
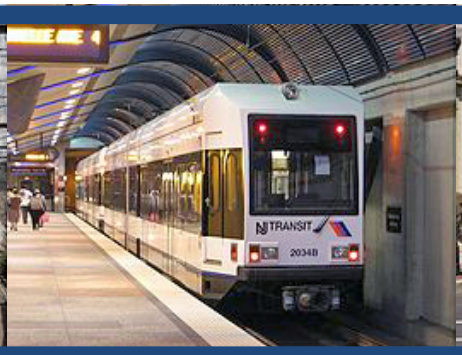



New Jersey Transit Corporation's Hurricane Sandy After Action Report

This document reviews NJ TRANSIT's preparation and response to Hurricane Sandy which made landfall on the New Jersey coast on October 29, 2012.



TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report documents The New Jersey Transit Corporation's (NJT) employee observations regarding Hurricane Sandy preparation, response, and recovery operations. The observations were documented during interviews with the Texas A&M Engineering Extension Service (TEEX) on December 11-14, 2012.

TEEX interviewers met with NJ TRANSIT personnel involved in the response and captured participants' views on the performance of critical tasks during the preparation, response, and recovery phases of Hurricane Sandy. Participants were encouraged to comment upon structures, policies, and procedures that worked effectively and led to desired outcomes and also upon those that impeded response and recovery operations. Suggested improvements were solicited.

Based on interviews, the general areas for improvement and strengths are below.

Areas for Improvement

- Vulnerability assessments should be conducted for all critical facilities and appropriate measures taken to mitigate potential threats. Assessments should include the ROC, MMC, NJT Headquarters, and all other key facilities.
- Storm surge and flood models should be prepared for all key facilities to provide more accurate projections of flooding in future storms.
- More emphasis should be placed on the importance of timely and accurate communication with the public during an emergency. Additional resources should be dedicated to emergency public information (EPI), media, social media, website, and customer service functions during emergencies that impact service to the public.
- Increase OEM staff in order to provide incident management training to key personnel and cross-train additional personnel to supplement the EOC in emergency situations.
- Plans that address emergency operations and continuity of operations should be reviewed and updated as necessary.
- A suitably equipped permanent EOC location of sufficient size to accommodate both the EOC staff and Executive Management Team (EMT) would improve coordination and the sharing of information. This center should be designed and equipped to handle extended operations.

Strengths

- Existing hurricane preparedness and restoration plans enabled NJT Bus, Rail and Light Rail to conduct safe, effective shutdown of operations and timely restoration of service. Storage of Rail equipment at the Meadows Maintenance Complex (MMC) resulted in

flood damage, but the decision to park equipment there was based on available storm prediction information, past storm experience, and the need to keep the equipment as close as possible to meet the demands for prompt restoration of service.

- NJT Bus did a good job of coordinating evacuation operations for Atlantic City and the Shore Communities.
- NJT Emergency Operations Center (EOC) effectively coordinated operations and information sharing internally as well as with the New Jersey State Emergency Operations Center and the New Jersey State Traffic Management Center. EOC staff coordinated shutdown, repair, and restoration operations across the agency and provided situational awareness for NJT management on damage assessments and the status of repairs and restoration.
- Post storm damage assessments, repairs, and debris removal operations by NJT personnel and contractors went very well. Examples include the Railroad Operations Center (ROC) and MMC restoration and the Morgan Draw Bridge clearance and repair.
- NJT effected a prompt restoration of transportation services through the use of buses and ferries as alternatives for rail service. This was facilitated by the exceptional efforts of NJT personnel and the cooperation of their respective unions and contractors. Fuel supply for bus operations was well managed.

SECTION 1: EVENT OVERVIEW

EVENT DETAILS

Background

Hurricane Sandy devastated portions of the mid-Atlantic and northeastern United States during late October 2012. In New Jersey, the hurricane resulted in loss of life and significant property damage as well as disrupting public transit operations. This document is a retrospective review of NJ TRANSIT's preparation and response to the storm in order to record those actions and procedures that were effective, as well as those that need improvement.

NJ TRANSIT is the nation's largest statewide public transportation system providing more than 895,000 weekday trips on 261 bus routes, three light rail lines, twelve commuter rail lines and through *Access Link* paratransit service. It is the third largest transit system in the country with 164 rail stations, 61 light rail stations and more than 19,000 bus stops linking major points in New Jersey, New York and Philadelphia.

CAPABILITES

The interview questions were based on the following U. S. Department of Homeland Security Target Capabilities (http://www.fema.gov/pdf/government/training/tcl.pdf):

- Planning
- Mitigation/Protective Actions
- Communications (technical)
- Information Sharing and Coordination
- Critical Infrastructure Protection
- Critical Resource Logistics and Distribution
- Emergency Operations Center Management
- Emergency Public Information and Warning
- Damage Assessment/Restoration and Recovery

NJ TRANSIT ORGANIZATIONS INTERVIEWED

- Executive Management Team
- Office of Emergency Management and Emergency Operations Center
- Rail
- Light Rail

- Bus
- Public Information
- Procurement and Support Services
- Capital Planning and Programs
- Internal Audit (Risk Management)

SECTION 2: EVENT CHRONOLOGY

TIMELINE

Hurricane Sandy will be remembered as a raging freak of nature that became one of the most destructive storms in U.S. history. Below is a timeline created by Willie Drye of National Geographic News that follows Sandy's birth deep in the Caribbean Sea to its dissipation over Pennsylvania nine days later. Select NJT activities are displayed in italics and embedded within the timeline.

Monday, October 22

A tropical depression forms in the southern Caribbean Sea off the coast of Nicaragua. The depression strengthens and becomes Tropical Storm Sandy, with maximum winds of 40 mph.

Wednesday, October 24

Sandy became a Category 1 hurricane as it moved northward across the Caribbean and crossed Jamaica with winds of 80 mph.

Friday, October 26

Sandy strengthened as it moved from Jamaica to Cuba and struck the historic city of Santiago de Cuba with winds of approximately 110 mph, only 1 mph below the status of a major Category 3 hurricane.

NJT Pre-Storm: Preparation

Friday 10/26 Planning Meeting with EMT & OEM

Saturday, October 27

Sandy moved away from the Bahamas and made a turn to the northeast off the coast of Florida. The storm briefly weakened to a tropical depression, but quickly re-intensifies into a Category 1 hurricane.

NJT Pre-Storm: Preparation

Saturday 10/27 Governor Christie declares State of Emergency
Mobilization and movement of equipment
Transportation Agencies to coordinate shutdown of service with last trains departing at 11PM Sunday to allow for 12 hour shutdown process, securing equipment and employee sheltering prior to the storm's arrival.

Sunday, October 28

Sandy continued moving northeast on a track that takes it parallel to the coasts of Georgia, South Carolina and North Carolina. The storm's center stays well offshore as it approaches latitude 35 degrees north off the coast of North Carolina.

The storm was still a Category 1 hurricane with peak winds of about 80 mph. However an unusual configuration of weather factors converged and meteorologists warned that the storm likely will morph into a powerful, hybrid super-storm as it churns northward.

A high-pressure cold front to Sandy's north forced the storm to start turning to the northwest toward major cities including Baltimore, Washington, Philadelphia and New York. And the full moon made Sandy's storm surge – expected to be 11 to 12 feet in some places – a little higher as it made landfall. Sandy had expanded into a huge storm with winds covering about 1,000 miles.

President Obama signed emergency declarations for Connecticut, District of Columbia, Maryland, Massachusetts, New Jersey and New York making available federal funds and allowing FEMA to provide resources directly to state, tribal and local government engaged in life-saving and sustaining activities.

NJT Pre-Storm: Preparation

Sunday	*10/28*	*Buses used to evacuate Atlantic City and coastal area*
		Transportation agencies, city and state officials agree on coordinated shutdown of service
		System begins gradual shutdown
		Last trains depart initial terminals at 11 PM

Monday, October 29

12:30 p.m.: Sandy made its expected sharp turn toward the northwest on a path for the coast of New Jersey. The storm also started interacting with other weather systems, gaining energy in the process. The storm dumped heavy snow in the Appalachian Mountains of Virginia, West Virginia and North Carolina.

Sandy had a run of about 300 miles over open water as it headed for landfall, giving it time to build up a huge storm surge that was larger because of the influence of the full moon.

NJT Pre-Storm: Preparation

Monday	*10/29*	*Equipment moved to final storage locations*
		Essential personnel staged for response
		Storm ensues, making landfall at 8PM

8 p.m.: Sandy's center came ashore near Atlantic City, New Jersey. The storm was no longer considered a hurricane, but was then classified as a post-tropical nor'easter. But the storm's unusual path from the southeast made its storm surge much worse for New Jersey and New York. A cyclone's strongest winds and highest storm surge are to the front and right of its circulation because the power of the storm's strongest winds is combined with its forward motion. New York Harbor receives this part of Sandy's impact.

The surge is worsened because the full moon has added about a foot to the surge and because Sandy arrives at high tide. Meteorologist at the National Weather Service's office in New York tells National Geographic News that the surge — nearly 14 feet — is a new record for a storm

surge in the harbor. The previous record of just over 10 feet was set in 1960 when Hurricane Donna passed just offshore.

The surge tops the seawall at The Battery in Lower Manhattan and floods parts of the city's subway system. The surge also floods the Hugh Carey Tunnel, which links Lower Manhattan and Brooklyn.

The storm's huge size means that its winds, rains and flooding will pound New Jersey and New York throughout the night and through three cycles of high tides and low tides.

Staten Island also is hit very hard by the storm.

Tuesday, October 30

Although Sandy started to move away from New York, the backside of the huge storm still inflicted punishment on the Northeast. As the day progressed, Sandy weakened as it moved inland over Pennsylvania.

NJT Post-Storm: Assessments, Restoration and Recovery

Tuesday	*10/30*	*Damage Assessment and evaluation of flooding at MMC/ROC, Hoboken, Hudson River Tunnels, Newark Penn Station and Bus garages*
		Debris and trees on railways and bridges, downed power lines, extensive power outages

Wednesday, October 31

The storm that began as Hurricane Sandy dissipates over western Pennsylvania, and the National Oceanic and Atmospheric Administration issues its final advisory on the storm.

NJ Post-Storm: Assessments, Restoration and Recovery

Wednesday	***10/31***	*Assessment of Road conditions for bus service restoration.*
		22 bus routes in Camden County area restored to full weekday service
Thursday	***11/1***	*80% of regular bus service throughout state restored*
		Hudson Bergen LR limited service restored
		Newark LR/Newark Penn Station pump out of 2.6M gallons of water begins
		Northeast Coordinator (NEC) South Tube restored after water pump out
Friday	***11/2***	*Limited service on NEC (Trenton to PSNY)*
		Emergency bus service starts
		River LINE Light Rail (SJLR) back to full service
Monday	***11/5***	*Emergency ferry service starts up.*
		Alternate ferry service begins (LSP-Battery Park / Hoboken–39St. NYC)
Wednesday	***11/7***	*Newark LR limited service begins*
Sunday	***11/11***	*ACL, ST, and ML service begins*
Monday	***11/19***	*NEC regular service restored*
Monday	***1/14***	*Service levels to NYC 100% restored*
		Rail Division at 94% of pre-Sandy service levels system wide

SECTION 3: EVENT OBSERVATIONS

OVERVIEW

This section documents observations and comments from NJT employees recorded during interviews with the Texas A&M Engineering Extension Service on December 11-14, 2012. Interviewers met with key participants in the response. Interview participants were asked to provide observations from their area of responsibility on:

- actions and decisions that went well,
- areas where improvements are needed, and
- recommendations for improvement.

Interviewers attempted to capture participants' views on the performance of critical tasks during the preparation, response, and recovery phases of the incident. Participants were encouraged to comment upon structures, policies, and procedures that worked effectively and led to desired outcomes and also on those that impeded operations. Suggested improvements were solicited.

Comments within this report are organized under nationally recognized emergency management tasks and summarize with suggested improvements. Recommendations that emanated from participants were aligned with emergency management best practices.

For the purpose of clarity, the NJT Emergency Operations Center commonly called the COOP by organizational participants during this response will be referred to as the EOC in this report. The term COOP will be used to refer to organizational Continuity of Operations Plans.

OBSERVATIONS

Planning

1. Observation: Existing plans guided shutdown, restoration, and recovery operations, but some portions of the plans were incomplete or needed updating.

Analysis: NJT and its operating divisions used the existing Emergency Operation Plan (EOP), Continuity of Operations Plan (COOP), and Hurricane Standard Operating Procedures (SOPs) to respond to this incident. The plans assisted in assembling an effective emergency management team, and the SOPs aided the orderly and safe shutdown of operations and facilities and the resumption of service.

The NJT EOP identifies emergency management responsibilities and designates emergency response tasks to various operating divisions. The EOP contains a Terrorism Incident Annex, but no corresponding section for weather related events. However, the various operating divisions have SOPs for responding to weather events.

The EOP contains general information on the NJT emergency organization, but little detail on the Executive Management Team (EMT) or Emergency Operation Center (EOC). The EOP should clearly identify the composition of both the EMT and EOC, articulate their respective roles and responsibilities and set forth basic operating procedures.

The NJT Rail, Light Rail, and Bus Divisions each used SOPs to guide their shutdown, response, and resumption of service.

The following plans were identified:

- NJT Emergency Operations Plan
- NJT Business Continuity Plan HQ and GOB Facilities
- NJT Rail Operations Hurricane Plan
- Newark Light Rail Hurricane Sandy Service Suspension and Recovery Plan
- Hudson Bergen Light Rail Adverse Weather Plan

Recommendations:

1. That each operating division review and update its existing Hurricane SOPs in light of the Hurricane Sandy experience.

2. That an intra-agency planning team chaired by NJTPD-OEM review and update the EOP and COOP so that the plans accurately reflect NJT's emergency organization and responsibilities.

Organization

1. Observation: Some confusion seemed to exist about the function of the EOC and its relationship to the EMT operating out of the 9th floor at NJT Headquarters.

Analysis: Complaints about duplicate reporting to the two entities and problems of information sharing between the two were voiced. Operational divisions were at times unsure whether to report to the EMT or EOC. Reporting requirements were further complicated by the two entities being in separate locations. This issue was aggravated as power was restored to NJT Headquarters, but the EOC remained at the remote location. Operational divisions were more inclined to report through their division to the EMT than through their representative at the EOC. Conference calls were helpful in resolving information gaps but did not resolve all information sharing issues.

There were instances when information about EMT decisions did not get to the EOC. As the coordination and information center for the EMT, the EOC should be in the information loop on all status reports and tasking between the EMT and operating divisions.

Each operating division should have a recording and reporting element that makes a record of divisional activity and provides information to the EOC.

Recommendations:

1. The respective roles and responsibilities of the EMT (policy and priority setting) and the EOC (coordination, resource and information management) should be clearly articulated in the EOP.

2. The EOP should set forth recording and reporting requirements for the operational divisions.

Critical Infrastructure Protection

1. Observation: Flood projection models specific to each location are needed to better predict storm impact on key facilities such as the Rail Operations Center (ROC) and Meadows Maintenance Complex (MMC).

Analysis: NJT has existing working relationships with the National Weather Service (NWS) offices in New York and New Jersey, the New Jersey OEM, and the Federal Emergency Management Agency (FEMA). Designated NJT personnel are trained in interpreting NWS information and plotting the flooding effects of hurricanes and other storms.

In preparation for Hurricane Sandy, NJT received NWS reports and provided briefings advising of high winds, extremely heavy rainfall, and record flooding along rivers and the coastline due to the storm surge and high tide. Predictions of possible record flooding in northern New Jersey was also briefed, but was not accompanied by plot of the storm's effect on specific NJT facilities or locations.

Forecasts of wind speed, rain amounts, and storm surge need to be translated so that their potential impact on key facilities is clearly defined. For example, if a six foot storm surge is projected, what is the specific impact of that forecast at key locations? With that information, NJT operations can better prioritize their emergency tasks.

Recommendation: NJT to further coordinate with weather service, Army Corps of Engineers, and other experts as needed to review and create models that display surge flood zones for anticipated rainfall or storm surges for each critical NJT facility.

2. Observation: NJT conducted a well-coordinated, safe shutdown of transportation operations.

Analysis: The shutdown of rail, light rail, and bus operations prior to Hurricane Sandy was coordinated with other transportation agencies (AMTRAK, PATH, CONRAIL) and government

organizations. With direction from the EMT, internal and external coordination through the EOC, and the dedicated effort of the operational divisions, all operations were efficiently and safely shutdown, equipment was stored, and employees were able to seek shelter well in advance of the storm.

Recommendation: Sustain shutdown procedures.

3. Observation: Protective measures should be considered for MMC shops and equipment.

Analysis: Storage of rail cars and equipment at the MMC resulted in flood damage, but the decision to park equipment at the MMC was based on the storm information available at the time, past storm experience and the need to keep the equipment as close as possible to meet demands for prompt restoration of service.

Had portable barriers been available, they may have prevented or minimized flood damage at MMC. Additionally, had an alternate storage location in close proximity been available, some rail parts and equipment could have been moved prior to the storm. Similarly, the existence of a backup shop facility at another location outside of the flood zone would allow continued maintenance of heavy equipment if the MMC is damaged. Another option, although costly, could be the construction of a barrier around MMC that is tall enough to withstand flood surges stronger than experienced during Hurricane Sandy.

Recommendation: Explore the feasibility of portable or permanent protective barriers at MMC, alternate storage facilities, and a backup maintenance facility.

4. Observation: Retired and unused rail equipment impeded storm preparations.

Analysis: Retired and unused equipment claimed space that could have been used for emergency storage. In some cases it also needed to be moved to prepare for the storm. Selling or removing the equipment to another location would facilitate future storm preparations.

Recommendation: Consider selling or otherwise disposing of retired and unused rail equipment.

5. Observation: The proposed backup location for the Rail Operations Center (ROC) may not be suitable.

Analysis: Existing plans establish a backup location for the ROC. During Hurricane Sandy the proposed location experienced flooding and road closures that made it inaccessible.

Recommendation: Reassess the proposed backup location for the ROC.

EOC Management

1. Observation: The NJT EOC substantially aided the coordination of the recovery and restoration process.

Analysis: The EOC was activated at 6 a.m. on Sunday October 28, using the Continuity of Operations (COOP) Trailer located in the NJT bus garage in Orange, New Jersey. Initial staffing included personnel from the NJT Police, Bus and Public Information organizations. Representatives from NJT Rail and Light Rail joined later in the day. The EOC remained active at this location through November 30.

In addition to the staff in the EOC, NJT assigned liaison officers to the New Jersey State EOC in Trenton and the State Traffic Management Center in Woodbridge. These liaison officers were invaluable for the sharing of information between NJT and the other organizations for passing resource requests and coordinating other requirements.

The EOC was used as a coordination and communication hub within NJT and as the primary point of contact for outside agencies. The EOC coordinated storm related activity across NJT; monitored shut down, repair, recovery, and restoration of transportation services; gathered, compiled, and disseminated information; served as the NJT intelligence and information center; handled resources requests and special projects; provided record keeping for resources and finances, prepared daily situation reports and incident action plans; and maintained liaison with city, county, state, and federal centers and agencies.

EMT and EOC members opined that the EOC was a valuable resource for getting things done. The EOC worked well, especially on issues requiring coordination across the agency, with outside government agencies, and regional and state emergency operations centers. The collection, recording, and sharing of information across the entire agency went extremely well, as did collaborative efforts to develop common solutions for agency problems.

Recommendation: Sustain the use of the EOC in future emergencies.

2. Observation: EOC officials had limited backup personnel.

Analysis: The EOC was staffed primarily by members of the NJTPD OEM and senior representatives from the operating divisions. This team of trained, knowledgeable personnel enabled the EOC to effectively address issues that impacted the entire agency. Having representatives with the knowledge to represent their division and decision making authority greatly facilitated EOC problem solving. Senior officials were able to obtain necessary information and to develop solutions.

However, beyond those who participated, there were few other personnel qualified to assume EOC responsibilities. Having a larger cadre of emergency management trained officials will greatly enhance NTJ's capability to respond to sustained emergency situations.

Recommendation: Develop a sufficient cadre of EOC-qualified personnel in each division to ensure adequate staffing for sustained EOC operations.

3. Observation: The EOC needed additional administrative support.

Analysis: While the participation of trained senior officials is critical to EOC operations, adequate numbers of trained administrative personnel is also essential. Response is hindered if key EOC personnel have to worry about the functioning of communications systems, logging messages, answering telephones, and other support functions that take time away from their primary responsibility. EOC operations require personnel who are trained to handle the administrative, communication, and information collection and dissemination functions. Cross training of personnel from divisions that may not have an emergency response role can often be a source of additional assistance for the EOC. Likewise, in today's information technology based environment, dedicated information technology support is also needed.

Recommendation: Assess the administrative and support needs of the EOC and designate and train appropriate administrative personnel.

4. Observation: Those manning positions in the EOC did not have written procedures.

Analysis: Most interviewees who were familiar with the EOC commented that operations were good. However, some thought that each position should have written procedures that could act as a guide, especially for those who might be unfamiliar with the EOC and its functions.

Recommendation: NJT consider developing written procedures for each EOC position.

5. Observation: For an event of this magnitude and duration, the COOP trailer was less than optimal as an EOC.

Analysis: The COOP trailer is a mobile command post used by the NJTPD for incident response and special event management. It is equipped with radio and telephone communications, computers and other support items. It functions well as a command post for short term events.

In this instance the COOP trailer was parked inside the NJT bus garage and received electrical power from the building until the building suffered a loss of power. The trailer was then placed on generators, which allowed the EOC to continue to function.

While the COOP may be adequate for short term operations or as an alternate (back up) EOC location, it does not have sufficient communication capability or workspace for all necessary personnel for a major event. As the response continued, the physical separation between the EOC and NJT headquarters resulted in some confusion and duplication of effort. The longer the event continued, more independent action was taken outside the EOC and information was increasingly passed to the EMT without notification to the EOC.

A dedicated EOC location with sufficient equipment and accommodations for EOC and EMT operations would allow better coordination between the policy group and the operations center.

Recommendation: Consider designating and equipping a permanent NJT EOC of sufficient size to accommodate all EOC functions.

Communications

1. Observation: The EOC had insufficient communication capability.

Analysis: The COOP trailer is equipped with wired telephones and EOC representatives had individual cell phones. Problems were experienced using cell phones in the EOC due to the loss of a local cell tower and because the EOC was located in a trailer within a warehouse. Other division personnel complained of having to make multiple attempts to contact their representative in the EOC. At times EOC personnel had to leave the EOC to get cell phone reception. This limited the EOCs ability to maintain communications with operating divisions and inhibited the flow of information between the EOC and the other divisions.

Recommendation: Consider the use of additional wired telephone lines when using the COOP trailer as the EOC at this location.

2. Observation: NJT employees' cell phone communications were impacted by the storm.

Analysis: The hurricane significantly impacted NJT employees who used Sprint as their cell service provider. Many reported little or no service in the wake of the storm. Verizon and AT&T customers seemed to fare better. Cell phone use was also impacted by the widespread storm-related power and transportation service disruptions. Many employees could not recharge their cell phone batteries at their homes because of lack of power, nor could they get to work to charge phones. Some divisions were provided satellite phones, but employees were not sufficiently familiar with the equipment to operate them.

Recommendations:

1. While a complete solution may not be feasible, at a minimum, review concerns with commercial carriers and determine if there are possible solutions for enhanced reliability.

2. If satellite phones remain an option, they will still have battery recharging considerations, but do provide an alternate means to communicate in the event of widespread cell service disruption. If adopted, training with the phones will need to be accomplished on a periodic basis to ensure that personnel know how to use them and who they can expect to talk to on the satellite network.

3. Observation: Radio communications reliability was limited during the early recovery phase.

Analysis: NJT rail and bus operations experienced internal radio failures and VHF and 800 MHz systems failed sporadically during the first 48 hours of recovery operations. Hoboken suffered a

catastrophic loss of radio communications that affected state-wide systems. Additionally, the police video system failed wherever units did not have battery back-up power. As a result of widespread radio shortfalls, cell phone communications became more important. However, as already noted in the previous observation, cell phone communications were seriously impacted by the storm as well.

Recommendation: Review the reasons for the failure of each communications system and identify necessary back-up power and alternate communications systems solutions.

Evacuation

1. Observation: NJT Bus and EOC successfully coordinated the evacuation of citizens to shelters.

Analysis: During mass evacuation, NJT is responsible for coordinating transportation for evacuees to and from shelter locations. NJT Bus is tasked by the State EOC to coordinate transportation services either through contract buses or NJT resources.

Prior to Hurricane Sandy, NJT was tasked to coordinate the evacuation of residents in Atlantic City and other coastal locations. In coordination with the NJT EOC, NJT Bus arranged for contract and NJT buses to accomplish this evacuation. The tasking, coordination, and transport of evacuees was well coordinated and very successfully done. The one major problem encountered was the lack of available shelters, which left many evacuees stranded on buses. Through the efforts of the EOC, state authorities were contacted and identified additional shelter locations which resolved the problem.

The return of coastal residents to their homes or long-term shelters was accomplished without incident. What remains is the reimbursement for evacuation transportation services.

Recommendation: Sustain effective NJT evacuation operations.

Information Sharing

1. Observation: Situation reports (SITREPs) and incident action plans (IAPs) produced by the EOC provided valuable information.

Analysis: During all phases of the Hurricane Sandy incident, NJT Police Department established a system at the EOC for recording, reporting and disseminating event information. Based upon information reported to the EOC, OEM prepared periodic SITREPs and IAPs. The SITREPs contained weather forecasts, flooding and roadway information, shelters, damage assessments, repair efforts and other response actions, and status reports on service resumption. The SITREPs were initially prepared on a three hour interval and distributed electronically throughout NJT.

The distribution interval lengthened to twelve and then twenty-four hours as response activity slowed.

The accuracy of each SITREP was dependent upon the timely receipt of status updates from the operating divisions. At times, this status information was not readily forthcoming.

Other NJT operating divisions, including the EMT and public information staff, found these SITREPs to be helpful in maintaining situational awareness and valuable resources for communicating with outside agencies, the public, and the media. However, one division opined that the length and format of the SITREPs limited their usefulness.

The IAPs were prepared twice daily in conjunction with the shift change at the EOC. Each IAP summarized the status of repair/recovery operations, documented accomplishments, and set forth objectives for each operating division. As with the SITREP, accuracy and completeness was dependent upon timely input from the operating divisions. The IAPs were distributed to the EMT who found them helpful in tracking accomplishments, setting priorities, and providing status information externally.

Recommendations:

1. Sustain the use of SITREPs and IAPs.

2. Establish emergency response recording and reporting guidelines for all NJT operating divisions.

3. Each business entity must supply accurate information on the timeline prescribed for future SITREP content and format.

4. Identify recipients and determine the most effective means of disseminating SITREPs and IAPs.

2. Observation: Some resource requests were not referred to the EOC.

Analysis: The EOC has the capability to track resource requests through the State EOC E Team system. The EOC used E Team to track resource requests received in the EOC, but they were not informed of all resource requests received directly by the operating divisions. For effective coordination, the EOC should receive notification of all resource requests received from outside agencies.

Recommendation: Include in the emergency plan an SOP that includes resource request procedures through the EOC.

Emergency Public Information

1. Observation: The public information effort and response were effective, but were slowed in some instances by organizational and policy decisions.

Analysis: The dissemination of information to the public was accomplished by the dedicated team of public information employees who were required to work remotely because of power and gasoline outages. They did this in the early stages of the recovery using cell phones, computers and web access. The existence of pre-drafted information and pre-approved press releases was extremely helpful in providing timely release of accurate information.

The public information officers (PIO) were valuable members of the EOC. They prepared the NJT message to the public regarding the damage sustained by NJT, the status of repairs, and the resumption of service. Preparation of these messages required coordination internally with the operating divisions and externally with local governments, other transportation agencies and the State EOC. By being in the EOC, the public information officers were able to readily obtain necessary information to ensure timely and accurate coordination of efforts for public information. However, limited workspace in the EOC resulted in the PIO not having any administrative assistance. This required communicating remotely to public information staff.

Other members of the public information office were assigned to work with the EMT at NJT HQ. This separation of personnel between the EOC and EMT sometimes caused confusion and duplication of reporting and decision making.

Recommendations:

1. Consider designating a unified location for the EOC and EMT to avoid duplication, improve information sharing, and unify emergency public information operations.

2. Streamline procedures for approval and release of transportation schedule information.

2. Observation: Public information staff was insufficient to handle the long term demand for information.

Analysis: Hurricane Sandy's effect on NJT generated a heavy and continual volume of media requests and customer service demands. The limited number of employees handling public information duties could not keep pace with the increased demands for information. There were insufficient personnel to manage the NJT Web site, monitor social media and customer service inquiries.

There was no plan to supplement the existing staff during emergency situations. The existing staff was at work or on call during every hour of the operation. Because crisis operations call for more coordination, updating, and manning emergency facilities, the work load increases and must be sustained on a 24-hour basis.

Recommendation: Re-instate cross training of personnel from other divisions to provide augmentation to emergency public information operations.

3. Observation: Methodology for providing current transportation schedules to the public should be reviewed.

Analysis: Preparing releases on transport services and updates on schedules was, at times, hindered by the lack of coordination between the planning and operations sections of the operating divisions. Keeping the schedules current on the NJT Web site was complicated by the fact that Web site management is in another organization and those employees had conflicting priorities.

Recommendations:

1. Place NJT Web site management and dedicated personnel under the direction of the communications and customer service department during emergency situations to expedite entry of constantly changing information.

2. Enhance coordination between planning and operations sections of operating divisions and public information staff on the release of service resumption and scheduling information.

Damage Assessments and Restoration of Transportation Services

1. Observation: NJT was able to restore bus and light rail service within a few days after Hurricane Sandy and to develop ferry and bus service to augment/replace rail systems until they could be restored.

Analysis: The monumental task of restoring transportation services in northern New Jersey following Hurricane Sandy required not only the dedicated effort of NJT employees and their primary contractors, but also the full participation and cooperation of the transit unions. The unprecedented storm damage across the NJT System required employees to devise plans for alternate transportation while effecting repairs to primary rail systems. Many employees were required to perform tasks that were far afield of their normal duties in order to make this process successful. The NJT effort that resulted in the effective restoration of service following Hurricane Sandy is noteworthy.

Recommendation: Sustain.

2. Observation: Coordination among the operating divisions and the EOC enabled NJT leaders to gain a clear picture of the storm related damage to NJT operations and facilities.

Analysis: Following the storm, the EOC monitored and coordinated the damage assessment process, and provided continual updates to the EMT on damage, the status of repair efforts and

resumption of service estimates. The damage assessment process enabled NJT to develop repair plans and priorities, devise alternate modes of transportation for service outages, and restore service in a reasonable timeframe.

Recommendation: Sustain.

3. Observation: NJT personnel demonstrated exceptional dedication and a commitment to restore normal operations as soon as possible.

Analysis: Despite their own personal hardships caused by the storm, many NJT personnel were observed performing extra duties to help restore normal operations. Personnel braved poor weather conditions to perform their tasks outdoors and many volunteered at transit stations to help customers get to their destinations.

Recommendation: Sustain.

4. Observation: Local law enforcement did not allow key workers access to NJT facilities.

Analysis: NJT Police Department must ensure that agreements with local and county law enforcement agencies are in place to allow key NJT staff access to facilities to perform recovery work. Employees were told that they only had to display their NJT identification for access. However, information had not been communicated to local law enforcement officers and they did not accept NJT identification for access.

Recommendation: NJTPD must reinforce coordination with local and county law enforcement agencies to establish acceptable procedures to allow NJT employees access to NJT facilities during emergency situations. This type of coordination will expedite recovery efforts.

5. Observation: Storm-related damage to rail service between New Jersey and New York placed a heavy burden on NJT bus operations.

Analysis: The number of passengers arriving at the PANYNJ Bus Terminal greatly stressed the capacity of the facilities and equipment. The result was extremely long lines and extended delays. The large number of passengers presented crowd control and operational challenges. Through the efforts of NJT Bus and EOC personnel, this challenge was addressed through coordination with the PANYNJ. Extra buses were placed in service, traffic routes altered, and additional personnel assigned to customer service and crowd control. These actions eventually resolved the emergency until rail service could be restored.

Recommendations:

1. NJT and PANYNJ should jointly review plans for handling exceptional demands for service at the PANYNJ Bus Terminal.

2. New York and New Jersey officials should review plans for traffic management across the Hudson River in emergency situations.

3. NJT Bus should review existing plans for emergency transportation requirements at the PANYNJ Bus Terminal.

Logistical Support

1. Observation: Written contracting guidelines should be prepared for all NJT personnel involved in emergency contracting.

Analysis: The Hurricane Sandy response required NJT to employ emergency means to obtain goods and services to effect repairs, conduct operations, and provide logistical support to employees and contractors. The NJT Procurement and Support Services have procedures in place for emergency contracting and purchasing. They sought and obtained authority to employ those procedures and informed other divisions of this authority. However, in many instances it was unclear to other divisions exactly what purchases were permissible within this authority. For example, could NJT Bus provide emergency lodging and subsistence for drivers and other personnel such as contract drivers?

Recommendation: Procurement and Support Services should prepare written guidelines for other divisions to follow regarding emergency contracting, purchasing, and tracking expenditures.

2. Observation: Emergency procurement procedures should be better defined.

Analysis: Finance and procurement personnel commented that a documented procurement process should be developed for emergencies. The experienced personnel in Procurement and Support Services coordinated with the EOC and operating divisions to expedite emergency contracts and the approval of emergency purchases. Had these knowledgeable employees not been available during this period, it is likely that the emergency contracting process would have been much more cumbersome and confused. Having this institutional knowledge documented as a guide would be a valuable tool for future use.

Recommendation: Document the emergency procurement process and incorporate it into the existing procurement manual.

3. Observation: Lodging and subsistence were not available for employees who worked extended hours.

Analysis: In some cases key personnel worked nearly continuously during the response and recovery portions of the emergency. They were housed in makeshift conditions in garage locations. Only operators had meal cards. The availability of nearby temporary lodging would

have allowed these personnel to obtain a few hours of rest before returning to their duties. Similarly, the use of meal vouchers for all workers or stockpiles of emergency rations could have provided some food to those working extended hours.

Recommendation: Consider identifying nearby commercial lodging or creating emergency living facilities with emergency rations on critical NJT sites.

4. Observation: Contracts to support recovery were in place, but they did not provide for the lodging and meals of those employees who became stranded.

Analysis: Contracts for heavy-duty trucks, heavy lift and other needed recovery support were in place prior to the emergency. They were activated and worked well. However, as the employees who worked through these contracts became stranded at NJT facilities, there were no provisions in the contract to provide lodging or food for them.

Recommendation: Review existing contracts and determine ways to provide emergency lodging and food if needed.

5. Observation: The loss of electrical power and the gasoline shortage following the storm, made it difficult to fuel NJT gasoline-powered vehicles.

Analysis: Since most NJT operations are either electric or diesel powered, NJT stores only minimal amounts of gasoline. NJT fills most gasoline requirements by direct purchase on the open market with NJT credit cards. NJT Bus is the only division that maintains gasoline storage in any quantity.

NJT Bus was able to provide gasoline for NJT Bus and NJTPD vehicles and limited amounts of gasoline to other NJT divisions from one storage location. Lack of electrical power limited pumping ability, and the single storage location presented access problems.

Recommendation: Review current gasoline storage capacity and develop plans for emergency supply of gasoline.

6. Observation: Emergency generators at NJT Headquarters and other operating locations provided emergency lighting, communication, and basic life services but were not sufficient to sustain normal operations.

Analysis: Hurricane Sandy resulted in extensive loss of electrical power throughout northern New Jersey and the NJT system. Most NJT facilities were dependent upon generators for some period of time and therefore could not perform their normal functions such as vehicle repair and servicing.

Fortunately, there were existing contractors who were capable of providing additional generators for electrical power to key facilities, and FEMA, through the Army Corps of Engineers, eventually provided generators. Emergency contracting procedures were used to obtain

commercial generators, and state/federal assistance procedures were employed to obtain FEMA generators. However, many of the FEMA-supplied generators were not of sufficient size to provide the power required to run operations. Many of the FEMA generators were unreliable because of the lack of maintenance prior to being delivered. Obtaining fuel for the generators was also an issue at many locations.

Recommendations:

1. NJT Headquarters and each operating division should review their emergency power requirements and develop plans to secure adequate sources of emergency power.

2. NJT OEM should provide feedback to FEMA on generator performance and establish with FEMA NJT emergency generator requirements. Procedures for servicing and fueling emergency generators should also be established with FEMA.

7. Observation: Light rail systems lacked sufficient backup power.

Analysis: The loss of commercial power caused damage to some light rail facility equipment such as sump pumps, lighting, and security systems. In many cases there was no backup power for these systems. Consequently, testing and repair of the equipment was delayed until the restoration of commercial power.

Recommendation: Review the need for backup power at light rail facilities.

8. Observation: Gasoline shortages hindered the response of critical NJT employees.

Analysis: The storm disrupted gasoline deliveries to area retail gas stations. This resulted in some NJT employees not being able to drive to work. Only one NJT division stored gasoline, but it was unable to fuel any private vehicles. Additionally, the absence of gasoline impacted the use of equipment such as chain saws and some generators during the recovery.

Recommendation: Consider developing the means to provide gasoline to critical personnel during an emergency.

CONCLUSIONS

In conclusion, several areas for improvement were identified. Among these were the need for vulnerability assessments to be conducted for all critical facilities and appropriate measures taken to mitigate potential threats. Storm surge and flood models should also be prepared for all key facilities for more accurate projections of flooding in future storms. Also identified was the need for more emphasis on the importance of timely, accurate communications with the public during an emergency and consideration should be given to dedicating additional resources to the emergency public information effort during future crisis of this nature. Last, the need was identified for a suitably equipped, permanent EOC location of sufficient size to accommodate both the EOC staff and the EMT.

Along with the areas for improvement summarized above, the interviews provided clear evidence that NJT's response to Hurricane Sandy showed many organizational strengths. Among these were the existing written plans, protocols, and procedures that facilitated Bus, Rail and Light Rail ability to conduct safe, effective shutdown of operations and timely restoration of service. While elements of the plans should be updated, they formed the basis for a successful response.

Another strength verified from interviews was the cooperation and willingness of NJT employees to go above and beyond normal requirements to accomplish critical response tasks. The sacrifices of many employees were unheralded. They accomplished much under difficult circumstances. An example is the overall spirit of cooperation that resulted in NJT prompt restoration of transportation services through the use of buses and ferries as alternatives for rail service. This was facilitated by the exceptional efforts of NJT personnel and the cooperation of their respective unions and contractors.

In closing, the coordination between the operating divisions, the EOC, and the EMT was very good. It enabled the accomplishment of major tasks such as facilitating the transportation for the evacuation of Atlantic City and the Shore Communities. Similarly, the EOC effectively coordinated operations and information sharing internally, as well as with the New Jersey State EOC and the State Traffic Management Center. EOC staff played a critical role in the coordination of shutdown, repair, and restoration operations across the agency and provided situational awareness for NJT management on damage assessments and the status of repairs and restoration.