Study DATE: 11-06-08

Re: CHR Building Curtain Wall Windows System

Observation made during the on site survey of the conditions are complied and presented as evidence of the findings of this study.

We have prepared floor plan documents that compile the information of the leak and broken IG insulated glass unit seal conditions at time of survey in an attempt to analyze the patterns of the problem areas.

See 11x17 drawings A-1 through A-5

The following is the number results of the units that at time of survey require attention

Second floor … 11 panels with broken IG glass unit seals 9 units with active leaks
Third floor …..19 panels with broken IG glass unit seals 20 units with active leaks
Fourth floor ……1 panel with broken IG glass unit seals 9 units with active leaks
Fifth floor ………0 panel with broken IG glass unit seals 10 units with active leaks
Sixth floor ………0 panel with broken IG glass unit seals 2 units with active leaks
Total units ……31 panel with broken IG glass unit seals 47 units with active leaks

This curtain wall system is of the age that it would be expected to start having failure of the components that make up the system especially the rubber membrane or gasket components that are susceptible to break down under the extreme exposure to ultraviolet light which causes hardening resulting less elastic properties and a reduction in the ability to seal the moving metal parts as they expand and contract with the climate changes. This is evident in the study plans as most areas exhibiting problems seems to be more extreme on the south and west exposures. This also is supported by the fact that most of the curtain wall on the ground floor is protected by overhang of floors above and shaded from most of the suns damaging exposure as there are no leaks on this floor that have been observed or reported at the time of this study.

This system is composed of insulated glass units which have a sealed air space between two pains of glass that offers more insulation value these panels seals have a service life that is soon to be reached on most of the original units installed at the time of building construction. This seal life span can be reduced if exposed to standing water. There is evidence of water standing in the bottom of the track system resulting in accelerated seal failure. A seal failure is evidenced by the fogging up of the airspace between the two pains of glass. The presence of water standing in the track system can also be grounds for voiding the warranty of the insulated glass manufacture of new IG panels.
The curtain wall system was originally installed improperly resulting in compromised weep system. This weep system was designed to remove any water that could be trapped due to condensation or a leak in the system. The capacity of this system to remove water is in question at this point.

There is evidence that the water that is created inside the system through condensation and leaks is not properly removed from the system. The leaks can be due to water seal failure at the glass frame connection because of gasket break down as well as those not correctly installed. The metal panel to frame connections is also a source that has not been addressed to date. The water is moving within the system. This movement can make it more difficult to locate the source of the leak. The water could be entering the building through a metal panel section above the window or the glass panel on the floor above and moving down the wall system until it finds an easy path to enter the building where it will show up inside on the vertical jamb or on the window sill and then move along the sill member and cause visible damage several feet and even another floor below. The survey plans clearly indicate that most of the leaks are evidenced inside the building on the second and third floors which also leads us to conclude that the water traveling can build up enough volume as it moves toward the bottom of the system that it overloads the compromised weep system which is not able to remove it this increased volume to the outside of the system and it enters the building. There is also evidence that this water is also standing in the frame system as rust is evident on some of the members inside the building and the salt deposits inside the space between the insulated glass units. This is a two fold problem as this water presence voids the warranty on the remaining intact insulated glass units and can also be a source to feed mold growth when coupled with a cellulose source such as insulation and gypsum board paper backing. The rust stains could be evidence of the connector deterioration as the rest of the system is aluminum.
Notice gap in rubber gasket material and evidence of a long term leak condition

Evidence of mold in crack of gypsum board material
Evidence of rust on aluminum member could indicate fastener deterioration.

Evidence of rust inside IG window unit long term exposure to standing water.

Salt deposits inside glass indicate long term high volume of water inside the glass and evaporation is the only means for escape and results in these sediment deposits.
The spot replacement of the leaking window units as it has been completed in the past would not be a sustainable plan of action. In fact in the past some units have been replaced with gaskets on perimeter of IG glass units that are not continuous and have gaps which are potential leaks (See image top of page 3). If replacement of windows with broken seals continues in this way it would be difficult to maintain the conditions of any warranty on that new glass unit. The weep systems is compromised by the initial installation and needs to be resolved before any other units are installed and the fact that these leaks can have a source a good distance away for the actual building entrance point makes leak work a real challenge.

We propose the following approach be considered as a phased approach to resolve this significant scope of work. See the image above and sheet 11x17 of A-6 and A-7 to view the scope of work to be completed.

Phase One

This would be a investigative project in which the worst area of the curtain wall would be targeted for a project to start from the top to bottom and remove a section of metal panel and glass units to determine the best solution for the weep system retrofit work with the current curtain wall installation (see sheet a-7). This investigation would inform of the extent of damage in the system and provide a plan to retrofit the rest of the curtain wall system to ensure a working weep system. The remaining portion of the targeted area weep system work could be completed based on the chosen process by change order to this initial contract. If this investigation goes not result in a cost efficient weep system fix the weep system objective would not be completed on this section and the rest of the stated objectives would be completed to see if this will be a stop gap measure that may extend the life of the building exterior until additional funds can be secured to restore the weep system.

The second objective in this phase would be to remove all window units that have broken seals replaced. The gaskets for the units in this area that have been replaced in past projects would be checked and any gaps would be repaired.

The third and final objective would be to wet seal all joints on the curtain wall system from metal and glass panel to the frame system for the targeted limits of the curtain wall from top to bottom.

This approach would allow for a test of the proposed sequence of repair for the remaining effected areas with the area of high seal failure and leak problems receiving the first priority to mitigate the damage to interior finishes.

Submitted for review

Jeff Owens AIA
PLAN REFERENCE NOTES

1. 30.5 x 30.5 LEAK
2. 30.5 x 70.5 BROKEN & SEAL
3. 30.5 x 70.5 LEAK BROKEN & SEAL
4. 30.5 x 70.5 LEAK
5. 30.5 x 70.5 BROKEN & SEAL
6. 30.5 x 55.5 BROKEN & SEAL
7. 30 x 96 BROKEN 16 SEAL
PLAN REFERENCE NOTES

1. 32" X 30.5 BROKEN 16 SEAL