

MEMORANDUM FOR THE RECORD

Type of event: Interview of David A. Rosenzweig, Vice President, Network Operations, Northeast, Verizon

Date: February 25, 2004

Special Access Issues: None

Prepared by: Emily Walker

Team Number: 8

Location: Verizon, 140 West Street, New York, NY

Participants - Non-Commission: David A. Rosenzweig of Verizon, Vice President, Network Operations, Northeast; Rich Demoro, Staff Manager

Participants - Commission: Emily Walker, Mark Bittinger

Commission staff spoke with David Rosenzweig and his staff manager, Rich Demoro, of Verizon to clarify the actions of Verizon related to the closure and reopening of the financial market in response to the terrorist attacks of September 11, 2001 (9/11) as well as their overall operations on 9/11.

Rosenzweig began by explaining the role of his group on 9/11. He was the "inside" commander for the Verizon Central Office (CO) switching station on 140 West Street, Verizon's "Grande Dame" of switching stations with 1,800 people and originally built in 1926. Joe DiMauro (see later interview MRF) was the commander for outside connectivity through-out lower Manhattan. He said that many people played critical roles that helped make the efforts a success, including those at headquarters (1095 Avenue of the Americas). He said that his team was supplemented by people from Verizon from around the country which gave him over 100% capacity. Other areas in Verizon were more thinly staffed, but he felt that they all worked well in spite of this.

On September 11, 2001, Rosenzweig was at Verizon headquarters at 8 am. He did not see the plane fly by his building, but one of his colleagues did and he turned around and saw the burning hole from the first tower having been hit. Not much later, he saw another plane fly low by his building and he watched the second plane fly into the South Tower. He took the subway back to Verizon's CO at West Street. The subway was slow, but it did move and eventually he was in his office on the 28<sup>th</sup> floor. The building was in its final stages of evacuation at this point. A few minutes after he arrived, the South Tower collapsed. He said that they did not realize that the tower had collapsed, but it got dark and one of his colleagues was outside their building and came in covered with white dust. He turned to the building manager who was still confirming that all the employees had left, as well as shutting down the building heating, ventilation, & air conditioning (HVAC) system. David shut down the building and was heading toward their offices (CO North) on Varick Street. There he could monitor the network remotely.

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He said that Verizon had three close-by switching stations. West Street was by far the largest. Another switching station was in the South Tower, but it served the clients in that tower, so when the tower and the clients fell; there was no need for the station. Another switching device was located in WTC 7, but this served only Salomon Smith Barney so once that building was lost, there was no need for the server. Thus there was no "mismatch" after the event between the loss of those two switching stations and service provided.

The WTC 7 caught fire and burned throughout the day. David believed that this led to the final collapse of WTC 7 at around 5:20 p.m. However, during the day, the Verizon station at 140 West Street continued to operate and switch calls until 10:21 pm. That is the last time that they have a "billed call" from that station (which he determined post 9-11). He said that this office was one of the largest in the United States (and his staff manager said it was the largest in "the world"). He said that between 5:00 and 5:30 or at the time of the collapse of the WTC 7 building, the building went on emergency power. He said there were five generators in the building. The generator on the 18<sup>th</sup> floor was clogged with debris from the outside. The basement generator stopped when water filled the basement after the WTC 7 collapsed. Evidently, and confirmed in pictures, the collapse of building 7 ripped the east face off the Verizon building at 140 West street.

911 emergency calls were routed through a tandem switch. This meant that they were backed up and rerouted to Brooklyn. As a result, they did not lose any 911 emergency calls that day. (Later, however, I was told by George DelGrosso of Commission staff that although these calls were not lost, they were rerouted to operators in a different borough who then had to relay the call back to those who could help in Manhattan). Rosenzweig did say that the back-up 911 call system was set up after the 1993 bombing and that he was glad that this switching mechanism worked because losing 911 calls would have been a very serious issue.

He said that the collapse of WTC 7 affected the power supply in the Verizon building; physically severed cables and it damaged the electronics. He also mentioned that they were unable to pump air into the manholes (which kept them free from water) since the power was out and thus the cables filled with water. Basically, the 140 West Street building was in some form of operation between 5:30 – 10:21 pm on Sept. 11. It manned calls from the Hudson River to the East River and up to Chinatown.

The Verizon Broad Street was not impacted. It had power and it largely serviced the NYSE. The exchange itself was not in trouble. The difficulty was connecting the market participants, many of whom had lost their buildings. The description of the issue of re-routing the calls to the NYSE was as follows. All calls came through the West Street CO from any tenant in the WTC area. Even those calls from cell phones, first went to the tower through the air, and then were transferred to this CO. Even other carriers, AT&T, Sprint, and/or WorldCom bought services through Verizon and used this switching station. Many companies did not realize that these carriers were also using the same cables and the same switching station. He said that even Time Warner Cable was a

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customer. He likened the issue to getting your car out of your garage when there was a dump truck blocking the end of your driveway. He suggested that no matter how badly you wanted to leave the garage, there was no way to get out with that truck in the way. In the same instance, with the switching station out of service, no matter what other service you had, if it had to use this switching station, the call could not get out (neither could the connection to the Internet). If the call did not have to go through Verizon's West Street station, it also may not have worked due to an overload of the networks with all of the calls that were peaking during the event. He said the system was not designed to be large enough to handle this type of overload which rarely occurred.

In terms of getting the financial market up and running, he said that he had heard that pressure had come from the White House to open on Thursday but it was not deemed possible by the players. He said that once Monday was decided, he and his group had to make Monday happen. They had to get the customers rerouted and the raw infrastructure moved to make it happen. He said that the way he thought it happened was the market participants called their normal account executive at Verizon and told them where they wanted to reconnect. All of these requests were taken by senior management and sorted through. Since the Broad Street switching station was still working, he said that normal connections were used from the new sites and routed through Broad Street. He said that it was difficult, but not impossible. If both Broad Street and West Street CO's had been destroyed, this would have been quite difficult. He said that while this effort related to restoring the connectivity to the NYSE was occurring through another switching station, his team was working on reconnecting West Street station. Both actions were occurring simultaneously.

Rosenzweig described southern Manhattan as basically having two Central switching stations. There were two kinds of diversity in carriers. There was logical diversity (e.g. you thought you had two carriers because their names were different) and physical diversity (e.g. there were two separate switching stations). He suggested that the first was true, the second was not. He said that most users were unaware that both of their carriers went through the same switching station and the same cables. He said that the Empire City Subway which is a wholly owned subsidiary of New York Telephone owned the underground cables for everything in NYC. They determined who dug cables and who used the underground. They treated everyone equally unfairly.

Rosenzweig confirmed various points in the GAO Report 03-251. He said that the numbers of voice circuits, data circuits, private branch exchanges (PBXs), and lines were largely correct as mentioned in the report (pg. 39) but he would be happy to see our final description of the event and comment on the correctness given that our report will be the only complete report of the event from their perspective in the public. He said that the data on page 42 that said there were three other switches was incorrect. He said that there was one switch in the towers, and WTC 7 had "switching modules," an extension of West Street switches. He did say that West Street served as a pass-through for many circuits that did not originate in the area.

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In terms of Verizon having an emergency/disaster plan, he said that they did have a disaster recovery plan. But they didn't have time to "pull out the manual and read the tabs." Everyday Verizon deals with contingencies. Their training is responding to real-world contingencies. They never training by way of table-top exercises. The important question to ask when responding to a crisis is "Do you know what you're doing?" He felt that they succeeded because they had years of solving problems behind their belt, and they scaled this experience to the level of the disaster. Verizon's work ethic is comprised of three simple rules: (1) do it on time; (2) don't let it break; (3) if it breaks fix it quickly.

He did mention that they had called in generators once the first plane hit because they knew they would need power. He also said that he nor anyone else ever expected the towers to fall and were not focused on that possibility. He felt that they did what they were trained to do their entire working career. And while it was emotionally challenging, they were not in danger while they were working to restore connectivity, so it was mostly a matter of engineering, letting the people who knew what they were doing get the job done. This meant, in many cases, that the people managing groups were lower level engineers and not senior management, even in their hierarchy. He felt that people paid attention to these leaders largely because they were technically competent and this entire event required technical skills. He said that senior management in Verizon was kept abreast by regular reports of what was occurring.

David provided us with the name of John McLaughlin, Verizon's Director of Network Operations for Manhattan, to follow up on the NYSE event. He also gave us a PowerPoint presentation written by Verizon following the incident (attached).

Attachments:

GAO Report 03-251 pages 30-48  
Verizon PowerPoint Presentation

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# September 11 Attacks Severely Disrupted U.S. Financial Markets

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The terrorist attacks on September 11, 2001, resulted in significant loss of life and extensive property and other physical damage, including damage to the telecommunications and power infrastructure serving lower Manhattan. Because many financial market participants were concentrated in the area surrounding the World Trade Center, U.S. financial markets were severely disrupted. Several key broker-dealers experienced extensive damage, and the stock and options markets were closed for the longest period since the 1930s. The markets for government securities and money market instruments were also severely disrupted as several key participants in these markets were directly affected by the attacks. However, financial market participants, infrastructure providers, and regulators made tremendous efforts to successfully reopen these markets within days. Regulators also took various actions to facilitate the reopening of the markets, including granting temporary relief from regulatory reporting and other requirements and providing funds and issuing securities to ensure that financial institutions could fund their operations. The impact on the banking and payments systems was less severe, as the primary operations of most banks and payment systems processors were located outside of the area affected by the attacks, or because they had fully operational backup facilities in other locations. Although many factors affected the ability of the markets to resume operations, the attacks also revealed limitations in many participants' BCPs for addressing such a widespread disaster. These factors included not having backup facilities that were sufficiently geographically dispersed or comprehensive enough to conduct all critical operations, unanticipated loss of telecommunications service, and difficulties in locating staff and transporting them to new facilities.

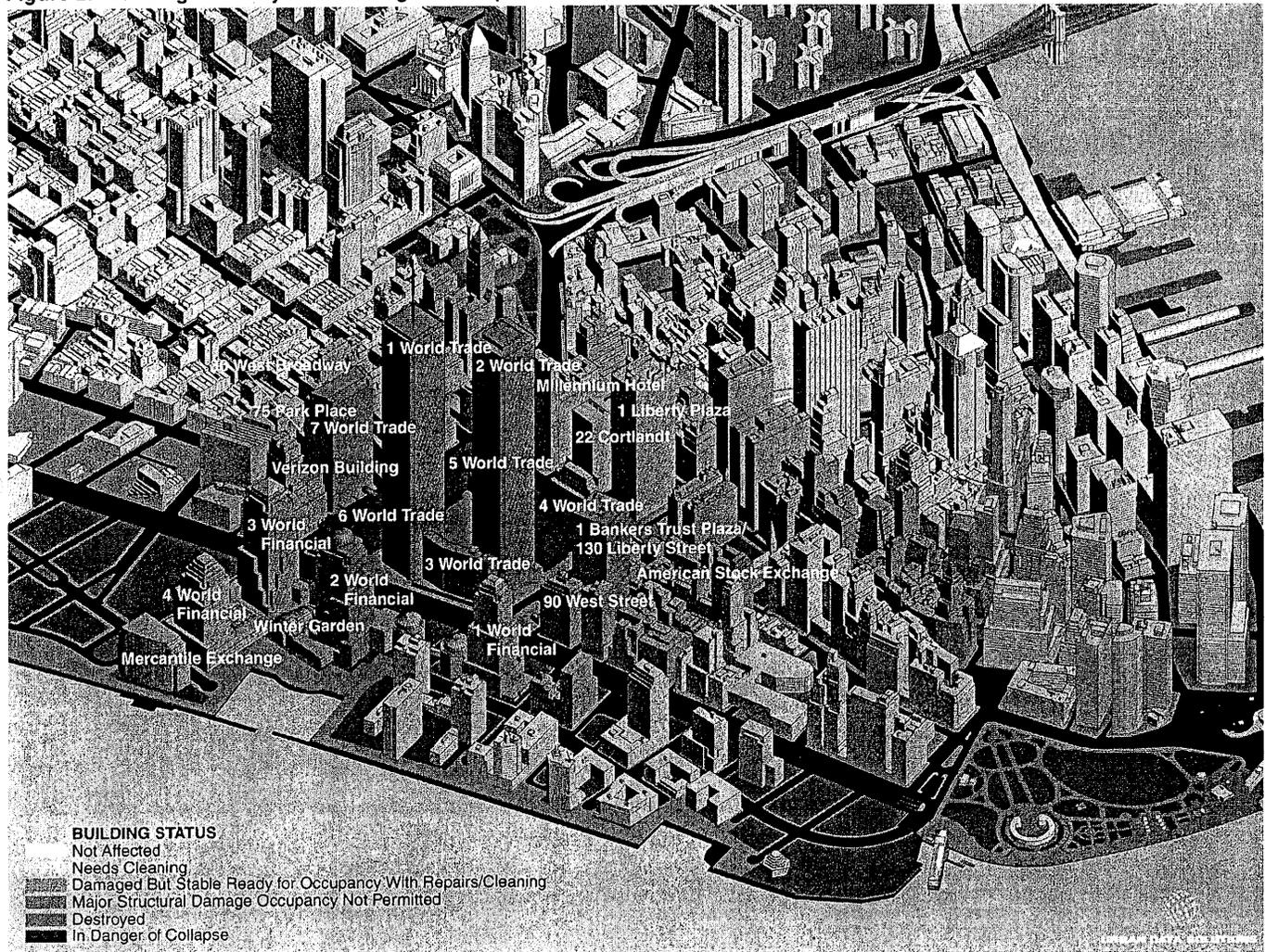
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## Attacks Caused Extensive Damage and Loss of Life and Created Difficult Conditions That Impeded Recovery Efforts

On September 11, 2001, two commercial jet airplanes were hijacked by terrorists and flown into the twin towers of the World Trade Center. Within hours, the two towers completely collapsed, resulting in the loss of four other buildings that were part of the World Trade Center complex. As shown in figure 2, the attacks damaged numerous structures in lower Manhattan.

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Figure 2: Buildings Destroyed or Damaged on September 11, 2001



Source: Urban Data Solutions Inc.

The attacks caused extensive property damage. According to estimates by the Securities Industry Association, the total cost of the property damages ranges from \$24 to \$28 billion. According to one estimate, the damage to structures beyond the immediate World Trade Center area extended across 16 acres. The six World Trade Center buildings that were lost accounted for

over 13 million square feet of office space, valued at \$5.2 to \$6.7 billion.<sup>1</sup> One of these buildings was 7 World Trade Center, which was a 46-story office building directly to the west of the two towers. It sustained damage as a result of the attacks, burned for several hours, and collapsed around 5:00 p.m. on September 11, 2001. An additional nine buildings containing about 15 million square feet of office space were substantially damaged and were expected to require extensive and lengthy repair before they could be reoccupied. Sixteen buildings with about 10 million square feet of office space sustained relatively minor damage and will likely be completely reoccupied. Finally, another 400 buildings sustained damage primarily to facades and windows. A study by an insurance industry group estimated that the total claims for property, life, and other insurance would exceed \$40 billion.<sup>2</sup> In comparison, Hurricane Andrew of 1992 caused an estimated \$15.5 billion in similar insurance claims.

The loss of life following the attacks on the World Trade Center was also devastating with the official death toll for the September 11 attacks reaching 2,795, as of November 2002. Because of the concentration of financial market participants in the vicinity of the World Trade Center, a large percentage of those killed were financial firm employees. Excluding the 366 members of the police and fire departments and the persons on the airplanes, the financial industry's loss represented over 74 percent of the total civilian casualties in the World Trade Center attacks. Four firms accounted for about a third of the civilian casualties, and 658 were employees of one firm—Cantor Fitzgerald, a key participant in the government securities markets. The loss of life also exacted a heavy psychological toll on staff that worked in the area, who both witnessed the tragedy and lost friends or family. Representatives of several organizations we met with told us that one of the difficulties in the aftermath of the attacks was addressing the psychological impact of the event on staff. As a result, individuals attempting to restore operations often had to do so under emotionally traumatic conditions.

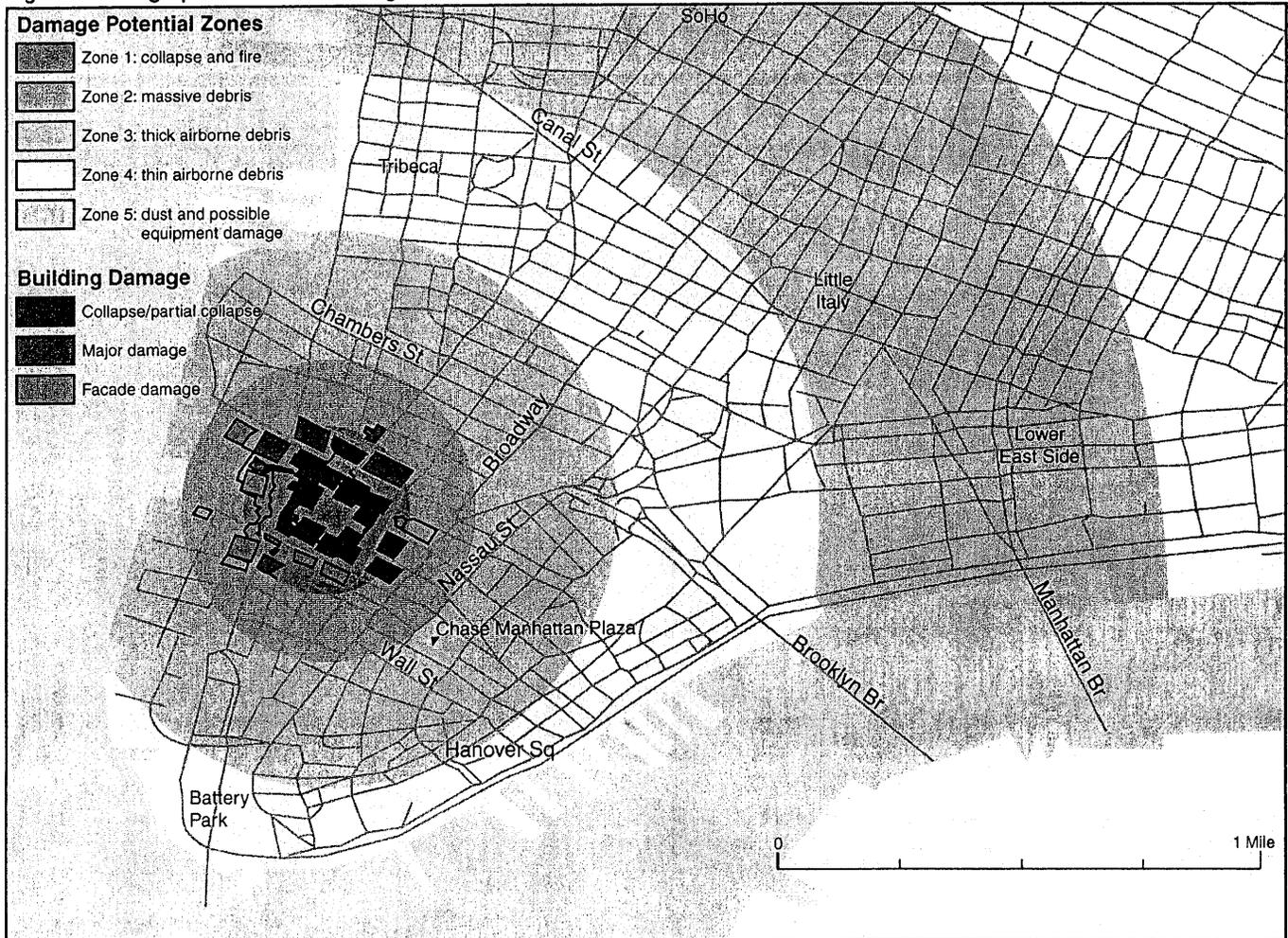
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<sup>1</sup>The seventh building was a hotel.

<sup>2</sup>According to another study by the Insurance Information Institute, *One Hundred Minutes of Terror That Changed the Global Insurance Industry Forever*, the total value of insurance claims for this event will be about \$40 billion. This study estimated that about \$2.7 billion, or 6.7 percent of this amount, would be for life insurance claims, and the remaining \$37 billion to be for nonlife insurance claims, which include property damages, business interruption, and nonaviation liability claims.

The dust and debris from the attacks and the subsequent collapse of the various World Trade Center structures covered an extensive area of lower Manhattan, up to a mile beyond the center of the attacks, as shown in figure 3.

Figure 3: Geographic Extent of Damage and Debris from Attacks in Lower Manhattan



Source: Risk Management Solutions, Inc., "World Trade Center Disaster Special Report," Sept. 18, 2001.

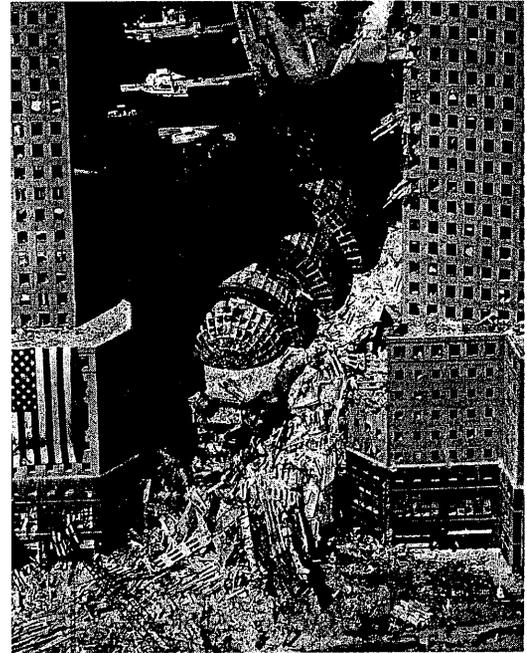
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Figures 4 and 5 include various photographs that illustrate the damage to buildings from the towers' collapse and from the dust and debris that blanketed the surrounding area.

**Figure 4: Damage to Buildings from Attacks and Resulting Debris**

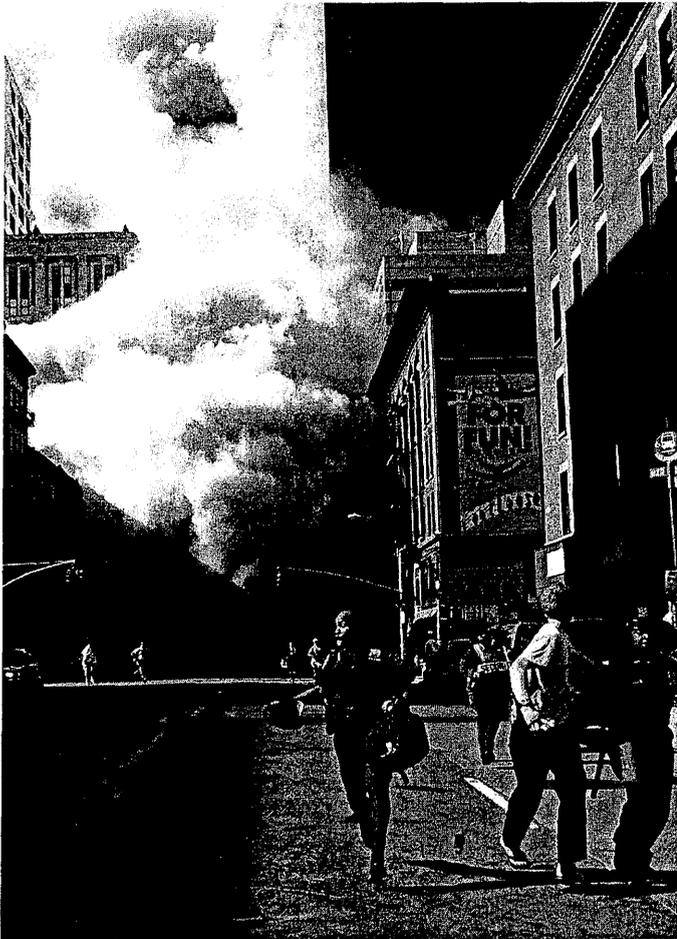


Source: Associated Press.



Left: An aerial view, September 17, 2001, of where the World Trade Center collapsed following the September 11 terrorist attack. Surrounding buildings were heavily damaged by the debris and massive force of the falling twin towers. Right: The debris-clogged Winter Garden between the buildings of the World Financial Center near the World Trade Center. These surrounding buildings, which contained important facilities of various financial market participants, were heavily damaged by the falling twin towers.

Figure 5: Dust and Debris Resulting from Attack



Source: Associated Press.

Left: Police officers and civilians run away from New York's World Trade Center after an additional explosion rocked the buildings Tuesday morning, September 11, 2001. This cloud of dust and debris was estimated to be as much as 30 stories high and blanketed the surrounding area, including financial market organizations' facilities. Top right: Ash covers a street in downtown New York City after the collapse of the World Trade Center. Bottom right: Rubble and ash fill lower Manhattan streets.

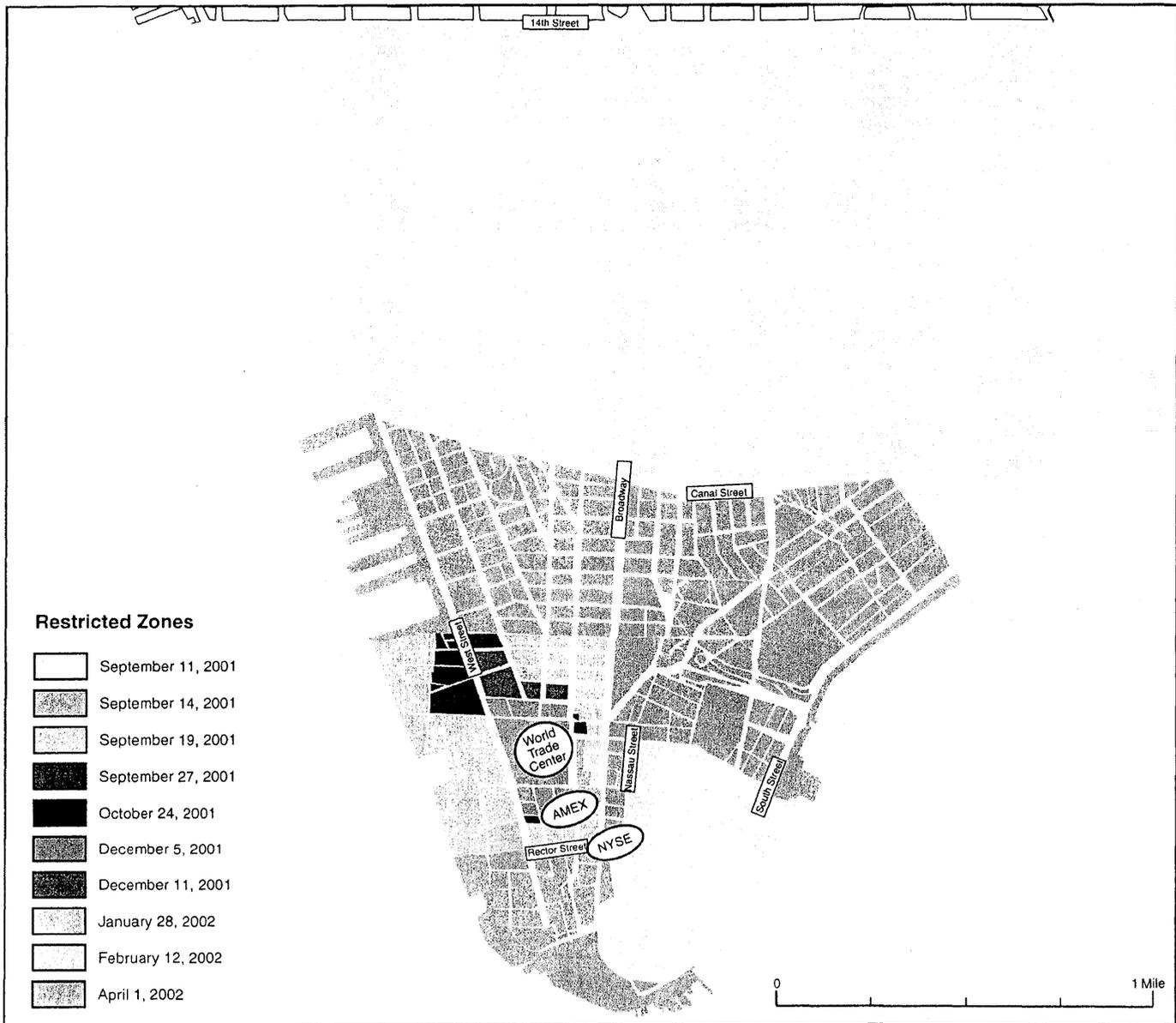
This dust and debris created serious environmental hazards that resulted in additional damage to other facilities and hampered firms' ability to restore operations in the area. For example, firms with major data processing centers could not operate computer equipment until the dust levels had been substantially reduced because of the sensitivity of this equipment to dust contamination. In addition, dust and other hazardous materials made

working conditions in the area difficult and hazardous. According to staff of one of the infrastructure providers with whom we met, the entire area near the World Trade Center was covered with a toxic dust that contained asbestos and other hazardous materials.

Restrictions on physical access to lower Manhattan, put into place after the attacks, also complicated efforts to restore operations. To facilitate rescue and recovery efforts and maintain order, the mayor ordered an evacuation of lower Manhattan, and the New York City Office of Emergency Management restricted all pedestrian and vehicle access to most of this area from September 11 through September 13, 2001. During this time, access to the area was only granted to persons with the appropriate credentials. Federal and local law enforcement agencies also restricted access because of the potential for additional attacks and to facilitate investigations at the World Trade Center site. Figure 6 shows the areas with access restrictions in the days following the attacks.

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Figure 6: Lower Manhattan Area Subject to Access Restrictions Following September 11, 2001, Attacks



Source: City of New York Emergency Mapping Center.

Some access restrictions were lifted beginning September 14, 2001; however, substantial access restrictions were in place through September 18. From September 19, most of the remaining restrictions were to cordon off the area being excavated and provide access for heavy machinery and emergency vehicles.

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## Damage from Attacks Significantly Disrupted Telecommunications and Power

The September 11 terrorist attacks extensively damaged the telecommunications infrastructure serving lower Manhattan, disrupting voice and data communications services throughout the area. (We discuss the impact of the attacks on telecommunications infrastructure and telecommunications providers' recovery efforts in more detail in appendix I of this report.) Most of this damage occurred when 7 World Trade Center, itself heavily damaged by the collapse of the twin towers, collapsed into a major telecommunications center at 140 West Street operated by Verizon, the major telecommunications provider for Manhattan. The collateral damage inflicted on that Verizon central office significantly disrupted local telecommunications services to approximately 34,000 businesses and residences in the surrounding area, including the financial district.<sup>3</sup> Damage to the facility was compounded when water from broken mains and fire hoses flooded cable vaults located in the basement of the building and shorted out remaining cables that had not been directly cut by damage and debris. As shown in figure 7, the damage to this key facility was extensive.

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<sup>3</sup>A central office is a telephone company facility containing the switching equipment linking customers with public voice and data networks within and outside of the local service area.

Figure 7: Damage to Verizon Central Office at 140 West Street



Source: Verizon Communications, Inc.

The remains of 7 World Trade Center building rest against the east wall of Verizon's 140 West Street facility. Telecommunications equipment in Verizon's facility also was damaged as a result of efforts to fight the fires burning in 7 World Trade Center. Firefighters used the building to assist in extinguishing adjacent fires. The rubble prevented Verizon technicians from getting into at least 15 manholes to assess and repair cables that run beneath ground zero. Inset top: View of damaged cable vault from street level. Because the cable vault at West Street was crushed, those physical connections between West Street switching facilities and customer premises were lost, resulting in a loss of dial tone for anyone at the World Trade Center and other local customers in the West Street serving area. Inset bottom: View of damaged digital switching system near breached seventh floor of east wall of 140 West Street. These switches were restored to service as a temporary measure but were to be replaced due to contamination.

Because of the damage to Verizon facilities and equipment, significant numbers of customers lost telecommunications services for extended periods. When Verizon's 140 West Street central office was damaged, about 182,000 voice circuits, more than 1.6 million data circuits, almost 112,000 private branch exchange (PBX) trunks, and more than 11,000 lines serving

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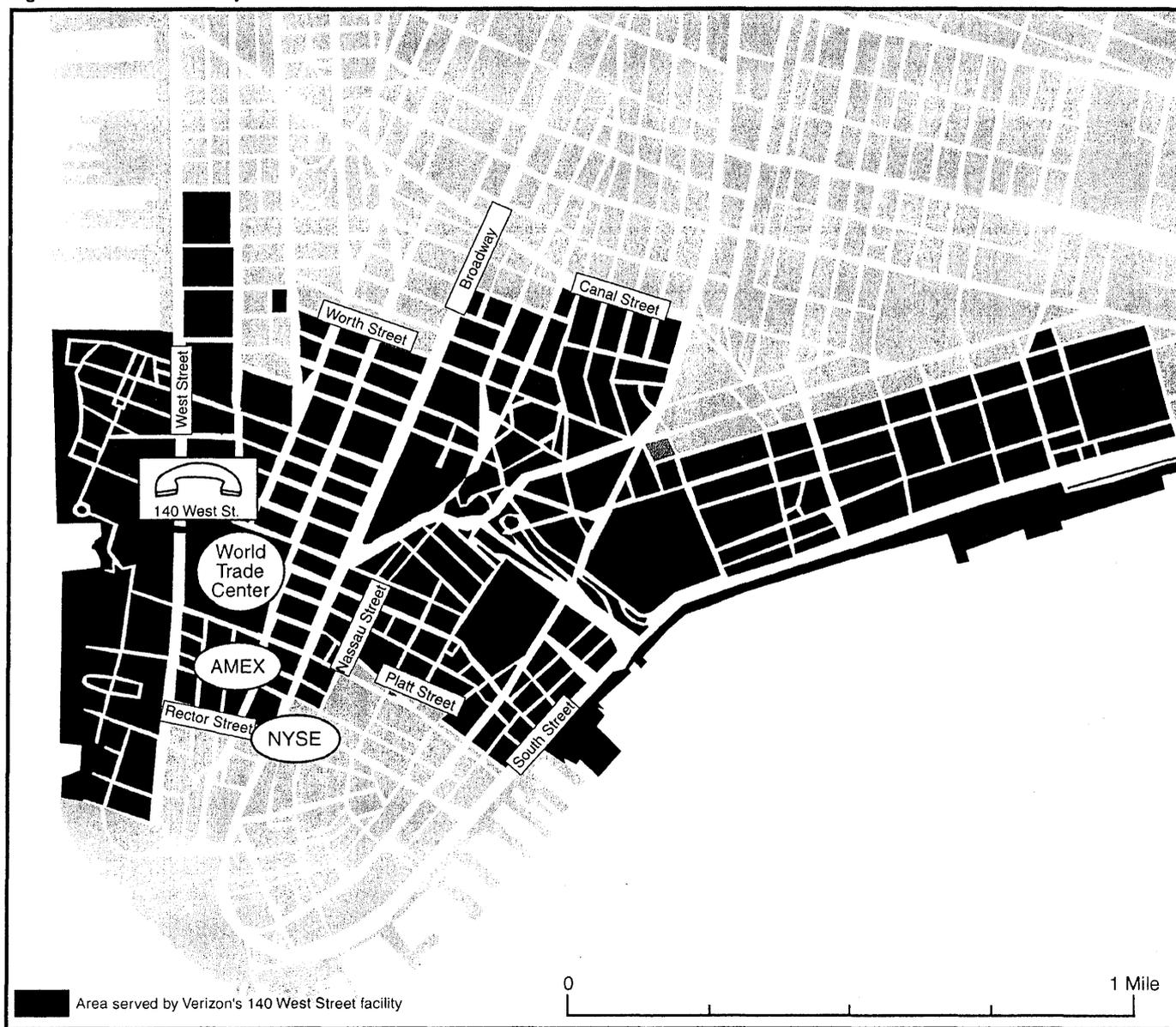
Internet service providers were lost.<sup>4</sup> As shown in figure 8, this central office served a large part of lower Manhattan.

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<sup>4</sup>A PBX is an automatic telephone switching system that is owned, operated, and located within a private enterprise. This system switches calls between enterprise users on local lines while allowing all users to share a certain number of external telephone lines. A PBX trunk line connects the PBX to the serving telecommunications carrier's local central office switch.

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Figure 8: Area Served by Verizon 140 West Street Central Office



Source: Verizon Communications, Inc.

In some cases, infrastructure providers employed innovative solutions to restore telecommunications and power quickly. For example, these providers placed both telecommunications and power cables that are normally underground directly onto the streets and covered them with temporary plastic barriers. Con Edison repair staff also had tanks of liquid nitrogen placed on street corners so that their employees could freeze cables, which makes them easier to cut when making repairs. To work around the debris that blocked access to 140 West, Verizon staff ran cables over the ground and around damaged cabling to quickly restore services. Because of damage to the reinforced vault that previously housed the cables at Verizon's facility, a new cable vault was reconstructed on the first floor, and cables were run up the side of the building to the fifth and eighth floors, as shown in figure 9.

Figure 9: Verizon Used Temporary Cabling Solutions at 140 West Street



Source: Verizon Communications, Inc.

Verizon restored service by using temporary cabling above and below ground in the days following the attack.

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## Attacks Severely Affected Financial Markets but Heroic Efforts Were Made to Restore Operations

Although the facilities of the stock and options exchanges and clearing organizations in lower Manhattan were largely undamaged by the attacks, many market participants were affected by the loss of telecommunications and lack of access to lower Manhattan. As a result, many firms, including some of the broker-dealers responsible for significant portions of the overall securities market trading activity, were forced to relocate operations to backup facilities and alternative locations. To resume operations, these new facilities had to be prepared for trading and provided with sufficient telecommunications capacity. Some firms had to have telecommunications restored although they thought they had redundant communications services. Regulators and market participants delayed the opening of the stock and options market until September 17, until the key broker-dealers responsible for large amounts of market liquidity were able to operate and telecommunications had been tested.

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## Most Securities Exchanges and Market Support Organizations Were Not Directly Damaged

Although several securities exchanges and market support organizations were located in the vicinity of the attacks, most did not experience direct damage. The NYSE, Depository Trust and Clearing Corporation,<sup>5</sup> Securities Industry Automation Corporation (SIAC), International Securities Exchange, and the Island ECN all had important facilities located in close proximity to the World Trade Center, but none of these organizations' facilities were damaged. The American Stock Exchange (Amex) was the only securities exchange that experienced incapacitating damage.<sup>6</sup> Amex was several hundred feet from the World Trade Center towers, but sustained mostly broken windows and damage to some offices. However, its drainage and ventilation systems were clogged by dust and debris and the building lost power, telephones, and access to water and steam. The loss of steam and water coupled with the inadequate drainage and ventilation meant that Amex computer systems could not run due to a lack of air conditioning. As a result, the Amex building was not cleared for reoccupation until October 1, 2001, after inspectors had certified the building as structurally sound and power and water had been fully restored. Although the remaining exchanges were not damaged, U.S. stock

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<sup>5</sup>The Depository Trust and Clearing Corporation is the holding company for various organizations that conduct clearance and settlement services, including the Depository Trust Company and the National Securities Clearing Corporation.

<sup>6</sup>Several futures exchanges experienced damage, including one whose operations were located in one of the World Trade Center towers.

and options exchanges nationwide closed the day of the attacks and did not reopen until September 17, 2001. However, regulators and market participants acknowledged that if the major exchanges or clearing organizations had sustained damage, trading in the markets would have likely taken longer to resume.

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### Damage to Financial Institutions' Facilities and Telecommunications Forced Relocations and Made Recovery Efforts Challenging

Although most exchanges and market support organizations were not damaged by the attacks, several key firms with substantial operations in the area sustained significant facilities damage. As a result of this damage and the inability to access the area in the days following the attacks, many financial institution participants had to relocate their operations, in some cases using locations not envisioned by their BCPs. They then faced the challenge of recreating their key operations and obtaining sufficient telecommunications services at these new locations. For example, one large broker-dealer with headquarters that had been located across from the World Trade Center moved operations to midtown Manhattan, taking over an entire hotel. To resume operations, firms had to obtain computers and establish telecommunications lines in the rooms that were converted to work spaces. Another large broker-dealer whose facilities were damaged by the attacks attempted to reestablish hundreds of direct lines to its major customers after relocating operations to the facilities of a recently purchased broker-dealer subsidiary in New Jersey. The simultaneous relocation of so many firms meant that they also had to establish connections to the new operating locations of other organizations. Although Verizon managers were unable to estimate how much of its restoration work in the days following the attacks specifically addressed such needs, they told us that considerable capacity was added to the New Jersey area to accommodate many of the firms that relocated operations there, including financial firms.

Restoring operations often required innovative approaches. According to representatives of the exchanges and other financial institutions we spoke with, throughout the crisis financial firms that are normally highly competitive instead exhibited a high level of cooperation. In some cases, firms offered competitors facilities and office space. For example, traders who normally traded stocks on the Amex floor obtained space on the trading floor of NYSE, and Amex options traders were provided space at the Philadelphia Stock Exchange. In some cases, innovative approaches were used by the exchanges and utilities to restore lost connectivity to their customers. For example, technicians at the Island ECN created virtual private network connections for those users whose services were

disrupted.<sup>7</sup> Island also made some of its trading applications available to its customers through the Internet. In another example, SIAC, which processes trades for NYSE and the American Stock Exchange, worked closely with its customers to reestablish their connectivity, reconfiguring customers' working circuits that had been used for testing or clearing and settlement activities to instead transmit data to SIAC's trading systems.

The Bond Market Association, the industry association representing participants in the government and other debt markets, and the Securities Industry Association (SIA), which represents participants in the stock markets, played critical roles in reopening markets. Both associations helped arrange daily conference calls with market participants and regulators to address the steps necessary to reopen the markets. At times, hundreds of financial industry officials were participating in these calls. These organizations also made recommendations to regulators to provide some relief to their members so that they could focus on restoring their operations. For example, the Bond Market Association recommended to its members that they extend the settlement date for government securities trades from the day following trade date (T+1) to five days after to help alleviate some of the difficulties that were occurring in the government securities markets. Through a series of conference calls with major banks and market support organizations, SIA was instrumental in helping to develop an industrywide consensus on how to resolve operational issues arising from the damage and destruction to lower Manhattan and how to mitigate operational risk resulting from the destruction of physical (that is, paper) securities, which some firms had maintained for customers.

SEC also took actions to facilitate the successful reopening of the markets. To allow market participants to focus primarily on resuming operations, SEC issued rules to provide market participants temporary relief from certain regulatory requirements. For example, SEC extended deadlines for disclosure and reporting requirements, postponed the implementation date for new reporting requirements, and temporarily waived some capital regulation requirements. SEC implemented other relief measures targeted toward stabilizing the reopened markets. For example, SEC relaxed rules that restrict corporations from repurchasing their own shares of publicly

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<sup>7</sup>A virtual private network is a private data network that uses public telecommunication infrastructure such as the Internet to provide remote users with secure access to an organization's network.

traded stock, and simplified registration requirements for airline and insurance industries so that they could more easily raise capital.

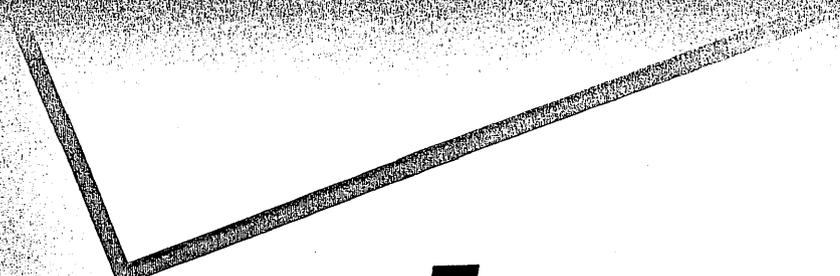
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### Stock and Options Markets Opening Was Delayed until Sufficient Connectivity and Liquidity Existed

Partially because of the difficulties experienced by many firms in restoring operations and obtaining adequate telecommunications service, the reopening of the markets was delayed. Although thousands of broker-dealers may participate in the securities markets, staff at NYSE and NASDAQ told us that a small number of firms account for the majority of the trading volume on their markets. Many of those firms had critical operations in the area affected by the attacks. For example, 7 of the top 10 broker-dealers ranked by capital had substantial operations in the World Trade Center or the World Financial Center, across from the World Trade Center. In the immediate aftermath of the attack, these and other firms were either attempting to restore operations at their existing locations or at new locations. In addition, financial market participant staff and the financial regulators told us that their staffs did not want to return to the affected area too soon to avoid interfering with the rescue and recovery efforts. For example, the SEC Chairman told us that he did not want to send 10,000 to 15,000 workers into lower Manhattan while the recovery efforts were ongoing and living victims were still being uncovered.

Because of the considerable efforts required for broker-dealers to restore operations, insufficient liquidity existed to open the markets during the week of the attacks. According to regulators and exchange staff, firms able to trade by Friday, September 14, accounted for only about 60 percent of the market's normal order flow. As a result, securities regulators, market officials, and other key participants decided that, until more firms were able to operate normally, insufficient liquidity existed in the markets. Opening the markets with some firms but not others was also viewed as unfair to many of the customers of the affected firms. Although institutional clients often have relationships with multiple broker-dealers, smaller customers and individual investors usually do not; thus, they may not have been able to participate in the markets under these circumstances.

In addition, connectivity between market participants and exchanges had not been tested. For this reason, it was unclear how well the markets would operate when trading resumed because so many critical telecommunication connections were damaged in the attacks and had been either repaired or replaced. Staff from the exchanges and market participants told us that the ability to conduct connectivity testing prior to

The Verizon logo, consisting of a downward-pointing chevron shape, is positioned above the word "verizon".

**verizon**

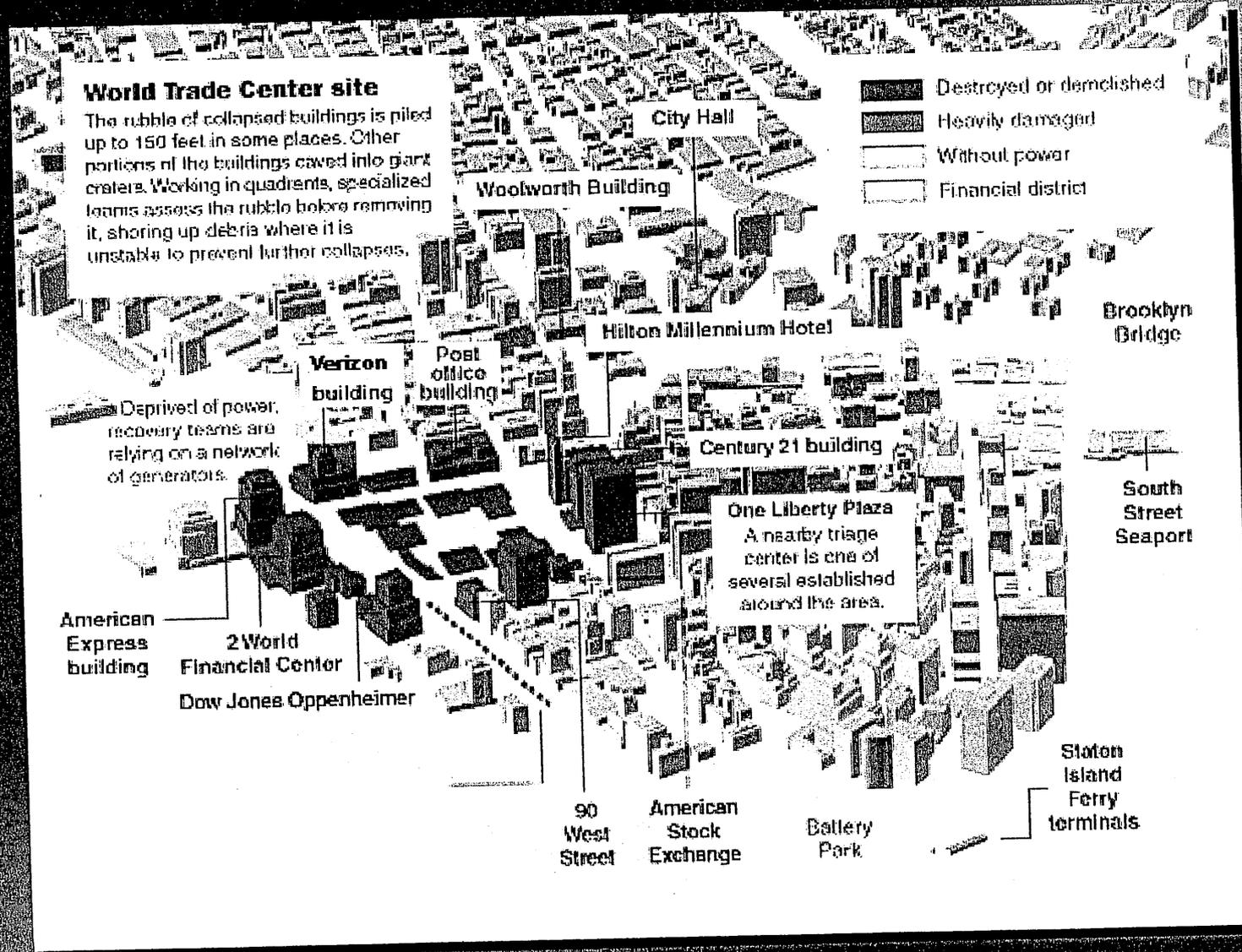
***Manhattan Restoration Project***

# *Agenda*

- **Disaster Impact**
- **VZ Emergency Response**
- **Stock Exchange Impact and VZ Response**
- **Lessons Learned**
- **Best Practices**
- **Successes and Problems**
- **Path Forward**

# Southern Manhattan

verizon



# *Aerial View of Southern Manhattan*

**verizon**





# 140 West St.

Other  
C.O.s

## INTEROFFICE FACILITIES

17,000 Fibers  
4.4M Total Data Circuits  
2.7M Through Data Circuits  
90,000 Message Trunks

Other  
C.O.s

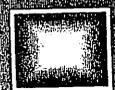
4 Digital Switches  
500 Optical Transport Systems  
1500 Channel Banks

## LOCAL LOOPS - FIBER

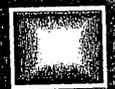
7,600 Fibers  
48,000 Voice Lines  
111,800 PBX Lines  
11,100 ISP Lines  
1.6M Data Circuits

## LOCAL LOOPS - COPPER

500 Copper Cables  
134,000 Voice Circuits  
80,000 Data Circuits



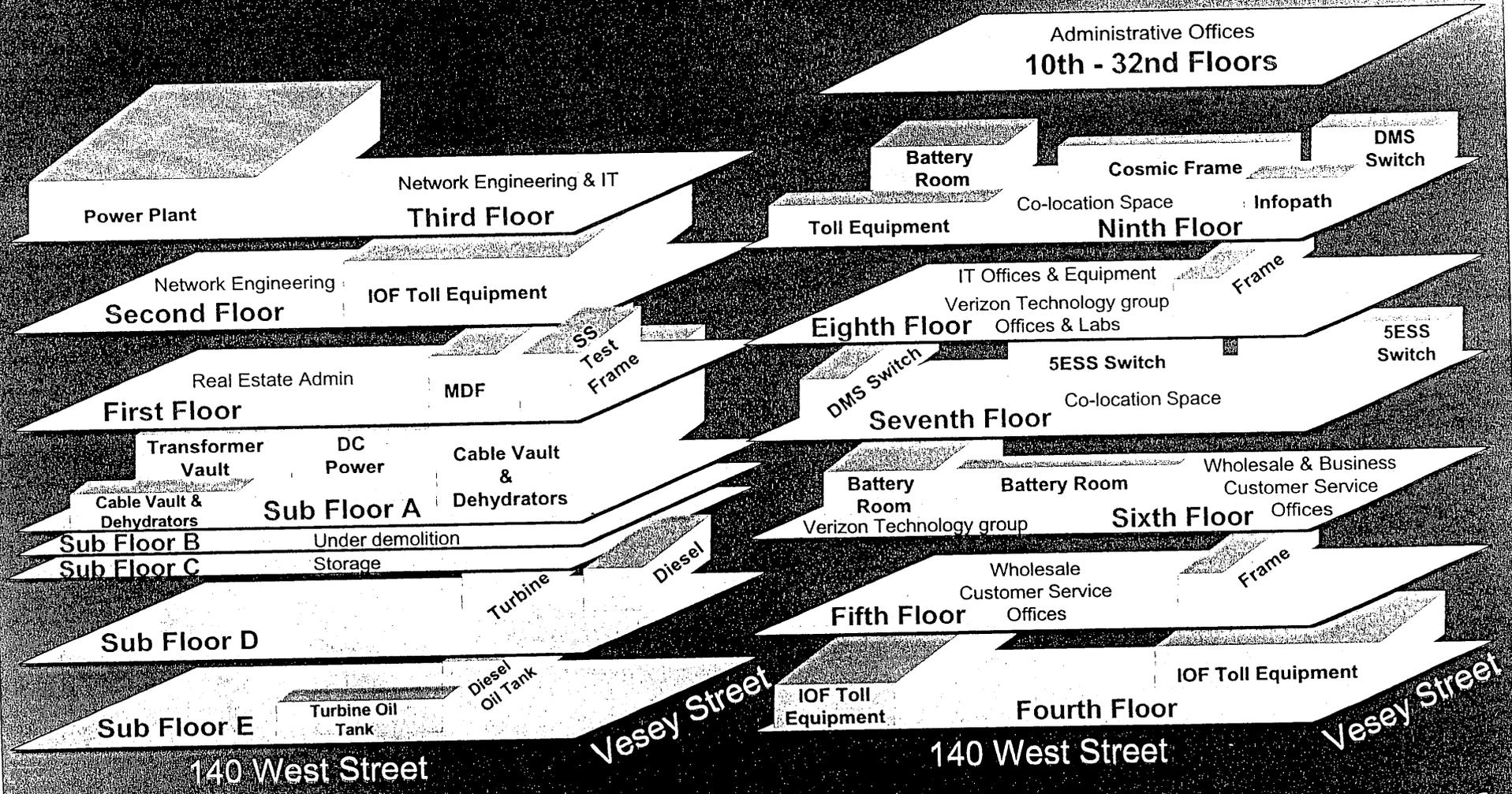
Customer Locations



Customer Locations



# 140 West St. Floor Plan



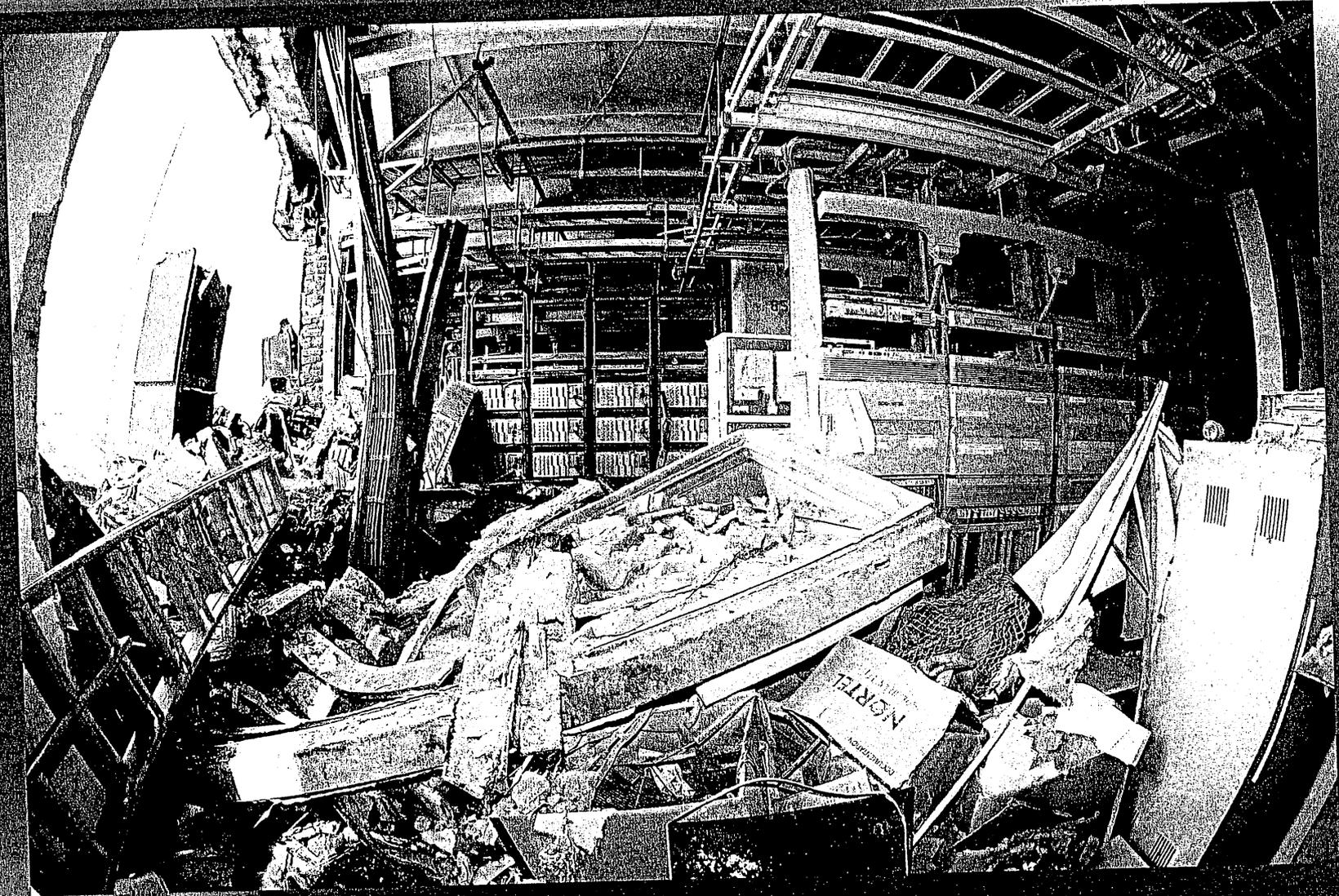
# WTC 7 collapses onto West St.

**verizon**



# West St. 4th floor

**verizon**



# West St. Cable Vault



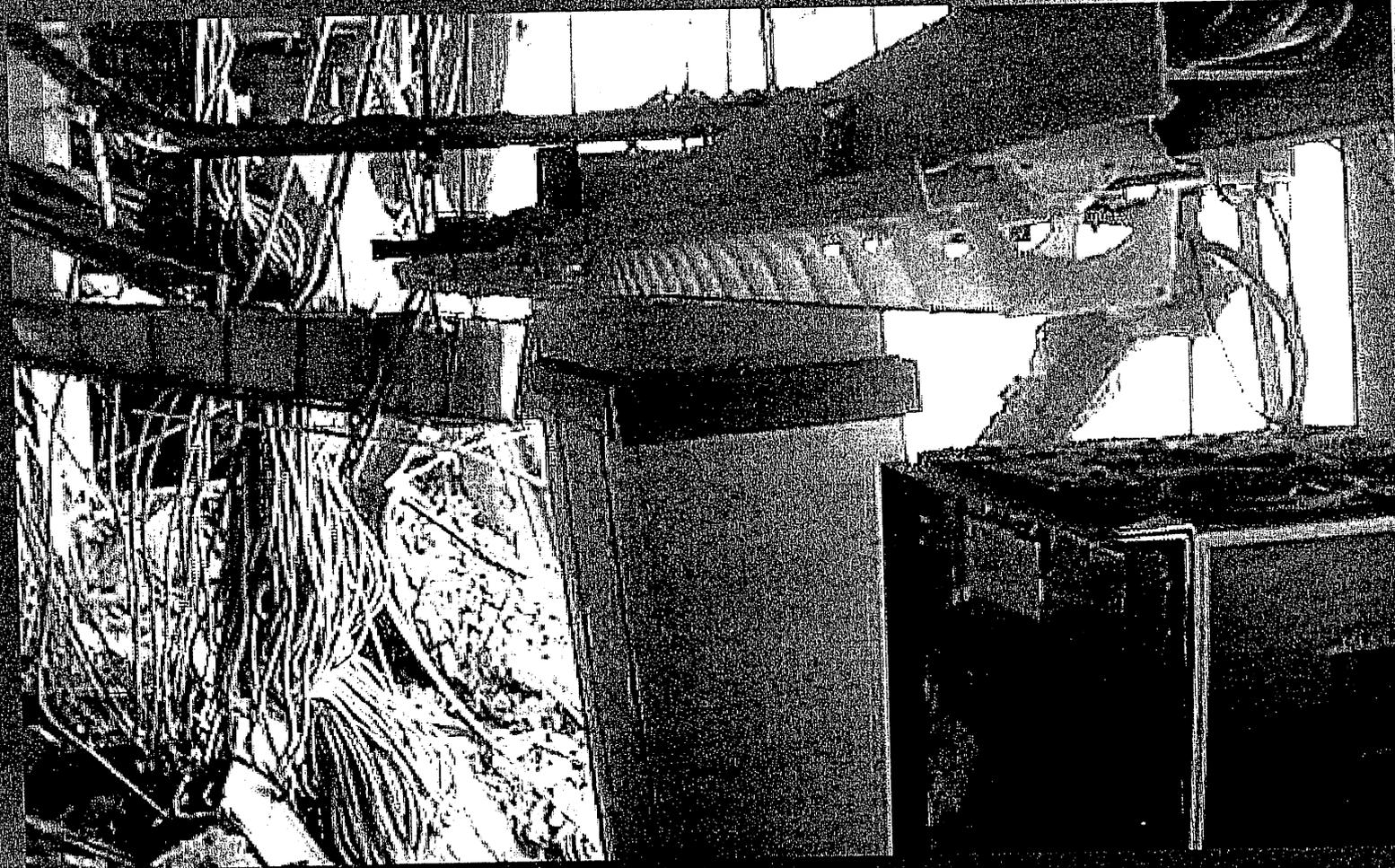
# West St. Switch Control Room

**verizon**



# West St. E911 System

**verizon**



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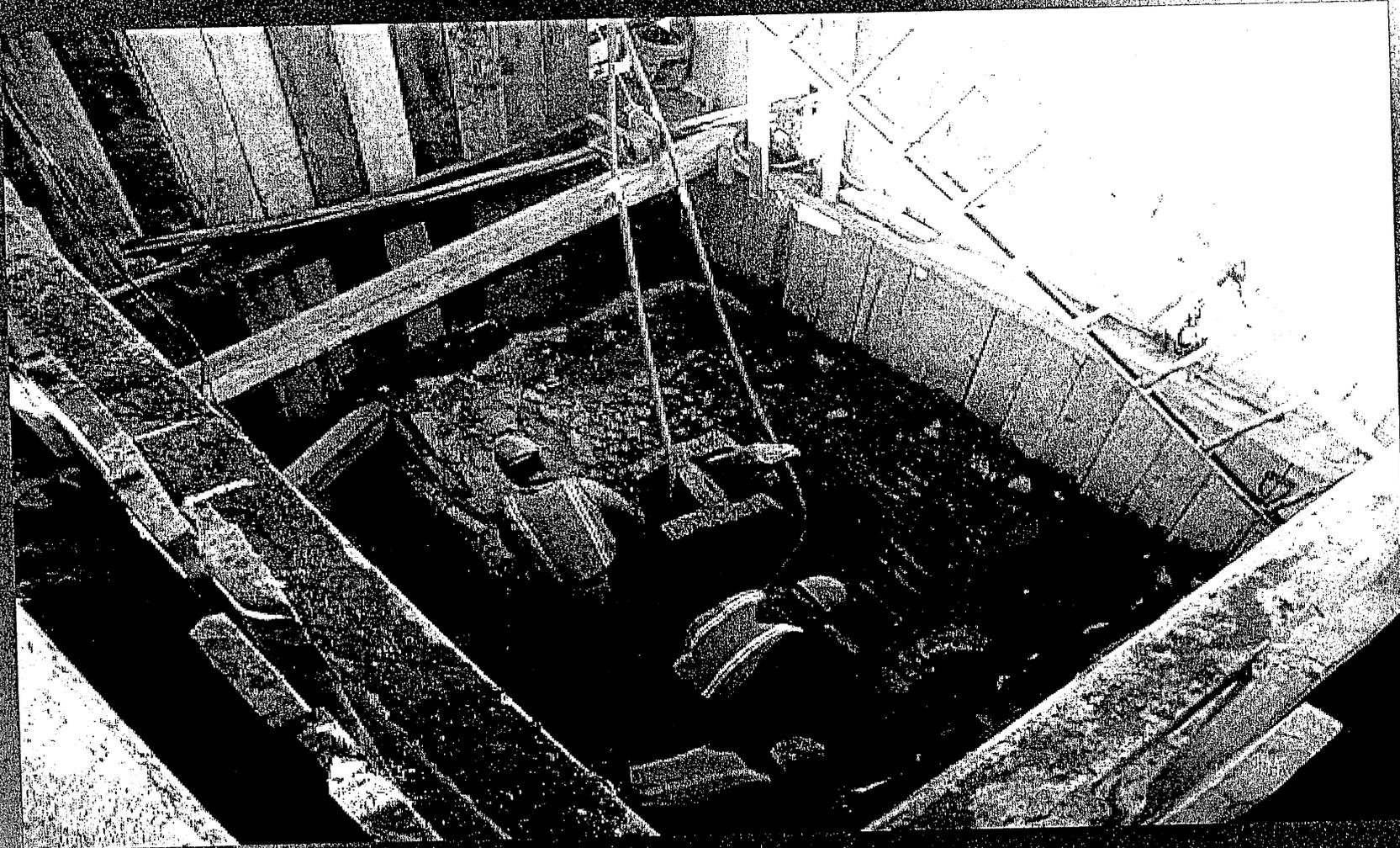
# West St. 7th Floor 5ESS switch

**verizon**



# West St. I Beam through Cable

**verizon**



# West St. Cable Vault

**verizon**





## ***VZ Damage Impact***

<b>Access lines to be restored (voice)</b>	<b>200 K</b>
<b>PBX / Centrex lines to be restored</b>	<b>100 K</b>
<b>Data circuits to be restored</b>	<b>4.4 M</b>
<b>Cell sites to be restored</b>	<b>10</b>
<b>Number of customers affected:</b>	
<b>Business</b>	<b>approx. 14 K</b>
<b>Residential</b>	<b>approx. 20 K</b>

***Landline and Wireless network call completions were at least 2 times higher than normal levels on Sept. 11***

# *Preparation and Response*

## ■ **Emergency Command Center**

- **Manned 24x7, Monitors CNN, Weather Channel, News**
- **Command Center went 'Hot' when first plane hit WTC**
- **Staff meeting interrupted, contacted Lines of Business centers to go 'Hot'**
- **Opened up Command bridge**
- **In constant contact with NYC Office of Emergency Management(OEM) and Federal Emergency Management Agency(FEMA)**

# *Preparation and Response*



## ■ **Continuity Plans for all Levels of Disaster**

- **Fires, Floods, cable cuts, switch/tandem outages, etc.**
- **No event experienced prior to 9/11 had the same magnitude with multiple network-wide service outages simultaneously**
- **Plans facilitated proactive response: Organizational, Prioritization and Communications**
- **National Communication Service**
  - ◆ **Government Emergency Telecommunications Service (GETS)**
    - **95% of calls completed**
  - ◆ **Telecom Service Priority**
    - **Utilized in restoration prioritization of Gov't circuits**



## ***Emergency Management Plan***

### **■ Public Safety**

- **On-site to assist emergency crews as debris was falling**
- **Established NYC OEM to handle Mayor's Command Center requests relocated from WTC 7**
- **E911 - dedicated Verizon personnel on-site**
- **Reroute service for 1 Police Plaza, City Hall, Federal Plaza, FEMA, ATF, FBI, Secret Service, and hospitals**
- **500 POTS and 30 T-1's installed overnight**
- **Constant contact between NYC and ESG Senior Management**

## ***Emergency Management Plan***

### **■ Wireline Network**

- Traffic rerouted per Disaster Recovery Plans, 100% above normal Manhattan call volumes
- Redundant Central Office power systems supported the network when commercial power was lost - Broad St., Pearl St., .....
- Service lost after cable vault and power panels were flooded, equipment contaminated or damaged from falling WTC towers, dust, smoke, steel beams, etc.
- IOF capacity augmented to carry network traffic to other offices and POPs: 40 SONET OC-48's over 5 days
- First access on 9/12, after ensuring structural integrity, cleaned first 9 floors, assessed damage, restored limited power available via generators, cleaned equipment
- Multiple evacuations, cable vault inhabitable, bypass cables strung out windows to manholes blocks away



## ***Emergency Management Plan***

### **■ Payphones**

- **By 6pm on 9/11 all local payphone calls free**
- **Street side payphones altered to allow incoming**
- **50 wireless payphones with free calling near ground zero and at other residential areas impacted**
- **180 additional wireless payphones installed to areas in Southern Manhattan without phone service**
- **Free 3 minute phone calls anywhere in the continental US**



## ***Emergency Management Plan***

### **■ Wireless**

- Twice the normal call volume of the busiest day ever on 9/11
- No switches lost, 11 cell sites out, 17 additional cell sites on wheels deployed
- Employees worked 24X7 to activate new services, 1,200 the first 18 hours
- 5,000 phones made accessible to emergency workers at 3 on-site command centers
- Worked with authorities to detect cellular signals beneath the debris in hopes of finding survivors

# ***Restoration Efforts***

## **Priority 1**

- **Emergency preparation planning**
- **Immediate restoral by design**
  - **E911 - 71% higher volumes - 38,000 calls**
  - **SONET (optical) inter-office network**
- **New or re-routed emergency service lines**
  - **Police, Fire, Medical**
  - **City, State and Federal government agencies**

## ***Restoration Efforts***

### **Priority 2**

- **Reopen Stock Exchanges**
- **Emergency power**
- **New high capacity routes**
- **Ported 140 West St. telephone numbers to new locations**
- **Vendor / Carrier coordination**
  - **AT&T, MCI/Worldcom, etc.**



# ***Restoration Efforts***

## **Priority 3**

- **High capacity landline connections**
- **Cable / Switch / Electronics restoration**
- **MegaForward services**
- **Payphones / Wireless alternatives**
- **Customer outreach**

## ***Restoration Action Plans***

**Use Any and All Means to Restore Service -  
A.K.A Temporary Alternatives**

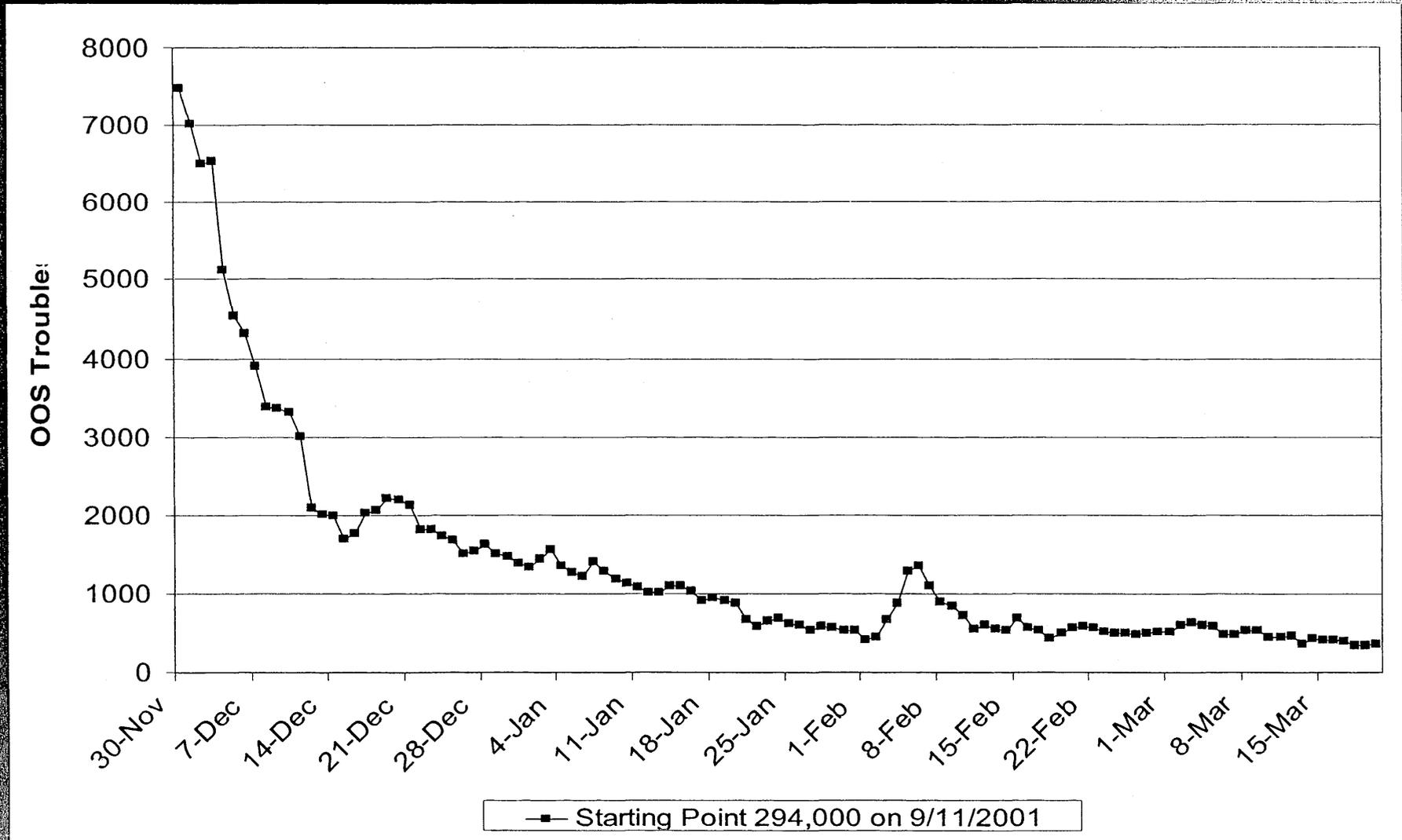
- **Place Portable Air Compressors and Air Chillers**
- **Replace/Restore Entire Electrical Distribution System**
- **Place Bypass Cables to Strategic Manholes**
- **Restore/Replace Damaged Central Office Electronics**

# *Bypass Cables*

**verizon**



# Restoration Status



# ***Stock Exchange Recovery***

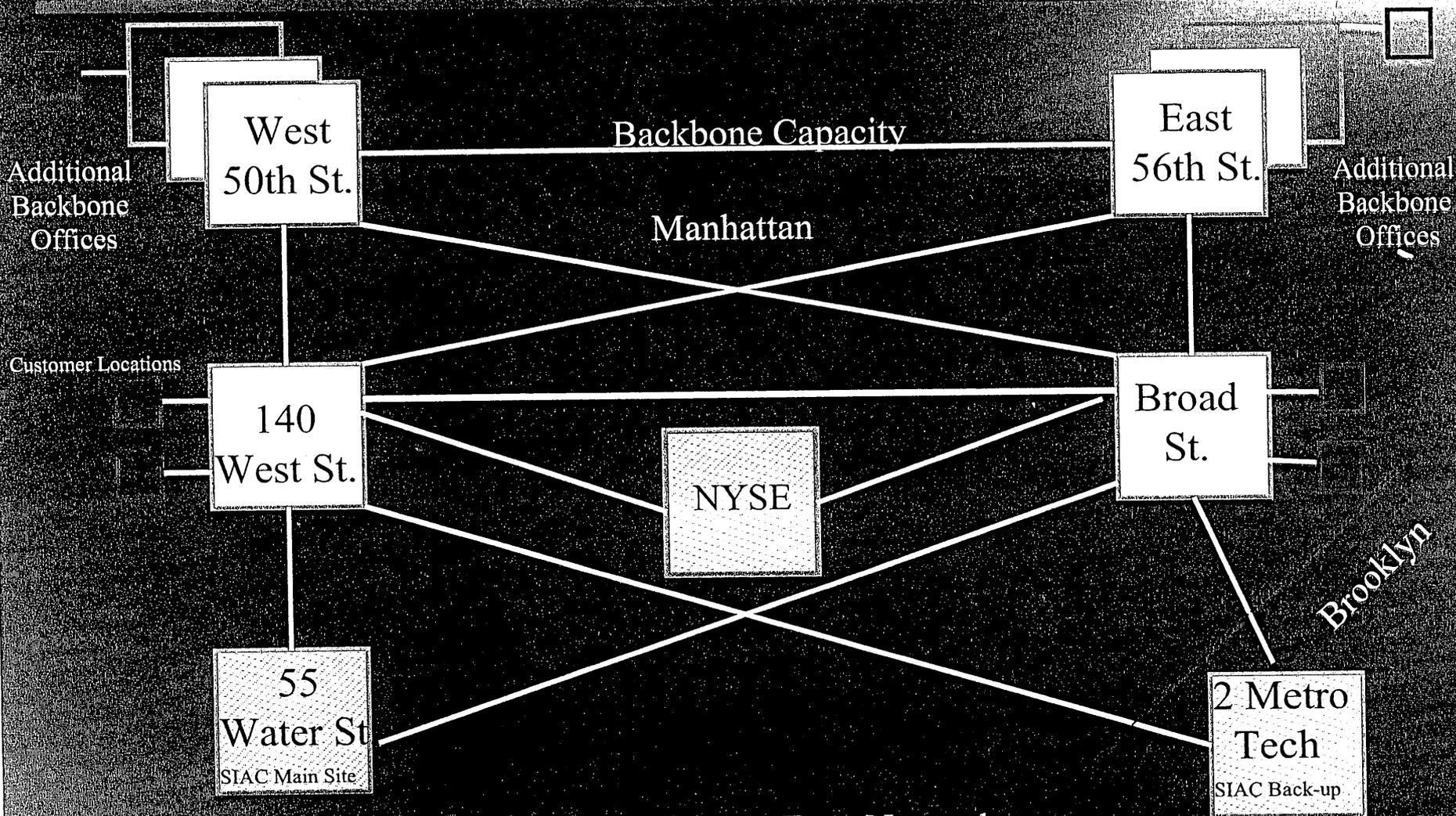
## ■ **Enterprise Network**

- ◆ **SIAC/Sector Network**
- ◆ **SIDN Control Network and Backbone**

## ■ **Exchange and Customer Networks**

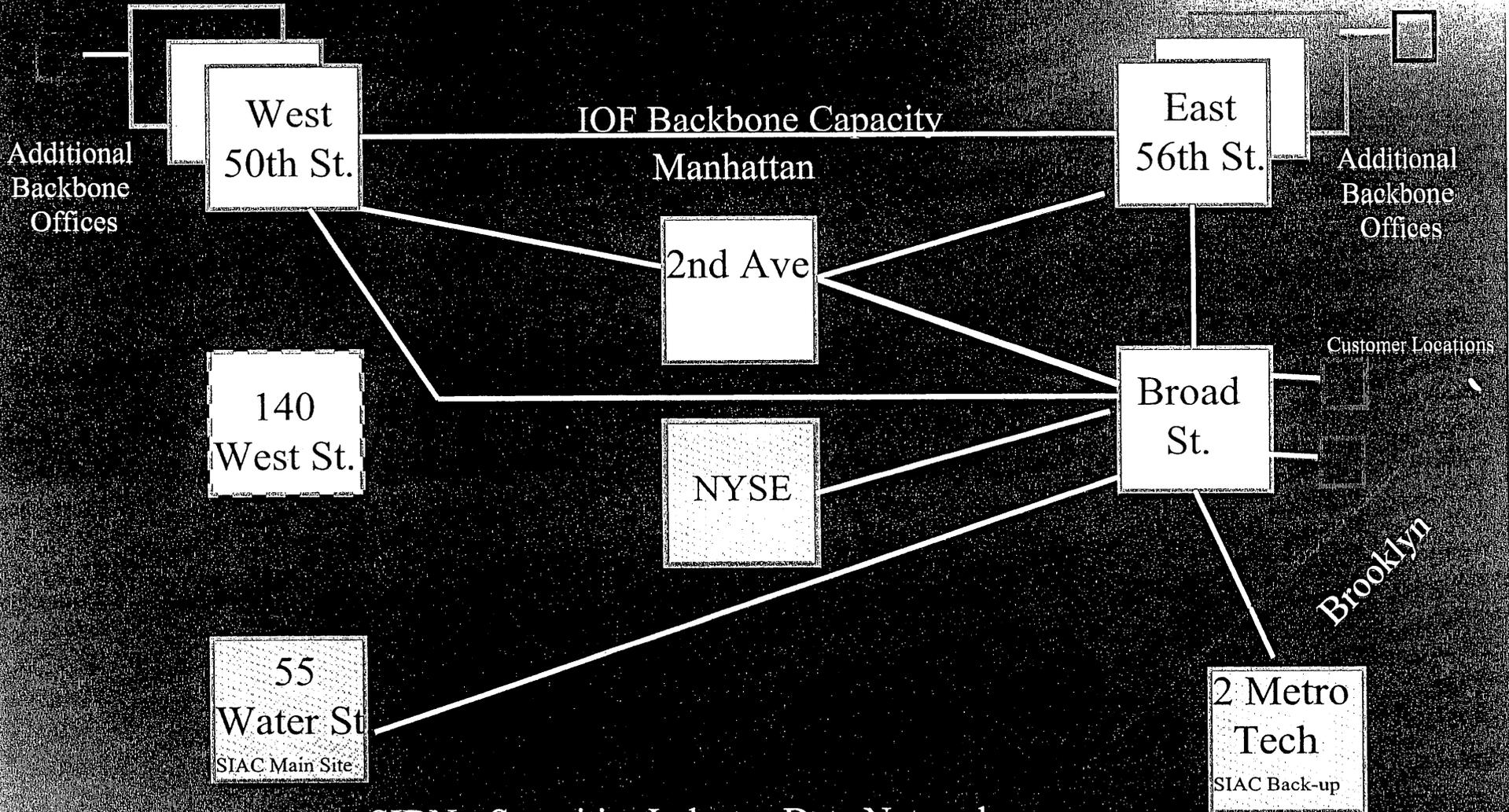
- ◆ **Exchanges**
- ◆ **Major Brokerage Firms**
  - **Focus on access to the network - not total restoration**
  - **Accommodate relocation requests**
  - **Maintain competitive parity with other members**
  - **Command Center tracking**

# SIDN/SIAC Network (Original)



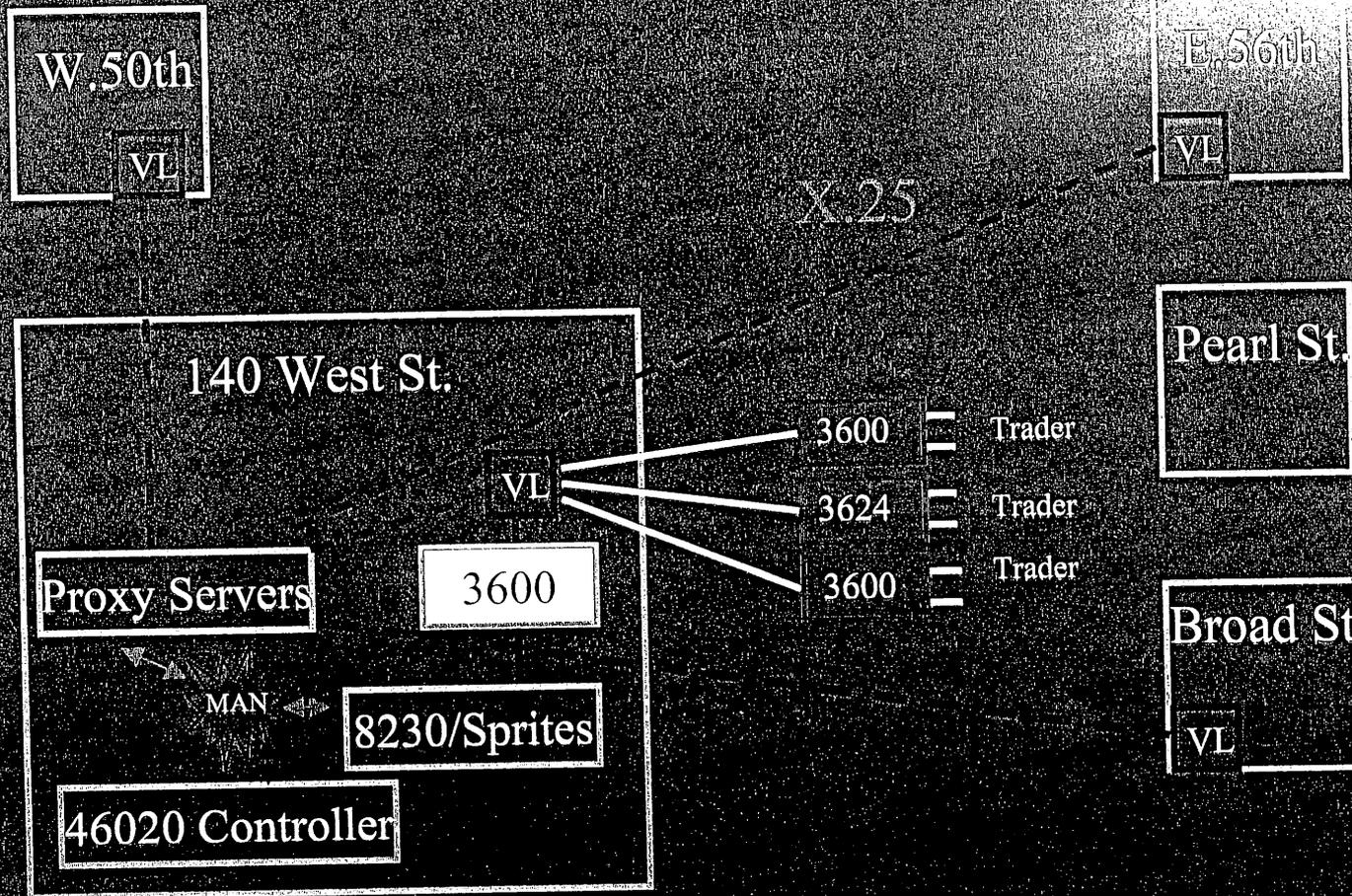
SIDN - Securities Industry Data Network  
SIAC - Securities Industry Automation Corporation

# SIDN/SIAC Network (New)



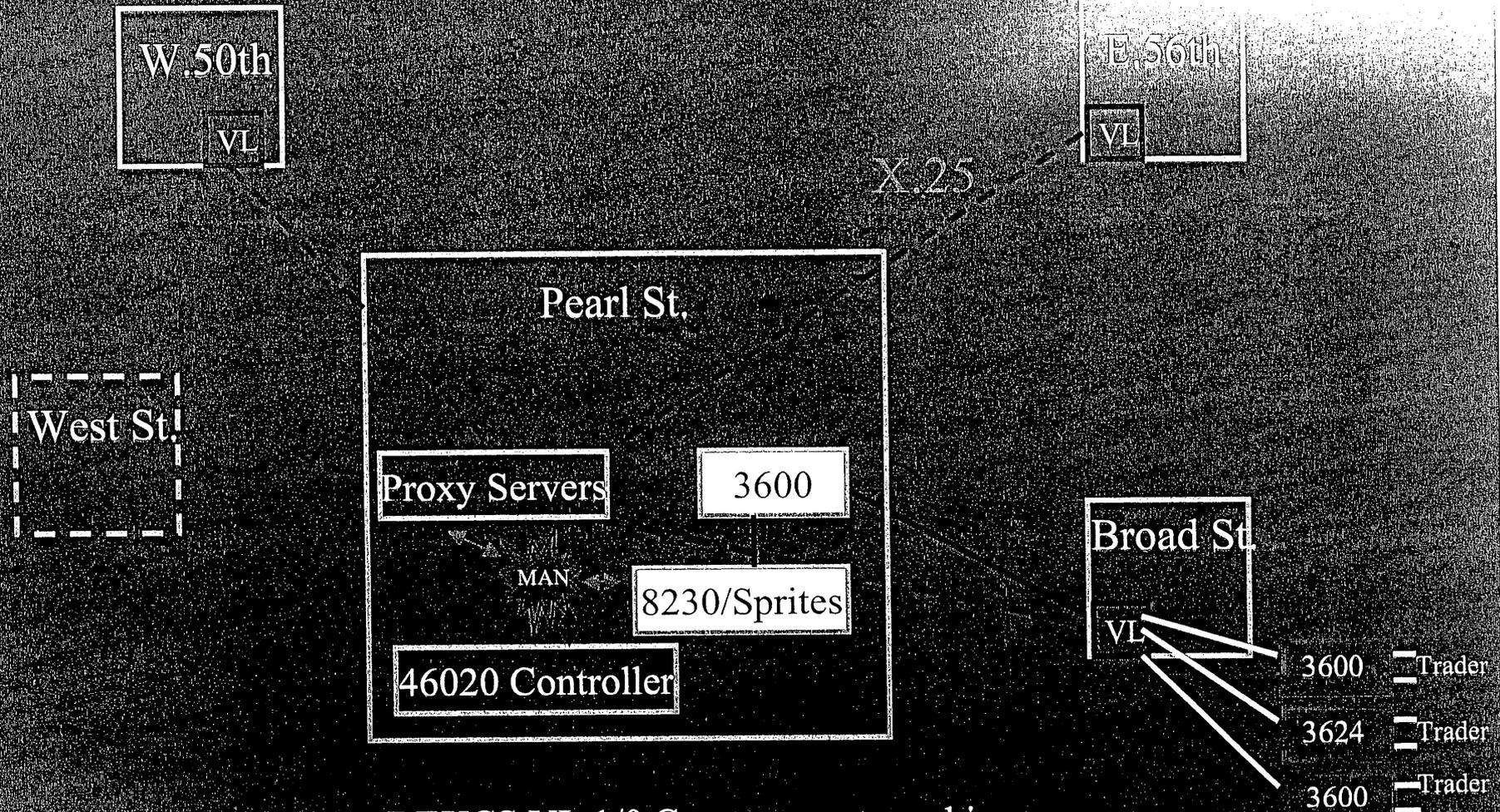
SIDN - Securities Industry Data Network  
SIAC - Securities Industry Automation Corporation

# Securities Industry Data Network Control Network (Original - 140 West St.)



DEXCS VL 1/0 Crossconnect machines  
Crossconnect Control  
Channel Bank Control

# Securities Industry Data Network Control Network (New - Pearl St.)



DEXCS VL 1/0 Crossconnect machines  
Crossconnect Control  
Channel Bank Control

# ***Customer Communications***

## **■ ESG - Wholesale Services**

- Web site established, emergency contingency procedures posted, customers contacted, communications 24x7**
- Wholesale and UNE operations relocated to Newark, NJ**
- Largest IXCs, Wireless and CLECs contacted to assess needs with Executive oversight**
- Rerouted 100,000 wholesale customer circuits**
- Initial restoration included prioritized restoral of CLEC collocation facilities in West St.**



## ***Lessons Learned***

- **E911 and Emergency Response Planning**
- **Wireless network integral in a landline disaster**
- **Customer/Community/Vendor relationships**
- **Industry Practices - Network Equipment Building Standards (NEBS)**

# **Best Practices - NEBS**



- **NEBS best practices assisted the recovery at 140 West St.:**
  - **Fire Prevention:**
    - ◆ UL V-0 rated components
    - ◆ Verizon's extra smoke requirements (Unique to Verizon)
    - ◆ Fire testing of all CO equipment
  - **Earthquake Protection to Racks & Equipment**
  - **Protection against Airborne Contamination**
  - **Robust design of back-up Battery housings & mountings**
  - **Electromagnetic Interference protection (EMI)**

# ***Successes and Problems***

## ■ **Success**

- **Verizon Emergency Response Plan in place**
- **E911 worked uninterrupted**
- **Customer/Community/Vendor Relationships**
- **Industry Standards - NEBS**
- **Significant portions of the network were able to withstand the disaster**

## ■ **Problems**

- **Lack of access to damaged area**
- **Extent of equipment in West St. damaged**
- **FEMA sequestered equipment**
- **Power outage in Southern Manhattan - Generators**
- **Contamination**

# ***Equipment Contamination***

- **Numerous Building Breaches @ 140 West Street**
- **Telcordia Hired to Perform Independent Assessment of Impacted Equipment**
- **Significant Impact on Floors 1, 2, 4, 7, 9**
- **Report Summary**
  - **“ the telecommunication network and support equipment experienced physical damage, loss of environmental control, exposure to untempered outdoor air, severe particulate contamination, and smoke ingress. In addition, water damage to the equipment and facilities occurred from firefighting activities conducted outside and within the Verizon building.”**
- **Much of the Equipment Currently Supporting Customer Service is no Longer Viable and Must be Replaced.**

# *Equipment Contamination*



- **Circuit pack change-outs and cleaning, Fan filter replacement**
- **New replacement switches**
  - West 5ESS DS-1 and DS-2 collapse into DS-6
  - West Street DMS-100 DS-0 into DS-7
- **DCS cutover Strategy**
  - 3 DCS have been replaced
  - 8 Additional DCS will be replaced partially or in-kind due to contamination representing ~29k T-1 equivalent circuits
  - DCS port reduction enables the collapse of 18 DCS to 12 DCS

# ***Equipment Contamination***

## **■ Transport Electronics**

- Transport areas on 2nd and 4th Floors most heavily impacted**
- 200 additional IOF systems are contaminated and will be replaced representing ~41k T-1 equivalent circuits**
- 150 Loop Fiber Optic Systems**



## *Path Forward*

- **Total Restoration - estimated 12-18 Months**
- **Total Restoration Costs - estimated \$1.3B - \$1.4B**
- **Continued Focus on Emergency Preparation with Federal, State, and Local Agencies**
- **Continued Leadership in NEBS**
- **Opportunities to work with Major Customers in Areas of Disaster Recovery and Network Redundancy.**