

## QR240: Querying Facility Management (FM) Teams: Document Preservation and Debris Removal for Cultural Collections

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### Research Questions

- How did FM teams' prior disaster planning and training affect Hurricane Sandy recovery efforts?
- What were the common actions taken by FM teams regarding *record preservation* and *debris disposal* at cultural institutions after Hurricane Sandy?
- How did Hurricane Sandy affect environmental systems and storage conditions of *records* at cultural institutions?
- What role did laws, standards, recommendations and codes play in influencing the Facility Management teams regarding *vital, cultural, and historic record preservation* and *debris removal and disposal* after Hurricane Sandy?
- What can be improved in FM teams' disaster planning, training, and recovery efforts?
- What is currently missing in FM teams' disaster planning, training, and recovery efforts?
- What works and what doesn't work in FM team's disaster planning, training, and recovery efforts?

### Methodology

In May 2013, a facility management research team, consisting of a graduate student and a faculty member from a southern mid-western U.S. university, traveled to 4 sites located in a large metropolitan area on the U.S. Eastern seaboard, which had been evacuated in anticipation of Hurricane Sandy.

Insert Figures 1 – 4 approximately here.

Figure 1. Hurricane Sandy Tracking U.S. East Coast

Figure 2. Hurricane Sandy Tracking U.S. Upper East Coast

Figure 3. U.S. East Coast Centered on Manhattan Island

Figure 4. Manhattan Island Sites with Zip Code Identification

Researchers toured affected sites; two university libraries, one national museum, and one world-class art gallery; during the three day field study period. Facility Management team participants at each site were identified utilizing suggestions from researchers' university contacts and the International Facility Management Association (IFMA) Foundation. After receiving Institutional Review Board (IRB) approval, the researchers utilized purposeful and snowball sampling techniques and contacted potential participants via telephone and email prior to travel. At the sites, the researchers administered perception surveys to facility management team members. The survey included 21 close-ended questions which used a Likert-type scale and also included one open-ended question. Facility management team members were queried regarding experiences prior to, during, and after Hurricane Sandy. Participants were asked for suggestions to improve disaster preparation and recovery. Researchers also conducted four focus groups which were audio recorded and later transcribed. Some on-site documentation was made. Data collection consisted of three parts:

Questionnaires: Disaster planning and disaster recovery surveys were developed and administered. A five point, Likert-type scale (Strongly Agree, Agree, Neutral/Not Applicable/ Disagree, Strongly Disagree) was utilized. The survey included relevant facility management questions drawn from an existing survey, the "Self-inspection Checklist" from Occupational Safety and Health Administration (OSHA), U.S. Department of Labor regarding record keeping. Participants were not asked personal questions other than basic demographics. Subjects were given an information sheet in lieu of consent forms, in order to preserve participants' anonymity. Questionnaires were analyzed utilizing descriptive statistics.

Focus Group Interviews: Participants were asked about their perceptions of disaster planning and recovery efforts at their facilities. Participants were asked to respond to questions, interact with other focus group participants and share perceptions and experiences. Responses were not linked to participant names. Participants were pre-existing FM team members at the same cultural institutions who were clustered into session(s) with co-workers as desired and as available. The focus group contributions were audio recorded. The researchers listened to the audio tapes and transcribed data. Transcriptions were analyzed using qualitative content analysis to search for themes.

In Situ Documentation: Limited digital photographs and dimensional measurements were made of sites' storage and display areas, when allowed.

## Results

Study participants included seven FM Team members who completed surveys and participated in focus group interviews. Two of the sites, the art gallery and one of the libraries, were also affiliated with "sister" facilities nearby. These sister facilities were also impacted by Hurricane Sandy and the participants reported they were also knowledgeable about conditions at these facilities. Therefore, those additional two facilities were considered in the focus group interviews. The additional two facilities were not visited by the researchers. This resulted in a total of six sites considered in this study: Site A (Library), Site B (Museum), Site C1 and C2 (Art Gallery), Site D1 and D2 (Library). The six considered sites' buildings varied greatly in size from 7,000 to 500,000 square feet, as reported by the study participants.

### **Surveys**

Q1 At the facility where I work, we *prepared* for Hurricane Sandy.

The vast majority of respondents, (6, 85%) agreed or strongly agreed. One (14.29%) respondent disagreed.

Q2 At the facility where I work, we incurred *damage* from Hurricane Sandy.

Over half (4, 57.14%) of the respondents agreed or strongly agreed. Less than half (3, 42.86%) disagreed or strongly disagreed.

Q3 At the facility where I work, we *recovered* from Hurricane Sandy and are back to normal.

The vast majority of respondents (6, 85.71%) agreed or strongly agreed. One (14.29%) disagreed.

Q4 At the facility where I work, in anticipation of Hurricane Sandy we *moved* some vital, cultural or historic records to a **temporary** location.

Over half of the respondents (4, 57.14%) agreed, less than one third (2, 28.56%) disagreed and one respondent (14.29%) neither agreed nor disagreed or did not know.

Q5 At the facility where I work, in anticipation of Hurricane Sandy we *moved* some vital, cultural or historic records to an **off-site** location.

All respondents (7, 100%) disagreed or strongly disagreed.

Q6 At the facility where I work, we **permanently relocated** some vital, cultural or historic records due to Hurricane Sandy.

The majority of respondents (5, 71.42%) disagreed or strongly disagreed. Over one quarter of respondents (2, 28.5%) neither agreed nor disagreed or did not know.

Q7 At the facility where I work, we *preserved* (kept safe from harm) some vital, cultural or historic records **during Hurricane Sandy**.

Results from this question were mixed. Less than half of the respondents (3, 42.85%) agreed or strongly agreed, less than one third of respondents (2, 28.57%) disagreed or strongly disagreed and less than one

third (2, 28.57%) neither agreed nor disagreed.

Q8 At the facility where I work, some vital, cultural or historic records were **damaged** due to Hurricane Sandy of the aftermath of Hurricane Sandy (for example, from flooding).

Less than half (3, 42.85%) of respondents agreed or strongly agreed. Over half (4, 57.14%) of respondents disagreed or strongly disagreed.

Q9 At the facility where I work, some vital, cultural or historic records were **destroyed** due to Hurricane Sandy of the aftermath of Hurricane Sandy (for example, from flooding).

Over half (4, 57.14%) agreed or strongly agreed. Less than half (3, 42.85%) disagreed or strongly disagreed.

Q10 At the facility where I work, we **disposed** of some vital, cultural or historic records as a result of Hurricane Sandy.

Less than half of the respondents (3, 42.85%) agreed or strongly agreed and over half (4, 57.14%) disagreed or strongly disagreed.

Q11 I am aware of my facility's **disaster and recovery plan**.

The vast majority (6, 85.71%) agreed or strongly agreed and one respondent (14.29%) strongly disagreed.

Q12 Prior to, during and after Hurricane Sandy, we followed our **disaster and recovery plan** at the facility where I work.

All respondents (7, 100%) agreed or strongly agreed.

Q13 At the facility where I work, per OSHA (the Occupational Safety and Health Administration), employee training records are kept up-to-date for items such as elevators, air pressure tanks, liquefied petroleum gas tanks, etc.

Over half (4, 57.14%) agreed or strongly agreed. Less than half (3, 42.85%) neither agreed nor disagreed or did not know.

Q14 At the facility where I work, arrangements have been made to retain employee training records for the time prior required by OSHA.

All respondents (7, 100%) neither agreed nor disagreed or did not know.

Q15 At the facility where I work, employee training records are accessible for review by employees, as required by OSHA.

All respondents (7, 100%) neither agreed nor disagreed or did not know.

Q16 What is your gender?

Almost three quarters of the respondents (5, 71.43%) were female and over one quarter (2, 28.57%) were male.

Q17 What year were you born?

Over one third of respondents (3, 42.85%) were born in 1955 or earlier and were classified as part of the Baby Boomer Generation. These facility management team members were 57 years old or older. Over one half of respondents (4, 57.14%) were born after 1964 but before 1978 and were classified as part of Generation X.

Q18 What is the zip code of the facility where you work:

Sites A Library: 10027

Sites B Museum: 10004  
Sites C1 & C2 Gallery: 10011 and 10011  
Sites D1 & D2 Library: 10012 and 10016

Q19 What type of facility is your workplace?

Over half of the respondents (4, 57.14%) indicated their cultural institutions were libraries, over one quarter (2, 28.57%) indicated their cultural institution was a gallery and one respondent (14.29%) indicated that their cultural institution was a museum.

Q20 What is your job title? (Respondents were allowed to check multiple categories.)

Some participants claimed more than one title. The most popular job titles reported were “Building Manager” (n=3) and “Librarian” (n=3). Some participants indicated that they were a “Director” (n=2) or “Administrator” (n=2). The least reported job title was “Facility Manager” (n=1).

Q21 What is the highest level of education you have completed?

The education level for the Facility Management team respondents was mixed. Over half of respondents (4, 57.14%) had achieved a Master’s degree. One (14.29%) had achieved a Doctoral degree, one (14.29%) had a 4-year college degree and one (14.29%) had completed high school.

Q22 What else would you like to tell us about any experiences you had with Hurricane Sandy?

The researcher has organized all of the participants’ responses by themes:

#### Damage

- “Mainly, due to the location of the facility away from storm surge, the damage to the facility was slight. Some glass damage at the entrance and minimum window leaks was the only damage sustained. The windows are slated for repair and re-sealing this Summer 2013.”*
- “It may be worthy to note that a sister facility, out of my purview, sustained heavy damage due to proximity to waterways.”*
- “We were extremely lucky and had no damage to collections.”*

#### Disaster Plans

- “Many of the protocols in the disaster plan were ineffective or didn’t exist with Hurricane Sandy, for example, the telephone tree to muster the disaster committee, people who were further away, outside of walking distance, could not respond because transportation was knocked out, no gas...”*
- “In a large institution that is spread out physically and administratively there are varying levels of disaster preparedness, awareness and recovery protocols, even in institutions that have strong disaster plans.”*

#### Within Organization Communications

- “One of the on-going challenges is our organizational structure.”*
- “Our Facility Management Department is a separate entity from Libraries. This causes a disconnect in coordinating efforts during such events. The distinction is so bad, that Libraries hired a separate Facility Manager, whose responsibilities include being a liaison to the main institution’s Maintenance Department.”*

#### Technology

- *“Lack of electricity made smart phones useful because we could photograph written notes, plans and maps and distribute through cell phones.”*

## **Focus Group Interviews**

At three of the focus group interview locations, two participants contributed to the focus group sessions. At one of the focus group interview locations, only one participant was available to participate. There were a total of seven focus group interviewees who participated at their workplace location. There were a total of four Focus group interviews. The sessions each lasted approximately one hour. Several trending issues were identified by the researchers. Examples of the participant comments are included below to illustrate these points:

The **main issues** raised by all of the participants (7, 100%) regarding all sites (6, 100%) follow:

### **1. Post- Hurricane Sandy disaster plan use or updates**

(Sites A, B, C1, C2, D1 and D2)

- *“We do have... semi-annual meetings to update the disaster management plan...We get different or better ideas from others who come from other facilities, other types of agencies*
- *“...It is kind of a living document...”*
- *“...having a disaster plan that...we do update every six months...It was interesting how much of it was either not anticipated, or you know, not really sufficient.”*
- *“I am sure there are more plans to update the disaster plan...”*
- *“We have had numerous ‘sit downs’ especially regarding the disaster plan and we have put on paper a number of improvements and actions we should take for future type of disasters the only problem is that due to our Government funding issue and sequestration issue the projects are basically on hold...”*
- *“They had a disaster plan, but couldn’t locate it. So, we were able to send them a digital copy. Probably around Day 4...”*
- *“It was interesting that even in a large institution like this where you think people would be on top of things, it’s so typical for institutions to give their disaster plan short shrift...”*

### **2. Vendors or external providers**

(Sites A, B, C1, C2, D1 and D2)

- *“One thing that really struck me... in the aftermath of hurricane sandy, our disaster plans...are really good when you have leaks and... minor disasters, but when it comes to a really major disaster, like Hurricane Sandy, then you need to have a company come in that is trained and has staff and ...has a much, much, larger operation...”*
- *“Belfor was the company...hired...on retainer. They were there pretty quickly...They trucked the materials down to their document recovery center in Fort Worth, Texas where they have been sitting in a freezer and they are just now beginning to get to them. They were in a cue queue for treatment.”*
- *“Here, we really should, in light of Sandy, have a contract with a vendor, like Belfor.”*
- *“The building was alarmed remotely through an offsite alarm company...”*
- *“There were a number of mold remediation companies that are doing all the buildings...”*
- *“GSA... has their own company that they brought in and they were able to make an assessment, took some samples, my understanding is there was no build-up of mold... They did take action regarding major clean-up at the subbasement level.”*
- *“We worked with our general contractors here...they knew what the codes are...a lot of it is outsourced....They were the ones that were dealing with things like that.”*

- *“There is no response company that is big enough to address something like that... if the roof blew off...How would anyone respond to that? How is it possible to do anything other than bring in a bulldozer?”*

### **3. Considerations for human health and safety**

(Sites A, B, C1, C2, D1 and D2)

- *“They were also really good about looking out for people’s health. They had people in hazmat suits that were moving stuff around and clearing out wet carpeting and things like that...Keeping the staff away because of mold or biohazards.”*
- *“At that point they had to transport the patients to other facilities. You can imagine...in that situation, the books in the library are going to take a little less priority.”*
- *“Naturally, the focus is on housing and student housing and life safety rather than the books in the stacks...”*
- *“We are not going to have someone spend the night here in case it floods. What’s the point of that? And then they are in danger and they’re trapped...That’s so stupid...”*
- *“I’m sorry I am not going to put someone’s safety...It’s the mindset, get the art safe, get the people safe, sometimes it’s the reverse order... and then clear out and then assess the situation.”*
- *“They did not want people to be in any danger.”*
- *“Some people were up here for a week. They could not get out. I brought in some canned food and some change of clothes. That is something I did.”*
- *“Their priorities will be life safety. Would we want to or could we take anything away from that? You’d have to be on-line, until certain other parameters - students are safe, structures are secure, before you probably could even address that...”*

### **4. Need for clear and prompt communications within the cultural institutions**

(Sites A, B, C1, C2, D1 and D2)

- *“It’s like you have to drag people and... I regard that as an institutional problem. Unless you have somebody to give people specific direction it is not going to be an issue to try to right things.”*
- *“Again, here is a communication problem because I couldn’t get a hold of anybody.”*
- *“It’s kind of outside the disaster plan itself, again, that communication with central facility department, which is tough since it’s not part of our division.”*
- *“ That has always been a problem, the... difference between the library’s disaster plan and recovery plan and the building’s disaster plan. They are two different things.... involve two different people. They aren’t really synchronized or coordinated.”*
- *“...communication...we are always ready to be that bridge.”*
- *“I think we could do a better job of coordinating, maybe.”*

### **5. Limited transportation hampered recovery**

(Sites A, B, C1, C2, D1 and D2)

- *“People who needed public transportation could not get here...These people who live within walking distance became ultra-important...”*
- *“That’s a big challenge in this area. It’s transportation. Because tunnels are closed. Bridges are closed... Once you’re in you can’t get in or out... Cars weren’t allowed over the bridges...so you know, it got down to like “You can walk.”*

- *“...But the conservator here and one of the assistant conservators were able to get in from Brooklyn, walking...”*
- *“We tried to come in the next day, but the bridges and everything were shut down. If you weren’t in a cop car they just like sent you back...so it took us awhile to get back into the city.”*
- *“Gasoline was at a major shortage...so even though we have a department vehicle, we did not have a lot of gas to work with to at least travel about and try to get some other supplies or needs or even exchange personnel...we need to include that in our new plan, in light of the upcoming storms to be prepared and to keep gas on site.”*

## 6. Problems associated with records in basements

(Sites A, B, C1, C2, D1 and D2)

- *“You really shouldn’t keep stuff in the basement. And I think they learned that lesson.”*
- *“Ideally, in a perfect situation, it would not be in the basement. Real estate is a real commodity here...It makes it a difficult situation...”*
- *“(They) did not fare so well just because of their proximity to the waterways. They got hit really hard... They were completely flooded in the basement...”*
- *“...Sadly... this is New York City...people put storage in attics and basements...the worst possible locations in buildings is generally where they want us to stash our collections...They want the prime space for the people...When you have one of these events you will be hearing what happens...”*
- *“By routinely leaving the bottom shelf of stacks empty, the chance of cultural documents being flooded was reduced. “*

The following issues were raised by a **majority**, almost three-fourths (5, 71.43%) of the participants:

### **Post-Hurricane Sandy problems with computers and electronic files**

(Sites B, C1, C2, D1, and D2)

- *“I was not reading up on ‘this is the best way to dispose of (documents)’...We had no internet...”*
- *“... So she literally had to write stuff down and take a picture of it with her phone and send it that way. We did that for several kinds of things...for making maps for areas where she wanted to show the conservator who was up there where things were. They drew maps. And because, there is no photocopier or anything, no electricity. We shared them by taking pictures and sharing them by cell phones.”*

To a **lesser extent**, the following four issues were mentioned by 4 (57.14%) participants at three or four sites:

### **1. Reconsideration of off-site storage conditions**

(Sites A, D1 and D2)

- *“The other worry that I have now, in the aftermath of Hurricane Sandy, is our off-site facility. We do not have a disaster plan for that, per se.”*
- *“We have been talking about what it would take to get us that off-site access and how important it is...”*
- *“The off-site facility is an area of concern in some sense...a warehouse...packed with books...teaming...It is built to withstand normal storms or even intense storms...but a tornado?...an earthquake?”*

### **2. Credible risk versus reward for the temporary relocation of records**

(Sites C1, C2, D1 and D2)

- “You are taking it (records) out of a fairly pristine environment, putting it on a truck. Who knows where it’s going to be? You have to weigh the risk. What is the damage you are going to do and the transportation?”
- “We could do all this and spend a lot of money and also damage or lose collections, since this is un-catalogued materials, for something that doesn’t happen. You have the hurricane idea...They can just veer a few degrees and you say, ‘What did we do all that for?’”
- “You can’t predict any of this anyway. We can’t sort of shut down and take down all these sculptures that take two weeks to install. We don’t have the time frame anyway. You just have to risk it.”
- “Like in 2011, they said Hurricane...This happens with the weatherman all the time. They say “It was going to be terrible” and then nothing happens. They said, ‘It was going to be a big deal and everyone be careful.’ and then it was just a rainstorm.”

□ **3. Employee turnover effects**

(Sites A, D1 and D2)

- “...Staff changes...There is a certain amount of turnover...People forget...”
- “All you can do is keep trying. and it’s something that changes as personnel changes...It has to be really has to kept up.”
- “I remember years ago there was an effort in the cultural community to have disaster training workshops where the facilities people and the library people came together from their institutions and went through this whole workshop. That was good until staff changed and then you have to do it all over again...”

□ **4. Stakeholder considerations**

(Sites C1, C2, D1 and D2)

- “You can imagine if you are in a 15 story residential **student** tower and the power is out. A lot of things can go wrong. So its understanding that a university would focus more on that than the study spaces.”
- “...and the **students and parents** calling in...”
- “Our other libraries... The whole medical center was pretty wiped out. They had to remove **patients** from the hospital.”

Also of note, three participants (42.86%) indicated that they had had problems with:

□ **Communications after Hurricane Sandy**

(Sites B, C1 and C2)

- “You could barely get cell phone coverage – just at one spot on 11<sup>th</sup> avenue...”
- “Our server room and our ability to communicate...that was a huge issue. We lost the connection between us and DC...primarily because we lost the feeder from our supplier...We use part of their system to send out our data through their lines and they went down, really went down...”
- “You had to literally walk around with your cell phone out in the air just trying to find that one little bar, that would easily go away...depends on which way the wind is going...I don’t know.”
- “That was the most difficult part...Just from a general communication stand point - for me (not) to be in contact with my superiors and also for me to gain some sort of support...”
- “We also trying to also work out some kind of communications...Satellite telephone might be of use although we did had one which wasn’t very effective... But there is just no line of sight, very difficult.
- “I had to sleep in the car one day to plug my cell phone in...with the engine running...”

A **minority** of participants (2, 28.57%) advocated:



□ **Permanent reduction of on-site records**

(Sites C1 and C2)

- *“I think a lot of people just used it (Sandy) as a chance to say to cull and to say “why are we even keeping this stuff, since everything is digitized anyway.”*
- *“We need to keep less artwork in the building, reduce... Bring stuff in for viewings and then take it back out.”*
- *“At that point we just decided to totally reduce the inventory we have in the gallery. We made it a chance that maybe we do not need to store so much in the building. We should get it to another area.”*

**Additional focus group participant comments specifically related to research questions**

□ **RQ1 How did FM teams’ prior disaster planning and training affect Hurricane Sandy recovery efforts?**

- *“Our disaster plan...picks up after the disaster happens and helps... guide you through the recovery and salvage process. It advises people who should be the first called and those people who will help the response...”*
- *“I feel comfortable with our training of the library staff...”*

□ **RQ2 What were the common actions taken by FM teams regarding record preservation and debris disposal at cultural institutions after Hurricane Sandy?**

- *“It was heart wrenching to see artwork thrown out on the street.”*
- *“Those (records) were actually removed and relocated to the second floor level.”*
- *“From the point of view of the collections, if we do sustain damage from a disaster...if for instance we have water events that lead to mold...we are very careful in terms of human health and safety but where those materials are unique we will work with external companies to have cleaning done and so forth so we don’t have to dispose of materials...if they are unique materials we go as far as we can...they know that we need special kinds of vendors to come in and deal with any damaged materials and that is always part of the recovery aspects...”*
- *“Our proactive efforts were then mainly focused on the special collections, because of their nature. But to made sure that we would move things that we could move away from windows. Generally, we don’t have much in front of the windows anyway. But whatever was there...We had a few flat files in some areas. We made sure they were covered in plastic.”*
- *“Their books, a lot of their reference materials and there were a lot of journals and anything that was on the lower shelves were totally soaked and pretty much soaked they were tossed. They determined they were available in electronic form. So a good deal of it was tossed.”*

□ **RQ3 How did Hurricane Sandy affect environmental systems and storage conditions of records at cultural institutions?**

- *“...They lost power. And here you have this setup that’s a Muntzer’s dehumidification system which works great when there is power to it, not so much without...I suppose there is the time of year, once the storm subsided it wasn’t a high humidity period. There was enough inertia there... We didn’t see big swings.”*
- *“You could see on our data loggers where the HVAC system went down.”*
- *“The rest (of the records were) packed up and sent off-site because there was no HVAC system and we were worried about dampness and mold.”*

□ **RQ4 What role did laws, standards, recommendations and codes play in influencing the Facility Management teams regarding vital, cultural, and historic record preservation and debris removal and disposal after Hurricane Sandy?**

- *“Other facility management team members were prevented from returning to their urban facilities for a week or more due to... access blocked by law enforcement.”*

- *“Our process definitely is very much in tune with any local codes and standards, regulations... The University is very rigorous about enforcing those standards...The city standards are more rigorous than the state and (Site A) generally exceeds both the city and state for disposal...From the library perspective we take great care in any disposal of any library content type materials even if that is by choice...we are very careful...”*
- *“...Standard practice is to keep everything off the floor anyway.”*
- *“We certainly were just doing what we thought was best.”*
- *“Dumpsters...we didn’t do it...it was our general contractor, I would assume...I mean who had trucks coming in, removing by whatever codes were necessary...He was following whatever laws...”*
- *“We did follow codes, obviously, our electrician knows the codes...”*
- *“We are basically kind of governed by the standards down in D.C....Disaster management plans are a template, boiler plate...it is pretty standard and we follow whatever they put in place...As time goes by...new potential procedure or steps are put in place...”*

□ **RQ5 What can be improved in FM teams’ disaster planning, training, and recovery efforts?**

- *“You got to go down to the server room so you can tell me what is going on there. You got to go down to your media vault and check the air conditioning unit and then go here and call me back when you are done. The existing facility management structure by itself just doesn’t go and do that. That’s something that really needs to be improved cause, you know...Let’s say I live in one of the outer parts and my house was in jeopardy or destroyed or something or be unable to make those calls. And there was a problem here as well, you know... there wouldn’t have been probably been a lot going on...”*
- *“...those kinds of coordinating relationships should be stronger.”*

□ **RQ6 What is currently missing in FM teams’ disaster planning, training, and recovery efforts?**

- *“I would say that is where one of the overall University deficiencies are...in that there is this disconnect from the facility and the facility maintenance....There is no engagement or there does not seem to be much of a desire to engage in the disaster recovery proactively or even when the disaster happens...”*
- *“...There is...no electricity... That should be part of your disaster plan but we had never anticipated that.”*
- *“Life would have been a lot easier if we would have thought of those aspects... You almost overlook it. You think we will never lose it. Yeah, I can lose the phones; I can use my cell phone...”*
- *“...When I have tried to put that kind of stuff (record preservation and recovery) in the disaster plan, It did not work, because it was... outside of my area of control, it was really the building’s control...That sort of fell out of our disaster plan.”*
- *“One of the things they have realized is that special collections that are in boxes should really be stored lower down in these large, high-density storage facilities because then they are easier to get to as opposed to way up... with the pickers and everything...When the boxes get wet, they break...How do you get up the 40’-0” to retrieve it?...So having the special collections a little lower so someone on foot or a ladder can get to them rather than relying on a pickers system which may be down due to electrical damage.”*
- *“We have...HVAC condition monitoring in the collections, especially in the rare book storage areas and in the server rooms... monitored 24/7...It’s radio telemetry...but I can’t do it at home...but we have been talking about what it would take to get us that off-site access and how important it is...”*
- *“Water, sleeping arrangements; hot water would have been nice. Cold showers are not good.”*

□ **RQ7 What works and what doesn’t work in FM team’s disaster planning, training, and recovery efforts?**

- *“I’ve read disaster planning. I think it helped guide...our proactive – moving things, wrapping things...I think it was very effective in that sense.”*
- *“...I do want to... credit our facilities department. They did stock up on... recovery materials. They had... plywood on hand. They had plastic on hand. They had tape and things to secure broken windows. They had extra staff...They paid overtime to have extra staff stay through the duration. I will give them a lot of credit...”*

- *“We are backed up off-campus, outside New York City in case something major hits the East Coast...”*
- *“There were some rare pamphlets, over 300 pamphlets that were in the cataloguing department that someone, in anticipation of Sandy, put on the floor’ cause they were worried about leaks from overhead and unfortunately those materials got wet because they were on the floor and the water came up.’*
- *“There isn’t a real proactive response. I think that is largely kind of ingrained into the system here... Until someone reports that cracked glass, that cracked glass will just stay there. It will stay cracked.”*
- *“If we lose our emergency generator, there is no plan...we are pretty much screwed...”*

### In Situ Documentation

Researchers observed record and artifact storage areas in visited cultural facilities. Electrical connections, fragile displays and book locations with bottom of shelf clear were photo-documented. Insert Figures 5 - 7 approximately here.

Figure 5. Electrical Wiring and Receptacle at Floor in Museum

Figure 6. Garment Exhibit at Floor in Museum

Figure 7. Empty Bottom Shelf in Library

### **Possible application of results**

This study’s findings begin to fill gaps in the literature, update lessons learned, and inform specific areas of future disaster planning and recovery efforts. Surveys and interviews of facility management team members and in situ documentation of specialized and complex cultural facilities - museums, libraries, and art galleries - provide insights and recommendations. Facility managers, whose facilities were in the path of Hurricane Sandy, revealed many challenges to their cultural facilities’ vital, cultural, and historic record preservation; debris removal and disposal; building systems and operations; as well as to the health, safety, and welfare of facility management team and facility stakeholders. Applied benefits include increasing facility managers’ awareness of potential problems and ultimately increasing facilities’ capacities to prepare for and recover from disasters, in terms of document preservation and debris removal for cultural collections. Applied benefits will most directly relate to those facilities located in urban areas which may be threatened by flooding as a result of hurricanes or other disasters. Specific topics addressed in this study include: making disaster plan recommendations for the in-house and off-site storage of records; considering outside vendors and service providers; weighing disaster planning risks versus rewards; considering regarding disaster plan updates; monitoring environmental controls; and considering communications, coordination, transportation, and support for facility managers who remain at facilities during disasters.

The potential decline or unavailability of facility management teams’ personal and corporate memories may hinder future efforts to capture data and apply the “lessons learned” regarding disaster preparation and recovery. Facility Management workers’ mobility may also restrict the sharing of lessons learned in-house to potentially mitigate future disasters. Facility Management team members’ anticipated retirements may further restrict the sharing of lessons learned throughout the FM industry and especially within large and complex cultural facilities. The International Facility Management Association (IFMA) has reported concerns for the greying and impending retirement of a considerable number of facility managers. In 2011, the American Association of Museums reported that over 22% of museum workers were age 55 or older. In the current study, over one third of respondents were over the age of 55.

Further, since the facility management team member participants in the current study identified themselves by various job titles, future efforts related to facility management and disasters should actively target those with a wide variety of job descriptions who may have facility management disaster responsibilities. These FM professionals may be reading different literature, belong to different professional organizations and may be separately networked.

Reaching FM team members in different types of cultural institutions with a record of lessons learned may be achieved by publication in facility management and various cultural facilities’ discipline-specific literature.

The researchers anticipate dissemination of their findings through appropriate peer-reviewed conference venues and journals.