

February 5, 2015
File No. 18.0171612.01



Mr. Charles Gibson
Deputy Police Chief
4 Fairgrounds Road
Nantucket, MA. 02554

Ms. Shelia Lucey
Nantucket Harbormaster
34 Washington Street
Nantucket, MA. 02554

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Re: Blizzard of 2015 – Post-Storm Inspection and Cost Estimate
Nantucket Town Pier
34 Washington Street
Nantucket, MA

www.gza.com

Dear Mr. Gibson/Ms. Lucey:

Per our agreement, GZA GeoEnvironmental, Inc., (GZA) is pleased to submit the following limited inspection report and attached photographs and cost estimate in response to our site inspection on February 4, 2015. The inspection was limited to visible above-water portions of the pier and float structures only. No underwater inspection, testing, probing or other means beyond a visible inspection was performed.

The report provides a description of the observed damage to the existing structures that was sustained during the 2015 Blizzard on January 26 and 27 (See Photographs 1 and 2). In addition, we have provided preliminary recommendations and budgetary cost estimates to repair the Town Pier structures back to its pre-storm, usable condition. No engineering calculations were performed for verification of member sizes, and no improvements beyond the existing structures were considered with the exception of improved decking fasteners and stringer-to-cap connections.

Table 1 below identifies the total quantity of items to be replaced due to damage sustained by the storm event for each of the identified locations.

Main Pier

The majority of the length of the Main Pier structure was observed to be in fair condition with minimal damage to framing and decking members. Three locations between pile bents were observed to have stringer members that were either cracked or separated from the pile caps below (See Photograph 8). A total of 44 timber deck planks were observed to be missing from the Main Pier structure (See Photograph 13 for typical decking loss).



Finger Piers & Catwalks

The majority of the Finger Piers and associated Catwalks were observed to be in fair condition; however portions of the structures did sustain damage from the storm event. Approximately three locations along the Finger Piers and Catwalks were observed to have stringer members that have been damaged or displaced (See Photographs 9 through 11). Numerous decking members have been displaced and/or missing. Locations along the piers and catwalks where stringers are mounted to an existing edge stringer are in poor condition with missing fasteners at bracket locations (See Photograph 12).

Breakwater Pier & Catwalks

The Breakwater Pier sustained the majority of the damage at the site (See Photographs 3 through 7). The majority of the decking along the Breakwater Pier was observed to be missing. The framing members were observed to be broken, missing or displaced in numerous locations. The plumb piles, and what was left of the remaining pier at the northern end of the breakwater, was observed to be wracked and leaning landward. The remaining decking and framing members were observed to be pitching down landward. Connections from batter pile to plumb pile were observed to be in poor to serious condition with bolts missing, not connected or loose. The plumb piles associated with the catwalks along the landward side of the Breakwater Pier were observed to be in fair condition. The Pump-Out Shed which was previously located at the Breakwater was missing and understood to be demolished somewhere off-site as a result of the storm event.

Due to the amount of damage sustained by the Breakwater Pier, we recommend that the entire pier be replaced. This would include removing and replacing the plumb and batter piles, the bracing members, the pile caps, the stringers and blocking, and the decking. The pile caps, stringers, blocking and decking along the three catwalks should also be replaced.

Timber Floating Docks

The Timber Floating Docks sustained damage throughout the entire length of the floats. The existing main float section consists of 8-foot wide by 40-foot long sections. Three of these were observed to have broken at approximately the halfway point of the float's length (See Photographs 19 and 20). A portion of the main float that appeared to have been previously repaired was damaged during this storm event (See Photograph 23). One of the 3-foot by 30-foot finger floats was observed to be missing from the floating dock system (See Photograph 22). Four of the hinge connections along the main float were observed to be corroded and broken (See Photograph 21).

One of the eight steel pile guides along the main float was observed to have been displaced from the steel pipe piles (See Photograph 22). Observations of the existing steel pipe piles at these locations show that the rollers of the pile guide were lifted all the way over the top of the pipe pile. The fiberglass pile cap was missing at two of the steel pipe piles. A separate steel pile guide was observed to be bent. Two of the timber pile guides were observed to have been displaced, no longer in contact with the timber piles. Existing pile guide rollers were damaged and worn (See Photograph 25). Additionally, the existing power pedestal at the northeastern end of the floating dock system was damaged (See Photograph 26). We recommend that all of these items be repaired or replaced.



Table 1: Repair/Replacement Quantities Based on 2015 Blizzard Damage

Location	Member	Member Size	Quantity
Main Pier	Decking	2x8	44 Members (470 Board Feet)
	Stringer	3x10	9 Members (225 Board Feet)
	Blocking	3x10	164 Members (2,115 Board Feet)
Finger Pier #1 & Catwalks	Decking	2x8	9 Members (22 Board Feet)
	Blocking	3x10	20 Members (150 Board Feet)
Finger Pier #2 & Catwalks	Decking	2x8	21 Members (155 Board Feet)
	Stringer	3x10	4 Members (100 Board Feet)
	Blocking	3x10	20 Members (150 Board Feet)
Finger Pier #3 & Catwalks	Decking	2x8	65 Members (437 Board Feet)
	Stringer	3x10	10 Members (250 Board Feet)
	Blocking	3x10	20 Members (150 Board Feet)
Finger Pier #4 & Catwalks	Blocking	3x10	20 Members (150 Board Feet)
Breakwater Pier & Catwalks	Decking	2x8	756 Members (7,380 Board Feet)
	Stringers	3x10	66 Members (1,650 Board Feet)
	Blocking	3x10	50 Members (750 Board Feet)
	Pile Caps	3x12	52 Members (1,392 Board Feet)
	Plumb Piles	12" Dia.	40 Piles
	Batter Piles	12" Dia.	19 Piles

Miscellaneous Repairs

Various other items were observed to have been damaged during the storm event. This includes damage to the Gangway Timber Platform, damage to the aluminum gangway (See Photograph 18), damage or missing berthing rub strips on existing timber piles, damage or displacement to existing ladders (See Photograph 16), damage to existing light poles and fire extinguisher box (See Photograph 15). The gangway timber platform was observed to have been damaged by uplift forces, was lifted off of the drift pins and is currently suspended and sitting on the drift pins (See Photograph 17). All of these items should be repaired or replaced as necessary.

Recommendations and Conclusions

During the storm event, the site was inundated by high water, waves and sustained winds. The wave height was likely at least a foot above the elevation of the existing pier and breakwater. This is evidenced by the pile guides being lifted up and over the steel piles of the floating dock system. Additionally, connections between the stringers and pile caps should be improved. The current connection consists for an approximate 3/8" steel drift pin. This connection will resist lateral movement of the structure but is not ideal when uplift conditions occur, such as during this past storm event. The water and surge created a buoyant force on the structure, lifting the stringers directly off of the drift pins (See Photograph 14). We recommend that steel straps or hurricane ties be utilized for fastening the stringers to the pile caps at all locations along the Main Pier, Breakwater Pier, Finger Piers and Catwalks to reduce the impacts on the structure in the future due to buoyant forces.



We have recommended that the above repairs and replacements be performed to the Town Pier structures based on our observations of the site after the storm event to bring the facility back to its pre-storm operating condition. The attached preliminary, budgetary cost estimate reflects the costs to repair or replace the items as referenced above. The cost associated with this work is approximately \$996,000, which includes a fifteen percent contingency. Engineering, permitting contract document preparation, bid phase and construction services are not included within the attached estimate.

Upon your review of the attached letter findings report, we would like to schedule an opportunity to discuss the report and our recommendations with you and the Town at your earliest convenience. I can be reached at (781) 278-4806 or by email david.smith@gza.com to schedule a time to discuss.

If you have any immediate questions or require any additional information, please call or email.

Very truly yours,
GZA GEOENVIRONMENTAL, INC.

A handwritten signature in blue ink that reads "David A. Smith". The signature is written in a cursive, slightly slanted style.

David A. Smith
Project Manager

Attachment: