

POWER PLANT

The original Power Plant at the Mendota Mental Health Institution, construction date unknown, had an adjoining Coal Storage Bin Building (CSB). The building consists of a slab-on-grade level where the coal was stored adjacent to the power plant and its boilers and an elevated slab, the level at which the coal cars traveled. With adjacent buildings and exterior grades, the CSB is essentially an underground structure. The CSB, which is approximately 63' wide in the North/South direction by 163' long East to West, has four (4) deep beams which run the length of the building. Two sets of railroad tracks were centered on the beams. Open coal chutes, built into the concrete slab, were centered between the deep beams and to each side of the beams for a total of six (6) chutes across the width of the CSB. Square concrete columns spaced approximately 13 feet on center support the deep concrete beams. Additional beams spanning North/South run between outside foundation walls and the columns and between columns and a central concrete wall which extends the length of the CSB to divide it into two equal halves. The Coal Storage Bin Building, the focus of our restoration, has undergone numerous changes since the original construction.

Building plans from 1954 indicate that minor modifications were made to the original Power Plant and the CSB at the time of the construction of a new Steam Generating Plant. Some changes were made updating the tracks, indicating the CSB remained in use as coal storage as it did under the original construction.

Plans from 1963 show changes made to the original Power Plant and CSB, converting these spaces into a Service Building. Drawings, no date found, assumed to be from 1962 based on a project number found on the plans, detail the addition of permanent steel shoring posts and steel beams within the CSB, presumably to strengthen damaged framing elements. These plans also provide details for in-filling the open coal chutes between the grid of concrete beams. Details also show the placement of an exterior concrete stair rising just over three (3) feet from the top of the coal car slab to an entry into the upper level of the original Power Plant.

At some time, following work completed in the early 1960's, restoration was completed on approximately 75 feet of the Eastern end of the CSB. Observations made from the slab-on-grade below the structure noted restored undersides of concrete beams. It was also noted that the elevated structural slab had been replaced full depth between beams in an area of the Southern half at the Eastern end. This could be determined by observations of plywood form marks on the underside of the replaced slabs and the concrete run down at the intersection of the slabs and beams. The Northern half of this Eastern end, from the center concrete wall to the North exterior wall, was filled in and abandoned as storage space. The train rails at the restored Southern end of the CSB were left in place.

The focus of the current review was the areas of the CSB West of the previously restored structure. Some assessments of the previous underside repairs were also made. This survey looked at the underside of beams and slabs and at columns and walls on the interior of the CSB. It also reviewed the exterior concrete walls, to the degree possible, the top of the slab and the two concrete stairs on the slab adjacent to the original Power Plant.

The concrete beams which span from the exterior walls at the North and South side of the CSB to the first interior beam lines are all severely spalled. These beams are 10" wide; all other beams are 20" wide. The slabs between these beams are also badly deteriorated. Lesser amounts of concrete spalling were present on the other beams. There are concrete spalls around many of the in-filled coal chutes and signs of leaking. There is some cracking and spalling on concrete columns and walls. Cracks and spalls at the interface of some beams and concrete walls seem to indicate that there was a lateral shift in the structure at some time. The concrete beams look like they are pulling out of the walls into which they are bearing. This could have occurred as a result of the dynamic loading from the rail cars and the coal dumping process. It was observed that there is some cracking and spalling within the concrete patching from the previous restoration.

The exterior grade at the West end of the CSB slopes sharply from North to South, exposing slightly more than half of this exterior wall. The grade at the North side of the CSB is only slightly below the top of the upper structural slab while the short section of wall at the South which runs from the West wall to the wall of the original power plant is near the level of the lower slab-on-grade of the CSB. Two (2) small windows were placed within the West end wall. From the exterior the observable area of the West wall is in very poor condition. The wall is crumbling in layers of concrete. Large cracks, both vertical and horizontal, extend through the wall. A major steam line runs to the West, through the wall near the lower Northwest corner. Steam lines also run overhead approximately 20' East of the West wall.

Portions of the Eastern end of the top side of the CSB slab currently is covered with a black elastomeric membrane. The waterproofing had also been placed over the concrete joints of the in-filled coal chute slabs. The top of the slab is at the top of the rails, assumed to be 6" above the tops of the concrete beams. There were cracks and delaminations present within the concrete slab. The Eastern concrete stair is severely cracked and crumbling. The Western stair is in good condition.

The proposed restoration of the CSB includes the removal and replacement of the concrete slab. Train rails centered on the four (4) deep concrete beams are to be removed. Tops of the concrete beams are to be roughened and any deterioration detected is to be restored in preparation of the placement of a new slab. Rebar dowels are to be placed into the concrete beams to facilitate transfer of loads from the new slab into the beams. Steel pipe columns on new footings are proposed to be placed below the West end of the four (4) deep concrete beams which currently bear on the Western end wall. This is proposed to be done in preparation of the removal of the West wall. Soils are to be excavated at the exterior of the West end wall in order to access and remove this wall. Care will need to be taken to prevent damage to the buried steam line. The West end wall shall be demolished and replaced from the top of the existing footing to the underside of the elevated structural slab. The return walls at the North and South corners of this wall will need to be repaired and prepared for the tie-in with the replaced West wall. Soils are to be replaced at the newly cast West wall. New concrete stairs will be constructed on top of the replaced CSB slab.

Concrete restoration to the underside of the CSB structure will include removal and replacement of deteriorated concrete on the underside of concrete beams, and on columns and walls. Cracks on interior walls that are non-bearing or not posing any structure concerns can remain as they are. Aesthetics are not a key concern.

The estimated cost for the restoration work described above is \$338,140.00. This is outlined in the attached tabulation. This work does not include placement of new windows in the replaced West concrete end wall. It also does not include any electrical, mechanical or plumbing that may currently be suspended from the underside of the structure. Currently there are heaters and conduits suspended from the underside of the structure which appear to be non-functional, abandoned in place.

The work as outlined could be separated into items that can stand alone and be completed at this time independent of the other work. These items include the underside repair to concrete beams and restoration work at columns and walls. The estimated cost for these work items is \$35,750.00 plus mobilization. The cost for placement of the four (4) columns and footings near the West end of the CSB is estimated to be \$3,000.00. The remainder of the work can then be budgeted for a future repair phase.

LORENZ HALL LOADING DOCK

The structural review at Lorenz Hall was limited to an area of the level below the loading dock. The review was made of the underside of the concrete beams which frame an opening in the loading dock slab. The opening, which has since been in-filled, provided access for moving equipment into and out of the building for the mechanical room below.

The opening was in-filled by anchoring steel angles to the concrete beams that surround the slab opening. Metal deck, supported by the steel angles, was placed across the open slab area at an elevation comparable to the elevation of the bottom of the slab of the loading dock. Concrete was placed over the metal deck to the elevation of the top of the adjacent surrounding loading dock slab. A membrane had been placed over the concrete slab.

The majority of the damage consists of concrete spalling on the underside of the concrete beams which surround the former slab opening. This spalling most likely was caused by the use of de-icing salts used on the loading dock slab. The salt, calcium chloride, attacks the embedded steel causing it to corrode. The expanding rust creates an internal pressure which breaks the bond of the concrete and the encased steel reinforcing. This then results in the concrete breaking away from the beam, which was observed from the underside of the structure.

Other deterioration detected included some minor cracking and spalling at the top of the building foundation wall that flanks the tunnel system below the sidewalk next to Lorenz Hall. This deterioration exists at the location where the wall ends to provide an opening from the tunnel into the space below the loading dock. Some slab cracks and signs of moisture were observed from below the loading dock. The outside foundation wall below the loading dock has a large crack near the floor level. There are rust stains around the crack, which would indicate some corroding reinforcing in the wall, and signs of water on the lower level floor slab near the crack. There are also water stains on the wall of the tunnel. This wall is the foundation for the building above and the water leakage indicates that the sealed joint between the building and the sidewalk above has failed.

Restoration at the underside of the loading dock at Lorenz Hall will begin with the repair of the spalled concrete beams at the former slab opening. This will include removal of the damaged concrete at the underside of the beams. The corroded reinforcing and newly exposed surfaces of the concrete will require a deep sandblasting to remove the rust from the reinforcing and any loose concrete chips from the removal area. The exposed concrete surface and rebar will be coated with a bonding agent prior to placing the new concrete patch material. There is an estimated ten (10) square feet of concrete spalls at the beams adjacent to the former opening. The wall repair will be similar to that described for the concrete beams.

Restoration at the top of the slab will include cleaning the joint around the in-filled slab and applying a joint sealant. New membrane placed over the in-filled slab would overlap the joint to add protection to the sealed joint and provide protection against water infiltration.

The wall crack should be monitored. If this is actively leaking, the crack could be injected with epoxy or a material by the name of Xypex which reacts with water. Both the epoxy and the Xypex would be placed in the crack. The joint between the building and the sidewalk at the tunnel wall below should be closely reviewed. It may be that this joint can simply be cleaned of any existing materials, properly prepared and a new backer rod and sealant material placed.

The estimated cost for the restoration at the former opening is estimated to be \$3,000.00. This includes \$1,500.00 for concrete repair, \$500.00 for preparation and placement of new sealant around the in-filled slab and \$1000.00 for the preparation and placement of membrane over the immediate area of the slab in-fill. These numbers include the contractor mobilization and project set-up and dust protection.



**JSD PROFESSIONAL SERVICES, INC
POWER PLANT-COAL STORAGE BIN BUILDING (CSB)
OPINION OF PROBABLE RESTORATION COSTS**

Item No.	Description	Est. Quantity	Unit	Unit Cost	AMOUNT
1 .	Mobilization	1	LS	\$8,000	\$8,000
2 .	Concrete Stair Removal	2	EA	750	1,500
3 .	Place Steel Columns and Footing Below Concrete Beams	4	EA	750	3,000
4 .	Excavate along West Wall and Wall Returns; Backfill After Construction of New Wall	100	CY	100	10,000
5 .	Demolition of West Concrete Wall	720	SF	25	18,000
6 .	Concrete Slab Removal	4,560	SF	20	91,200
7 .	Chip off tops of Concrete Beams and Walls	1,590	SF	15	23,850
8 .	Remove Existing Train Rails	424	LF	10	4,240
9 .	Drill in Dowels in Tops of Beams	200	EA	25	5,000
10 .	Place Concrete Wall at West	720	SF	30	21,600
11 .	Place Concrete Slab over Prepared Beams	4,560	SF	25	114,000
12 .	Place Concrete Stairs	2	EA	1,000	2,000
13 .	Removal/Replacement of Unsound Concrete at Underside of Beams	250	SF	75	18,750
14 .	Removal/Replacement of Unsound Concrete on Walls	150	SF	70	10,500
15 .	Removal/Replacement of Unsound Concrete on Columns	100	SF	65	6,500

TOTAL \$338,140

NOT INCLUDED

Windows at West Wall

Electrical or Plumbing Suspended from Slab Underside

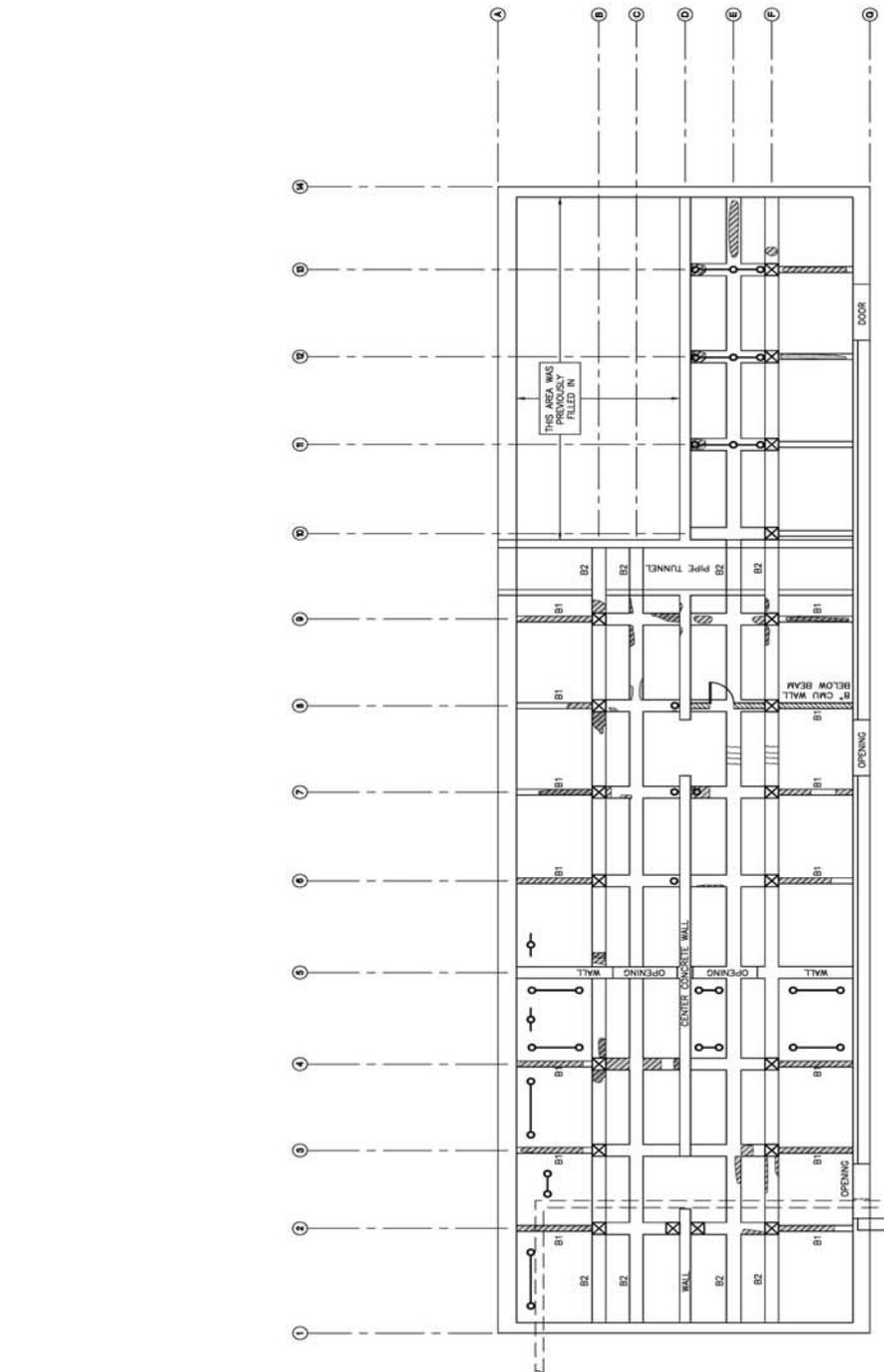
Pipe Support/ W Windows \$8,000
Lorenz Hall Dock Repair \$3,000
TOTAL \$349,140

ASSUME \$350,000

<p>In providing Opinions of Probable Costs, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over conditions or the Contractor's method of pricing, and that the Consultant's Opinions of Probable Construction Costs are made on the basis of the Consultant's professional judgment and experience. The Consultant makes no warranty, expressed or implied, that bids, quantities, or negotiated costs of the Work will not vary from the Consultant's Opinion of Probable Construction Cost.</p>

LEGEND

- PREVIOUS PATCH
- PROPOSED REPAIR PATCH
- STEEL FRAMING PROPOSED TO BE ADDED BELOW SLAB, COLUMNS & BEAMS
- VERTICAL CRACKS



ORIGINAL POWER PLANT

north

UNDERSIDE BEAM PLAN
 SCALE: 1/8" = 1'-0"

