September 15, 2004

Mike Schuetz, P.E.
University of Alaska, Fairbanks
Division of Design and Construction
P.O. Box 757380
Fairbanks, AK 99775

Subject: State Parking Garage
"Quick Look" Condition Survey

Dear Mr. Schuetz,

On September 9, 2004, USKH personnel visited the above subject building to note the condition of the facility. Present from USKH were Gary Pohl, AIA (Architect); Greg Liebl, PE (Structural Engineer); Scott Bell, PE (Mechanical Engineer); Phil Schaeffer, PE (Electrical Engineer) and Marty Woodrow (Hazardous Material Abatement Specialist).

Our assessment of the facility was limited to visual observations of the building and was cursory in nature, not a detailed review. Larry Crouse, with DOT building maintenance was present and facilitated us with our site visit.

The State Parking Garage was constructed in 1975 as an enclosed parking garage. The first and second levels are enclosed. The third level is not enclosed and does not have a roof.

Architectural

<u>Exterior Envelope</u>

Note is made that the building was originally designed to function as a heated parking garage, with exterior walls being insulated foam core panels, and the top parking level slab being a sandwich assembly of structural slab, high density rigid foam insulation, waterproof membrane, and topping slab. However, the design never functioned as intended, and heating systems were turned off, although ventilation of the enclosed areas was still required to remain operational.

Roof surfaces inspected appear to be built-up roofing with an emulsion coating. The roofing appears to be the original construction, and at 30 years of age, the general condition is poor, with heavily alligatored sections. The roof membranes and emulsion, although installed in approximately 1974, may contain asbestos fibers, and should be tested prior to removal.

Parking deck upper surface (topping slab) is severely cracked throughout. Areas around several of the drains are significantly spalled, and the drain perimeters are higher than the adjacent surfaces, and water has obviously been infiltrating into the layers between the topping slab and the insulation and structural deck below. This is further evidenced by water stains and efflorescence that is visible on the concrete structure and decks below. In addition, water has been reported to run down onto the interior floor surfaces and then freeze, creating difficult driving and walking conditions.

Roof level curbs are cracked. Caulking failure and spalling of the concrete is present at the mechanical room door thresholds. Both conditions provide further avenues for water infiltration.

The existing exterior metal wall panel system and components appear to be functional. Some damage is noted in a few areas.

The suspended plaster soffit located above the vehicle entrance on Barnette Street has been partially removed, leaving the unfinished area above exposed. Some of the insulation boards have come loose and fallen off.

Finishes

The exterior finish and appearance of the existing metal wall panels and flashings are acceptable, but substantial sections of paint flaking are present on the parapet and wall flashings. The parapet flashings appear to be galvanized sheet metal that was field painted, as opposed to a coil coated material. Preliminary swab tests for the presence of lead paint were negative.

The lower exterior walls are painted concrete, and are in acceptable condition. Preliminary swab tests for the presence of lead paint were negative.

Red colored enamel paint has been used for interior metal railings, and hollow metal doors and frames. Although preliminary swab tests for the presence of lead paint were negative, it is suspected that lead chromate is present in the paint, based on the color and build of the paint. Swab tests do not immediately detect lead chromate, and further testing is recommended.

Existing suspended ceiling tiles in the southwest corner of the garage at the elevator lobbies is heavily water stained, and in addition, does not meet current seismic code restraint requirements.

Building Code

The existing guardrails and handrails in the stair wells are not in compliance with the 2003 International Building Code (IBC) or the Americans with Disabilities Act Accessibility Guidelines) in the following areas:

1. Handrails do not extend a minimum of 12 inches past top landing. (IBC 1009.11.5)
2. Handrails do not return to wall. (IBC 1009.11.5)
3. Spacing of balustrades does not prohibit passage of a four-inch sphere. (IBC 1012.3)

Hazardous Material

The following were identified as possible asbestos concerns:

- All cement joint compounds and expansion joints
- Tape at ductwork connections
- HVAC expansion joint at ceiling (square ducts)
- Seal between concrete decking and insulated wall. (located at ceiling by phone company generator)
- Exterior sofit joint compound, if any.
- Joints between exhaust and supply fans to ductwork
- Roofing mastic
- Hard fittings in mechanical rooms have already been tested, are labeled and are of no concern

The following were identified as possible lead concerns:

- All paint on walls, beams, piping, and mechanical equipment.
- Lead may also be present in piping joints.

Architectural Recommendations

The following recommendations assume that the facility will continue to be operated in an unheated mode.

1. Moisture Damage Control
   The most urgent consideration is that of continuing deterioration of the top level slab and potential harmful infiltration of water into the structure. Signs of water infiltration and damage are apparent at various locations. Since the structure is now operated in unheated mode, moisture remaining within interstitial spaces

can have a deleterious effect on the structure. One option would be a comprehensive repair of the top level to remove the fractured topping slab and damaged insulation, and repair/reseal the waterproof membrane and reinstall new insulation and topping slab. However, it may be more cost effective and practical to install an upper level roof covering over the entire 38,000 square foot area. This is what was done on the new City of Fairbanks Block 39 Transportation Center, and in addition to simplifying the means of intercepting and diverting water from entering the structure, the roof would eliminate the need to undertake snow removal. The existing topping slab would still require repairs, but they would likely be surface type repairs.

Cost Estimate:

- Installation of an upper level roof covering 38,000 square feet at an estimated cost of $40.00 per square foot would be approximately $1,500,000.

2. Roof Replacement

The roofing systems at the small roof areas located over the mechanical rooms and at the lower level canopies should be removed and replaced.

Cost Estimate:

- Removal and replacement of roughly 1,000 square feet at an estimated cost of $25.00 per square foot would be approximately $25,000.

3. Stair Handrail Replacements

The existing non-compliant railing systems at all three stairwells should be removed and replaced with new railings.

Cost Estimate:

- Removal and replacement of the railing systems would be approximately $40,000.

4. Exterior Refurbishment

The exterior parapet flashings should be removed and replaced with prefinished flashing materials, as the existing flashings will continue to flake if repainted. Other flashings should be checked and replaced where damaged. The area over the main vehicle entrance/exit where the plaster soffit has been removed should be repaired and replaced.

Cost Estimate:

- Removal and replacement of roughly 1,000 square feet of exterior flashing at an estimated cost of $10.00 per square foot would be approximately $10,000.

5. <u>Interior Finish Upgrades</u>
The suspended ceiling system in the south elevator lobbies should be removed and replaced, but not until after completion of moisture intrusion repairs as recommended in Item 1 above.

Cost Estimate:
- Removal and replacement of 500 square feet of suspended ceiling system at an estimated cost of $10.00 per square foot would be approximately $5,000.

Structural

The parking garage is a concrete structure with floors and roof formed with cast-in-place "flat" slabs spanning to pre-cast concrete girders supported on cast-in-place concrete columns. The building utilizes cast-in-place concrete shear walls for lateral resistance for wind and seismic loads. The building is "structurally" divided in half with an expansion joint running east-west in the center of the building. Small mechanical spaces at the roof level are framed with metal deck and structural steel. We assume that the building is founded on conventional spread footings and the lower level floors are constructed as "slab-on-grade". It appears that the building was designed to accept future levels, as concrete columns were extended above the present roof level with reinforcing exposed for future splicing.

The structure in general appears to be in good condition with no signs of significant structural distress. There is moderate cracking in the lower level floors that are presumed to be constructed as "slab-on-grade". The most significant problem is the "topping" slab at the roof level. Larry Crouse indicated that this slab was constructed on top of insulation/roofing that is supported on structural slabs and the pre-cast concrete beams as described above. The topping slab serves as a driving surface at the roof level of the building. This topping slab is in very poor condition primarily due to thermal expansion and contraction and lack of slab joints to control cracking.

With regard to lateral resistance for seismic loading, the size and spatial distribution of the concrete shear walls appears appropriate for the size of the building.

An issue that is a concern for future maintenance of the building is the fact that seasonal moisture is allowed to infiltrate the concrete components of the building (See Architectural for similar verbiage). While there currently are no significant signs of corrosion, parking structures that are subject to infiltration of water along with cold climate freeze/thaw cycles usually experience high maintenance and repair cost during the life of the structure. An associated hazard with the water infiltration is the fact that, in the spring, the snow melts on the roof, runs through the structure down to the lower level floors, and then glaciates on the colder floors. This situation creates both walking and driving difficulties, in addition to the potential for falls and fender benders.

Mechanical

The original design was for the enclosed portions to be mechanically heated and ventilated. The building is symmetrical in design with the north and south halves mirrored images, except for the presence of an elevator on the south end.

Ventilation Systems

1. Description: Two identical vehicle area ventilation systems were originally installed. Both were designed as recirculating systems with independent controls. But there was no physical partition in the building separating the two systems. In each system, a return air duct is monitored by a duct-mounted carbon monoxide (CO) detection system. The CO monitoring system was intended to open the outside air dampers when the CO concentration exceeds the acceptable level and purge the facility with outside air. Unheated air curtains at the vehicle entrance/exit doors on the first floor and third floor reduced infiltration to acceptable levels.

   Unfortunately the system did not work as anticipated. The outside air heating coils froze and the CO monitoring system was too finicky to keep within calibration. For years, the building has operated in a manner very different from its design. The supply air system is permanently off. The exhaust air system only operates for a half-hour period, four times a day (8:00 am, 11:30 am, 1:00 pm and 5:00 pm). Makeup air is drawn into the building through the vehicle entrance/exit doors. The air curtains are manually turned on when the building is open and the weather is cold.

   No measurements of air quality have been made of the garage air under the current operation method. Maintenance staff believe the air quality in the garage is adequate and the air temperature in the garage does not drop below 0 degree F. This is certainly a less costly way to operate the garage than originally designed, but does not meet current code requirements for enclosed garage ventilation systems. The 2003 International Mechanical Code (IMC) Chapter 4 requires that the ventilation system be capable of providing 1.5 cfm per square foot of floor area. This airflow does not need to be on all the time but, it must be automatically capable of providing this exhaust air flow rate when CO concentrations become unacceptably high (above 25 ppm). There is a minimum continual ventilation requirement of 5 cfm per person in the facility and any occupied spaces adjacent to the garage must be kept under positive pressure with respect to the garage. The current system cannot meet this requirement.

2. Condition: The air curtains are near the end of their useful life and should be replaced. The exhaust fans are still in reasonable shape and do not get many hours of use each year. Replacement should be scheduled in 7 to 10 years. The exhaust duct work is dirty but otherwise in reasonable shape. The CO monitoring system is not operable. The supply air system ductwork is damaged in places and dirty.

   To bring the ventilation system up to current code requirements, the supply air system must be put back in operation. The outside air heating coils should be converted from a steam system to a hydronic heating system. A larger steam to glycol heat exchanger will be required as will new piping, pumps and heating coils.

3. Construction Cost Estimate:

- New Air Curtains: Four (4) each at $25,000 for an approximate installed cost of $100,000.
- New Exhaust Fans: Four (4) each at $20,000 for an approximate installed cost of $80,000.
- Clean Supply air and exhaust air ductwork: approximately $100,000
- A new ventilation system to continually ventilate the garage would include both supply air and exhaust air systems and cost about $5 per enclosed square foot of floor area (approximately $380,000). This includes new fans, ductwork and CO monitoring system. Heat recovery would be worth considering but is not included in this cost estimate. Additional costs are included in the Heating Systems and HVAC Controls sections.

<u>Heating Systems</u>

1. Description: The building is connected to Aurora Energy's steam district heating system and was originally designed to use steam heating coils to preheat outside ventilation air and to heat the facility. The interior winter design temperature set-point is not known but the steam heating system failed early in the life of the building when the steam heating coils froze. Maintenance personnel installed a small steam to glycol converter and pump glycol-based heating medium to terminal heating units in the stairwells, janitor closets, mechanical rooms and electrical rooms. The remainder of the building is not heated but due to the air curtains at the vehicle entrance/exits and limited use of the exhaust ventilation system it stays above zero (0) degrees Fahrenheit even at –50 degrees Fahrenheit outside temperatures (based on maintenance personnel observations).

If the heating system is upgraded to provide the code-required ventilation at –50 degrees F outside temperatures, the district steam should be used to heat a glycol-based hydronic heating system. Components would include a steam to glycol heat exchanger, new preheat coils, pumps, condensate receiver, condensate return pipe, unit heaters, and baseboard.

2. Condition: The steam system has been cannibalized to the point where it could not service the preheat coil without serious repairs. The steam to glycol system is in relatively good shape. However, the terminal heating units in the stairwells and janitor closets are rusty and damaged.

   The 3" condensate return piping between the building the Aurora Energy condensate main in the street has leaks. Because the heating load of the glycol heating system is much smaller than the original steam heating load, the 1" PEX condensate line pulled through 3" condensate pipe is sufficient. If the heating system was to upgraded to provide heat for the entire ventilation load, the condensate system would need to be replaced.

3. Cost Estimate:
   - A new heating system sized to adequately heat the outside air would cost approximately $6.50 per enclosed square foot of floor area (approximately $494,000). This includes the new components discussed above. Replacing the buried condensate pipe from the garage to the manhole would add approximately $150,000. Additional costs are included in the Ventilation Systems and HVAC Controls sections.

<u>HVAC Controls</u>

1. Description: The original pneumatic controls system is essentially inoperative. Maintenance personnel have replaced much of it with electric and electronic systems.

2. Condition: Systems are old and not integrated. A new DDC system would be the best solution.

3. Cost Estimate:
   - A new DDC system would cost about $200,000.

<u>Plumbing</u>

1. Description: The roof drainage and sanitary waste systems appear to be interconnected with both waste streams delivered to the sanitary waste main in the street. Current codes require the roof drains and waste drains to be routed

separately but this building might be "grandfathered-in" and allowed to remain as is. Current codes require an oil-water separator on the sanitary waste discharge and there is no separator in the building.

The original potable water system froze. The maintenance staff installed a new potable water system providing water to the janitor closet, exterior lawn watering sprinklers, and interior hoses for washing down the parking areas. Unfortunately the interior washdown hoses are in red cabinets and are easily mistaken for fire hose cabinets.

2. Condition: The roof drain and waste systems are in reasonable shape but should be separated. The potable water system is pieced together and should be entirely replaced.

3. Cost Estimate:
   - Separating the roof drain and waste systems requires the roof drain system be connected to the storm drain system in the street. Estimated cost is approximately $200,000.
   - Adding an oil-water separator will cost approximately $80,000.
   - Replacing the potable water system will cost approximately $120,000

Fire Sprinkler

1. Description: The existing dry-pipe fire sprinkler system appears to adequately cover the enclosed portions of the building. It appears to be in good working order. However, a standpipe system in not installed and may be required by the 2003 International Building Code (IBC) Section 905. If so, it would be a Class 1 standpipe system with risers in all stairways and in additional locations as required to be within 150 feet from all areas of the building. The standpipe system risers would also be interconnected.

2. Condition: Good.

3. Cost Estimate: No repairs or upgrades appear necessary to the fire sprinkler system. However, the estimated cost of a Class 1 standpipe system for the building is approximately $100,000.

Electrical

General Service

The existing electrical service consists of a pad mounted transformer on the roof providing 480V, 3 phase power for the building. There is a separate transformer and