

Summary
Structural Evaluation
of
Surfside Beach Pier
Surfside Beach, SC



Prepared by

Chao and Associates, Inc.

August 2011





August 19, 2011

Mr. Mike Wooten, PE
President
DDC Engineers, Inc.
1298 Professional Drive
Myrtle Beach, SC 29577

RE: Structural Evaluation of Surfside Beach Pier in Surfside Beach, SC
C&A Project No. 393703B

Dear Mr. Wooten:

As requested, Chao & Associates, Inc. (Chao) performed an initial visual observation of the above referenced site on July 7, 2011. You were present to provide access and background information.

For description purposes, the directions used in this report are based on the view of a person standing in the street/parking lot facing the pier/ocean.

GENERAL INFORMATION

The Surfside Beach Pier is a wooden fishing pier extending from shore into Atlantic Ocean currently owned by the Town of Surfside Beach. It was reported that the water side of the pier was damaged and rebuilt twice previously. There are two one story building structures on the land/shore side (Photo 1) with a wood deck walkway centered between the two buildings. The building on the right hand side (Building A) was previously served as a restaurant and currently is vacant. The building on the left hand side (Building B) is currently occupied by various vendors. The existing buildings were built on top of pier structure. The pier structure consists of timber piles with wood beam framing (Photo 2). Single diagonal wood braces were provided at half of the front pier line and entire left and rear pier line (see attached framing plan). There is a four-sided "X" bracing bay constructed below the center wood walkway at the second bay from the rear of the building. The Town wishes to explore possible renovation of building A into a two story building. No existing construction plans are available.

SCOPE OF SERVICE

Chao was engaged to conduct a cursory, field evaluation of existing pier structure under the existing buildings (the piers beyond the existing buildings' rear exterior walls are not included in the scope of work). The scope of service includes, A) Providing a cursory, visual site observation of the existing structures and conditions. B) Conducting limited non-destructive



hammer testing and wood coring to examine the structural integrity of the piles. C) Providing a written report outlined the structural deficiencies noted and repair recommendations.

This report is based on visual observations and information that was provided or was made available during the visual field evaluation. It represents the professional opinion and judgment of a Licensed Professional Engineer. No material testing or uncovering were performed and are beyond the scope of service. If further information is provided or becomes available, the initial findings will be reviewed which may result in the need to modify the opinion rendered initially.

This report is solely for the benefit of the client to whom it is addressed. Any reuse of this report without the expressed written consent of Chao & Associates Inc. is prohibited.

FIELD OBSERVATIONS

During the visual field evaluation, the following items were noted:

- 1 Most of the face mounted joist hangers, connecting through bolts and steel plates shows signs of heavy corrosion or noted to be missing (Photo 3, 4, Typ.).

Recommendation:

Replace all corroded or missing hangers, bolts and steel plates with Grade 316 stainless steel hardware. Sizes shall match existing.

- 2 Most of hurricane ties and beam hold down hardware show signs of heavy corrosion or are noted to be missing (Photo 5, 6, Typ.).

Recommendation:

Replace all corroded or missing hurricane ties and provide hold down hardware at each beam end of Grade 316 stainless steel. Sizes shall match existing.

- 3 Some exterior edge beams are noted to be insufficient in strength to support the load bearing walls above, particularly the edge beams supporting the right exterior wall of building A. This was mainly due to inadequate splice connection as well as beam member size. The hold down connections at the edge beams were also noted to be missing or insufficient. (Photo 7, 8, Typ.) There are no noted edge beams supporting the exterior walls along both sides of the walkway in between the two buildings. There are no noted distresses on these walls.

Recommendation:

Reinforce the existing beams with treated wood and reinforce/replace the existing splice connections. Provide hold down hardware at each beam end with Grade 316 stainless steel material. Investigate the support system for the exterior walls prior to any renovation work. Edges beams with holddown may be required to support these two walls.

- 4 Some floor joists and floor deck planks were noted to show signs of rot and decay. (Photo 9, 10, Typ.).

Recommendation:

Scabbing an additional treated floor joist to the rotten joists, size to match existing. Remove the rotten floor decking and replace with treated floor decking, size to match existing.



- 5 There were two interior columns inside of building A, believed to serve as roof load bearing elements. A lack of solid bearing/support was noted at the bearing of the columns, between the floor decking and the beam framing below. The column is measured to be approximately above the beam line. (Photo 11, 12, Typ.).

Recommendation:

Providing treated solid blocking between the decking, directly below the column, and the beam below. Additionally, hold down connecting hardware shall be provided between the column and supporting beam, utilizing grade 316 stainless steel materials.

- 6 There was an interior wall inside of building A that possibly serves as a roof load bearing element. The wall was measured to bear on the floor joists. The floor joists are noted to be insufficient to support loads associated with a load bearing wall. (Photo 11, Typ.).

Recommendation:

Further investigation is required to determine if the wall is a load bearing element and therefore the floor joist reinforcement requirements if it is determined to be so.

- 7 There were total of six exterior columns noted at the entrance for buildings A and B. It was noted that no direct solid bearing/support or hold down connection was present between bottom of decking and the supporting framing below the column bearing. (Photo 13, 14, Typ.).

Recommendation:

Providing treated solid blocking between the decking, directly below the column, and the beam below. Additionally, hold down connecting hardware shall be provided between the column and supporting beam, utilizing grade 316 stainless steel materials.

- 8 Wood pile checking was noted at most of piles. The maximum checking width is measured to be approximately 1/2". (Photo 15, 16, Typ.).

Recommendation:

Currently there is no structural concern regarding the checking observed. It may become an issue of decreasing pile capacity when the checking lead into splitting. Annual pile inspection is recommended.

- 9 Some piles were noted to have "Reduced section" or splitting conditions at the building A side. Wood coring were performed at these piles to examine the structural integrity of the piles. (Photo 17, 18, Typ.).

Recommendation:

The wood coring results appear to indicate no hollow section in the wood pile (Photo 19). However, the bearing adequacy of these piles will need to be re-evaluated when the new applied loading is determined and analyzed in conjunction with pile load testing results.

- 10 Two concrete foundation piers were noted at building B side. These concrete piers may likely be the reinforcing repair for the existing wood piles. This indicates that

existing piles may have had a structural deficiency or an inadequate bearing. (Photo 20, Typ.).

Recommendation:

Structural bearing capacity of these piles will need to be evaluated when the new applied loading is determined and analyzed in conjunction with pile load testing results.

- 11 There were signs of likely settlement noted at a couple of pile locations. (Photo 21, Typ.).

Recommendation:

The structural bearing capacity of these piles will need to be load tested and evaluated to determine the adequacy of pile bearing.

- 12 There current lateral bracing system, below framing (between piles) appears likely insufficient to resist the code required design forces.

Recommendation:

Addition lateral bracing will likely be required. The lateral bracing reinforcement will be evaluated and provided when the new applied loading is determine and evaluated.

CONCLUSIONS

Based on the field observation, repairing the current pier structure as recommended above is highly recommended. Future pile load bearing testing is also required to evaluate the current pile bearing capacity and also to determine the bearing adequacy for the future additional story loading. It is our opinion that after repairing the current pier structure, the existing pier framing can be preserved with additional pier reinforcements, for the future two-story building. However, it is our recommendation that the building above the existing pier framing will need to be removed and rebuilt to accommodate the two-story structure.

The pier structure beyond the existing rear exterior walls was not inspected and is not in the scope of service. According to the National Bridge Inspection Standard, certain under water structural elements shall be inspected at regular intervals not to exceed sixty months and above water structure at inspection intervals of twenty-four months. Considering the similarities between pier structures and bridges, we recommend both an underwater and above-water structural inspection for the rest of the structure of the Surfside Beach pier, not included in this scope of work, be performed.

It is a pleasure to provide our engineering service to you. Please do not hesitate to call us if you have any questions.

Sincerely,
Chao and Associates, Inc.

Ta-Wei (David) Chao, PE, LEED AP
Project Structural Engineer





Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12



Photo 13



Photo 14



Photo 15



Photo 16



Photo 17



Photo 18



Photo 19

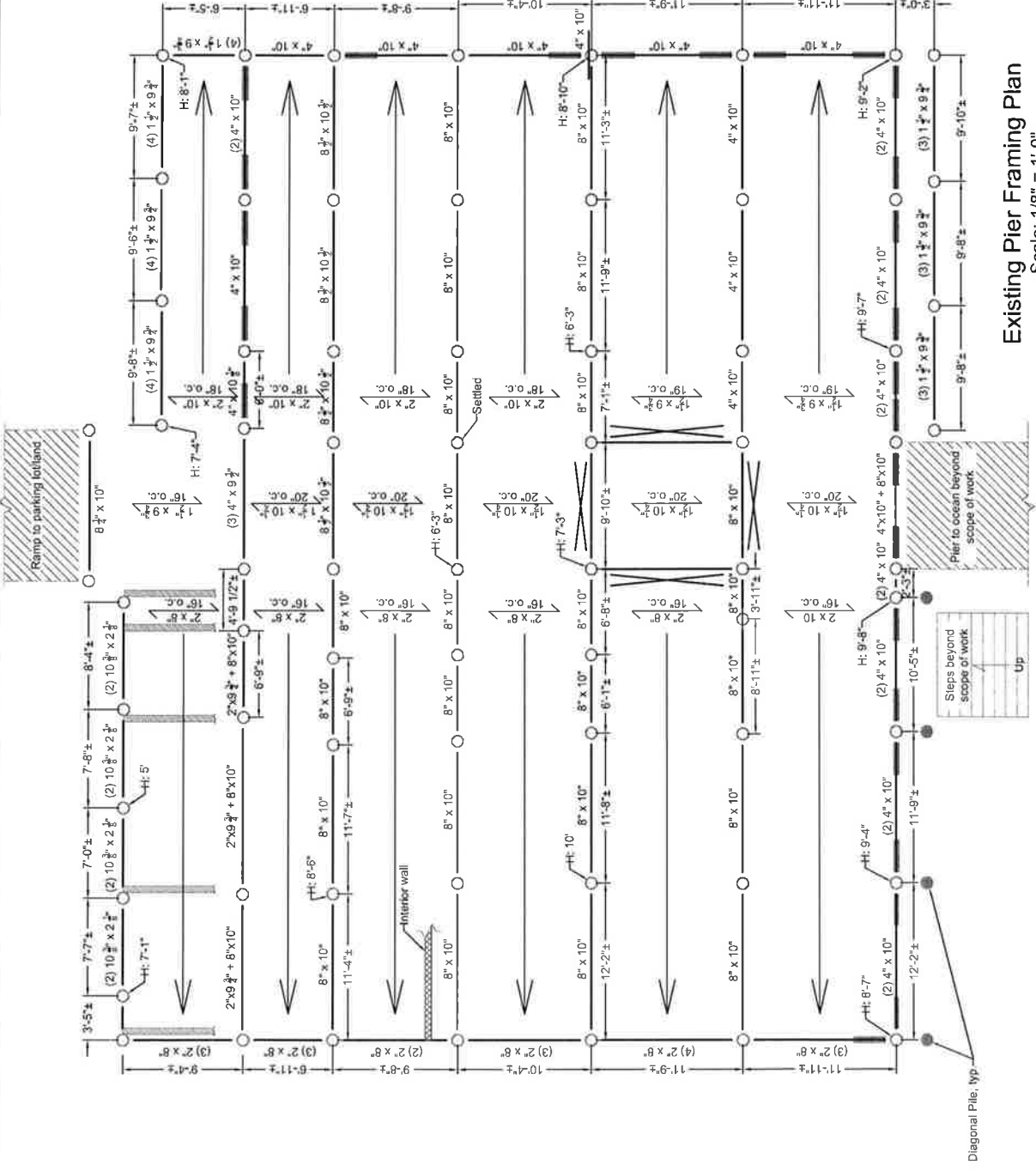


Photo 20



Photo 21

○	Denote Pier (Southern pine)
●	Diagonal Pile
—	Denote (5 1/2" x 5 1/2") single bracing location (From beam to pile)
▨	Denote (6" x 6") single bracing location (From beam to ground)
⋈	Denote (3 3/4" x 8 1/2") "X" bracing location



Existing Pier Framing Plan
Scale: 1/8" = 1'-0"