th attack on the World Trade Center. For those unfamiliar with that hospital, NYU Downtown Hospital (formerly known as Beekman Downtown Hospital) is the only Hospital south of Houston Street, and is approximately (3) blocks from the World Trade Center. Michael's ability to calmly and successfully meet a wide range of challenges, during a crisis, is an inspiring story.

Michael was kind enough to detail his experience for our newsletter. Here is his story, roughly in his words, as told to William N. Bernstein, AIA, principal of our company:

"NYU Downtown Hospital had recently revised its Emergency Management/Disaster Plan, as of January 2001, to meet the new JCAHO standards. Prior to September 11th, we had conducted extensive training, based on the new plan, which follows the Incident Command System. In fact, we performed a utility disaster drill at the end of July 2001, to test our new plan. So, in a way, we were as prepared for September 11th as we could be. On September 11th, when the first plane hit the north tower before 9:00 AM, many of our staff were still arriving at work. The staff that arrived after the first plane hit were very frantic. Even those inside the Hospital could view the incident since the World Trade Center was clearly visible from our parking lot and main Hospital lobby. When the first plane hit, we immediately activated our Disaster Plans by announcing a Code Yellow and establishing a Command Post. All available staff returned to their departments and received specific instructions. All Outpatient and Faculty Practice appointments were immediately canceled, as well as any elective surgeries. The Hospital's Cafeteria was quickly set up to treat victims in anticipation of a patient influx. I was stationed within the Command Post and acted as the Operations

Section Chief within the ICS Organization established. Soon after 9:00 AM, due to the smoke from the fire, we turned off all of the Hospital's HVAC and air conditioning units and closed all outside air dampers, to prevent the systems from drawing smoke from outside and contaminating the hospital. In addition, staff were requested to shut windows. Fortunately, the outside air temperature was not too warm, otherwise the hospital would have become very uncomfortable.

By the time that the 2nd Tower was hit, the hospital was on high alert and had already begun to receive patients suffering from serious burns, crush injuries, and smoke inhalation. At approximately 10:00 AM, when the first tower fell, the dust just rolled through the streets towards the hospital, chasing hundreds of people. Luckily, we had previously shutdown our HVAC systems and windows, which prevented the Hospital from becoming infiltrated with dust.

After the first tower fell, everything on the outside of the building was covered with about 2" of cement dust, including hundreds of people that entered our lobby seeking refuge. Hospital staff were assigned in the lobbies to tend to the 450-500 people from lower Manhattan seeking refuge. We washed out their eyes, gave them water and dust masks, organized them into groups based on where they were headed (Brooklyn, Queens, Uptown), and appointed separate Group Leaders to walk each group out to safety.

During the panic that ensued and running for safety, a mother and son were separated, as well as a Downs syndrome patient from his parents. Hospital staff were assigned to comfort both until parents were later located.

We immediately set up portable decontamination showers outside our ambulance bays to hose off those victims covered in dust. Our hose bibs were designed with a thermostatic mixing valve for the water, and we also had medical gases built into that location, in case we needed medical air for staff in decontamination suits (we did not).

For those victims that we did triage, we set up four color-coded levels: Green for ambulatory, Yellow for seriously injured, Red for life-threatening injuries, and Black for deceased. We set up the cafeteria for the Yellow level of triage, and the main ED for the Red level of triage. We also used our Outpatient Clinic and Faculty Practice areas to provide emergency medical care for those ambulatory victims.

During the first morning, from roughly 9:00 AM to 1:00 PM, we triaged approximately 320 victims. Existing, stable patients were transferred to NYU Hospital Center, to make room for the new patients. Those requiring orthopedic surgery were transferred to Hospital for Joint Disease, and three serious burn victims were transferred to the New York-Cornell Burn Center.

This was accomplished using the Hospital's paramedics and ambulances. To get an idea of the scale, our hospital has approximately (170) beds in operation. We even used a newly constructed 26-bed medical/surgical unit, undergoing punchlist work for ambulatory patient care.

Shortly after Tower 2 collapsed, we lost gas and high-pressure steam service to the hospital. This was a part of a large-scale shutdown of services by Con Ed based on their concern about gas and steam leaks. In addition, due to the number of hydrants opened by the fireman, to fight the fires, the Hospital also lost water pressure to the building, causing the fear of losing water all together. Immediately staff were notified to conserve water.

As each of the two towers fell, it caused the ground below the hospital to shake and the windows to rattle, much like an earthquake. While this caused significant fear in many of our employees, staff continued to provide emergency medical attention to victims. By 4:00 PM on Tuesday, gas and high-pressure steam had been restored, based on re-routing done by Con Ed. Before the gas was turned on, Con Ed made extensive tests to assure that there were no leaks. Also by 5:00 PM, the water pressure had slowly started to increase, and the Hospital was able to begin again sterilizing instruments and providing domestic hot water. However, a little after 5:00 PM, after Building #7 collapsed (this was the third building to collapse), the hospital lost electrical power from Con Edison. The emergency generator immediately came on, which would allow us 24-36 hours of power, based on the diesel fuel on-hand and demand.

We were concerned that we do whatever was necessary to keep the generator functioning, as it is located on the roof and was being covered by inches of dust during this period. So we stationed maintenance staff, in protective clothing, in four-hour shifts, to keep the machine clean and to check controls on a regular basis. We needed a tank of diesel fuel for refilling the generator, but having a fuel truck in the area, during that period, was deemed unsafe. So Con Ed agreed to "top off" the generator twice a day (which they did through the following Monday, six days later, when power was finally restored).

In addition, we arranged for Con Edison to provide an additional generator outside the Hospital in case ours failed. Unfortunately, they were only able to provide a smaller generator (1200kW) than our existing equipment (1500kW) --- therefore, if our generator had failed, it would have been necessary for the Engineering staff to manually open and close the service and distribution switches, to maintain power in the hospital.

Since the electrical power was out all over lower Manhattan, we also had no streetlights. GE delivered portable light towers and those were set up outside of the hospital. GE also delivered and set up a portable Cat Scan

unit, run on diesel fuel, since our Cat Scan could not be powered by our emergency generator. GE really came through for us. We discovered that certain critical items were without emergency power, such as the morgue refrigerator and (4) walk-in refrigerators and freezers in Food & Nutrition. So our Engineering staff ran temporary emergency power from nearby emergency circuits to maintain the equipment in operation. Phone service to the hospital was cut off --- no inbound or outbound calls. So we had to use cell phones, which were sporadic, as well as satellite phones. Another problem that we had --- which everyone in the city had --- was the inability to contact the Mayor's Office of Emergency Management (MOEM), as their Command Post or "Bunker" was located at 7 World Trade Center (a building that was initially evacuated, and then later collapsed). It took two days for a temporary office to be set up, and during that time, communications were very difficult.

When the phone went out, the cable service also went out. So our only outside news was through battery-powered radios. We couldn't see all of the coverage that the rest of the world could see. In turn, with the threat of other potential building collapses, tight security surrounding entire Lower Manhattan, and because of our proximity to 'Ground Zero', news media were unable to get their mobile broadcast units near NYU Downtown Hospital. Therefore we also isolated from the media in this regard, and did not receive the initial media attention that other institutions did.

Like other hospitals, we had expected more victims. But after 1:00 PM, the only patients we treated were rescue workers who had injured themselves in their efforts to find victims. A team of (20) MD's and surgeons were requested at the site, but unfortunately there was little for them to do, so they returned to the Hospital. During rescue operations, NYU Downtown Hospital provided emergency medical care to over 140 FDNY, NYPD and volunteers, suffering from sprains and fractures, exhaustion, and respiratory difficulties. Many of them being discharged returned immediately to the site to continue to look for survivors.

What I think we are all most proud of is that after the incident, we provided much-needed assistance to a large residential community (Southbridge Tower) located directly across the street from the Hospital. This high-rise building was occupied by many seniors, who were now without power, water, or vertical transportation. Hospital staff walked up through the building --- up to 20 stories in some cases --- and delivered 300 meals prepared at the Hospital. In addition to providing meals, physician and nursing staff provided medical treatment, and refilled prescription drugs for those elderly who were trapped in their apartments.

During the crisis, and continuing to now, indoor air quality (IAQ) was an important concern. We had an environmental consultant running constant IAQ

studies, immediately after the incident and since. We followed the advice of our Environmental Consultants and mobilized cleanup operations. In addition, my peers from Mount Sinai NYU Health really came to our rescue. After working around the clock for over 80 hours, I could see my staff needed rest.

All of the pre and bag filters on 25 or so air handling units had to be changed before the Engineering Department could restore the building to normal operations. A team of 25 HVAC Mechanics and Electricians from Mount Sinai and NYU Medical Center came to our rescue on Saturday morning. They worked like gangbusters performing preventative maintenance on each of the units, washing heating and cooling coils, replacing all HVAC filters, greasing bearings and motors, and replacing belts. They also relieved my staff by provided electricians to continually monitor the emergency generator. I am grateful and indebted for their assistance during the Crisis, since without their assistance, it would have taken weeks to prepare the Hospital's physical plant back for normal operations.

I must say that every single Engineering Department employee at NYU Downtown Hospital did an outstanding job of responding to the many needs of the facility. They demonstrated extraordinary courage and dedication to the Hospital, its patients, and Community we serve.

Being informed by Con Edison that the power interruption was likely and would probably last another week, we were concerned that our emergency generator had been running for (4) days,. With the assistance of Mount Sinai NYU Health and HO Penn, we secured a larger generator (1875kW). We requested that Con Edison remove the smaller generator and disconnect us from their electrical grid. Late Saturday evening, the larger generator on the street was connected to the normal distribution service and power was systematically transferred from our emergency generator on the roof to the temporary one on the street. After the generator on the street was fully loaded, our emergency generator went into it's cool-down cycle and stopped, after running for over 110 hours. HO Penn performed a quick PM on our generator, while the Hospital's normal power was now being fed by the temporary generator on the street, a much more stable environment. Monday morning, 140 hours after the incident, Con Edison finally tied the Hospital back onto a temporary electrical grid.

As of today, Tuesday, September 25, 2001, the Hospital continues to be very seriously affected by the tragedy. Access to the facility is blocked by police barricades and National Guard, so it is very difficult for staff and patients to travel to the hospital. Patients who come by car are turned away. Even some staff --- when deemed "non-essentials" by the police at the roadblocks --- are turned away. Wires from Con Edison's temporary power grid are still running along every sidewalk, and phone service is still out to our Faculty Practice and off-site offices.

You can now get to the hospital by subway, however we are running shuttles and car service from 14th Street, Brooklyn, and Chinatown for patients to better access our services. Unfortunately at NYU Downtown Hospital, we are still experiencing business interruptions due to significant decrease in patient volume and utilization. It seems like it will be a very long time before things get back to normal, if ever."

--- End ---

2.0 CONTACT INFO FOR *BERNSTEIN & ASSOC., ARCHITECTS* :

Founded in 1990, *Bernstein & Assoc., Architects, PLLC* is an award-winning architectural firm specializing in : health care, laboratories, offices, educational, and infrastructure work.

In addition to architectural and engineering services, the firm offers owner's rep and value engineering services.

Our mission statement : high-quality design, excellent service, strategic thinking.

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