Remnants of Hurricane Ida
4615DR
Damage Assessments

New York City Housing Authority

MOORE HOUSES

April 7, **2022** (rev)

Submitted to:
New York City Housing Authority

Submitted by:
CSA Group NY Architects
and Engineers, PC
55 Broadway, 14th Fl.
New York, NY, 10006

Table of Contents

Table of Figures

Table of Tables

Table of Photos

1 Introduction

The New York City Housing Authority (NYCHA), the largest public housing authority in North America, was created in 1935 to provide decent, affordable housing for low- and moderate-income New Yorkers. On September 1, 2021, remnants of Hurricane Ida caused extensive flooding throughout New York City. Subsequently on September 5, 2021, the storm was declared a disaster with incident-related damages eligible for funding through FEMA's Public Assistance program (4615-DR-NY). Many NYCHA developments experienced flood-related damages as a result of the storm, including loss of heat and hot water service due to boiler and tank room floods, elevator outages, loss of equipment, and other damages. In addition to funding for restoration to pre-storm conditions, public assistance funding may in some cases be available for mitigation of damages should similar future storms occur. In order to understand the level of capital investment needed to restore sites to pre-storm conditions, as well as to mitigate against future similar storms, NYCHA prepared assessments of storm-related damages at the most heavily damaged sites.

CSA Group New York Architects and Engineers, PSC (CSA Group or CSA) was contracted by NYCHA to perform these damage assessments. This report focuses on Moore Houses Development and presents the findings and conclusions of the assessments organized in the following sections:

- Site/Building Description
- Field Damage Assessment
- Proposed Restoration Scope of Work
- Proposed Mitigation Scope of Work
- Rough Order of Magnitude Cost Estimate
- Appendices

2 Development Description

According to NYCHA public information, E. Roberts Moore Houses (Moore) consists of two, 20-story buildings of approximately 117,000 square feet. Completed in March 31, 1964, the 2.69-acre Bronx development is bordered by Clymer and East 149th Streets, and Jackson and Trinity Avenues (Figure 1 and Figure 2). The Development has a total of 463 apartments and an approximate population of 1,108.

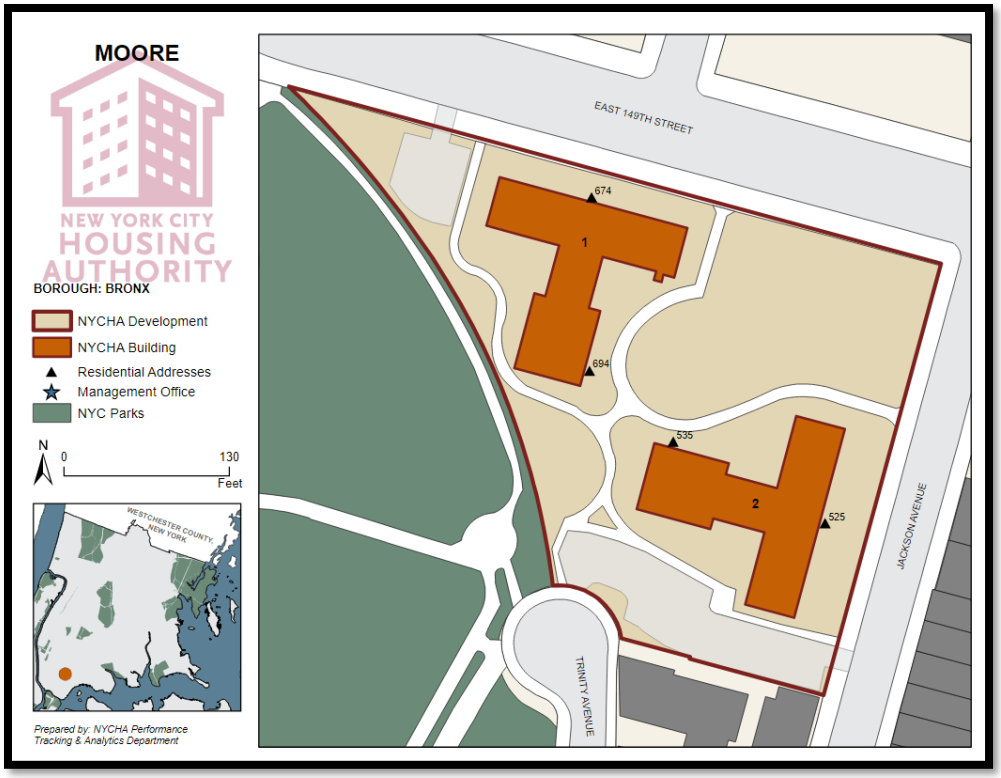


Figure 1. Moore Houses Development Map

Figure 2. Moore House Development Google Earth Image

According to FEMA flood map number 3604970083F, effective on 09/05/2007, this site is not located in a flood zone (Figure 3). According to the New York City Department of City Planning Flood Zone Mapper, this site is not located in a flood zone (Figure 4). Also, according to the Beta Version of the New York City Stormwater Flood Maps, this site is not subject to flooding impacts due to a moderate rainstorm combined with sea level rise (Figure 5); however, it is subject to "Nuisance Flooding" (greater or equal to (4) four inches and less than (1) one foot) and "Deep and Contiguous Flooding" ((1) one foot or greater) (Figure 6).

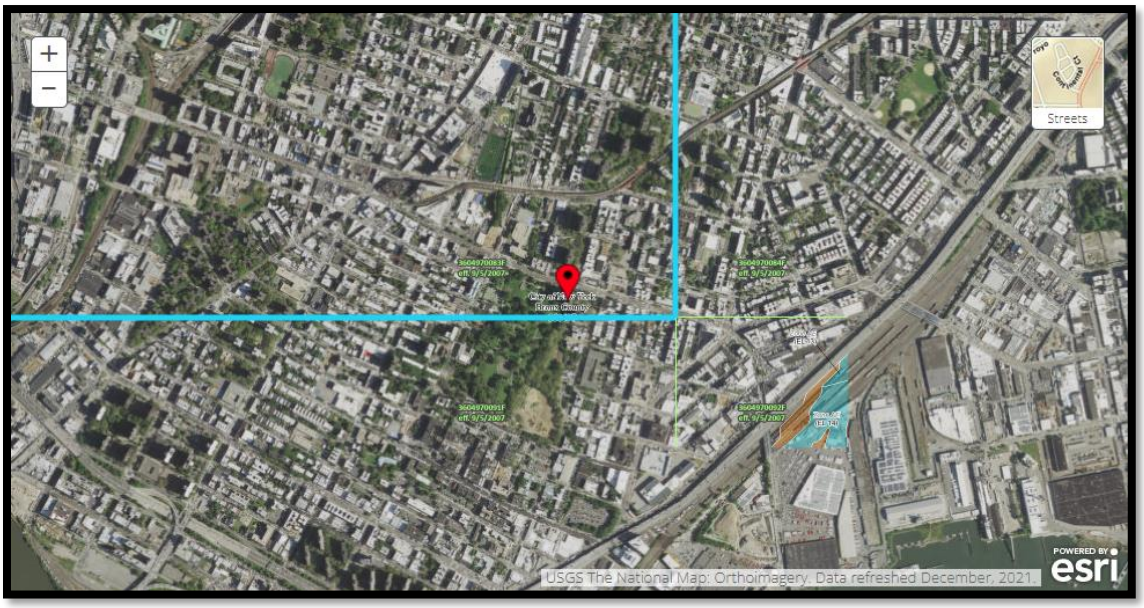


Figure 3. Moore Houses Development FEMA Flood Hazard Map

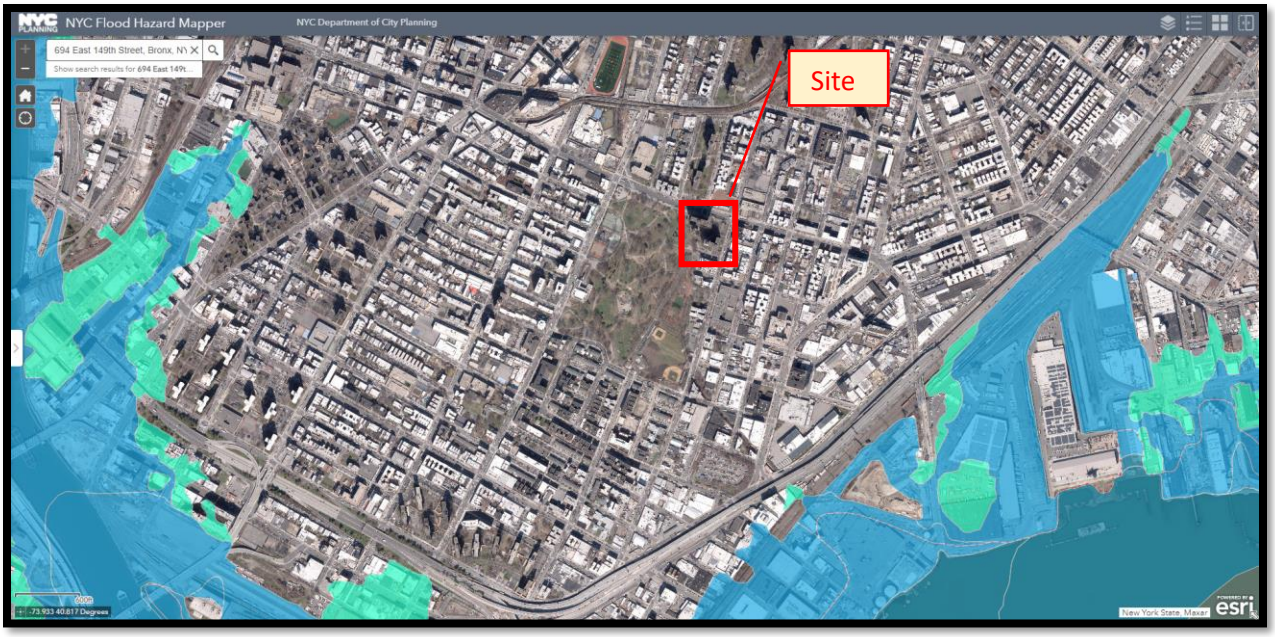


Figure 4. Moore Houses Development NYC Flood Hazard Mapper from NYC Department of City Planning

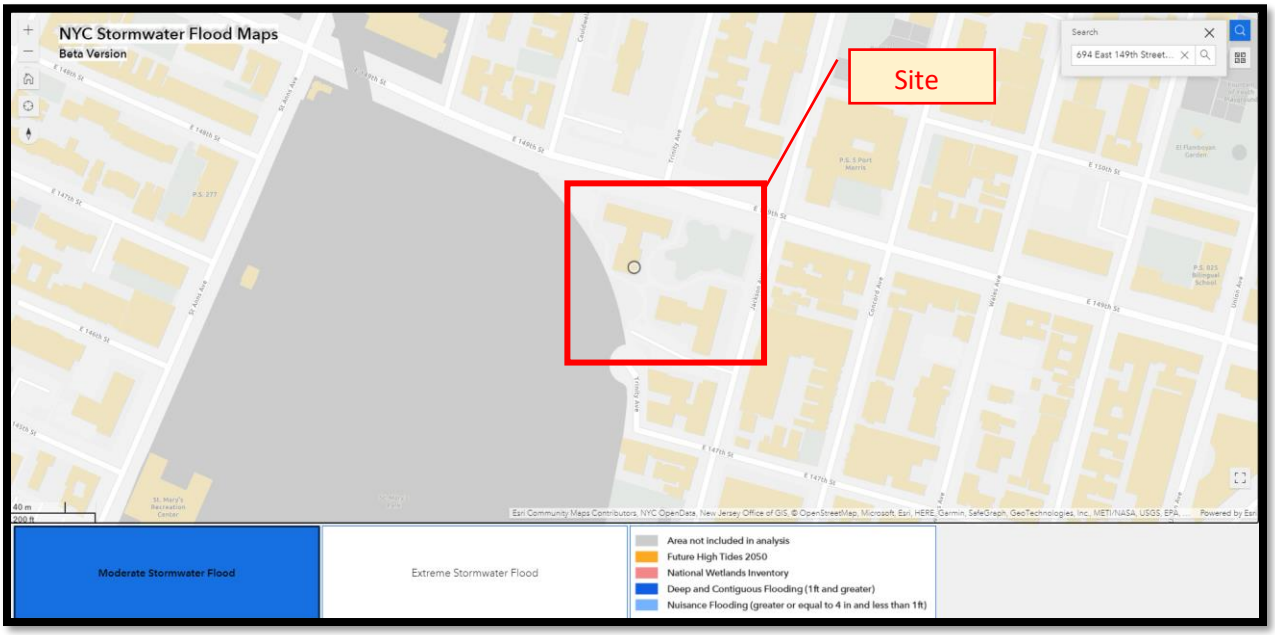


Figure 5. Moore Houses Development NYC Stormwater Flood Maps (Beta Version) for Moderate Stormwater Flood

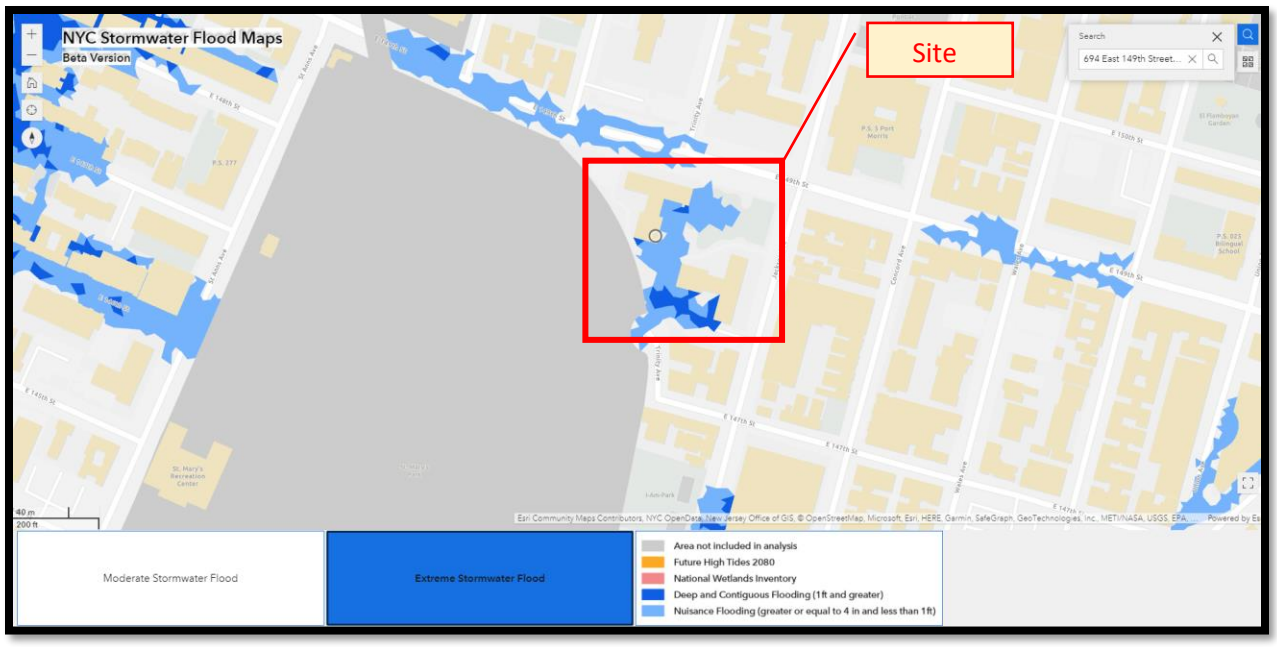


Figure 6. Moore Houses Development NYC Stormwater Flood Maps (Beta Version) for Extreme Stormwater Flood

3 Field Damage Assessment

During the month of February 2022, CSA performed a field damage assessment of the buildings that NYCHA identified that were most severely impacted by the Remnants of Hurricane Ida 4615-DR-NY. For Moore Houses, the field damage assessment was focused on Building 1, specifically in the basement and sub-basement. Prior to the field visits, CSA reviewed information compiled by NYCHA for the development. Site personnel from NYCHA facilitated the field visits and damage assessments. Based on the anticipated damages, the following elements (Table 1) were defined for field evaluation by a multidisciplinary team:

Table 1. Categories and Elements Evaluated during Damage Assessment Field Visits (where applicable):

Category	Evaluation Element	Category	Evaluation Element
Mechanical	• Air Conditioning • Boiler • Boiler Auxiliary Equipment • Boiler Burner • Boiler Control Panel • Boiler Feed Unit • Chimney Stack • Condensate Pump • Fuel Oil Pump • Insulation • Piping • Radiators • Unit Ventilators • Vacuum Pump • Valves • Ventilation Fans • Water Treatment System • Other	**Plumbing**	• Bathrooms • Booster Pumps • Calorifiers • Drains • Elevator Pit Sump Pump • Gas Meter • Hot Water Tank • House Trap • Recirculatory Hot Water Pumps • Sump Pump • Water Heater • Water Meter • Other
Electrical	• Distribution Panels • CT Cabinet • Electrical LV Control • Electrical Meters • Fire Alarm Devices • Fire Alarm Panel • House Lighting • Main Disconnect Switch • Main Service Distribution Board • Panels • Security Camera • Transformer Cabinet • Other	**Architecture**	• Base Chimney and Access • Door • Drainage • Elevator Pit • Finishes • Floor • Roof • Skylight • Storefront • Trash Compactor • Water Mark • Windows • Other

Category	Evaluation Element	Category	Evaluation Element
Structural	• Columns • Floor • Foundation • Roof • Walls • Boiler Base/Mount • Other	**Fire Protection**	• Fire Pump • Sprinkler • Other

For these elements, an evaluation matrix was defined to preliminarily assess the level of damage (Table 2) with the applicable definitions.

Table 2. Field Preliminary Damage Assessment Categories and Definitions

Preliminary Damage Assessment Category	Definition
No Damage	• No damages evident from site visit nor input from NYCHA staff
Damage - Minimum	• Minimum level of damage evident that does not impact functionality
Damage - Moderate	• Moderate level of damage determined
Complete/Substantial Damage: Recommend Replacement	• Substantial or complete level of damage for which replacement is recommended.
Needs Further Evaluation	• Level of damage cannot be determined in the field and requires additional evaluation. These may or may not be recommended for replacement.

The results of the damage assessment are summarized in the following sections while Appendix 1 includes an indexed photo documentation of all elements evaluated on the field.

3.1 Immediate Post-Storm Information and Assessment

NYCHA provided photos of the aftermath from the remnants of Hurricane Ida that illustrated the flooding in the basement and sub-basement in Building 1. Based on the initial assessment performed by NYCHA and its providers, the following was preliminarily determined to be the impacts of the flood:

- Complete loss of heating system
- Development required temporary mobile boilers (still under operation as of the time of the field visit) to maintain service in the building
- Electrical LV control systems were contaminated by flood water
- Wall mounted disconnects and mains supply were contaminated by flood water
- Actuators, gas fittings and shut off valves should be replaced

- Fiber insulation (including condenser tank, pie-line, among others) below flood level is likely contaminated and needs replacement
- Cleanup required for the boiler room electrical panels, controls, ignition components, oil lines, gas lines, circulation pumps, water treatment system, calorifiers, Oil pumps with ancillary oil treatment and hot water tanks
- Possible asbestos mitigation

The following photos, taken shortly after the storm, present a view of the impacts:

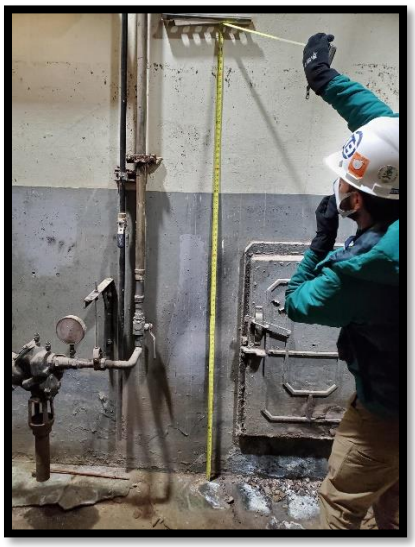


Photo 1. Moore House Building 1 High Water Mark (approximately 81.25") in Basement after the Storm

Photo 2. Moore House Building 1 High Water Mark in Basement after the Storm

Photo 3. Moore House Building 1 Flooded Basement

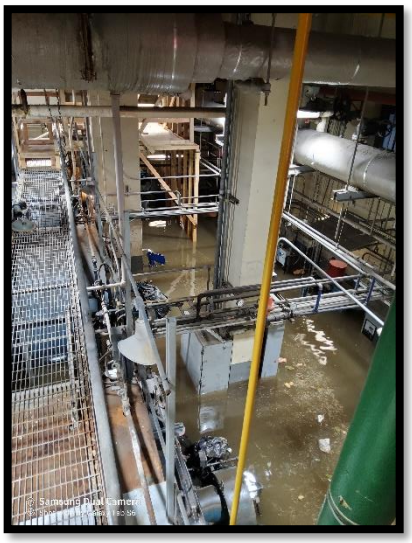


Photo 4. Moore House Building 1 Flooded Basement

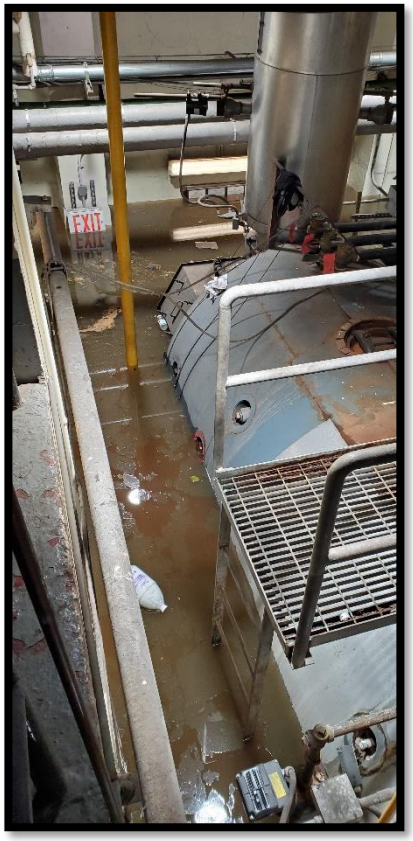


Photo 5. Moore House Building 1 Flooded Basement

Photo 6. Moore House Building 1 Flooded Basement

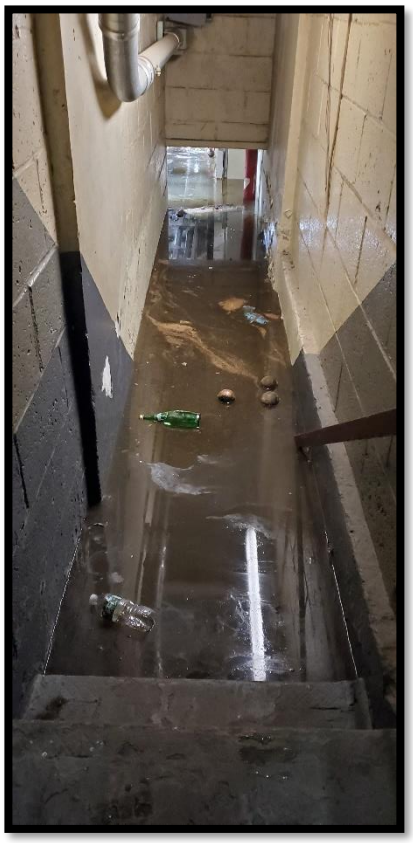


Photo 7. Moore House Building 1 Flooded Entryway to Basement

3.2 Field Damage Assessment

During the month of February 2022, CSA performed a field damage assessment with a multidisciplinary team of the elements previously described for Building 1 in Moore Houses. The following table summarizes the findings per element. Appendix 1 includes an indexed photo documentation of all elements evaluated on the field.

Table 3. Building 1 Preliminary Damage Assessment

Facility Name	Category	Element	Complete/ Substantial Damaged - Recommend Replacement	Damage - Moderate	Damage - Minimum	Needs Further Evaluation	Restoration / Mitigation SOW
Moore House - Building 1	Architectural	Finishes					
Moore House - Building 1	Architectural	Floor					
Moore House - Building 1	Architectural	Other					
Moore House - Building 1	Architectural	Windows					
Moore House - Building 1	Electrical	Distribution Panels					
Moore House - Building 1	Electrical	Fire Alarm Panel					
Moore House - Building 1	Electrical	Main Disconnect Switch					
Moore House - Building 1	Electrical	Other					
Moore House - Building 1	Electrical	Panels					
Moore House - Building 1	Mechanical	Boiler					
Moore House - Building 1	Mechanical	Boiler Auxiliary Equipment					
Moore House - Building 1	Mechanical	Boiler Feed Unit					
Moore House - Building 1	Mechanical	Fuel Oil Pump					
Moore House - Building 1	Mechanical	Insulation					
Moore House - Building 1	Mechanical	Other					
Moore House - Building 1	Plumbing	Elevator Pit Sump Pump					
Moore House - Building 1	Plumbing	Hot Water Tank					
Moore House - Building 1	Structural	Boiler Base/Mount					
Moore House - Building 1	Structural	Floor					
Moore House - Building 1	Structural	Other					
Moore House - Building 1	Structural	Walls					

Elements not presented in the table above represent that there were no visible impacts. Appendix 1 has detailed photos for elements evaluated in the field. The next section includes a narrative of the impacts and the proposed scope of work for restoration to pre-storm conditions and mitigation strategies.

4 Proposed Restoration Scope of Work

It is CSA's determination that the damages evaluated for this site can be attributed to the impacts of the remnants of Hurricane Ida. As such, CSA has defined a Scope of Work (SOW) for the restoration to pre-storm damage conditions as well as a potential SOW for mitigation (in next section). The impacts evaluated and proposed scope of work are presented by discipline below for restoring to pre-storm conditions.

4.1 Architectural

Flood waters entered the basement level primarily through the exterior door at the bottom of an exterior ramp. Due to a clogged ground drain at the bottom of the ramp, water collected to a height of 36 inches. The water poured in around the door and filled the boiler room in the subbasement with 82 inches of water. While this path of water infiltration was a major contributor to the flooding of the two floors, we suspect that floor drains in the boiler room also backed up, pushing water into the building. Also, a series of below grade areaways were clogged with debris and allowed water to enter through the windows that are open to the boiler room.

The resulting damage from the high-water levels included the boilers and all related mechanical and electrical equipment. The finishes of the two basement levels were severely impacted. The paint on the walls and floors are peeling, and portions of the quick-crete floor surface is pitted and spalling as a result of the flood.

Photo 8. Entryway During Field Visit

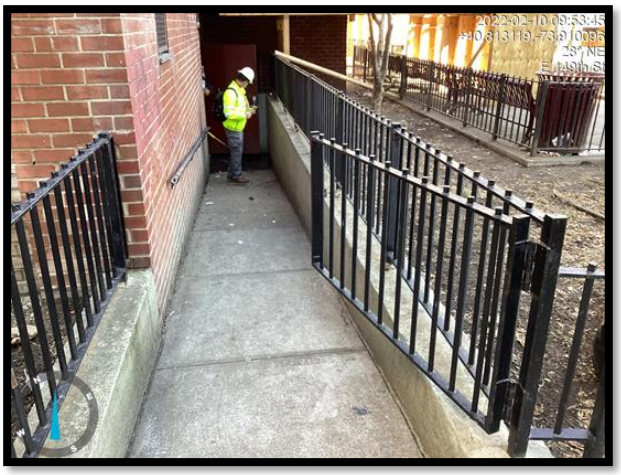


Photo 9. Boiler Room Entryway During Field Visit

Photo 10. Boiler Room Door clogged drain During Field Visit

Photo 11. High Water Mark inside the Boiler Room during Field Visit

Photo 12. Current Floor Finish Conditions

Photo 13. Current Floor Finish Conditions

4.2 Structural

It was observed that the basement foundation walls have numerous cracks, and the plaster has detached from the wall forming superficial voids. We believe the high flood waters during the weather event exacerbated these imperfections causing notable structural damage. The presumed presence of hydrostatic pressure on the perimeter walls has created points of water infiltration through these cracks. This constant exposure of water through the cracks results in the deterioration of the concrete and corrosion of the reinforcement.

Photo 14. Current Wall Finish Conditions

Photo 15. Current Wall Finish Conditions

4.3 Mechanical

4.3.1 Boilers

The site has been provided with 3 low pressure steam boilers all of which were damaged during Remnants of Hurricane Ida all of them were completely under flood waters. Each boiler is manufactured by Easco Boilers with a capacity of 250 BHP each totaling 750 BHP. These boilers were installed in 2001. The boilers and burner assemblies appear to be substantially damaged. The boiler skid shows signs of corrosion and must be addressed. From our visual inspection, the boilers, burners and related gas piping, power wiring and LV controls must be replaced.

As of the time of the field visits, the boilers are not operational, and the Development is being supported by temporary boilers parked in the street behind the boiler room.

Photo 16. Current Boiler and Burner Assembly

Photo 17. Current Boiler and Burner Assembly

Photo 18. Boiler Control Panel

4.3.2 Fuel Oil System

While on site, the fuel oil pumps were in operation however, they have been temporarily wired and adjusted to get them back into operation. These pumps currently serve the temporary boiler which has been parked on the street outside the boiler room. The fuel oil pump set, electrical wiring and panel related to the monitoring of the fuel oil systems were all submerged during the storm. These items must be replaced to achieve reliable operation in the future.

Photo 19. Fuel Oil Pumping System

4.3.3 Boiler Feed System

The feed water system was fully submerged during the flood. The system is currently not functioning. Condensate for the building is still returning to the tank and repeatedly overflowing. The tank and pump systems are both in poor condition and must be replaced.

Photo 20. Feed Water System

4.3.4 Boiler Feed Unit

4.3.4.1 Vacuum and Condensate System

The vacuum and condensate systems were fully submerged and were not operating at the time of our visit. Condensate from the building is being dumped on the floor with the intent that it flows to a local drain in the boiler room. The water temperature was at 154 degrees Fahrenheit which is in violation of the NYC Building Code. Water must be below 140-degree Fahrenheit to be dumped to a drain. The systems should be tested and reevaluated to determine their conditions along with the electrical disconnect switches and related controls. All indications are that these components should be replaced.

Photo 21. Vacuum System

4.3.4.2 Domestic Hot Water Storage Tanks and Related Pumps

The existing boiler plant also houses a domestic hot water storage tank and heaters. The tank, related pumps and controls were all submerged and damaged during the storm and must be replaced. Domestic water piping insulation was also damaged and must be replaced.

Photo 22. Domestic Water Storage Tank

4.3.4.3 Sump Pumps

The existing sump pump was overwhelmed with the level of water that was introduced to the boiler room. The condition of these systems must be further investigated to determine if they are damaged as a result of the flooding. It is suspected that the controller that was under water will need to be replaced.

Photo 23. Sump Pump

4.3.4.4 Insulation

The insulation covering the main cold-water lines, steam and condensate piping and all domestic water lines insulation were all submerged in the flood waters and must be replaced.

Photo 24. Cold Water Mains

4.3.4.5 Miscellaneous Low Voltage Panels

Low voltage panels and controller were all below the water level during the flood conditions. These panels and their components must be replaced.

Photo 25. Low Voltage Control Panel

Photo 26. Low Voltage Control Panel

Photo 27. Low Voltage Control Panel

Photo 28. Fuel Oil Control Panel

4.3.5 Electrical

The electrical service and related panels are in poor condition. These panels were submerged in the flood water entering the Boiler room. It is recommended that these panels be replaced since they have been compromised by flood waters.

Photo 29. Power Distribution Panel Board

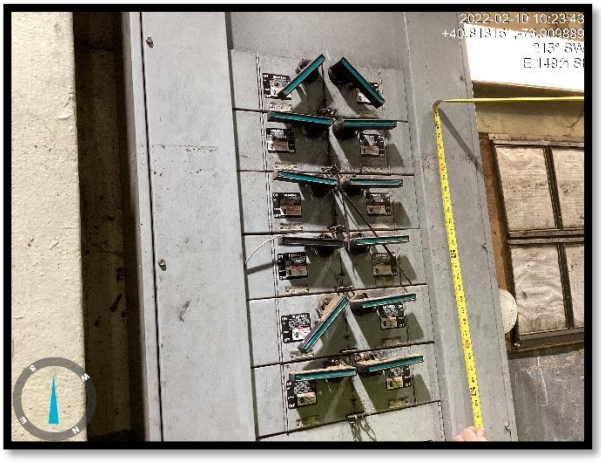


Photo 30. Miscellaneous pumps Vacuum pumps panel (208 V 3 Phase –- 400 Amps max) and High Water Mark

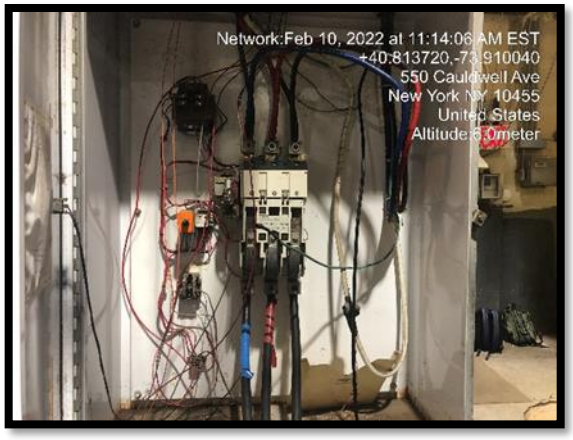


Photo 31. 300-amp Siemens Panel-Contactor that Control the Boiler Loads

Photo 32. General Electrical Panel

4.3.6 Summary of Proposed Restoration to Pre-Storm Conditions Scope of Work

It is CSA's determination that the damages evaluated for this site can be attributed to the impacts of remnants of Hurricane Ida. As presented in the previous sections, a summary of the restoration Scope of Work to Pre-Storm Conditions is presented below:

- Removal and reconstruction of exterior foundation wall in Boiler Room
- Boilers, burners and related gas piping, power wiring and LV controls must be replaced
- Replace fuel oil system (oil pump set, electrical wiring and panel)
- Boiler Feed system: replace tank and piping systems
- Replace Vacuum and Condensate System
- Replace Domestic Hot Water Storage Tanks and Related Pumps (tank, related pumps and controls)
- Replace insulation
- Replace low voltage panels
- Replace electrical service and related panels
- Repair and seal all wall cracks
- Repainting walls, floors, and ceilings with (2) two coats of epoxy paint
- Removing and replacing floor drain covers

5 Proposed Mitigation Scope of Work

Based on our site visits and damage assessment, CSA determined that a significant amount of water entered the mechanical spaces from:

- Entry door at the foot of the ramp leading to the boiler room
- Drainage stoppage at the foot of the ramp
- Back up of floor drains in the Boiler room
- Areaways that are clogged with debris and clogged drains allowing water to enter the Boiler room

In order to assure that the investment in restoration to pre-storm conditions is sustainable and efficient, CSA recommends that additional mitigation measures are taken to avoid future similar impacts. The proposed mitigation Scope of Work is summarized below:

- Provide a flood barrier at the top of the ramp leading to the boiler room
- Provide concrete walls/columns or steel post with foundations to support and confine the proposed watertight/flood barrier system.
- Reinforce and modify existing structural elements such as ramp walls, areaways and perimeter walls above ground to comply with the design flood level as required.
- Upgrade drainage at the foot of the ramp
- Increase height of curb along the wing walls of the ramp to avoid spill over from grade to the ramp area
- Provide a flood door at the entry to the boiler room
- Reinforce all existing walls to receive the new flood doors as required.
- Clean and increase the number of drains in the boiler room
- Clear all areaways and confirm drainage is achieved and maintained
- Raise areaways to avoid future spill over into the boiler room
- Provide back water valves at the base of the storm lines beyond the building to avoid the back up of storm water and possibly sanitary discharge from the site and street into the boiler room
- Provide holding tanks to hold storm water and sanitary discharge from the building during these periods

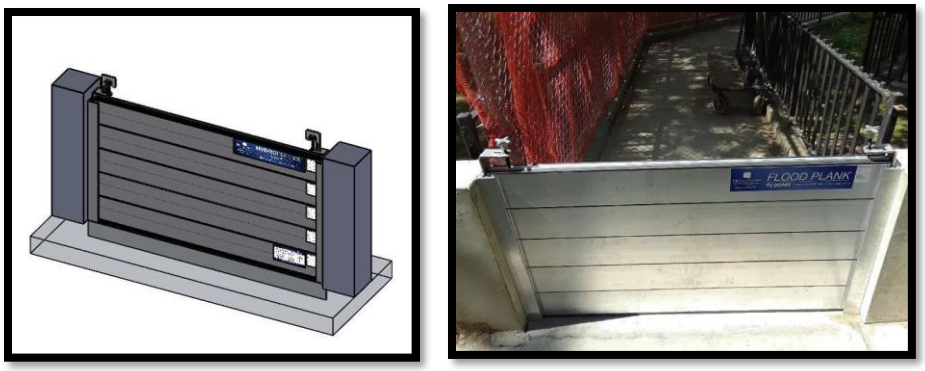


Photo 33. Sample Detail -Flood Logs Proposed for the Top of the Ramps

Photo 34. Flood Protection of Areaways

In addition, NYCHA has requested that an elevated hydronic boiler system mitigation alternative be considered. An elevated hydronic system uses hot water boilers and piping distribution to heat the building. A critical parameter for the installation of this system is the capacity of the building's structure to withstand the additional weight on the roof. Since the conceptualization of this system is beyond the scope of work of this damage assessment, based on best engineering judgement and previous experience with NYCHA, CSA included a rough estimate of the cost of such a system to be installed in this Development. The exact SOW for this system is unknown at this time as it requires further architecture and engineering evaluation of the existing structural, mechanical and architectural systems in the building to withstand such a system.

Photo 35. Hydronic Boiler System Typical Assembly

6 Rough Order of Magnitude Cost Estimate

Based on the damage assessment, CSA developed a Rough Order of Magnitude (ROM) Estimate for the proposed Restoration and Mitigation Scope of Work. This ROM estimate is considered a Class 5 estimate according to the Cost Estimate Classification System from the American Association of Cost Engineer (AACE). The cost estimate was standardized based on the following premises:

- Unit prices for our estimates based on information gathered form the 2017 PNA Boiler Inventory, other similar projects and best engineering judgement. Due to the time constraints our assessments consisted of verifying that the damages sustained by the developments were due to flooding caused by remnants of Hurricane Ida. We did not do any design work to develop our estimates, so further evaluation is warranted to confirm our findings.
- Quantities estimated based on initial field visit and best engineering judgement given the limited time available for cost estimating
- Cost broken down using Master Format divisions whenever possible or based on general unit prices for specific activities
- Allowances based on a fixed percentage of the Base Direct Cost were allocated for the following components and included as part of the Direct Cost:
    - Installation Complexity
    - Code Upgrade
    - Site Restoration
    - Temporary Works
- Contractor Fee
    - Includes Contractor Overhead and Profit, Insurance and Payment and Performance Bond calculated on the Direct Cost
    - Cost Estimate Level 5 Contingency calculated on the Direct Cost
- Design/Permitting Fee
    - A/E Fees (Architect and Engineering design services)
    - CM Fees (pre, construction & post services)
    - Escalation (2 years)
    - Air monitoring
    - Special Inspection
    - Testing and balancing
    - Project Commissioning
    - Program Management Fee

6.1 ROM Estimate for Restoration SOW

A restoration cost estimates was developed for Building 01 as presented in Section 4. The estimated ROM for the restoration SOW is **$8,747,803**. A detailed cost estimate is included in Appendix 2.

6.2 ROM Estimate for Mitigation SOW

A mitigation cost estimate was developed for Building 01 and site work as presented in Section 5 (excluding hydronic system). The estimated ROM for the mitigation SOW is: **$1,740,330**. The cost estimate is included in Appendix 3.

The above table does not include the installation of a hydronic system in each building. Based on previous experience, CSA estimates that each building could cost **approximately $3,500,000-$4,200,000, totaling between $7,000,000- $8,500,000 for the complete development**. The cost does not include the removal of the existing systems and conversion of the existing space to alternate uses. As stated previously, a more detailed evaluation of each building is required to develop a more accurate estimate.

7 Appendices

7.1 Appendix 1: Detailed Field Damage Assessment Report

Development Damage Assessment Report

Name

Moore House

Firm Performing Assessment

CSA Group New York Architects and Engineers, PSC

Assessment Dates

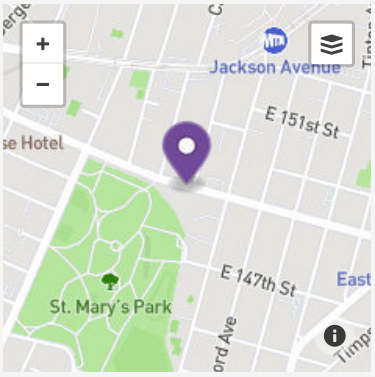
Building 01: 02-10-2022 ; 02-11-2022

Address

674 East 149th Street Bronx NY

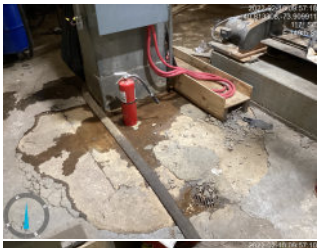
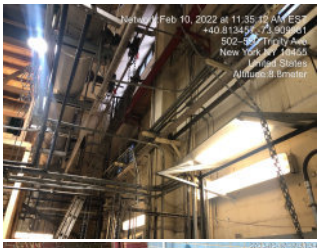
Location

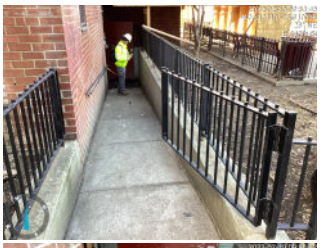
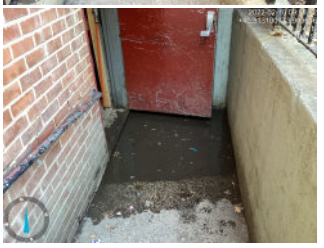
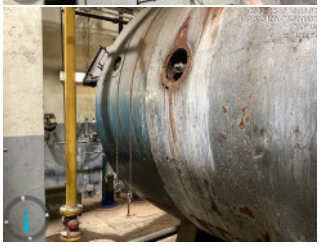
40.81342670081542, -73.91021246044328

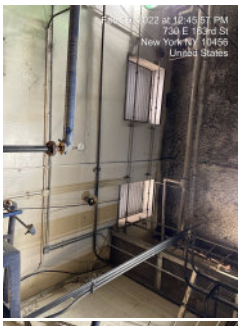
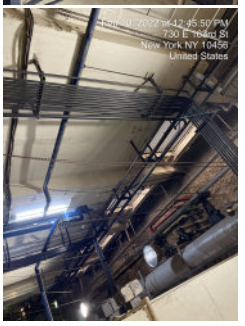
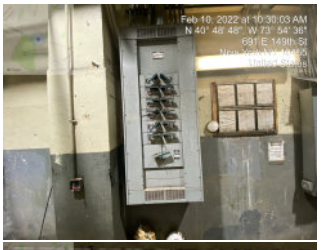


Buildings

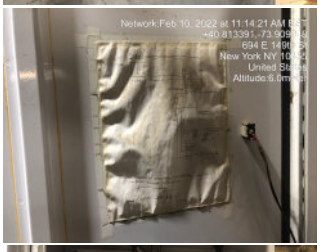
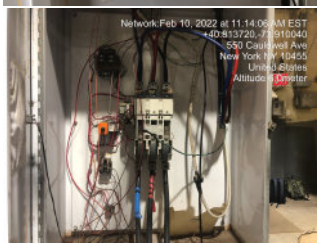
Full Report | **Grid Edit** | **Email** | **More** **46 Elements**

Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
Building 1 (46 Elements)							
Moore House - Building 1	Architectural	Finishes	Level: Basement Room: Boiler Room	On all walls	Damage - Moderate	Wall paint cracking and peeling in many locations throughout boiler room	
Moore House - Building 1	Architectural	Floor	Level: Basement Room: Boiler Room	Concrete surface and floor finish broken up and / or missing; sprawling of concrete leveling material	Complete/Substantial Damage - Recommend Replacement	The concrete floor finish is sprawling throughout the boiler room	 
Moore House - Building 1	Architectural	Other	Level: Basement Room: Boiler Room	Basememt	Complete/Substantial Damage - Recommend Replacement	Access to allow entry of new equipment will be an issue.no access. Potential point of water infiltration during weather event	  

	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Architectural	Other	Building Face: Left Level: Basement Room: Boiler Room	Exterior ramp to boiler room with door at end.	Needs Further Evaluation	Drain at landing was clogged at time of site visit. Potential source of water infiltration during weather event	 
☐	Moore House - Building 1	Architectural	Water Mark	Level: Basement Room: Boiler Room Height: 82 Inches	Watermark evident on boiler tanks, and on exterior walls.	N/A	Entire boiler room submerged during weather event	  

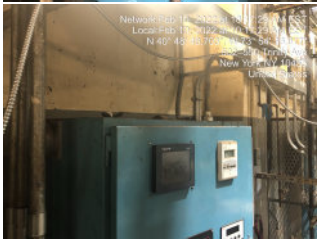
Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
Moore House - Building 1	Architectural	Windows	Building Face: Front Level: Basement Room: Boiler Room	(3) Below grade window wells potential location of water infiltration.	Needs Further Evaluation	Windows in the open position during site visit	 
Moore House - Building 1	Electrical	Distribution Panels	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 01	Panel is located on second column near stair	Complete/Substantial Damaged - Recommend Replacement	Brand : Siemens Cat # P4C60ML400ETS Type: P4 Location : S S.O.: 3004041807 Item no. : 021020 Date: 10/17/2012	
Moore House - Building 1	Electrical	Distribution Panels	Building Face: Front Level: Basement Room: Boiler Room Element Number: 06 Quadrant: C2	Panel located Behind boiler #2 on back wall of boiler room.	Complete/Substantial Damaged - Recommend Replacement	During the water even the entire panel was submerged below the high water mark	 

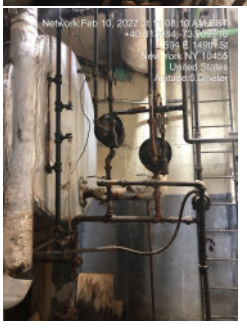
	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Electrical	Distribution Panels	Level: Basement Room: Boiler Room	Boiler room back of boilers	Complete/Substantial Damaged - Recommend Replacement	Panel is in very poor shape and must be replaced	 
☐	Moore House - Building 1	Electrical	Distribution Panels	Building Face: Front Level: Basement Room: Boiler Room Element Number: 07	6th panel after stair	Complete/Substantial Damaged - Recommend Replacement	Brand Webster Hays Cleveland Div. Of Unicontrol Inc	
☐	Moore House - Building 1	Electrical	Fire Alarm Panel	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 04	2nd panel after stair	Complete/Substantial Damaged - Recommend Replacement	Brand : Sensaphone Express Phonetics, Inc	
☐	Moore House - Building 1	Electrical	Main Disconnect Switch	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 11	10th panel after stair	Complete/Substantial Damaged - Recommend Replacement	Federal pump coporation Record # 120802-09 Unit no: VCU-4020-2	

	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Electrical	Other	Level: Basement Room: Boiler Room	Waco switch and disconnect switch it serves. Appears to be temp power for temp boilers outside.	Damage - Moderate	Looks to have been submerged but in operation serving the temp boiler system.	  
☐	Moore House - Building 1	Electrical	Other	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 10	10th panel after stair	Complete/Substantial Damaged - Recommend Replacement	Brand Lonergan pump system	
☐	Moore House - Building 1	Electrical	Other	Level: Basement Room: Boiler Room	Back of boilers	Complete/Substantial Damaged - Recommend Replacement	All breakers are on.	 

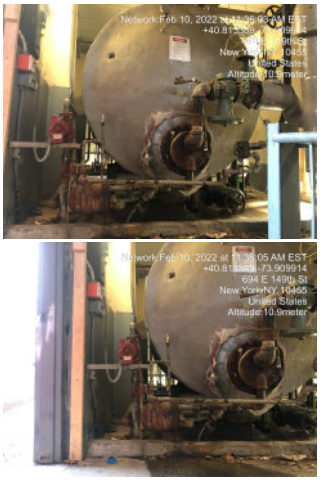
	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Electrical	Panels	Building Face: Front Level: Basement Room: Boiler Room Element Number: 02	3rd panel after stair	Complete/Substantial Damaged - Recommend Replacement	Brand : Webster Opacity Monitor Series 8700	
☐	Moore House - Building 1	Electrical	Panels	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 03	1st Panel after stair	Complete/Substantial Damaged - Recommend Replacement	Brand : OEL QDC-7000	
☐	Moore House - Building 1	Electrical	Panels	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 05	4th Panel after stair	Complete/Substantial Damaged - Recommend Replacement	Brand Hays Cleveland Div. Of unitcontrol inc Honeywell	
☐	Moore House - Building 1	Electrical	Panels	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 06	5th Panel after stair	Complete/Substantial Damaged - Recommend Replacement	Electrical panel Located on the rear wall approximately 12 feet from the stairs.	
☐	Moore House - Building 1	Electrical	Panels	Level: Basement Room: Boiler Room	Boiler room	Complete/Substantial Damaged - Recommend Replacement	Panels in poor conditions	 

Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
Moore House - Building 1	Electrical	Panels	Building Face: Front Level: Basement Room: Boiler Room Element Number: 08	8th Panel After stair	Complete/Substantial Damaged - Recommend Replacement	Electrical panel	
Moore House - Building 1	Electrical	Panels	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 09	9th panel after stair	Complete/Substantial Damaged - Recommend Replacement	Brand Webster Opacity Monitor Series 8700 Hays Cleveland Div. Of unicontrol inc With electric panel attached	
Moore House - Building 1	Electrical	Panels	Building Face: Front Level: Basement Room: Boiler Room Element Number: 13	13th panel after stair	Complete/Substantial Damaged - Recommend Replacement	Electrical panel	
Moore House - Building 1	Electrical	Panels	Building Face: Rear Level: Basement Room: Boiler Room Element Number: 04 Quadrant: B2	Located 6 feet from entrance	Needs Further Evaluation	Water level was at 82 in from basement finish floor , this on and off sump pump switch for sump pump #1 & #2 is 37 in from basement finish floor on and off sump pump switch for sump pump #1 & #2	
Moore House - Building 1	Mechanical	Boiler	Building Face: Rear Level: Sub-basement Room: Boiler Room Quadrant: B2	All 3 boilers were below the 7 mark and have been damaged to included burners	Complete/Substantial Damage - Recommend Replacement	Fuel pumps are operating to feed temporary boiler, it appears to be in poor condition.	
Moore House - Building 1	Mechanical	Boiler	Building Face: Rear Level: Sub-basement Room: Boiler Room Quadrant: B2	3 boilers- exist in the space. All three are in poor condition. See photos. The boiler are currently not operating. Loose wires and and several elements related to the burners are are dismantled.	Complete/Substantial Damage - Recommend Replacement	Boilers need to be replaced along with burners and connecting piping	

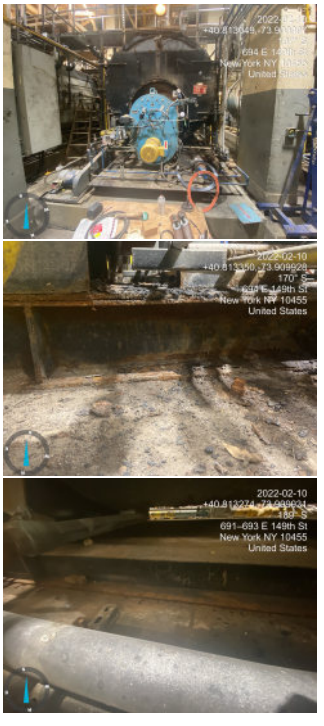
Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
Moore House - Building 1	Mechanical	Boiler	Building Face: Rear Level: Sub-basement Room: Boiler Room Quadrant: B2	Boiler room	Complete/Substantial Damage - Recommend Replacement	The boilers and burners are all damaged and should be replaced.	    
Moore House - Building 1	Mechanical	Boiler Auxiliary Equipment	Building Face: Rear Level: Sub-basement Room: Boiler Room Quadrant: B3	Boiler room	Complete/Substantial Damage - Recommend Replacement	Boiler control panel was completely submerged and has been damaged	 

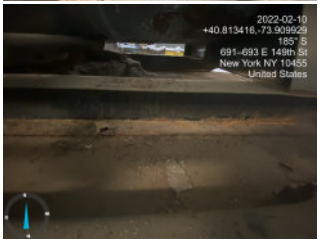
	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Mechanical	Boiler Feed Unit	Level: Basement Room: Boiler Room	Boiler room	Complete/Substantial Damage - Recommend Replacement	Tank is in poor shape and is currently over flowing and dumping water in the floor.	  
☐	Moore House - Building 1	Mechanical	Fuel Oil Pump	Building Face: Rear Level: Sub-basement Room: Boiler Room Quadrant: A3		Damage - Moderate	Fuel oil pumps located in the floor is operating but in poor shape	  

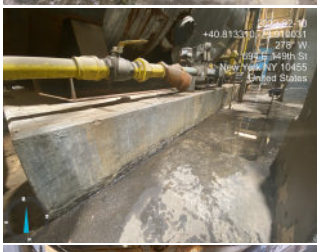
Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
Moore House - Building 1	Mechanical	Fuel Oil Pump	Building Face: Front Level: Basement Room: Boiler Room Element Number: 12	11th panel after stair	Complete/Substantial Damaged - Recommend Replacement	Brand Franklyn fueling system Model : TS-1001 Tank sentinel Serial 16L451801062P Fuel management system	
Moore House - Building 1	Mechanical	Insulation	Level: Basement Room: Boiler Room	Boiler room	Complete/Substantial Damage - Recommend Replacement	Pipe insulation is damaged and must be replaced	 
Moore House - Building 1	Mechanical	Other	Level: Basement Room: Boiler Room	Basement	Complete/Substantial Damage - Recommend Replacement	Fuel oil management panel is in poor condition and was submerged. this panel must be replaced	
Moore House - Building 1	Plumbing	Elevator Pit Sump Pump	Level: Basement Room: Boiler Room	Back of boilers	Complete/Substantial Damaged - Recommend Replacement	Sump pumps and controls Panel. Panel was under water. Pump appears to work but considering the amount of water in the basement during the flood it should be replaced.	 

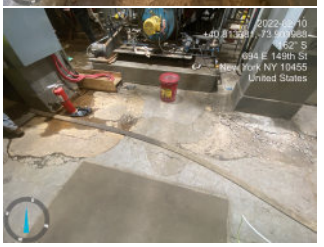
	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Plumbing	Hot Water Tank	Level: Basement Room: Boiler Room	Mezz level of the boiler room	Complete/Substantial Damage - Recommend Replacement	Tank was completely under water but appears to be in ok condition although that may be a temporary fix since the building is on a temporary boiler. Lower lying pipe and insulation damaged	
☐	Moore House - Building 1	Plumbing	Hot Water Tank	Building Face: Left Level: Basement Room: Boiler Room	Mezz level of boiler room	Damage - Moderate	Moderate condition. Damage from water seems To be limited to the low lying Piping, traps and insulation	
☐	Moore House - Building 1	Plumbing	Hot Water Tank	Level: Basement Room: Boiler Room	Mezz of boiler room	Complete/Substantial Damage - Recommend Replacement	the tank and pumps are all in poor condition and must be replaced. all equipment below the tank was fully submerged.	

	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Structural	Boiler Base/Mount	Level: Basement Room: Boiler Room Element Number: 01	Boiler #1 Located on the left side of the room	Damage - Moderate	Sign of corrosion and deterioration on the boiler skid. It appears that these damages are not associated with the flood event.	   

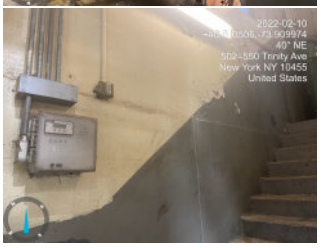
Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
Moore House - Building 1	Structural	Boiler Base/Mount	Level: Basement Room: Boiler Room Element Number: 02	Concrete pad of Boiler #1	No Damage	No sign of damage or deterioration.	
Moore House - Building 1	Structural	Boiler Base/Mount	Level: Basement Room: Boiler Room Element Number: 01	Middle of the room	Damage - Minimum	Minor signs of corrosion on the boiler skid. It appears that these damages are not associated with the flood event.	

Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
Moore House - Building 1	Structural	Boiler Base/Mount	Level: Basement Room: Boiler Room Element Number: 02	Middle of the room	Damage - Minimum	Boiler Concrete pad shows minor concrete spalls on the sides. It appears that these damages are not associated with the flood event.	 
Moore House - Building 1	Structural	Boiler Base/Mount	Level: Basement Room: Boiler Room Element Number: 01	Right side of the room from the entrance	Damage - Minimum	Boiler 3 skid shows minor sings of corrosion. It appears that these damages are not associated with the flood event.	   

	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Structural	Boiler Base/Mount	Level: Basement Room: Boiler Room Element Number: 02	Right side of the room from the entrance	Damage - Minimum	Minor concrete cover spall on the side of the concrete pad. It appears that these damages are not associated with the flood event.	   

Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
Moore House - Building 1	Structural	Floor	Level: Basement Room: Boiler Room Element Number: 01	Floor area	Needs Further Evaluation	The overall condition of the structural floor slab is unknown. The only evidence of deterioration is on the concrete topping (non structural item) a further investigation needs to be done to determine actual condition of the structural slab.	   

	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Structural	Other	Level: Basement Room: Boiler Room Element Number: 01	The Boiler feed tank is located below the entrance on the left side of the room.	Damage - Moderate	The steel base of the tank shows a moderate to substantial level of corrosion and deterioration. The concrete pad top surface shows a moderate level of deterioration due to a constant exposure to water coming from the tank. It appears that these damages are not associated with the flood event.	     

	Facility Name	Category	Element	Location Reference	Location Notes (if needed)	Preliminary Assessment - Colorized	Notes	Photo Thumbnails
☐	Moore House - Building 1	Structural	Walls	Level: Basement Room: Boiler Room Element Number: 01	Structural Wall/Column inside perimeter of the room.	Needs Further Evaluation	The structural wall interior surface shows what appears to be stains, moisture intrusion, mold, calcification and concrete or plaster spalling. The structural system of the wall has to be confirmed with the as built drawings. It appears that these damages are not associated with the flood event.	  

7.2 Appendix 2: ROM Level 5 Cost Estimate for Restoration SOW

Development Moore Houses
Facility Name Building 1 (Boiler Room)

																		Base Direct Cost
80			80	80	74	34,849	$ 938,014.02	$ 2,101,738	2,340.74	9,833.68	$ 9,838.24	$ 338,265.61	$ 1,336,558	$ 186,394.10	$ 215,503	$ 404,000	$ 1,022,841	$ 4,057,799

Division	Division Description	Element Description	Seq	Unit	Total Qty	Mat Cost Unit	Mat Cost Total	Lbr Time Unit	Lbr Time Total	Lbr Wage	Lbr Cost Unit	Lbr Cost Total	Equip Cost Unit	Equip Cost Total	Allowance	Unit Cost	Total Cost
DIVISION 01	GENERAL REQUIREMENTS	GENERAL REQUIREMENT COST	1	LS	1	$ 219,904.00	$ 219,904.0	-	-	$ -	$ -	$ -	$ -	$ -	$ -	$ 219,904	$ 219,904
DIVISION 01	GENERAL REQUIREMENTS	PROVIDING MOBILE STEAM BOILERS	2	LS	3	$ 100,000.00	$ 300,000.0	-	-	$ -	$ -	$ -	$ -	$ -	$ 120,000	$ 100,000	$ 420,000
DIVISION 01	GENERAL REQUIREMENTS	EQUIPMENT MOBILIZATION	3	EA	1	$ -	$ -	80.00	80.00	$ 100.00	$ 8,000.00	$ 8,000	$ 2,500.00	$ 2,500	$ -	$ 2,580	$ 10,500
DIVISION 01	GENERAL REQUIREMENTS	TEMPORARY CHAIN LINK FENCE	4	LF	100	$ 31.00	$ 3,100.0	0.50	50.00	$ 100.00	$ 50.00	$ 5,000	$ -	$ -	$ -	$ 32	$ 8,100
DIVISION 01	GENERAL REQUIREMENTS	TREE PRESERVATION AND PROTECTIVE CHAIN LINK FENCE	5	LS	1	$ 2,500.00	$ 2,500.0	-	-	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,500	$ 2,500
DIVISION 01	GENERAL REQUIREMENTS	BOILER RIGGING	6	EA	3	$ -	$ -	56.00	168.00	$ 100.00	$ 5,600.00	$ 16,800	$ 1,000.00	$ 3,000	$ -	$ 1,056	$ 19,800
DIVISION 02	EXISTING CONDITIONS	REMOVAL OF BOILER EQUIPMENT CONCRETE PADS	1	EA	-	$ -	$ -	8.00	-	$ 90.00	$ 720.00	$ -	$ 55.50	$ -			
DIVISION 02	EXISTING CONDITIONS	REMOVAL OF EXISTING STEEL PLATFORMS AND ALL MISC. IRON WORK	2	EA	2	$ -	$ -	20.00	40.00	$ 90.00	$ 1,800.00	$ 3,600	$ 166.60	$ 333	$ -	$ 187	$ 3,933
DIVISION 02	EXISTING CONDITIONS	CUT EXISTING CONCRETE FLOOR SLAB	3	LF	2,000	$ -	$ -	0.20	400.00	$ 90.00	$ 18.00	$ 36,000	$ 6.00	$ 12,000	$ -	$ 6	$ 48,000
DIVISION 02	EXISTING CONDITIONS	BRICK ACCESS WALL REMOVAL	4	SF	400	$ -	$ -	0.50	200.00	$ 90.00	$ 45.00	$ 18,000	$ -	$ -	$ -	$ 1	$ 18,000
DIVISION 02	EXISTING CONDITIONS	ASBESTOS ABATEMENT - ALLOWANCE	5	Allow	1	$ -	$ -	0.50	0.50	$ 90.00	$ 45.00	$ 45	$ -	$ -	$ 100,000	$ 1	$ 100,045
DIVISION 03	CONCRETE	BOILER EQUIPMENT CONCRETE PADS	1	CY	-	$ 266.70	$ -	7.83	-	$ 121.00	$ 947.43	$ -	$ 6.00	$ -			
DIVISION 03	CONCRETE	FILL FLOOR OPENING WITH CONCRETE	2	CY	2	$ 266.70	$ 533.4	7.83	15.66	$ 121.00	$ 947.43	$ 1,895	$ 6.00	$ 12	$ -	$ 281	$ 2,440
DIVISION 03	CONCRETE	PATCHING FLOOR	3	SF	10,000	$ 5.08	$ 50,800.0	0.10	1,000.00	$ 121.00	$ 12.10	$ 121,000	$ -	$ -	$ -	$ 5	$ 171,800
DIVISION 04	MASONRY	BRICK ACCESS WALLS	1	SF	400	$ 25.00	$ 10,000.0	0.20	80.00	$ 105.00	$ 21.00	$ 8,400	$ -	$ -	$ -	$ 25	$ 18,400
DIVISION 04	MASONRY	WATER PROOFING	2	LS	1	$ 1,270.00	$ 1,270.0	-	-	$ 105.00	$ -	$ -	$ -	$ -	$ -	$ 1,270	$ 1,270
DIVISION 04	MASONRY	Brick wall access and exterior excavation to allow the introduction of the boilers	3	LS	1		$ -		-		$ -	$ -		$ -	$ 150,000	$ -	$ 150,000
DIVISION 05	METALS	STEEL LADDERS, PLATFORMS & IRON WORKS AND ALL ASSOCIATED ITEMS	1	EA	1	$ 6,350.00	$ 6,350.0	124.00	124.00	$ 159.00	$ 19,716.00	$ 19,716	$ 500.00	$ 500	$ -	$ 6,974	$ 26,566
DIVISION 07	THERMAL AND MOISTURE PROTECTION	VAPOR RETARDER UNDER SLAB ON GRADE	1	SF	-	$ 6.35	$ -	0.10	-	$ 118.00	$ 11.80	$ -	$ -	$ -			
DIVISION 08	LOUVERS, DOORS AND WINDOWS	NEW LOUVERS AND DAMPERS	1	EA	6	$ 6,350.00	$ 38,100.0	24.00	144.00	$ 130.00	$ 3,120.00	$ 18,720	$ -	$ -	$ -	$ 6,374	$ 56,820
DIVISION 08	LOUVERS, DOORS AND WINDOWS	ALUMINUM WINDOW	2	EA	-	$ 3,810.00	$ -	24.00	-	$ 130.00	$ 3,120.00	$ -	$ -	$ -			
DIVISION 08	LOUVERS, DOORS AND WINDOWS	STEEL TRAP DOOR	3	EA	1	$ 1,270.00	$ 1,270.0	8.00	8.00	$ 130.00	$ 1,040.00	$ 1,040	$ -	$ -	$ -	$ 1,278	$ 2,310
DIVISION 09	FINISHES	PAINTING OF BOILER ROOM WALLS, FLOORS & EQUIPMENT (Add 30% for Metal Works)	1	SF	20,000	$ 0.38	$ 7,620.0	0.05	1,000.00	$ 105.00	$ 5.25	$ 105,000	$ -	$ -	$ -	$ 0	$ 112,620
DIVISION 09	FINISHES	WALL REPAIRS	2	LS	1	$ 7,620.00	$ 7,620.0	80.00	80.00	$ 105.00	$ 8,400.00	$ 8,400	$ -	$ -	$ -	$ 7,700	$ 16,020
DIVISION 10 & 13	SPECIALTIES & SPECIAL CONSTRUCTION	EXTINGUISHERS	1	EA	1	$ 533.40	$ 533.4	1.00	1.00	$ 105.00	$ 105.00	$ 105		$ -	$ -	$ 534	$ 638
DIVISION 22	PLUMBING	REMOVAL OF SUMP PUMPS, PIPING & CONTROLS	1	EA	1	$ -	$ -	16.00	16.00	$ 146.28	$ 2,340.48	$ 2,340	$ -	$ -	$ -	$ 16	$ 2,340
DIVISION 22	PLUMBING	NEW FLOOR DRAINS	2	EA	6	$ 3,500.00	$ 21,000.0	4.00	24.00	$ 146.28	$ 585.12	$ 3,511	$ -	$ -	$ -	$ 3,504	$ 24,511
DIVISION 22	PLUMBING	DOMESTIC COLD AND HOT WATER PIPING WITH INSULATION, HANGERS AND SUPPORTS	3	LF	400	$ 40.64	$ 16,256.0	0.50	200.00	$ 146.28	$ 73.14	$ 29,256	$ -	$ -	$ -	$ 41	$ 45,512
DIVISION 22	PLUMBING	DUPLEX PUMP SYSTEMS & CONTROLS	4	EA	-	$ 25,000.00	$ -	40.00	-	$ 146.28	$ 5,851.20	$ -	$ -	$ -			
DIVISION 22	PLUMBING	EYE WASH EQUIPMENT	5	EA	1	$ 1,905.00	$ 1,905.0	8.00	8.00	$ 146.28	$ 1,170.24	$ 1,170	$ -	$ -	$ -	$ 1,913	$ 3,075
DIVISION 22	PLUMBING	GENERAL DUTY VALVES	6	LS	2	$ 5,715.00	$ 11,430.0	40.00	80.00	$ 146.28	$ 5,851.20	$ 5,851	$ -	$ -	$ -	$ 5,755	$ 17,281
DIVISION 22	PLUMBING	Plumbing-Domestic water tank and coil and related pumps	7	LS	1		$ -		-		$ -	$ -	$ 140,000.00	$ 140,000	$ -	$ 140,000	$ 140,000
DIVISION 22	PLUMBING	Plumbing- Domestic water tank insulation removal	8	LS	1		$ -		-		$ -	$ -	$ 15,000.00	$ 15,000	$ -	$ 15,000	$ 15,000
DIVISION 22	PLUMBING	cold water insualtion 6 "piping	9	LS	-		$ -		-		$ -	$ -	$ 8,000.00	$ -			
DIVISION 22	PLUMBING	mixing valve	10	LS	1		$ -		-		$ -	$ -	$ 15,000.00	$ 15,000	$ -	$ 15,000	$ 15,000
DIVISION 22	PLUMBING	SINK	11	EA	-	$ 3,175.00	$ -	8.00	-	$ 146.28	$ 1,170.24	$ -	$ -	$ -			
DIVISION 22	PLUMBING	Sump pump set and controls	12	LS	1		$ -		-		$ -	$ -		$ -	$ 34,000	$ -	$ 34,000
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	REMOVAL OF OLD STEAM PIPING (Ave.14"D, 8"D,6"D,4"D,3"D)	1	LF	100	$ -	$ -	0.50	50.00	$ 151.00	$ 75.50	$ 7,550	$ -	$ -	$ -	$ 1	$ 7,550
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	REMOVAL OF OLD BOILER FEED WATER SYSTEM	2	EA	1	$ -	$ -	16.00	16.00	$ 151.00	$ 2,416.00	$ 2,416	$ -	$ -	$ -	$ 16	$ 2,416
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	REMOVAL OF OLD FUEL OIL PUMP AND HEATER SET AND ALL ASSOCIATED PIPING	3	EA	1	$ -	$ -	32.00	32.00	$ 151.00	$ 4,832.00	$ 4,832	$ -	$ -	$ -	$ 32	$ 4,832
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	REMOVAL OF BOILERS, EQUIPMENT, WIRING,& CONTROLS	4	EA	3	$ -	$ -	300.00	900.00	$ 151.00	$ 45,300.00	$ 135,900	$ -	$ -	$ -	$ 300	$ 135,900
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	REMOVAL OF OLD BOILER BREECHING	5	LF	75	$ -	$ -	0.50	37.50	$ 151.00	$ 75.50	$ 5,663	$ -	$ -	$ -	$ 1	$ 5,663
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	REMOVAL OF LOUVERS & DAMPERS	6	EA	6	$ -	$ -	2.50	15.00	$ 151.00	$ 377.50	$ 2,265	$ -	$ -	$ -	$ 3	$ 2,265
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	250-BHP BOILERS, BURNERS AND ALL ASSOCIATED EQUIPMENT INCLUDING RIGGING	7	EA	3	$ 260,350.00	$ 781,050.0	490.00	1,470.00	$ 151.00	$ 73,990.00	$ 221,970	$ 1,000.00	$ 3,000	$ -	$ 261,840	$ 1,006,020
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM GATE OS&Y VALVES W/ SPROCKET & CHAIN, 14" DIA.	8	EA	3	$ 22,860.00	$ 68,580.0	32.00	96.00	$ 151.00	$ 4,832.00	$ 14,496	$ -	$ -	$ -	$ 22,892	$ 83,076
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM GATE OS&Y VALVES W/ SPROCKET & CHAIN, 12" DIA.	9	EA	3	$ 13,970.00	$ 41,910.0	32.00	96.00	$ 151.00	$ 4,832.00	$ 14,496	$ -	$ -	$ -	$ 14,002	$ 56,406
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM GATE OS&Y VALVES W/ SPROCKET & CHAIN, AVE. 6" DIA.	10	EA	3	$ 4,445.00	$ 13,335.0	10.00	30.00	$ 151.00	$ 1,510.00	$ 4,530	$ -	$ -	$ -	$ 4,455	$ 17,865
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	CONDENSATE TANK RECEIVER (2,500 Gal.), INCL. SUPPORTS & INSULATION	11	EA	3	$ 10,160.00	$ 30,480.0	80.00	240.00	$ 151.00	$ 12,080.00	$ 36,240	$ 1,000.00	$ 3,000	$ -	$ 11,240	$ 69,720
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	BREECHING	12	LF	75	$ 654.05	$ 49,053.8	2.00	150.00	$ 151.00	$ 302.00	$ 22,650	$ -	$ -	$ -	$ 656	$ 71,704
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	CHEMICAL FEED SYSTEMS	13	EA	1	$ 1,905.00	$ 1,905.0	16.00	16.00	$ 151.00	$ 2,416.00	$ 2,416	$ -	$ -	$ -	$ 1,921	$ 4,321
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM SEPARATORS W/ 3" INSULATION	14	EA	1	$ 7,937.50	$ 7,937.5	8.00	8.00	$ 151.00	$ 1,208.00	$ 1,208	$ -	$ -	$ -	$ 7,946	$ 9,146
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	INSTALLATION OF MISC. PIPING VALVES & INSULATION (500' @ 3" D Ave.)	15	LF	500	$ 37.02	$ 18,510.3	0.57	285.00	$ 151.00	$ 86.07	$ 43,035	$ -	$ -	$ -	$ 38	$ 61,545
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM PIPING, 14" D W/ 2.5" INSULATION	16	LF	100	$ 241.30	$ 24,130.0	2.50	250.00	$ 151.00	$ 377.50	$ 37,750	$ -	$ -	$ -	$ 244	$ 61,880
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM PIPING, 12" D W/ 2" INS	17	LF	200	$ 151.13	$ 30,226.0	2.00	400.00	$ 151.00	$ 302.00	$ 60,400	$ -	$ -	$ -	$ 153	$ 90,626
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM PIPING, 6" D W/ 2" INS	18	LF	200	$ 88.90	$ 17,780.0	1.25	250.00	$ 151.00	$ 188.75	$ 37,750	$ -	$ -	$ -	$ 90	$ 55,530
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	BOILER FEED WATER PUMP SET	19	EA	1	$ 20,000.00	$ 20,000.0	16.00	16.00	$ 151.00	$ 2,416.00	$ 2,416	$ -	$ -	$ -	$ 20,016	$ 22,416
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	TESTING, BALANCING AND START-UP	20	EA	8	$ 5,715.00	$ 45,720.0	60.00	480.00	$ 151.00	$ 9,060.00	$ 72,480	$ 72.00	$ 576	$ -	$ 5,847	$ 118,776

Division	Division Description	Element Description	Seq	Unit	Total Qty	Mat Cost Unit	Mat Cost Total	Lbr Time Unit	Lbr Time Total	Lbr Wage	Lbr Cost Unit	Lbr Cost Total	Equip Cost Unit	Equip Cost Total	Allowance	Unit Cost	Total Cost
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	CHIMNEY LINING INCLUDING SCAFFOLDING AND RIGGING EQUIPMENT, SPECIFIED MASONRY REPAIR, CHIMNEY COPING, CHIMNEY INSPECTION AND ALL RELATED WORK	21	LF	75	$ 406.40	$ 30,480.0	3.00	225.00	$ 151.00	$ 453.00	$ 33,975	$ 250.00	$ 18,750	$ -	$ 659	$ 83,205
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM CONDENSATE VACUUM PUMP	22	EA	1	$ 20,000.00	$ 20,000.0	32.00	32.00	$ 151.00	$ 4,832.00	$ 4,832	$ -	$ -	$ -	$ 20,032	$ 24,832
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	FACILITY NATURAL GAS PIPING	23	LF	100	$ 46.36	$ 4,635.5	1.15	115.00	$ 151.00	$ 173.65	$ 17,365	$ -	$ -	$ -	$ 48	$ 22,001
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING	STEAM HEADER	24	EA	1	$ 10,160.00	$ 10,160.0	16.00	16.00	$ 151.00	$ 2,416.00	$ 2,416	$ -	$ -	$ -	$ 10,176	$ 12,576
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	Panel board, 120/208V, 3 PHASE, 4 WIRE	1	EA	1	$ 12,700.00	$ 12,700.0	170.00	170.00	$ 154.46	$ 26,258.20	$ 26,258	$ 1,000.00	$ 1,000	$ -	$ 13,870	$ 39,958
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	200A PANEL, 120/208V, 3 PHASE, 4 WIRE	2	EA	1	$ 4,445.00	$ 4,445.0	90.00	90.00	$ 154.46	$ 13,901.40	$ 13,901	$ -	$ -	$ -	$ 4,535	$ 18,346
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	100A PANEL, 120/208V, 3 PHASE, 4 WIRE	3	EA	1	$ 3,048.00	$ 3,048.0	60.00	60.00	$ 154.46	$ 9,267.60	$ 9,268	$ -	$ -	$ -	$ 3,108	$ 12,316
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	RC SWITCH	4	EA	1	$ 10,160.00	$ 10,160.0	140.00	140.00	$ 154.46	$ 21,624.40	$ 21,624	$ -	$ -	$ -	$ 10,300	$ 31,784
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	BREAK GLASS STATION	5	EA	1	$ 274.32	$ 274.3	5.00	5.00	$ 154.46	$ 772.30	$ 772	$ -	$ -	$ -	$ 279	$ 1,047
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	RECEPTACLES	6	EA	6	$ 69.53	$ 417.2	1.25	7.50	$ 154.46	$ 193.08	$ 1,158	$ -	$ -	$ -	$ 71	$ 1,576
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	SWITCH	7	EA	2	$ 62.87	$ 125.7	1.00	2.00	$ 154.46	$ 154.46	$ 309	$ -	$ -	$ -	$ 64	$ 435
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	1' X 4' INDUSTRIAL FLUORESCENT LAMP	8	EA	12	$ 254.00	$ 3,048.0	4.21	50.52	$ 154.46	$ 650.28	$ 7,803	$ -	$ -	$ -	$ 258	$ 10,851
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	EMERGENCY SIGN	9	EA	1	$ 609.60	$ 609.6	10.00	10.00	$ 154.46	$ 1,544.60	$ 1,545	$ -	$ -	$ -	$ 620	$ 2,154
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	EMERGENCY LIGHT BATTERY PACK	10	EA	4	$ 558.80	$ 2,235.2	10.00	40.00	$ 154.46	$ 1,544.60	$ 6,178	$ -	$ -	$ -	$ 569	$ 8,414
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	MOTOR STARTERS AND DISCONNECT	11	EA	4	$ 3,175.00	$ 12,700.0	56.00	224.00	$ 154.46	$ 8,649.76	$ 34,599	$ -	$ -	$ -	$ 3,231	$ 47,299
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	DISCONNECT SWITCH	12	EA	4	$ 635.00	$ 2,540.0	4.00	16.00	$ 154.46	$ 617.84	$ 2,471	$ -	$ -	$ -	$ 639	$ 5,011
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	GAS DETECTION SYSTEM	13	LS	1	$ 4,445.00	$ 4,445.0	-	-	$ 154.46	$ -	$ -	$ -	$ -	$ -	$ 4,445	$ 4,445
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	CONDUIT AND WIRE	14	LS	1	$ 63,500.00	$ 63,500.0	-	-	$ 154.46	$ -	$ -	$ -	$ -	$ -		$ 63,500
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	REMOVAL OF EXISTING ELECTRICAL EQUIPMENT	15	LS	1	$ 5,080.00	$ 5,080.0	-	-	$ 154.46	$ -	$ -	$ -	$ -	$ -	$ 5,080	$ 5,080
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	TERMINATION OF EXISTING ELECTRICAL EQUIPMENT	16	LS	1	$ 6,350.00	$ 6,350.0	-	-	$ 154.46	$ -	$ -	$ -	$ -	$ -	$ 6,350	$ 6,350
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	TEMPORARY WORK	17	LS	1	$ 6,985.00	$ 6,985.0	-	-	$ 154.46	$ -	$ -	$ -	$ -	$ -	$ 6,985	$ 6,985
DIVISION 26 & 28	ELECTRICAL /ELECTRONIC SAFETY AND SECURITY	DIGITAL CONTROL CENTER	18	LS	1	$ 31,750.00	$ 31,750.0	-	-	$ 154.46	$ -	$ -	$ -	$ -	$ -	$ 31,750	$ 31,750
DIVISION 32	EARTH WORK & EXTERIOR IMPROVEMENTS	RESTORATION, INCL. PAVEMENT & CLEANING	1	LS	1	$ 15,240.00	$ 15,240.0	74.00	74.00	$ 105.00	$ 7,770.00	$ 7,770	$ 832.00	$ 832	$ -	$ 16,146	$ 23,842

Other Allowances	Allocation	Unit	Ref. Cost	Estimate Amt
Asbestos/Hazardous Waste Removal	5%	Allow	$ 4,057,799	$ 202,890
Installation Complexity	10%	Allow	$ 4,057,799	$ 405,780
Code Upgrade	2%	Allow	$ 4,057,799	$ 81,156
Site Restoreation	2%	Allow	$ 4,057,799	$ 81,156
Temporary Works	5%	Allow	$ 4,057,799	$ 202,890
Subtotal Allowances Direct Cost				**$ 973,872**
Subtotal Direct Costs				**$ 5,031,671**

Contractor Fee	Allocation	Unit	Ref. Cost	Estimate
Contractor Overhead & Profit (On Direct Cost)	11%	Alloc	$ 5,031,671	$ 553,484
Insurance (On Direct Cost)	4%	Alloc	$ 5,031,671	$ 201,267
Subtotal CONTRACTOR FEES				**$ 754,751**
BASE BID ESTIMATE (A.1)				**$ 5,786,421**

Contractor Fee	Allocation	Unit	Ref. Cost	Estimate
Cost Estimate Level 5 Contingency (A.2)	25%	Alloc	$ 5,031,671	$ 1,257,918
Payment and Performance Bonds (A.3)	2%	Alloc	$ 5,031,671	$ 100,633
Subtotal Contractor Fees				**$ 1,358,551**
TOTAL BASE BID ESTIMATE (A.1+A.2+A.3)				**$ 7,144,973**

Design/Permitting	Allocation	Unit	Ref. Cost	Estimate
A/E FEES (Architect design and Engineering services	10%	Alloc	$ 4,057,799	$ 405,780
CM FEES (pre, construction & post Services)	10%	Alloc	$ 4,057,799	$ 405,780
Escalation (2 years)	6%	Alloc	$ 4,057,799	$ 243,468
Air monitoring	2%	Alloc	$ 4,057,799	$ 81,156
Special Inspection	2%	Alloc	$ 4,057,799	$ 81,156
Testing and balancing	1%	Alloc	$ 4,057,799	$ 40,578
Project Commissioning	1%	Alloc	$ 4,057,799	$ 40,578
Program Management Fee	7.5%	Alloc	$ 4,057,799	$ 304,335
Subtotal Design/Permitting Fees				**$ 1,602,831**
GRAND TOTAL ESTIMATE				**$ 8,747,803**

7.3 Appendix 3: ROM Level 5 Cost Estimate for Mitigation SOW

Development Moore Houses

Facility Name Building 1 (Boiler Room)

																			Base Direct Cost
9			9		6	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ 805,000	$ -			$ 805,000
Division	**Element Description**	**Seq**		**Unit**	**Total Qty**	**Mat Cost Unit**	**Mat Cost Total**	**Lbr Time Unit**	**Lbr Time Total**	**Lbr Wage**	**Lbr Cost Unit**	**Lbr Cost Total**	**Equip Cost Unit**	**Equip Cost Total**	**Allowance**	**Unit Cost**			**Total Cost**
Civil	Concreate to extend areaways		1	LS	1	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ 65,000	$ -			$ 65,000
Civil	Flood doors 3x7		2	EA	1	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ 15,000	$ -			$ 15,000
Civil	Area drains		3	LS	-										$ 40,000				$ 40,000
Civil	Flood wall		4	LS	1	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ 50,000	$ -			$ 50,000
Civil	Foundation protection		5	LS	1	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ 500,000	$ -			$ 500,000
Civil	Grouting		6	LS	1	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ 10,000	$ -			$ 10,000
Civil	Sheetpiles		7	LS	-														
Mechanical	Back water valves with holding tank, excavation and piping		1	EA	1	$ -	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ 125,000	$ -			$ 125,000

Other Allowar	**Allocation**	**Unit**	**Ref. Cost**	**Estimate Amt**
Other General Site Activities	0%	Allow	$ 805,000	$ -
Asbestos/Hazardous Waste Removal	0%	Allow	$ 805,000	$ -
Installation Complexity	0%	Allow	$ 805,000	$ -
Code Upgrade	0%	Allow	$ 805,000	$ -
Site Restoreation	2%	Allow	$ 805,000	$ 16,100
Temporary Works	5%	Allow	$ 805,000	$ 40,250
Subtotal Allowances Direct Cost				**$ 56,350**
Subtotal Direct Costs				**$ 861,350**

Contractor Fe	**Allocation**	**Unit**	**Ref. Cost**	**Estimate**
Contractor Overhead & Profit (On Direct Cost)	11%	Alloc	$ 861,350	$ 94,749
Insurance (On Direct Cost)	4%	Alloc	$ 861,350	$ 34,454
Subtotal CONTRACTOR FEES				**$ 129,203**
BASE BID ESTIMATE (A.1)				**$ 990,553**

Contractor Fe	**Allocation**	**Unit**	**Ref. Cost**	**Estimate**
Cost Estimate Level 5 Contingency (A.2)	50%	Alloc	$ 861,350	$ 430,675
Payment and Performance Bonds (A.3)	2%	Alloc	$ 861,350	$ 17,227
Subtotal Contractor Fees				**$ 447,902**
TOTAL BASE BID ESTIMATE (A.1+A.2+A.3)				**$ 1,438,455**

Design/Permit	**Allocation**	**Unit**	**Ref. Cost**	**Estimate**
A/E FEES (Architect design and Engineering services	8%	Alloc	$ 805,000	$ 64,400
CM FEES (pre, construction & post Services)	10%	Alloc	$ 805,000	$ 80,500
Escalation (2 years)	6%	Alloc	$ 805,000	$ 48,300
Air monitoring	2%	Alloc	$ 805,000	$ 16,100
Special Inspection	2%	Alloc	$ 805,000	$ 16,100
Testing and balancing	1%	Alloc	$ 805,000	$ 8,050
Project Commissioning	1%	Alloc	$ 805,000	$ 8,050
Program Management Fee	7.5%	Alloc	$ 805,000	$ 60,375
Subtotal Design/Permitting Fees				**$ 301,875**
GRAND TOTAL ESTIMATE				**$ 1,740,330**

NEW YORK CITY HOUSING AUTHORITY

CSA GROUP EST • 1956

CSA GROUP SUPPORTS ALL
GREEN INITIATIVES. PLEASE RECYCLE.