

TITLE

Retrofitting Industrial Grain Silos

An exploration into the concrete mechanics involved with modifying the concrete structure of cylindrical storage bins.

PROPOSAL

The objective of my research paper will be to examine what considerations need to be made in order to retrofit concrete storage silos into loft-style housing units. The structures themselves were built to resist unique loadings imposed by the lateral forces of the dry storage material. The circular shapes and honeycomb pattern were applied to maximize the volume and provide the most stable and efficient geometry.

The specific facility that will be examined is an old abandoned silo unit located in Montreal, Quebec. It was built in the late 1950's and 15 years ago, 1989, was decommissioned. A relocation of the industrial area further up river left this monumental structure empty and abandoned. Still because of its historical significance it remains standing as a symbol of the industrial era that used to exist in the area. Now, discussions are to be made to redefine the function of the building but at the same time preserve its identity.

To accommodate living units some major alterations need to be analyzed. Firstly, punching holes into the walls to allow for windows and doors to be installed. Then, because the cylinders stand nearly 100 feet high floor plates within each tube need to be installed and supported by the concrete shells. It is presumed that the lateral stability associated with the installation of floor plates will compensate for the holes punched into the walls. Hopefully this assumption can be verified.

The structure itself was in use for nearly 40 years and therefore exposed to some significant loading. The current condition of the concrete will need to be assessed along with the state of the reinforcing bars inside the walls. The cracking patterns and fracture mechanics related to the unique geometry will also be explored and considered for any alteration.

Ultimately, this paper will hopefully determine whether such a major adaptation is physically feasible and perhaps what are the limitations to the modifications.