

LSU Health Sciences Center: Preparing for Restoration

The Problem

The multi-building campus of the Louisiana State University (LSU) Health Sciences Center in New Orleans, Louisiana, was one of the many properties impacted by the storm and floods of Hurricane Katrina. Though the Health Sciences Center buildings survived, they required extensive cleaning and remediation. A year after the storms, questions still remained about the suitability of the damaged areas for restoration and the potential for hidden damage or contamination.

Chelsea Group, Ltd., was retained by Duplantier & Meric, Architects, LLC, on behalf of LSU to observe conditions, collect samples, and obtain laboratory analysis of materials relevant to the recovery and future use of areas of the Health Sciences Center campus that were impacted by Hurricane Katrina. The primary concern of this project was to verify whether the buildings required further remediation or cleaning of building assemblies or materials, and to identify any potential for the presence of chemical or biological agents that would threaten the future use or pose concerns about environmental health and safety or disease transmission.



Chelsea Group assembled a team of engineers, materials scientists, and other experts, including specialists in-house and from Wiss, Janney, Elstner Associates, a global leader in construction problem solving. The team gathered at LSU to observe, conduct field tests, and collect samples for laboratory tests.

Chelsea Group Intervention

The Chelsea team conducted visual observations of both exterior and interior conditions in the lower floors of the ten buildings. Initial observation of building surfaces indicated typical and generally unremarkable debris and dirt. The visual survey observations included the following:



- Initial remediation after the storm was generally effective at removing debris and cleaning surfaces.
- Evidence was found of corrosive salt water damage to metal brackets that support granite panels; if the metal is not thoroughly cleaned or replaced, the granite panels will eventually fall off the walls.
- Stains at the flood line on exterior and interior granite do not appear to affect the structural integrity of the granite.

Chelsea Group then began to look for hidden damage. Chelsea Group's protocol involved destructive sampling and collection of materials from newly exposed surfaces. For example, all of the granite wall panel samples were collected from the unexposed side of the panel shortly after removal from the wall.

Similarly, samples of the base material and mortar beneath the pavers were collected immediately after the paver "core" was removed. Samples were collected from "hidden" water beneath some of the buildings. Care was taken to avoid the introduction of contaminants related to removing or exposing the sampled materials. Focus was on the surfaces not exposed to the general environment in order to minimize the impact that weathering and/or cleaning could have had on the residual materials.

The Chelsea team conducted field testing including frost point testing of insulating glazing units, pull-off strength testing of coating adhesion, tape adhesion testing of coatings and films, adhesive bond testing of pavers and tiles, and field chloride testing. Samples were taken for laboratory material studies including visual microscopy, petrographic examination, LECO sulfur testing, X-ray diffraction analysis, Fourier Transform Infrared Spectroscopy analysis, and water-soluble chloride testing.

Biological Sampling

The biological field sampling technique generally involved swabbing the surface of newly exposed material. In some cases, bulk samples of sand or mortar were collected for biological analysis. One bulk sample of flood water that had been recovered from one of the buildings was available for testing. The target biological contaminants selected for analysis included fecal bacteria, *Shigella* species, hepatitis A virus, *Giardia*, and *Cryptosporidium*.

Immediate Results: All samples were reported as "none detected," indicating no significant residual biological or sewage contamination in the tested buildings.

Chemical Sampling

The Chelsea team collected samples for chemical analysis by removing material directly from potentially impacted building components, such as granite wall panels, or material directly adjacent to the potentially impacted building components, such as sand from beneath a floor slab. The samples were analyzed for a slate of possible contaminants based on EPA recommendations, 39 total including 8 metals, 10 volatile organic compounds, 12 semi-volatile organic compounds, 2 common herbicides, and 7 pesticides.

Immediate Results: Tests showed no significant concentrations of chemical contamination, especially related to petroleum, agricultural, or industrial sources. Trace amounts of chromium were detected in a few samples, still significantly below any noted level of concern for this metal. Chloride was found in many areas; because it could cause damage to metal building components, Chelsea Group recommended cleaning or replacement of those components.



Building Structure Analysis



Potential corrosion due to chloride contamination is of particular concern in many of the buildings. For example, the hollow core steel door at the first floor level of a parking garage was more heavily corroded than the similar door at the second floor. It is possible that this heavier level of corrosion is related to the immersion of this door during the flood. Since the interior core of the door is filled with batt insulation, moisture in the core could wick upward, cyclical condensation could occur on the door's interior, and all interior surfaces of the door would be exposed to unusual levels of moisture. The chloride detected here will promote accelerated corrosion of the steel door.

Other flood-related defects identified in the buildings include

- Damage to interior gypsum-based plaster wall finishes
- Localized damage to coatings on wall surfaces
- Staining of granite cladding panels, both interior and exterior
- Loss of adhesion of opacifier film on spandrel glass
- Scratches in vision glass coatings
- Cracking and spalling of concrete parging
- Damage to wood furring elements in exterior wall construction

After planned renovations, the buildings can be occupied. However, without careful cleaning or repair, the long-term service life of some building materials and systems will be reduced. In some cases, replacement is recommended.

Final Results

Based on the extensive field assessments and the results of laboratory analysis of the samples taken at the Health Sciences Center campus, Chelsea Group found:

- No evidence of significant concentrations of the target biological agents related to sewage contamination in any of the materials collected
- No evidence of significant concentrations of residual contamination from the targeted 39 chemicals and compounds that would reflect petroleum, agricultural or other industrial sources impacting the buildings
- No evidence of likely environmental health impact from the targeted chemical and biological agents by occupancy of the buildings
- Based on these findings, further remediation would not be required for the targeted chemical and biological agents in any ongoing demolition or construction work

Chelsea Group provided some specific recommendations for repair and renovation:

- Where chloride contaminated metal building components such as doors and brackets, the components should be removed and cleaned or replaced
- Plaster finishes should be removed, replaced, and repainted
- Areas of localized paint failure should be cleaned, spot-primed, and topcoated
- Spandrel glass units with delaminated opacifier film should be replaced
- Localized areas of damaged parging should be replaced

Chelsea Group reported that there was no evidence of significant biological or chemical contamination and no need for further remediation on the Health Sciences Center campus. Building management could move ahead with plans to renovate and reoccupy the buildings, and tenants could be assured that they and the buildings faced no environmental health concerns. However, Chelsea Group findings related to the damage to window, wall, foundation, structure, and finish elements pointed to the need for much more extensive repair of the basic fabric of the buildings. These issues must be resolved to assure that the renovation will restore the buildings to their full utility and lifespan.