



North Shore at Canton

Baltimore, MD

Final Report

Problem Statement

Beau Menard
Structural
Parfitt
4/05/06

Problem Statement:

“In general, gypsum board should not be exposed to elevated levels of moisture for extended periods. Examples of elevated levels of moisture include, but are not limited to, exposure to rain, condensation, water leakage, and standing water. Some board exposed to these conditions may not need to be replaced, depending upon the source of the moisture and the condition of the gypsum board being considered for replacement. However, IF THERE IS EVER A DOUBT ABOUT WHETHER TO KEEP OR REPLACE GYPSUM BOARD THAT HAS BEEN EXPOSED TO MOISTURE – REPLACE IT.”

This quote was taken directly from an article written by the Gypsum Association, in regards to moisture related problems with gypsum board. Since the structure of the top three floors are dependent on the stability of the gypsum sheathing, the effects of water damage should be of great consideration. There are also issues that arise from the buildings constant exposure to moisture, since the building is built over Baltimore harbor.



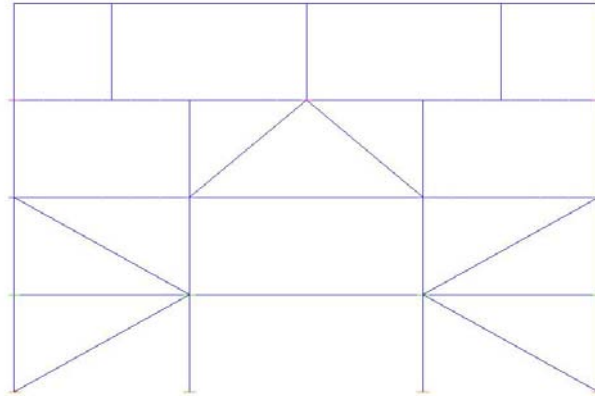
Example of moisture damage to gypsum.

There are also issues that arise in the parking level below the town homes. That area is basically the only public space in the building, and to my knowledge there were no specification made to assure the quality of lighting in that space.

Solution Overview:

Structural Depth:

To help reduce the effect that moisture damage has on the existing structure, two alternative designs of the building superstructure will be proposed. The first structure will be comprised of a rigid steel frame; the second system will consist primarily of pre-cast concrete. Both systems will affect the cost and construction duration of the project.



Steel frame short span

The rigid steel frame will consist of four stories of steel columns and girders, , affixed to the pier bents. Each story height is approximately 10 feet. The floor system will be comprised of open web steel joists, maximum span of 25', topped with metal decking and light weight concrete. The frame will contain braced members along shared interior walls. The effects on the foundation will be addressed, given that the lateral loads will transfer differently than the original system. The design of the steel frame shall be in accordance with the AISC (LRFD) 3rd edition. Members will be analyzed by hand and checked against a computer model.



precast frame long span

The pre-cast system will consist of raising the pier bents to the first level of the town homes, an additional concrete slab will be poured on the first floor so the pier structure would utilize a double diaphragm system. The remaining three floors will consist of pre-cast concrete shear walls, the floor system will also consist of pre-cast concrete planks. The design of the concrete system shall be in accordance with the ACI 318-05. Members will be analyzed by hand and checked against a computer model.

Loads and load cases will be determined from ASCE 7-02. The IBC 2003 will also be referenced through out the design process.

Construction Management Breadth:

The overall project can be affected by dramatically changing the building systems. Altering the superstructure of the building greatly affects the overall project in both cost and construction durations. An analysis of cost and construction durations will be done for both structures presented, and a comparison will be done between the current system and the two proposed systems.

Cost and time duration estimates will be based on the data given in the RS Means manual.

Lighting Breadth:

As the parking level is the only public area of the building, it is only logical that the occupants would want a safe visual environment. To provide this an analysis was done based on IES and ASHRAE standards, to provide a safe lighting environment for the tenants of the building.