CYS

STRUCTURAL ENGINEERS INC.

ICELAND ARENA SACRAMENTO
WALL SAFETY
STRUCTURAL REPORT

FOR
ROB KERTH

1430 DEL PASO ROAD
SACRAMENTO, CA

DECEMBER 4, 2010

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CYS Job No. 10092

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Purpose:

1. Perform an investigative structural analysis of exterior cast-in-place concrete walls and integral columns that will be self-supporting for horizontal loads imposed by wind and seismic forces.
2. Produce a written report which describes the current configuration and conditions of the walls & columns and their supporting foundations and their capability to perform safely in their current free-standing condition. Included in the report will be a listing of any structural safety deficiencies presented by the free-standing walls and written descriptions, but no drawings, of suggested mitigations to correct the deficiencies.

Basis of Report:

This report is based upon the following:

1. CYS on-site inspections of the existing walls, columns and their support foundations.
2. Wallace Kuhl & Associates non-destructive testing to determine the existence of and locations of reinforcing bars within the walls, columns and foundations, November 10, 2010 Report attached.
3. CYS inspections to determine the condition, locations and sizes of existing reinforcing bars that had been exposed by removal of concrete cover for that purpose at strategic locations.
4. CYS investigative structural analysis of the free-standing walls & integral columns and their support foundations.
5. An undated "Revised" Floor Plan drawing prepared for Wm. J. Kerth by Chas. F. Dean, Architect.

Arena Configurations & History:

Initial Arena Configuration & Recent History:

The arena was designed and constructed, reportedly in the early 1940's, as a 90 ft by 150 ft. enclosed Ice Skating Rink with approximately 14 ft. tall cast-in-place concrete exterior walls and a wood-framed roof supported on heavy timber 'Barrel' trusses that spanned the 90 ft dimension of the building. The trusses were spaced 15 ft o.c. and supported on 20" sq. concrete pilasters that are cast-in-place monolithic with the 8" thick concrete walls. The pilasters support on 20" wide rectangular foundations that were confirmed to project about 52" inward and are presumed to project outward a like amount from the face of the pilaster.

The Ice Rink had been functioning actively until an arson-set fire destroyed the wood-framed roof structure and parts of the wood-framed floor system that existed between the oval-shaped ice rink and the exterior walls. The fire debris and all of the wood floor framing between the ice rink and exterior walls has been removed down to the ice rink piping and the ground surface at locations between the rink oval and the exterior walls. The ground surface at those locations is about 36" to 42" below the ice rink surface. The rink is surrounded by a concrete retaining wall.

The signature 48" wide by approximately 15 ft tall sign that cantilevers up from the front wall was not attached to the wood roof system and suffered no damage or deformation other than some paint scorching.

Current Wall Configuration and Condition:

The exterior concrete walls and their integral pilasters are currently free-standing with approximately 12.4 ft to 14.4 ft of exterior vertical exposure at the two long sides, 14.4 ft. of exterior exposure at the alley, (rear) side and 18.7 ft of exterior exposure at the Del Paso Blvd., (front), side. The interior vertical exposures for the walls are approximately 18.4 ft. at the rear wall and two side walls and about 20.7 ft. at the front wall. Concrete slabs-on-grade exist tight against and bracing the walls at the two long sides and front wall and asphalt pavement occurs tight against the rear wall.

Following are descriptions of superficial damage that was caused to the walls by the fire, but our professional opinion is that none of that damage is detrimental to the structural safety performance of the walls:

- Concrete cover was spalled at several wall opening heads, exposing reinforcing bars there. The owner has since provided paint protection for the bars and their lack of encasement in concrete does not effect the structural performance of the walls.
- The two side walls were pulled inward slightly at the top when the roof system crashed down. As a result, a 1/8" to 3/16" wide horizontal crack exists at the exterior surface of each side-wall pilaster at the original construction joint, located just above the exterior grade. The cracks indicate that the exterior vertical reinforcing bars in the pilasters were stretched in-elastically at that location, but no evidence was found that any bars were cracked or fractured. Therefore, they should be dependable to provide their full original structural capacity.
- Some diagonal wall cracks are visible, propagating from opening corners typically. They are most likely long-term volume-change cracks caused by initial concrete shrinkage and/or thermal variation of the concrete dimensions.

Arena Wall Structural Systems:

The exterior walls of the arena are all 8" thick cast-in-place concrete with two curtains of #4 bars spaced each way at 16" o.c. typically. The pilasters at the two long side walls are 20" sq. concrete, cast-in-place monolithic with the 8" walls, and reinforced with #8 or 1" sq. vertical bars and #3 ties spaced at 12" o.c. typically. Pilasters at the rear wall are cast-in-place 16" sq. and most of the front wall pilasters are 28" wide by 16" deep, (exterior to interior). The pilaster foundations are rectangular as noted above, 20" deep typically, and were determined to have a bottom layer of reinforcing, size and number undetermined.

Summary of Findings:

Our analysis indicates that the free-standing walls and their integral pilasters will, in their current configuration and condition, perform in a manner that provides acceptable life-safety for occupants within the arena and in close proximity to the exterior of the arena. Our professional opinion is that no structural remedial work is needed at this time for the life-safety performance of the free-standing walls.

Two steel 2.5"x8" channels are located in the corners of the gauge-metal clad sign that cantilevers up from the front wall. The channels are well imbedded into the large pilaster/fireplace chimney below and that large pilaster is more than adequate to resist lateral loads imposed on the sign.

Evaluation Method:

We performed our investigative structural analysis imposing horizontal Seismic and Wind forces required by the 2007 CBC for the site. An 85 mph wind speed was used and exposure C assumed. We assumed 3,500 psi strength for all of the concrete since an original document had called for a six-sack concrete mix, great effort was needed to chip into the walls and pilasters, and the degree of consolidation and overall appearance of the concrete is exceptional. Reinforcing steel strength was assumed to be 33,000 psi, standard for that vintage. An allowable soil pressure of 2,000 psf, increased by one-third for short term loading, was used for the fine-grained, stiff, silty-sand soil observed at the foundation depths.

Recommendations:

As indicated above, our opinion is that no structural remedial work is required for acceptable life-safety performance of the existing free-standing walls. We do recommend that some work be performed eventually to provide protection for reinforcing steel. The cracks at the base of the side-wall pilasters definitely should be sealed to provide protection against corrosion damage to the vertical pilaster bars that cross the crack.

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November 19, 2010

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ICELAND SKATING RINK BUILDING EVALUATION
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WKA No. 8966.01

As authorized, Wallace-Kuhl and Associates (WKA) has provided non-destructive testing services to determine the approximate reinforcing steel (rebar) layout in portions of the existing Iceland Skating Rink building. The purpose of our work has been to provide information to CYS for use in structural evaluation of the building.

On November 11, 2010 our representative met at the site with CYS to perform non-destructive testing. Using a Protovale Rebar-Plus pachometer, we determined the approximate location of near-surface rebar within the concrete walls, pilasters and footings as described below.

West Wall and Pilasters

We checked several locations in the south half of the eight-inch-thick west wall. There were two mats of rebar present, with approximately one to two inches of concrete cover from each face of the wall. The wall rebar is spaced at approximately 16 inches on center each way. We did not detect significant difference in signal strength above and below the construction joint near the bottom of the wall that would indicate significant lapping of the vertical rebar.

The approximately 20-inch wide pilasters we checked had three relatively large vertical bars on the outside face; one near each corner and one near the center of the face. Confining hoop steel was also present, spaced at approximately 12 inches on center. The pilasters also had three large vertical bars on the inside face of the wall at the locations we checked.

East Wall and Pilasters

We spot checked several locations along the east wall and pilasters and found similar rebar present. However, the approximately 16-inch wide east side pilasters only had two larger vertical bars near the corners of the outside faces.

Front Wall Footing, Beam and Pilaster (Del Paso Road side)

We checked the first footing in from the west end of the front wall. Rebar was present approximately three inches above the bottom of the footing concrete on both sides.

We also checked the first pilaster / column in from the west end of the front wall. Below the street level there is a wall / pilaster system. The wall is approximately eight inches thick with rebar spaced at 16 inches on center each way, with approximately one to two inches of concrete cover on the inside face. The pilaster is approximately 16 by 16 inches, with large, wide vertical bars at each corner and confining steel hoops spaced at 12 inches on center.

Above the street level the pilasters transition to columns between openings, with the same rebar continuing upward. The columns have extra unreinforced concrete added at each side to achieve a total concrete width of approximately 28 inches. The beams above the openings in the front wall are approximately 16 inches wide with three longitudinal bars and confining steel hoops spaced at 12 inches on center. The beams had what appeared to be a lightly reinforced concrete extension on the front side approximately 10 inches wide that did not yield clear rebar readings on our instrument.

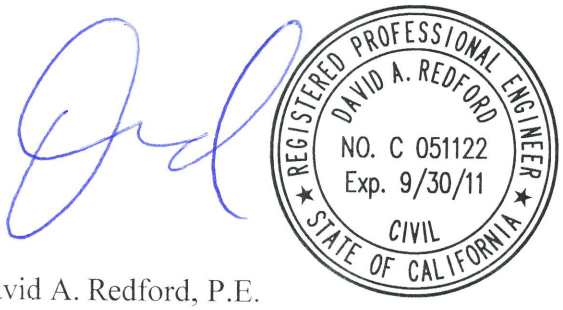
South Wall and Pilaster (Alley side)

The south wall was very similar to the east wall, with four large vertical bars near the corners of the 16-inch wide pilasters. We detected extra vertical jamb bars at both sides of the window and door openings we checked. The pilaster vertical bar was exposed at the southwest corner, with a diameter of one-inch.

All of the dimensions described above are approximate and the spacings are an average, with relatively minor local variations found. In general, the concrete appeared to be in relatively good condition without excessive honeycombing, cracking, or erosion of the cement paste. We understand rebar sizes and layout will be confirmed with limited concrete removal by others.

Please contact me if you have any questions or require further information.

Wallace - Kuhl & Associates



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