Since 1975

Portland State University
511 S.W. Montgomery
Portland, OR 97201
Attn: Mike Gipson

Re: Structural Evaluation of PSU Swimming Pool

Dear Mike:

Enclosed are the evaluation documents and the physical survey that the SJO team completed on the PSU swimming pool. The purpose of this survey was to document current conditions for future reference and to provide a repair plan after structural evaluation.

The results of this study indicate that the pool is in better condition today than at the time of the last repair job in 1987. However, additional repair and inspection is now required as preventative maintenance to maintain the integrity of the pool.

The enclosed drawings will be provided on disk for your records and for future reference, if additional problems arise. We recommend the repair options be implemented as soon as possible.

We appreciate the opportunity to provide facility support engineering services to PSU.

Sincerely,

Richard S. Fitterer, P.E.
Principal

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encls.
STRUCTURAL EVALUATION
OF
PSU SWIMMING POOL LOCATED IN
PHYSICAL EDUCATION BUILDING

August 25, 1999

Prepared For:
Portland State University
Facilities Department
511 S.W. Montgomery
Portland, OR 97201

Prepared By:
SJO Consulting Engineers, Inc.
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1902 S.E. Morrison
Portland, OR 97214
August 24, 1999

Portland State University
Facilities Department
511 S.W. Montgomery
Portland, OR 97201

Attn: Mr. Mike Gipson

RE: Engineering Services to Evaluate the PSU Swimming Pool for Structural Integrity and Recommendation for Improvements
Our Job #9951

1.0 Verification of Existing Conditions

Per our proposed scope of work we have surveyed the existing pool structure.

A. From the exterior side (basement area) on August 5, 1999.
B. From the interior (first day after the pool was drained) on August 23, 1999.

We have recorded our findings on the attached plans (see sheets S-1 and S-2). These findings are not alarming and the proposed methods of repair should provide the structure continuous serviceability.

A. On the outside, there are signs of seepage which is leaching out the lime from the concrete walls. Most of the lime deposits are fully white in color and only a few have minor brownish discoloration, which is a sign that the water came in contact with the reinforcing and has created some surface rust. We did not see any dark rust colored lime deposits, which is an encouraging sign.

B. On the inside we noticed heavily reeded grout joints, and in some areas loose tiles due to the disappearing binding (grout) material. Only one area at the Southwest corner of the pool has an approximately five (5) ft. long hairline crack showing on the surface of the tiles.

Overall the swimming pool structure is in better condition than before the 1987 reconditioning/repair. Naturally we are unable to perform a more accurate survey at the bottom of the structure (which is directly supported by the soil). The inside
surface is fully covered by tiles and the inspection would require removal of them all. This is both economically and schedules wise unacceptable.

2.0 Review of Repair Options

The following tasks need to be performed:

A. On the outside:
   - Scraping off the lime deposits and cleaning off the concrete surface to expose of the center of seepage.
   - Injecting epoxy into these areas to plug the established water conduits.
   - Surface treatment of the total wall area with Xypex.

B. On the interior:
   - Remove broken and loose tiles.
   - Chisel a V groove with about one and one-half (1 1/2)-inch depth, centered on the crack. Apply one slurry coat of Xypex “concentrate” at the rate of 1.5 lb./sq.yd. Then fill slot to surface with Xypex “concentrate”.
   - Clean entire area, tile surface and especially existing grout surfaces to remove any loose or possible contaminating material.
   - Replace missing tiles (as much as possible tiles to match existing).
   - Regrout entire pool with high quality, long life expectancy grout material.
   - Seal all grout surfaces.

The “Xypex” brand material can be substituted with “Vandex” super (gray) cementitious penetrating waterproofing (Vandex Super, Vandex Mortar: 1/4 - 3/8 inch thickness and Vandex Plug). However, its application seems to be more expensive. There are two reasons we propose “Xypex”:

1. Good experience at previous projects.
2. Relatively inexpensive.

3.0 Name, Address and Phone Numbers of Recommended Contractors

- Grout America
  Grout Contractor
  Address unavailable
  Contact: Steve Johnson
  252-7613
• Western Waterproofing 239-7075
  Chemical Grouting (epoxy injection)
  4950 SE 25th St.
  Portland, OR 97202
  Contact: Rich Fletcher
  Note: This construction company bought out Adhesive Engineering, the contractor of the 1987 repair work.
  They are good!

• Ad Tech 631-4815
  Chemical Grouting & Tile Work
  21594 South Spring Water
  Estacada, OR 97023
  Contact: Lynn Peterson

• Jim Caudle Pools 408-8073
  Pool Contractor
  4648 NE 97th Avenue
  Portland, OR 97220
  Contact: Jim Caudle

• Medford & Meyers 669-5307
  Pool Contractor
  Address unavailable
  Contact: Dan Medford

• Greg Height 236-8656
  Pool Contractor

• Little Chemical Company 255-7652
  Grout Contractor

• Allied Building Products 256-5544
  "Xypex" Product
  Mobile: 348-0790
  11305 NE Marx
  Portland, OR 97220
  Contact: Chris Ferguson
4.0 Construction Assistance

We recommend that we inspect the cleaned off surfaces before the epoxy grouting takes place to verify the extent of the cracks and to take appropriate remedial measures if necessary.

We trust our report will enable you to start the repair work and have the pool structure in good, serviceable condition.

We thank you again for the opportunity to work with you on this project.

Sincerely,

[Signature]

Julius Horvath, PE
CRACK AND FAULTY CONSTRUCTION JOINT REPAIR
AGAINST A FLOW OF WATER

SECTION D - HIGH HYDROSTATIC PRESSURE WITH MINIMUM WATER FLOW -

STEP 1 Rout out crack/joint in a "U" shaped slot 1 inch wide and 2½ to 3 inches deep. A "V" shaped joint is not acceptable. Areas with the most water flow should be identified and chipped slightly deeper. Using a chipping hammer or scabbler, scuff a strip 6 inches wide on either side of the slot.

STEP 2 Remove all loose material and saturate dry areas with water. Allow water to soak in and then remove all surface water.

STEP 3 Apply one coat of Xypex "Concentrate" at a coverage of 1 1/2 pounds per square yard into the slot and on a strip extending 6 inches on either side of slot. If a flow of water is present, brush whatever surfaces mentioned above that are not covered by water. Application may be performed by hand or by brush.

STEP 4 Fill complete length of slot to 1 1/4 inches below surface with a Xypex Ultra-Plug. An Ultra-Plug is made by mixing Xypex "Ultra" powder with Xypex "QuickSet" liquid accelerator in a ratio of 1 to 1 by volume. Concentrate efforts on worst spots; working away from them along the slot. For applying Ultra-Plug on areas of extreme hydrostatic pressure, it may be necessary to mix the Ultra-Plug so that it sets faster. This is accomplished by adding LESS "QuickSet" to the mixture.

STEP 5 Apply a slurry coat of Xypex "Concentrate" at a coverage of 1 1/2 pounds per square yard over the Ultra-Plug.

STEP 6 After slurry has begun to set, fill slot to surface with Xypex "Concentrate" Dry-Pac. A Dry-Pac is mixed by adding 1 part clean water to 6 parts "Concentrate". Blend by trowel for 10 to 15 seconds only. Lumps SHOULD be present in mixture. Apply Dry-Pac by hand followed by compressing tightly using a pneumatic packing device or a hammer and block. The Dry-Pac should be applied before the Ultra-Plug is 20 minutes old.

STEP 7 Wet the Dry-Pac lightly with water, then apply a slurry coat of Xypex "Concentrate" at 1 1/2 pounds per square yard over the repaired area.

STEP 8 For curing, fog spray periodically with water for two days, or apply Xypex "Gamma Cure" immediately after the slurry coat has set.