



January 11, 2008

Via E-mail (Dave.Edwards@dgs.ca.gov)

Mr. Dave Edwards

Re: 450 N Street – Board of Equalization, MCA Job No.: 05155.00 RP  
Subj: January 4, 2008 Storm Water Intrusion Observations

Dear Dave,

The following letter report is a preliminary summary of the water intrusion leak sources based on site observations during the extreme weather event that occurred on Friday, January 4, 2008, and follow-up limited investigations on Monday, January 7<sup>th</sup> and Wednesday, January 9<sup>th</sup>.

**Weather Data:**

A print-out of the weather data reported at the Sacramento International Airport (located approximately 10 miles north of downtown Sacramento) is enclosed. Hourly observations and associated graphs indicate that the storm moved in from the Southeast and South/Southeast direction with elevated winds (32 mph sustained winds, 44 mph Gusts) and the Barometric Pressure beginning to drop at 1:00 AM. Light rain from the storm band was initially observed at 4:00 AM and intensifying to Rain at 8:00 AM and Heavy Rain at 9:00 AM. The most intense portion of the storm (Rains and Wind) occurred between 7:00 AM and 2:00 PM. The Maximum observed sustained wind speed was 58 mph with a maximum gust speed of 66 mph.

**Observations:**

Don Mayugba and I arrived at 450 N Street at 8:30 AM to observe the performance of the curtain wall and deck remedial work. While riding the elevator to observe the 3<sup>rd</sup> Floor garage roof deck to building interface, Rick Guidera (BOE) and Charlene Yount (BOE) entered the elevator and relayed to us that there were reported leaks at the southeast corner at several floors. Don and I accompanied Rick and Charlene to investigate the reported leaks and one rattling noise associated with the curtain wall. Shortly thereafter, Dave Edwards (DGS) and additional BOE Building Engineering Staff also joined the floor-to-floor walk (recalled to be Floors 23 thru 9 (excluding the Mezzanine, 6 and 3)). The floor-to-floor walk was completed at approximately 11:45 AM and a review of the observations was then conducted. MCA left the site at 12:30 PM.

Don Mayugba (MCA) and Dave Edwards (DGS) reviewed the doors on Monday, January 7<sup>th</sup>.

Don Mayugba and Jeff Martin (MCA) reviewed the decks and utilized the house swing stage and reviewed the exterior sealant work on the curtain wall at the south elevation, floors 22 thru 7. An exterior review of the punched windows at the east wall of the south balcony is scheduled to be done when an electrical connection on the house swing stage is replaced and the stage is reconfigured to fit the narrow drop.



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*Punched Windows:*

The initial leaks reported/observed were at the punched windows located at the East wall of the South balcony and the South wall of the East balcony (southwest corner). Isolated leaks were also reported at several punched windows at the building's northeast corner. MCA estimates that there were 20 to 24 punched windows with leaks. Water is observed at the sill-can seam and spilling onto the gypsum board stool and down the wall and onto the floor when there was a lot of water. Isolated locations with larger amounts of water intrusion resulted in water moving past the floor below and staining the ceiling tile above the punched window below. A "percolating" noise could be heard at the frames of the windows at several of the windows with leaks.

The punched windows could be viewed from the opposing curtain wall corner. No breach (bubbling/streaking) could be seen at the perimeter sealant joints. This is consistent with the observed water at the window sill-can seam. MCA believes the water is bypassing the window perimeter gasket and the positive pressure on the exterior on the two weeps at the base of the window prohibits the water from exiting.

Wet sealing the glass perimeter and weeps would prevent further water intrusion. This scope was not part of the curtain wall project as, historically, leaks at the punched windows reported to MCA have been very uncommon and prior investigation and testing lead to the window/pre-cast joint being suspected.

*Curtain wall:*

Vision and spandrel glass curtain wall leaks were observed at the East and South elevations MCA estimates that there 10 to 12 total leak locations were encountered at the curtain wall. Wet ceiling tiles at the curtain wall are an indication of a leak through the spandrel glass perimeter sealant. The spandrel sill track then fills and does not weep and spills over onto the ceiling tile.

Water leaking through the vision glass gasket at the vision glass head can be attributed to either a leak through the exterior sealant at the vision glass head, or a breach of the sealant at the horizontal/vertical intersection for the structural spandrel sill/vision head member.

A rattling noise at a curtain wall vision glass (recalled to be 19<sup>th</sup> floor near the east end) was investigated. The noise had subsided by the time we arrived. The vision glass perimeter interior gasket was investigated and found to be engaged and secure. The exterior perimeter sealant observed through the glass was found to be continuous and in place. The glass was vibrated by hand to see if the glass could be loosened but was found to be tight and secure.

The exterior investigation by MCA on January 9th of the south wall between grid lines 20 and 21 from floor 22 to floor 7 did not result in observations of any significant curtain wall perimeter or expansion joint cover sealant problems (missing sealant, failed sealant). A small quantity of pin-holes (Photos 1 and 2) in the exterior sealant were observed; however, these did not correlate to interior leaks observed during the January 4<sup>th</sup> storm. MCA recommends that the horizontal beauty caps be removed at the leak locations to further investigate the leak sources.



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Photo 1: Pin-hole encountered at south elevation.



Photo 2: Pin-hole encountered at south elevation.

The more significant sealant problems were encountered at the joint between the curtain wall/pre-cast at the 14<sup>th</sup> floor (vision sill), 11<sup>th</sup> Floor (vision head). Adhesion and cohesion failures were observed (Photos 3 and 4).



Photo 3: Cohesion failure at sealant joint between 14<sup>th</sup> floor vision sill/precast panel.



Photo 4: Adhesion failure at sealant joint between 11<sup>th</sup> floor vision head/precast panel.

### *23<sup>d</sup> Floor Balconies:*

#### *East Balcony –*

The most significant water entry was due to the northern most door of the East balcony blowing open (Photos 5, 6 and 7). This door is also in the worst possible location for this storm direction as the water on the balcony deck was being blown to the north end of the balcony (where the door is). This resulted in a large amount of water at the office where door is located and then the water dispersed to the adjacent southerly offices. The water also was found to leak down the the wall (where the balcony transitions to the building) and was observed at the 18<sup>th</sup> floor ceiling tile.



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Water was also observed to bypass the thresholds and wet the carpet an estimated 1 ft. past the thresholds at the East balcony doors that remained secured. Note that we attempted to open one of the East Balcony doors to observe the curtain wall and it took two persons to get the door to open (the observation was aborted due to the extreme winds).



Photo 5: East Balcony, north end door had blown open earlier.



Photo 6: East Balcony, north end office, water accumulated on floor at door (looking south)



Photo 7: Water accumulated at office south of door that had blown open.



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#### South Balcony –

There is only one door access to the South balcony. This door was blocked open and the opening was curtained off with plywood and penetrations for evacuating negative pressure for the ongoing abatement work. No water was observed at the threshold or around the door opening.

Water was observed to be dripping down the bottom of the structural angle that rests on the pre-cast concrete panel supporting the curtain wall above (Photos 8 and 9). Closer investigation revealed that water appeared to be bypassing the sealant at the curtain wall to pre-cast concrete panel joint. It was found to be more significant where the vertical mullions terminated at the pre-cast concrete panels. MCA reviewed the sealant joint assembly at each of the balconies and notes that the joint dimension is most narrow at the South Balcony and that the elastomeric coating on the pre-cast concrete terminates at the exterior face of the horizontal beauty cap (Photo 10) at some locations and may have prevented proper weeping.



Photo 8: 23<sup>rd</sup> floor south balcony, water dripping at bottom of the angle and precast.



Photo 9: 23<sup>rd</sup> floor south balcony, water at the floor slab below the precast panel.



Photo 10: Elastomeric coating build-up at face of horizontal beauty cap.



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#### West Balcony –

There are four door entries for the West Balcony. The southern-most door had been blocked open and curtained off with plywood and penetrations for evacuating negative pressure for the ongoing abatement work. No water was observed at the threshold or around the door opening.

The adjacent northern door did have water bypass the threshold making the adjacent carpet only damp. Water spots were also observed at the doorjamb and near the door head as a result of water bypassing the doors weather stripping (the water was not observed to be actively running down the back of the door).

The other two doors showed no water at the carpet or the backsides of the doors.

The January 9<sup>th</sup> review of the deck and pre-cast joint sealant revealed concrete pulling away in the west parapet pre-cast concrete panel joints adjacent to the sealant joint (Photos 11 and 12).



Photo 11: Concrete pulled away at base of the sealant joint.



Photo 12: Concrete pulled away at base of the sealant joint.

#### North Balcony –

There are three door entries for the North Balcony. No water at the carpet or on the back sides of the doors was observed.

The January 9<sup>th</sup> review of the deck and pre-cast joints revealed cuts in the northeast corner vertical pre-cast panel joint (Photo 13).



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Photo 13: North Balcony, northeast corner precast joint, sealant is cut at the base.

A review of the door latching was conducted on Monday, January 7<sup>th</sup>. All of the active doors (doors blocked off were not checked) were found to not latch properly and each could be opened without utilizing the doors opening hardware. Further investigation of this condition revealed that the activator pins that would normally lock the doors were missing at all but four of the doors. The three with activator pins were reviewed as to their non-working and the following was found:

- One due to the new weather stripping falling from its proper position prohibiting the door from fully closing (North Elevation).
- One due to the door being blown open at some time (not known if it was during this storm or previous event) and racking the door out of position so the pin no longer aligned properly to secure the door (North Elevation).
- Two doors could not be determined why they would not properly work (East elevation adjacent to the Southern most door and North Elevation door).

Prior to the January 4<sup>th</sup> storm, MCA had not been notified of any curtainwall or punched window leaks after the work at these areas had been completed. Another wind driven, but shorter in duration, storm occurred on Tuesday, January 8<sup>th</sup>. MCA inquired with JLS (on site abatement subcontractor for floors 24, 23 and 22 and directed to document/dry/abate damage from leaks resulting from the January 4<sup>th</sup> storm) if leaks had been reported from the January 8<sup>th</sup> storm. They said no reports were received.

Please call me if you have any questions or comments regarding the above information.

Regards,

Jeff Martin  
McGinnis Chen Associates, Inc.

Enclosure: 05155 - 80104 Weather.pdf

Copy to: Jeff Chen (McGinnis Chen Associates, Inc)

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http://server.as5000.com/AS5000/adserver/image?ID=CLSM-00019

### History for Sacramento International, CA

Friday, January 4, 2008

#### Daily Summary

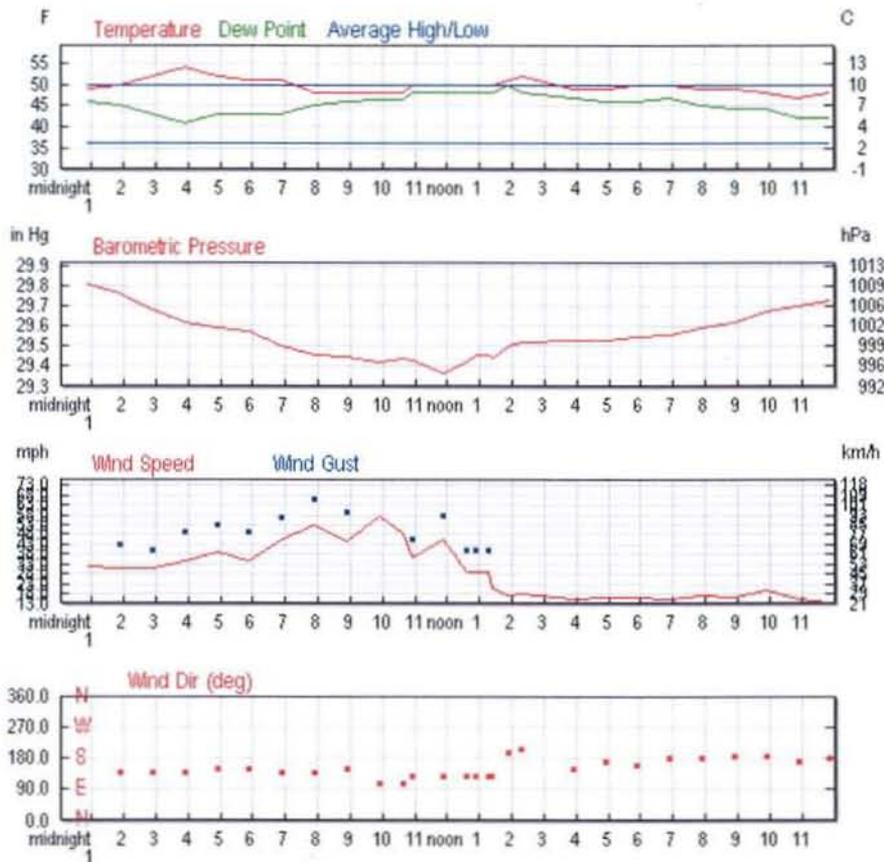
	Actual:	Average :	Record :
<b>Temperature:</b>			
Mean Temperature	50 °F / 10 °C	-	
Max Temperature	54 °F / 12 °C	50 °F / 9 °C	62 °F / 16 °C (1948)
Min Temperature	46 °F / 7 °C	36 °F / 2 °C	23 °F / -5 °C (1949)
<b>Degree Days:</b>			
Heating Degree Days	15		
<b>Moisture:</b>			
Dew Point	44 °F / 6 °C		
Average Humidity	87		
Maximum Humidity	96		
Minimum Humidity	62		
<b>Precipitation:</b>			
Precipitation	1.08 in / 2.74 cm	-	- 0
<b>Sea Level Pressure:</b>			
Sea Level Pressure	29.55 in / 1001 hPa		
<b>Wind:</b>			
Wind Speed	35 mph / 56 km/h (SSE)		
Max Wind Speed	58 mph / 93 km/h		
Max Gust Speed	66 mph / 106 km/h		
Visibility	7 miles / 11 kilometers		
Events	Rain		

Averages and records for this station are not official NWS values.

T = Trace of Precipitation, MM = Missing Value

Source: NWS Daily Summary

Seasonal Weather Averages



Hourly Observations

Time (PST):	Temp:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	48.9 °F / 9.4 °C	46.0 °F / 7.8 °C	90%	29.81 in / 1009.2 hPa	7.0 miles / 11.3 kilometers	SE	32.2 mph / 51.9 km/h / 14.4 m/s	43.7 mph / 70.4 km/h / 19.5 m/s	0.03 in / 0.1 cm	Rain	Light Rain
1:53 AM	50.0 °F / 10.0 °C	45.0 °F / 7.2 °C	83%	29.76 in / 1007.6 hPa	10.0 miles / 16.1 kilometers	SE	31.1 mph / 50.0 km/h / 13.9 m/s	42.6 mph / 68.5 km/h / 19.0 m/s	0.02 in / 0.1 cm		Overcast
2:53 AM	52.0 °F / 11.1 °C	43.0 °F / 6.1 °C	71%	29.68 in / 1005.0 hPa	10.0 miles / 16.1 kilometers	SE	31.1 mph / 50.0 km/h / 13.9 m/s	40.3 mph / 64.8 km/h / 18.0 m/s	N/A		Overcast
3:53 AM	54.0 °F / 12.2 °C	41.0 °F / 5.0 °C	62%	29.62 in / 1002.8 hPa	10.0 miles / 16.1 kilometers	SE	34.5 mph / 55.6 km/h / 15.4 m/s	49.5 mph / 79.6 km/h / 22.1 m/s	0.00 in / 0.0 cm	Rain	Light Rain
4:53 AM	52.0 °F / 11.1 °C	43.0 °F / 6.1 °C	71%	29.59 in / 1001.8 hPa	6.0 miles / 9.7 kilometers	SSE	39.1 mph / 63.0 km/h / 17.5 m/s	52.9 mph / 85.2 km/h / 23.7 m/s	0.05 in / 0.1 cm	Rain	Light Rain
5:53 AM	51.1 °F / 10.6 °C	43.0 °F / 6.1 °C	74%	29.57 in / 1001.2 hPa	7.0 miles / 11.3 kilometers	SSE	34.5 mph / 55.6 km/h / 15.4 m/s	49.5 mph / 79.6 km/h / 22.1 m/s	0.05 in / 0.1 cm	Rain	Light Rain
6:53 AM	51.1 °F / 10.6 °C	43.0 °F / 6.1 °C	74%	29.50 in / 998.8 hPa	7.0 miles / 11.3 kilometers	SE	46.0 mph / 74.1 km/h / 20.6 m/s	56.4 mph / 90.7 km/h / 25.2 m/s	0.11 in / 0.3 cm	Rain	Light Rain

Time (PST):	Temp:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
7:53 AM	48.0 °F / 8.9 °C	45.0 °F / 7.2 °C	89%	29.46 in / 997.4 hPa	3.0 miles / 4.8 kilometers	SE	52.9 mph / 85.2 km/h / 23.7 m/s	65.6 mph / 105.6 km/h / 29.3 m/s	0.25 in / 0.6 cm	Rain	Rain
8:53 AM	48.0 °F / 8.9 °C	46.0 °F / 7.8 °C	93%	29.45 in / 997.2 hPa	2.5 miles / 4.0 kilometers	SSE	44.9 mph / 72.2 km/h / 20.1 m/s	59.8 mph / 96.3 km/h / 26.8 m/s	0.27 in / 0.7 cm	Rain	Heavy Rain
9:53 AM	48.2 °F / 9.0 °C	46.4 °F / 8.0 °C	93%	29.42 in / 996.1 hPa	3.0 miles / 4.8 kilometers	ESE	57.5 mph / 92.6 km/h / 25.7 m/s	-	0.13 in / 0.3 cm	Rain	Rain
10:36 AM	48.2 °F / 9.0 °C	46.4 °F / 8.0 °C	93%	29.44 in / 996.8 hPa	3.0 miles / 4.8 kilometers	ESE	48.3 mph / 77.8 km/h / 21.6 m/s	59.8 mph / 96.3 km/h / 26.8 m/s	N/A	Rain	Rain
10:53 AM	50.0 °F / 10.0 °C	48.2 °F / 9.0 °C	94%	29.43 in / 996.5 hPa	3.0 miles / 4.8 kilometers	SE	36.8 mph / 59.3 km/h / 16.5 m/s	46.0 mph / 74.1 km/h / 20.6 m/s	N/A	Rain	Rain
11:53 AM	50.0 °F / 10.0 °C	48.2 °F / 9.0 °C	94%	29.37 in / 994.4 hPa	4.0 miles / 6.4 kilometers	SE	46.0 mph / 74.1 km/h / 20.6 m/s	57.5 mph / 92.6 km/h / 25.7 m/s	N/A	Rain	Rain
12:36 PM	50.0 °F / 10.0 °C	48.2 °F / 9.0 °C	94%	29.42 in / 996.2 hPa	2.5 miles / 4.0 kilometers	SE	28.8 mph / 46.3 km/h / 12.9 m/s	40.3 mph / 64.8 km/h / 18.0 m/s	N/A	Rain	Heavy Rain
12:53 PM	50.0 °F / 10.0 °C	48.2 °F / 9.0 °C	94%	29.46 in / 997.6 hPa	2.5 miles / 4.0 kilometers	SE	28.8 mph / 46.3 km/h / 12.9 m/s	40.3 mph / 64.8 km/h / 18.0 m/s	N/A	Rain	Heavy Rain
1:15 PM	50.0 °F / 10.0 °C	48.2 °F / 9.0 °C	94%	29.46 in / 997.5 hPa	2.5 miles / 4.0 kilometers	SE	28.8 mph / 46.3 km/h / 12.9 m/s	40.3 mph / 64.8 km/h / 18.0 m/s	0.06 in / 0.2 cm	Rain	Heavy Rain
1:21 PM	50.0 °F / 10.0 °C	48.2 °F / 9.0 °C	94%	29.44 in / 996.8 hPa	5.0 miles / 8.0 kilometers	SE	20.7 mph / 33.3 km/h / 9.3 m/s	-	0.07 in / 0.2 cm	Rain	Light Rain
1:53 PM	51.1 °F / 10.6 °C	50.0 °F / 10.0 °C	96%	29.50 in / 998.8 hPa	7.0 miles / 11.3 kilometers	SSW	17.3 mph / 27.8 km/h / 7.7 m/s	-	0.12 in / 0.3 cm	Rain	Rain
2:17 PM	51.8 °F / 11.0 °C	48.2 °F / 9.0 °C	88%	29.52 in / 999.5 hPa	4.0 miles / 6.4 kilometers	SSW	18.4 mph / 29.6 km/h / 8.2 m/s	-	0.06 in / 0.2 cm	Rain	Rain
3:53 PM	48.9 °F / 9.4 °C	46.9 °F / 8.3 °C	93%	29.53 in / 999.8 hPa	10.0 miles / 16.1 kilometers	SSE	15.0 mph / 24.1 km/h / 6.7 m/s	-	0.03 in / 0.1 cm		Overcast
4:53 PM	48.9 °F / 9.4 °C	46.0 °F / 7.8 °C	90%	29.53 in / 1000.0 hPa	10.0 miles / 16.1 kilometers	South	16.1 mph / 25.9 km/h / 7.2 m/s	-	0.01 in / 0.0 cm		Overcast
5:53 PM	50.0 °F / 10.0 °C	46.0 °F / 7.8 °C	86%	29.55 in / 1000.4 hPa	10.0 miles / 16.1 kilometers	SSE	16.1 mph / 25.9 km/h / 7.2 m/s	-	N/A		Clear
6:53 PM	50.0 °F / 10.0 °C	46.9 °F / 8.3 °C	89%	29.56 in / 1000.9 hPa	10.0 miles / 16.1 kilometers	South	15.0 mph / 24.1 km/h / 6.7 m/s	-	0.01 in / 0.0 cm	Rain	Light Rain
7:53 PM	48.9 °F / 9.4 °C	45.0 °F / 7.2 °C	86%	29.59 in / 1001.9 hPa	10.0 miles / 16.1 kilometers	South	17.3 mph / 27.8 km/h / 7.7 m/s	-	0.00 in / 0.0 cm		Partly Cloudy
8:53 PM	48.9 °F / 9.4 °C	44.1 °F / 6.7 °C	83%	29.62 in / 1003.0 hPa	10.0 miles / 16.1 kilometers	South	16.1 mph / 25.9 km/h / 7.2 m/s	-	N/A		Clear
9:53 PM	48.0 °F / 8.9 °C	44.1 °F / 6.7 °C	86%	29.67 in / 1004.5 hPa	10.0 miles / 16.1 kilometers	South	19.6 mph / 31.5 km/h / 8.7 m/s	-	N/A		Clear

Time (PST):	Temp:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
10:53 PM	46.9 °F / 8.3 °C	42.1 °F / 5.6 °C	83%	29.70 in / 1005.7 hPa	10.0 miles / 16.1 kilometers	South	15.0 mph / 24.1 km/h / 6.7 m/s	-	N/A		Partly Cloudy
11:53 PM	48.0 °F / 8.9 °C	42.1 °F / 5.6 °C	80%	29.73 in / 1006.7 hPa	10.0 miles / 16.1 kilometers	South	13.8 mph / 22.2 km/h / 6.2 m/s	-	N/A		Mostly Cloudy

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