



## ENGINEERING DIVISION

### EMERGENCY FIELD OBSERVATION 03 September 2020

**Project:** Sinkhole and Associated Collapse at Berth 44 Main Building

**Structure:** Main Building  
Berths 44 former San Pedro Boatworks

**Observation Performed:** Date: 03 September 2020  
Time: 1100 - 1200

**Persons Present:** James C. Brown - POLA EngDiv

#### **Introduction**

After reports on August 25, 2020 of the collapse of a portion of the floor slab and appearance of a large sinkhole, the Engineering Division of the Port of Los Angeles was requested to assess the structural condition of the main building at the former San Pedro Boatworks at Berth 44. The building is part of the former boatyard complex and has been vacant for 18 years. It is located in the northwestern portion of the site, next to the dike with its western wall on the seawall. The assessment was conducted from the exterior and interior of the building. The exterior of the west wall of the building could not be observed, as the wharf structure in front of it did not appear safe to walk on. This report was prepared by James C. Brown, who inspected the structure.

#### **Condition Summary**

The existence of at least one large and expanding sinkhole and resulting void under the Main Building at Berth 44 presents an imminent risk to human health and safety. The building is built on shallow foundations based on soil, and a growing void below the foundations compromises the structural integrity of the building and could result in a sudden collapse at any time. While the western wall of the building appears to rest on the concrete seawall, all the perpendicular walls are at risk of undermining by the void, as well as column footings if the void extends inland. The building is boarded up and locked, and the boatyard is fenced and locked with no trespassing signs posted, but evidence of trespassers has been found on the site. In addition, the boatyard is the site of an ongoing cleanup and remediation project, and the instability of the building poses a risk to workers as well. It is impossible to safely determine the extents of the void under the foundations without sending personnel and equipment into the building to break up more of the floor slab, which could precipitate a collapse. The floor of the building is concrete, which masked the presence of the sinkhole until the slab collapsed under its own weight. Other voids may exist and the weight of personnel or equipment inside the building could suddenly collapse a section of floor over an undetected void.

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### **Recommendation:**

It is recommended that the building be demolished expeditiously to eliminate the risk it currently presents, understanding that the risk of potential injury or loss of life only increases with the passage of time and growth of the sinkhole(s). After demolition, the floor slab should be removed in a 15-foot-wide strip along the back of the seawall, to expose the extents of the sinkhole voids, which should be exposed and filled with cementitious slurry. If the voids extend beyond the footprint of the building, pavement should continue to be removed until the full extents are determined. After demolition of the building, the existing unstable wharf structure should be fenced to prevent access.

### **Architectural Analysis**

Per historical records, the Main Building at Berth 44 was constructed in stages between 1943 and 1947. The original portion was the single-story northernmost leg of the building with approximate dimensions of 56 feet by 48 feet. This building was constructed in the northwest corner of the property, with its northern wall on the northern property line and western wall on the seawall. The much larger east-west leg of the building, consisting of a one story lumber shed of approximately 125 feet by 35 feet on the north and two-story office/shop on the south of approximately 125 feet by 40 feet, was constructed within the following four years, attached to the original structure to form an "L" shape.

#### Exterior

The structure is timber framed, with ship lap siding on the exterior walls. The roofs are a mixture of flat and very shallow gabled. The original structure has a single window on the southern end of its western wall and roll up doors along the eastern side. The lumber shed has sliding wood doors on the northern side, with windows above. A silo, likely part of a sawdust gathering system, was constructed adjacent to the middle of this north wall. The eastern wall of the lumber shed features two large windows. The northern wall of the second floor of the office/shop has nine windows looking out onto the roof of the lumber shed. The east wall of office/shop has two person doors and three windows on the first floor, and five windows on the second floor. The south side of the office/shop includes two person doors, a sliding door with a person door, and four windows on the first floor, as well as an awning on the eastern end and a small bump-out add-on containing restrooms on the western end. The second floor has 13 windows of varying sizes and a larger door opening onto a balcony in the middle of the wall. The western side of the office/shop and lumber shed portion of the building could not be well observed, as it is built directly on the seawall, and the wharf in front of it was unsafe to walk on. It does feature a balcony the width of the office/shop portion of the building.

#### Interior

The interior of the building was accessed from the southern side of the building, through the wood shop which occupies the middle third of the first floor. Partition walls separated the shop from the public counter area to the east and machine shop to the west and are faced with shiplap or diagonal sheathing. Exterior walls are faced on the inside with shiplap or have exposed studs with no interior facing. The floor consisted of a concrete slab on grade. The shop rooms have built-in workbenches on some walls. A large lathe remains in the machine shop. Exposed conduits and wiring are present throughout the shops, all in poor condition. The second floor and public counter area were not observed.

### **Structural Analysis**

Based on structural calculations from the Port's archive, the building is timber framed, with large timber girders and timber columns in the middle of large span areas like the shop/office and lumber shed. The first floor is slab on grade, and the second floor is supported on joists spanning between the girders and exterior walls. The roof is supported similarly. The foundations for the building are shallow, with the exterior walls resting on a

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continuous concrete footing, and the columns supported by square concrete footings. Lateral resistance is provided by diagonal sheathing on the exterior and partition walls.

### **Building Condition**

In the northern portion of the building, a large sinkhole has developed behind the seawall (upon which the west wall of the building is built). An approximately 5-foot by 9-foot portion floor slab on grade has collapsed into the hole, and it is evident that the void continues beyond the area of the floor collapse. It was impossible to determine the southerly extend of the void under the remainder of the building, but differential settlement of concrete slabs immediately south of the building indicate the possible presence of a second sinkhole void or continuation of the first. The sinkhole will continue to grow along and away from the seawall, at some point resulting in collapse of the building, until it is filled with cementitious grout to prevent further loss of soil. The larger or more numerous the sinkholes are, the sooner collapse will occur.

Sinkholes of this nature have occurred in other areas of the Port, adjacent to older seawalls or rock dikes. They are typically caused by tidal action over many years, with the ebb and flow of the tide percolating through the rock dikes and removing fine soil particles and eventually creating a significant void. As in the case of the Berth 44 Main Building, the sinkholes often go undetected under a concrete slab or asphalt paving until sudden collapse occurs. In cargo terminals this has resulted in large container handling machines falling into sinkholes. Flexible asphalt paving will sometimes exhibit a depression as a warning of a pending sinkhole, but rigid concrete slabs tend to fail suddenly and without warning. Current seawall and dike design include filter fabric to reduce the loss of fines to tidal action.

Repair of sinkholes involves removing pavement or slabs over the suspected void and excavating to ensure that the full extent of the void is found. The voids can extend a considerable distance from where the sinkhole is originally observed. After excavation, the void is filled with a cementitious slurry to protect against future loss of material and the pavement or slab is reconstructed.

Regarding the general condition of the building, the exterior wooden shiplap siding is mostly intact, with a few missing pieces. The light blue paint is in extremely poor condition and flaking over the entirety of the structure. Wooden roof boards are missing in some locations, and light is visible through the seams in the single-story areas. Light is also visible through the seams in the walls. Doors and windows are largely present and intact but boarded over. Exposed conduits and wiring and broken lighting fixtures are present in the shops. The concrete slab on grade floors are cracked and show evidence of settlement. The silo on the north side of the lumber shed has corroded through at the bottom, and the structure is leaning on the building.

Report by: James C. Brown – EngDiv

Attachment: 1. Photos P-1 to P-12 (6 Pgs.)  
2. Berth 44 Main Building – Recommendation plan



**P-1 (Exterior – North Side Lumber Shed)**



**P-2 (Exterior – N Side Lumber Shed, E Side Original Bldg, Silo)**



**P-3 (Exterior – East Side Lumber Shed, Office/Shop)**



**P-4 (Exterior – South Side)**



**P-5 (Exterior – South Side)**



**P-6 (Interior – Orig Bldg, West Wall, Floor, Sinkhole)**



**Port of Los Angeles**  
Engineering Division

**BERTH 44 MAIN**  
**BUILDING CONDITION ASSESSMENT**  
**FIELD OBSERVATION REPORT NO. 20-0903**  
PHOTOS TAKEN SEPTEMBER 3, 2020



**P-7 (Interior – Sinkhole, Seawall Visible)**



**P-8 (Interior – Machine Shop, South and West Wall)**



**P-9 (Interior – Wood Shop Floor and South Wall)**



**P-10 (Interior – Wood Shop Floor and Partition Wall w/ Machine Shop)**

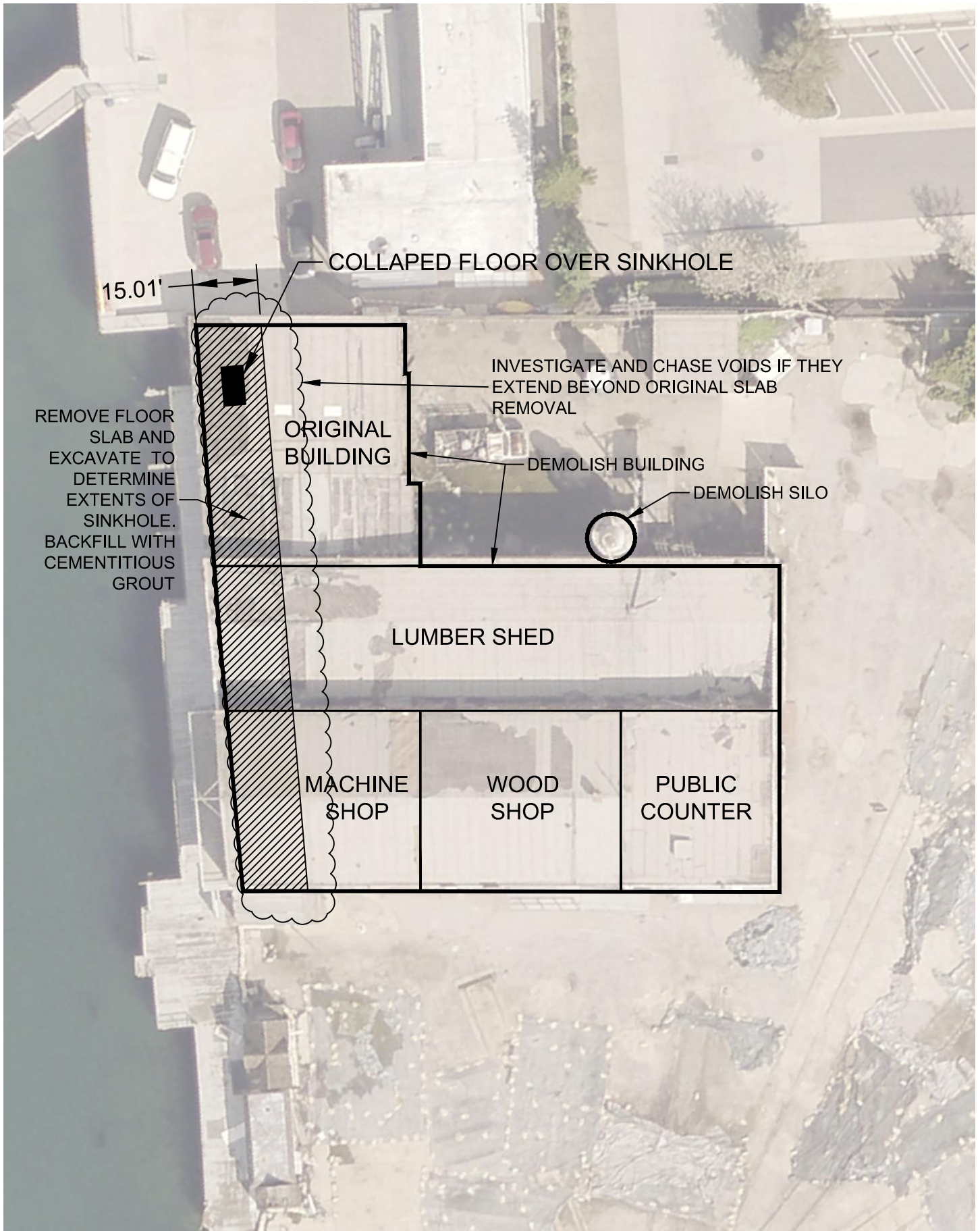




**P-11 (Interior – Wood Shop Floor and Partition Wall w/ Public Counter)**



**P-12 (Exterior – Conc Slabs along Seawall Directly South of Bldg)**



**BERTH 44 MAIN BUILDING - RECOMMENDED ACTIONS**