LACMA

LACMA, DCA, and Watts Towers

Fourth Quarterly Report (October - December 2011)

Prepared for the DCA, City of Los Angeles, by Frank Preusser, Mark Gilberg, and Brooke Davis Anderson

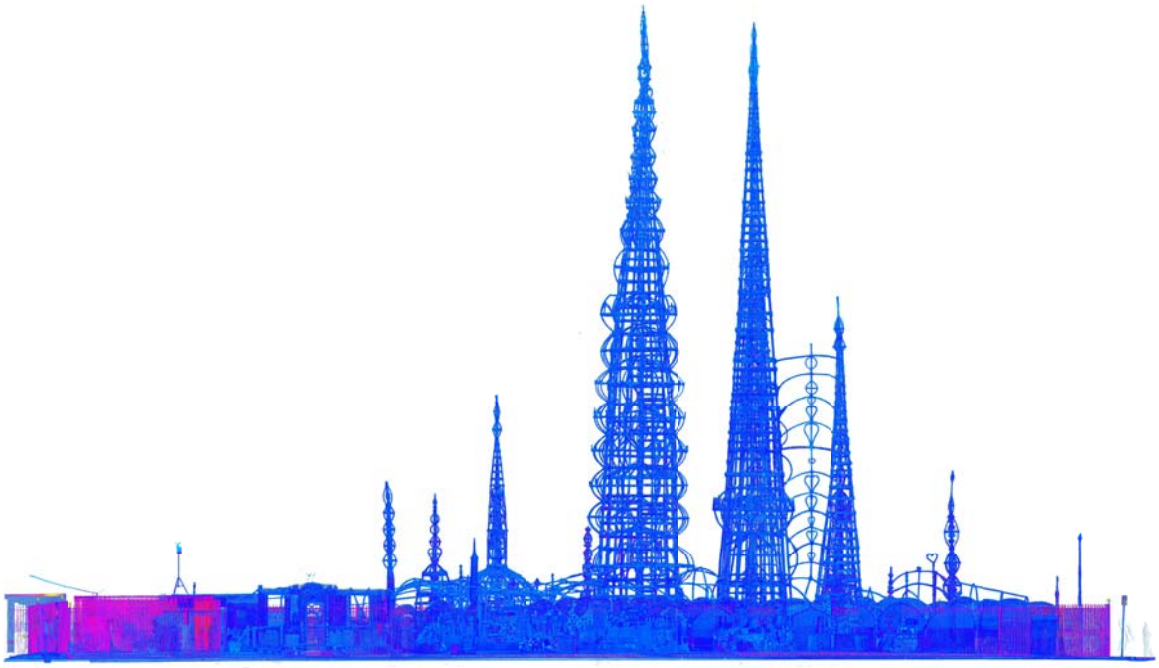

Figure 1: Laser Scan

Summary

During the fourth quarter we continued the organization and review of existing documentation and information (hardcopy and electronic). All of the state treatment records from 1979-1985 have been sorted and re-housed. Work on the fallen fragments has continued: good progress has been made. GBG USA Inc. performed a "Measured Building Survey" (high resolution laser scan). The remedial condition survey was continued and loose ornaments and mortar fragments were temporarily consolidated or reattached. Inspection of the three tall towers with a spotting scope and photography with a telephoto lens continued. Thermal imaging activities were temporarily suspended in favor of other more urgent activities and will be resumed early next year. A

comparison of the current condition of the monuments with the Rand photographs was started and continues. During this quarter we had two heavy rain events and one severe wind event (early December). Inspections after these events did not reveal any serious problems. During the wind event we monitored vibrations of the artwork in nine locations.

Introduction

Besides routine maintenance of the site and sculpture, the main task for the first year is to review and assess the City's existing conservation and preservation plans for the Watts Towers, which includes proposing changes consistent with available funding and developing a comprehensive conservation management plan. To accomplish this it is necessary to thoroughly evaluate the performance of past interventions. It is also currently not known what the actual *rate of deterioration* is, both in terms of crack development and loss of decorative elements (ornaments). In the fourth quarter we continued the work commenced in the first three quarters and expanded on it with the main goal to better understand the deterioration mechanism of the monument and the reasons for the successes and failures of past interventions.

Accomplishments

Staffing

There were no changes in staffing during this quarter.

Consultants

- Discussions with Mr. Mel Green (Melvyn Green & Associates, Inc.) on the monitoring program for the Towers continued.

- Upon our request Dr. Hugh Saurenman (ATS Consulting) submitted a revised proposal for the pilot vibration and crack monitoring study. The cost for this study is too high and we decided not to proceed. We are currently looking into alternate ways of obtaining the necessary information.

- GBG USA Inc. carried out a "Measured Building Survey" (high resolution laser scan) of the monument. The point cloud data and measured drawings were received. We also obtained the Laser Scan Data generated in 2005 by Bestor Engineers, Inc. GBG will compare the 2005 scan data and the 1988 and 1994 Cook survey data with the latest scan data to try to determine if any permanent displacement of the Towers has taken place.

Office

The re-organization and purging of the office files approaches completion.

Chemical Safety

No news to report.

General Safety

An Emergency Action Plan (EAP) and an Injury and Illness Prevention Program (IIPP) have been drafted. Both have been reviewed and will take effect on January 1, 2012.

Site Maintenance and Improvements

The site is surveyed daily for any fallen ornaments and other problems. The daily survey also includes visual examination for new cracks or significant changes in existing cracks.

The ultrasonic cat deterrent appears to be effective.

Archival Research

Ms. Colleen Boye completed re-organizing, re-housing, and creating an inventory of the treatment records from the state.

Treatment Database

Ms. Colleen Boye has completed the first version of the new treatment database and it is currently undergoing testing.

Rand Photographs

The Rand 35 mm slides of the three towers have been scanned and Ms. Liz Werden has labeled the scans. Now all the Rand photographs are available in digital format and the originals can be put in archival storage.

Re-Photography of the Artwork

The re-photography of the areas documented by Rand in the 4x5 format approaches completion. Ms. Blanka Kielb has commenced the re-photography of the three tall towers using a telephoto lens. We are getting excellent results (figure 2). Not only will this allow us comparisons with the Rand photographs and the ARG crack documentation, but it will also allow us to monitor selected cracks and identify new cracks, should any develop. The Towers are photographed from 12 different locations (approximately every 30 degrees) to create maximum coverage. The distance is also changed as needed.

Figure 2: Detail of Top Third of the East Tower; cracks marked with arrows

X-Radiographs

Some 60+ X-radiographs have been taken in the past, providing some interesting insight in the construction of the monument and into some of the cracking problems. Mr. Yosi Pozeilov has started digitizing them. To date 19 radiographs have been digitized. Figures 3 - 6 show some examples. Besides showing details of the construction, one interesting aspect of the X-radiographs is that they do not indicate any serious corrosion related problems.

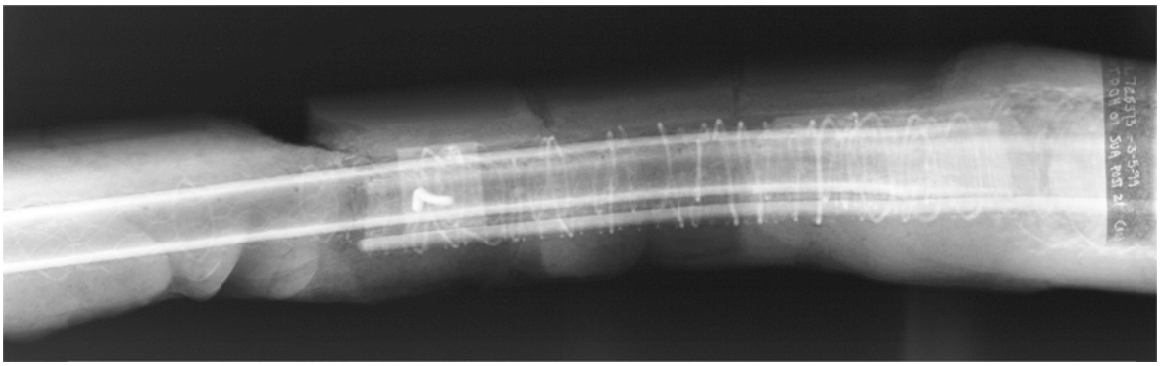

Figure 3: X-radiograph

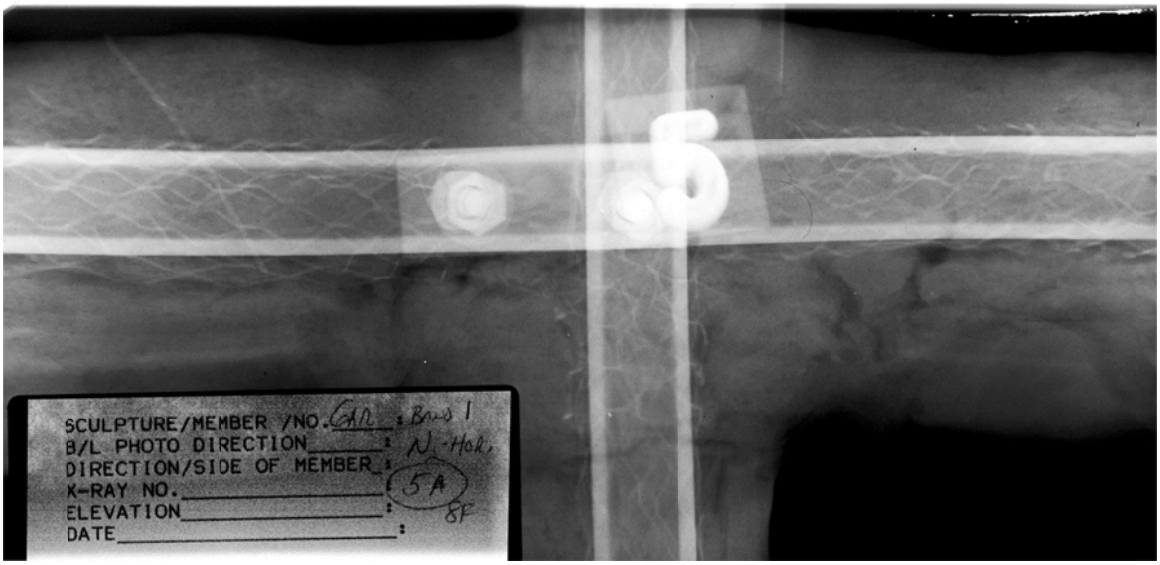

Figure 4: X-radiograph

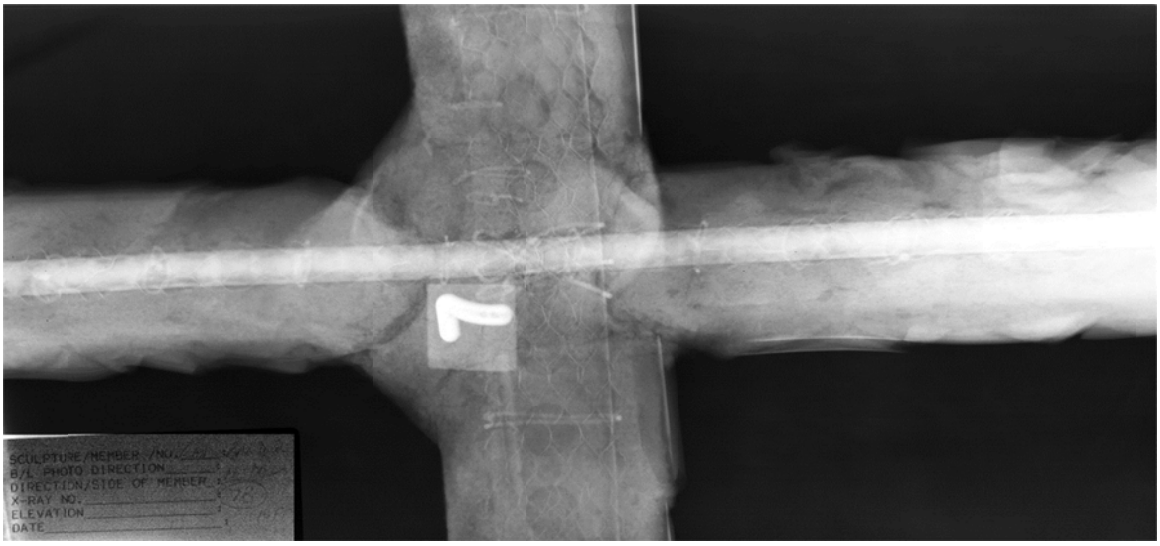

Figure 5: X-radiograph

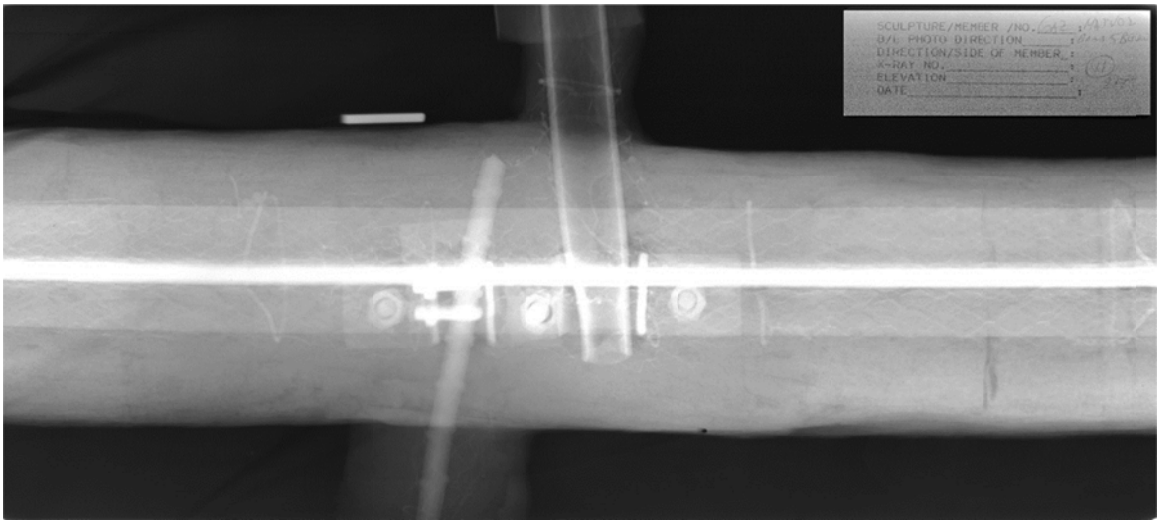

Figure 6: X-radiograph

Inventory of Detached Ornaments

Ms. Kimberly Blanks has continued to make good progress, documenting 185 fragments.

71 fragments have fallen or been removed by conservation staff (for later re-attachment) since the last report. They have been collected, photographed and entered in the database.

Condition Survey

The remedial condition survey and stabilization of loose ornaments and mortar made good progress. Figures 7 and 8 show a sample record. Ms. Sylvia Schweri-Dorsch and Ms. Blanka Kielb completed the South and North Walls, the Ship, the lower portions of the East Tower and are currently working on the Central Tower.

Figure 7: Remedial survey record

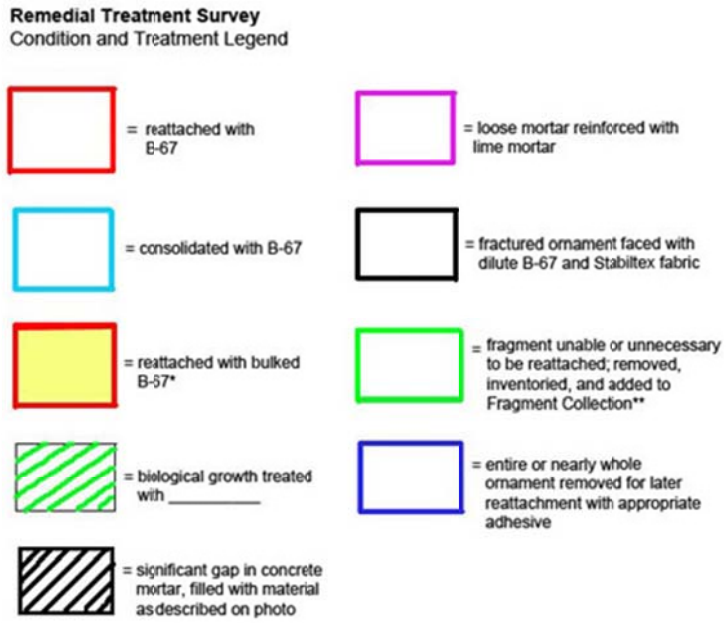

Figure 8: Legend for remedial survey

Evaluation of Changes since Rand Photo Campaign

Mr. Israel Campos is comparing the Rand photographs with the current state of preservation of the monument. Any observed changes are then marked on the recent photos taken by Mr. Yosi Pozeilov during the re-photography of the Towers (see Figs. 9 and 10). Israel has to date completed this comparison for the South Wall and is currently working on the North Wall.

Figure 9: Condition comparison 1987 - 2011

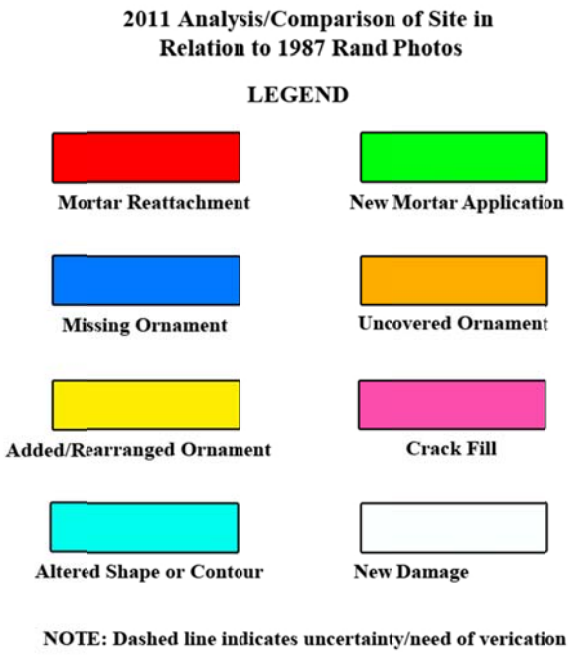

Figure 10: Legend for Rand comparison

Evaluation of Cracks

Monitoring of selected cracks with plaster bridges and telltales continued. We also started monitoring cracks to determine if they are propagating lengthwise (figure 11).

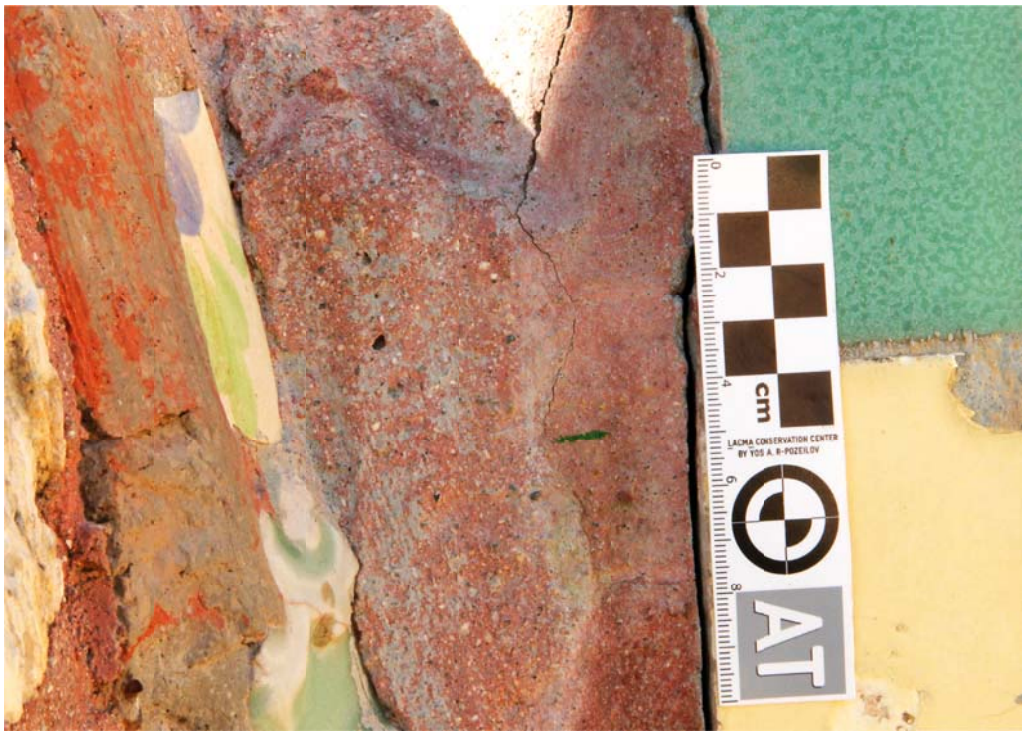

Figure 11: Crack propagation monitoring

Vibration Monitoring

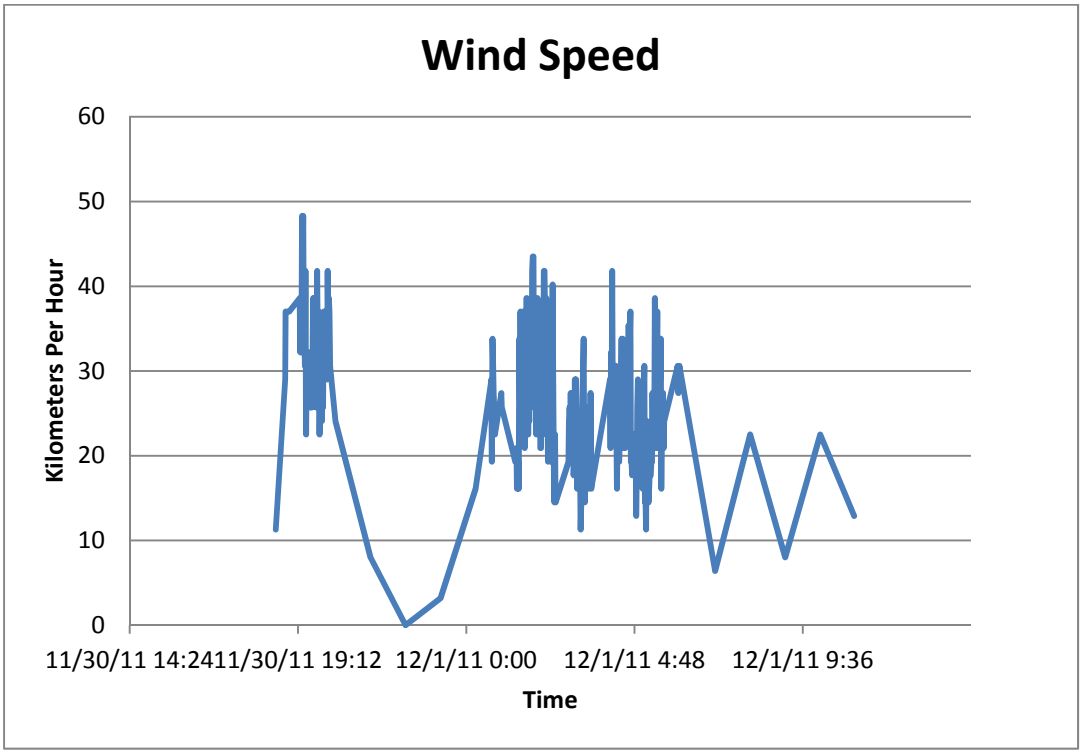

Figure 12: Wind Graph

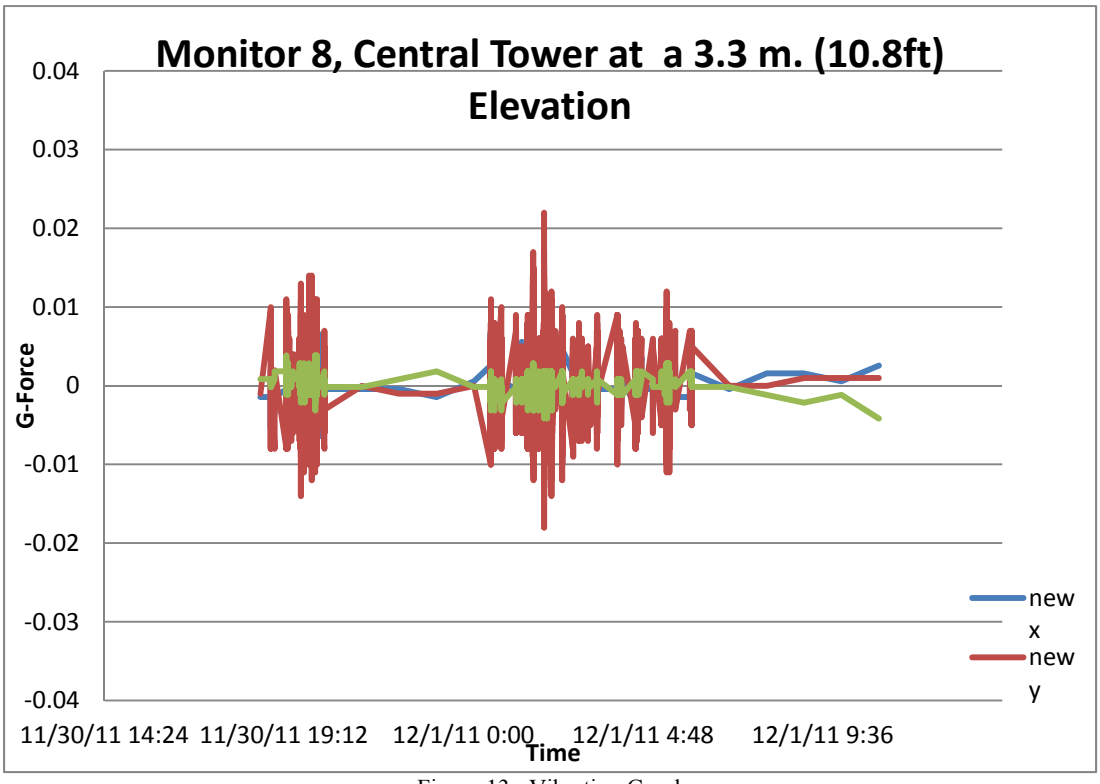

Figure 13: Vibration Graph

While we are still searching for the most suitable vibration monitors for the Towers we decided to use the available battery operated accelerometers to monitor the high wind event on November 30 and December 1. We installed 10 accelerometers in different locations at a height of approx. 15 feet. Figure 12 shows the wind speed (in km/h) and figure 13 shows the data from accelerometer 8. There is very good correlation between the wind speed and the vibration data. The results from the different accelerometers show significant variation. This could be due to location specific issues, or to difficulties in the installation of the monitors. This will be further explored during future vibration measurements.

Weather Station

The Weather Station continues to reliably record the environmental conditions. The data are downloaded and processed at regular intervals by Ms. Heather Goers.

Thermal Imaging

The thermal imaging program yielded quite interesting results, demonstrating significant difference in in the heating and cooling of different elements of the monument (figures 14 - 17).

Figure 14: West Tower

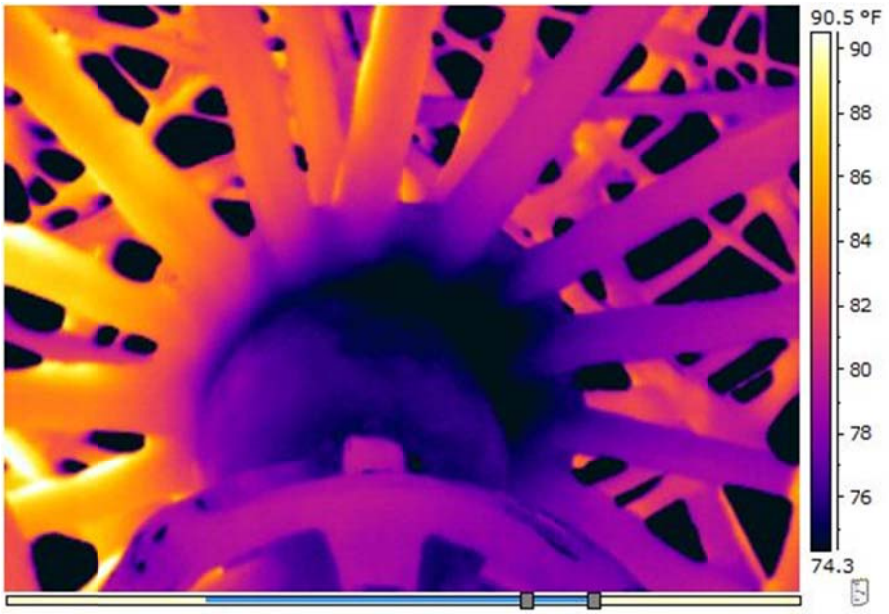

Figure 15: West Tower, Thermal Image, 11:26 am

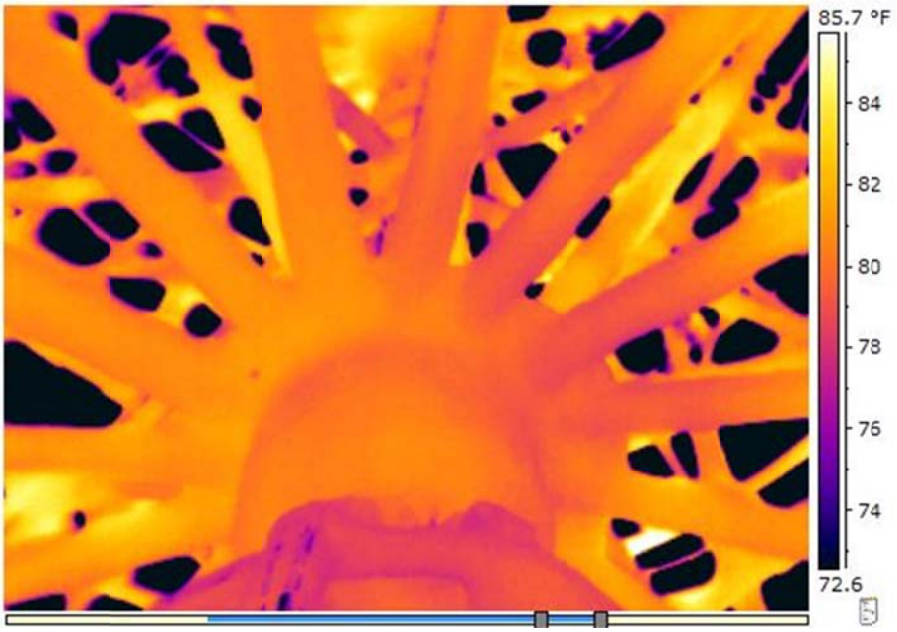

Figure 16: West Tower, Thermal Image, 3:39 pm

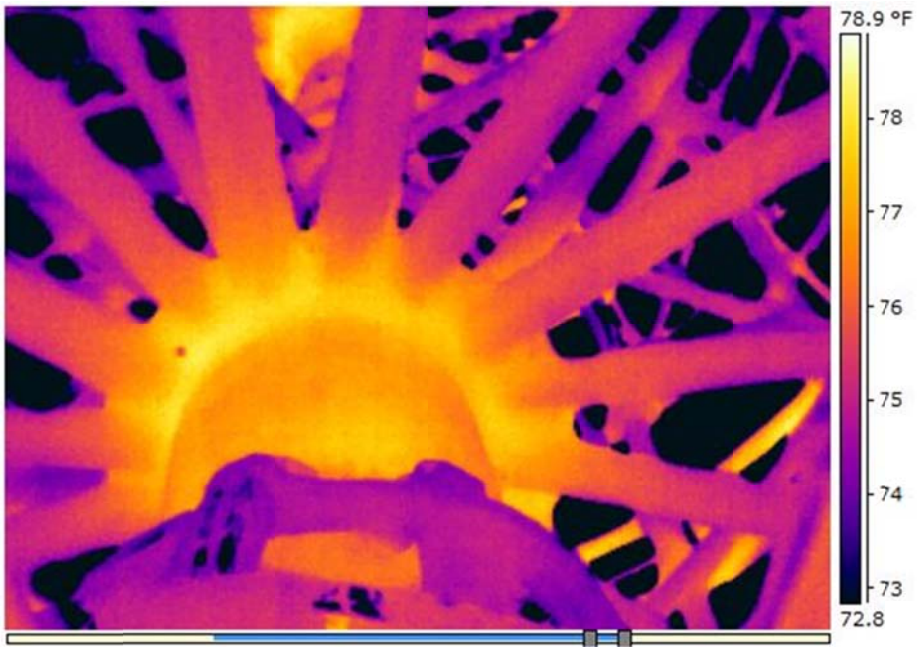

Figure 17: West Tower, Thermal Image, 5:49 pm

It also serves to document the temperature differences between the cement and different types of ornaments (figures 18 and 19).


Figure 18: South Wall

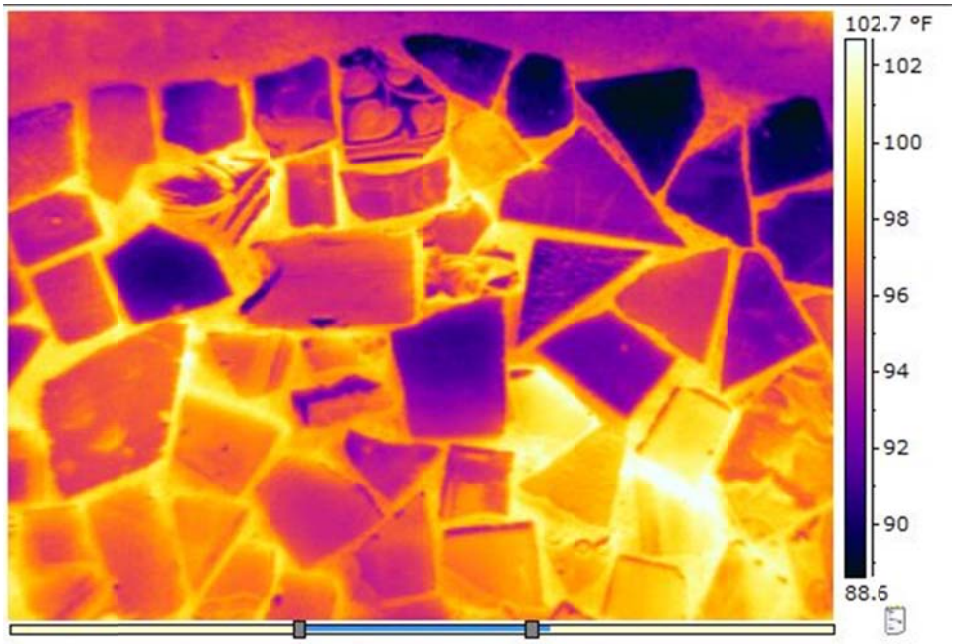

Figure 19: South Wall, Thermal Image

Currently the thermal imaging program is on hold due to other, more pressing issues.

Weather Events

During this quarter we had two major rain events and one serious wind event. We used the wind event to conduct a vibration monitoring experiment (see above). Neither event led to significant losses or other damage (see attached incident report).

During and after the rains we observed and documented the wetting and drying behavior of a few select areas. As it is to be expected, the wetting occurs in the beginning along water runoff paths (figures 20 and 21) and then spreads to adjacent areas.

Photo 20: wetting along structural elements

Figure 21: wetting along structural elements

As the wetting continues one can observe distinct differences in the water absorption of the different repair mortars (figures 22 – 25). These differences sometimes become even more pronounced during the drying cycle.

Figure 22: differential wetting of repair mortars and cracks

Figure 23: differential wetting of repair mortars

Figure 24: differential wetting of repair mortars

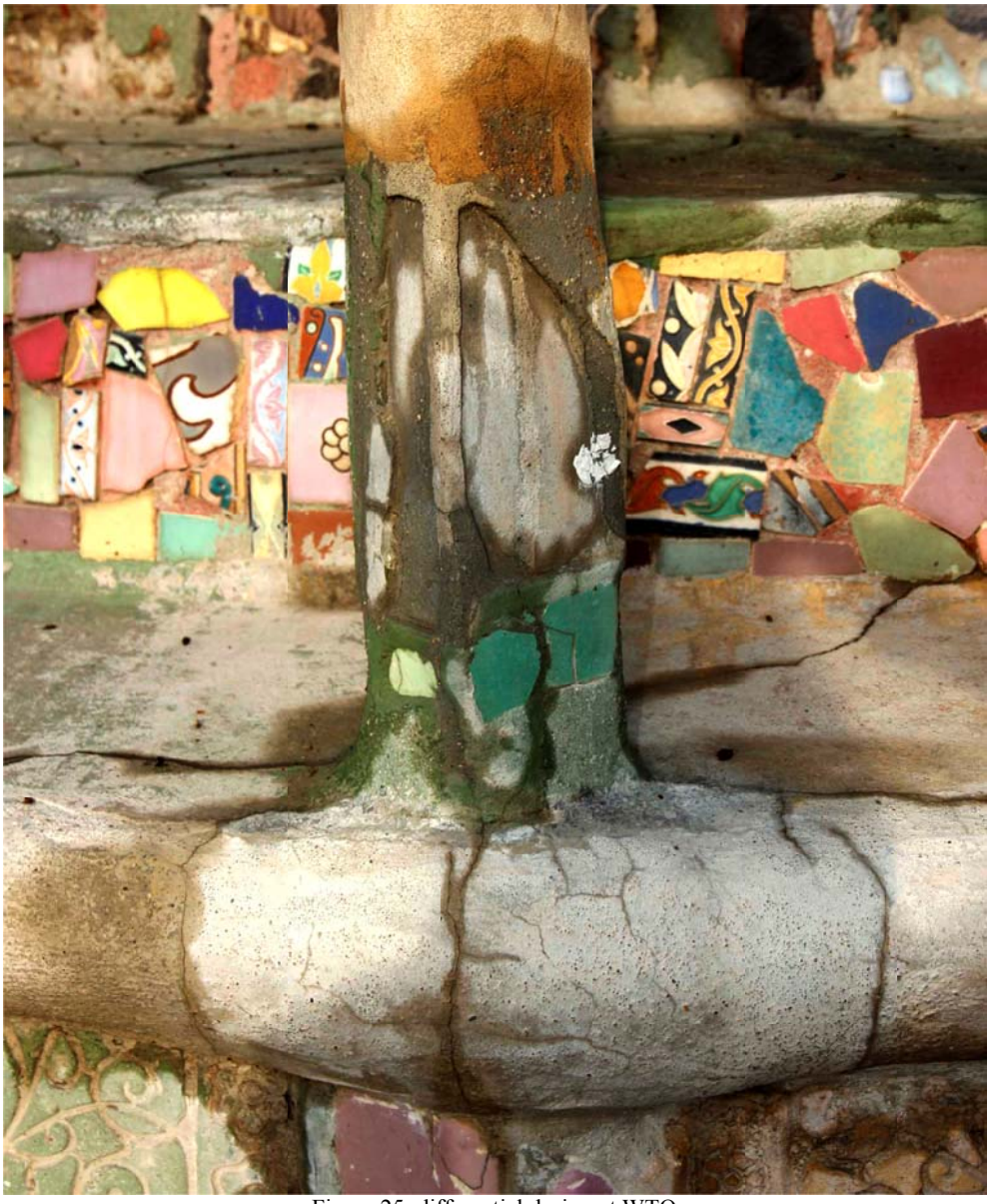

Figure 25: differential drying at WTO

As a consequence of the differential wetting and drying there are differences in the dissolution of the cementing material of the mortars, leading to even greater differences in their thermal and hygric behavior. In future work we will have to explore the possibility of applying an improved water repellant, suitable for carbonized cementitious materials.

Only one weep hole displayed active water movement.

Next Steps

In a separate document we will review the Conservation Handbook and make recommendations for future work.

Fundraising

No updates this quarter.

Other

Three tours to patrons and possible supporters: October 19 for legal affairs department at LACMA and outside counsel; November 17 for City Commissioners in conjunction with DCA; and December 14 for the Angell Foundation.

Respectfully submitted by Frank Preusser, Senior Conservation Scientist, Conservation, with support from Mark Gilberg, Suzanne D. Booth and David G. Booth Conservation Center Director, and Brooke Davis Anderson, Deputy Director for Curatorial Planning, LACMA.

Submitted January 6, 2012

Attachment
Incident report: Santa Ana Wind Event November 30 – December 2, 2011.

LACMA

INCIDENT REPORT for the Watts Towers of Simon Rodia

Santa Ana Wind Event

Date of Incident: 11/30/2011 – 12/02/2011
Date of Report: 12/06/2011
Prepared by: Blanka Kielb

Description:
The Watts Towers were hit by strong Santa Ana winds beginning on the evening of Wednesday, November 30th, and lasting until the afternoon of Friday, December 2nd. Strong gusts came predominantly from the N and W directions.

An on-site weather station was set to collect wind, temperature and humiditiy data in 1-minute intervals from Wednesday to Friday afteroon. The maximum windspeed recorded during the event was 48.3 km/hr (30.0 mi/hr). Daily high wind speeds were recorded as follows:

Date	Time	Highest Wind Speed
Wednesday, 11/30	7:19pm	48.3 km/hr (30.0 mi/hr)
Thursday, 12/01	1:54pm	43.5 km/hr (27.0 mi/hr)
Friday, 12/02	1:30pm	27.4 km/hr (17.0 mi/hr)

Wind speed data collected from 11/30 to 12/02 is summarized by the line graph in **Figure 1.** Average wind speed, high wind speed, wind direction and temperature data are summarized by line graphs in **Figure 2**.

In addition to the collection of weather data, 10 accelerometers were installed in various locations on site to monitor vibration in the sculptures during the Santa Ana wind event. Accelerometers manufactured by Gulf Coast Data Concepts were installed at 3 to 4.5 meter height (10-15 feet) and collected data from late afternoon of Wednesday 11/30 until mid-day Friday 12/02. Vibration data collected during this period are currenly being processed.

Figure 1

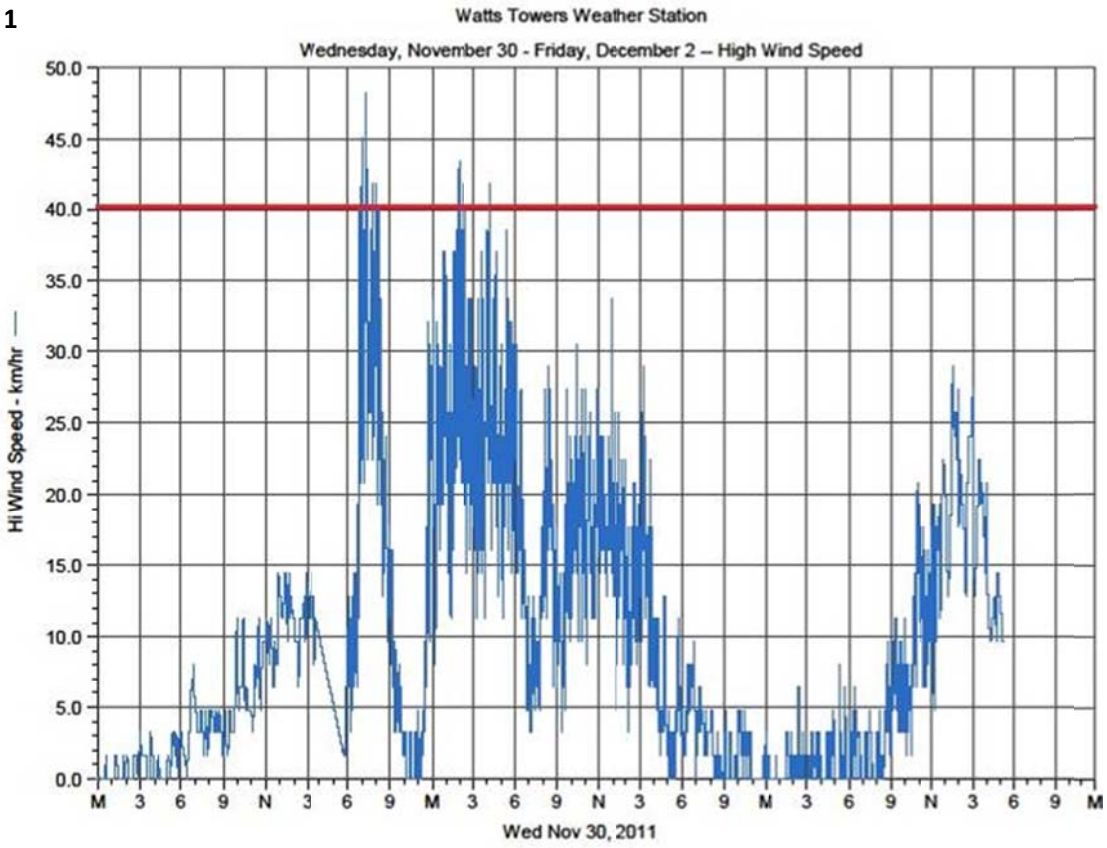

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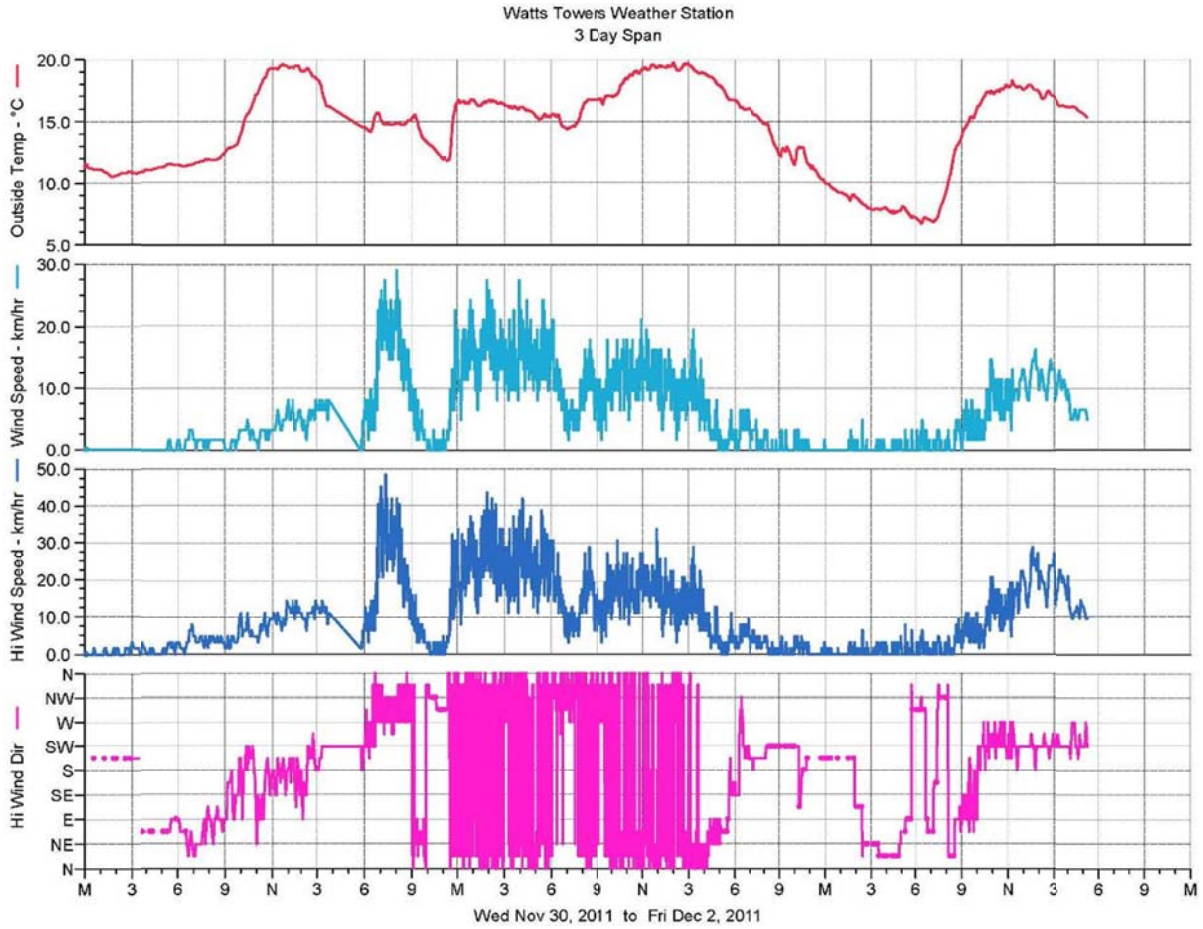
Figure 2



Summary of Damage:
The site was inspected for wind-related damage on the morning of Thursday, December 1st by Conservators Sylvia Schweri-Dorsch and Blanka Kielb and Research Assistant Israel Campos. Small branches, twigs and leaves were strewn throughout the site, with the heaviest accumulation of debris noted east of the House (see **Figure 3**) and along the South Wall (see **Figure 4**). A general site clean-up

Figure 3. View of the site entrance following the Santa Ana wind event.

was performed on the morning of Thursday, December 1st. The site was swept and cleared of branches and twigs.

Figure 4. Scattered twigs and leaves along the South Wall.

Overall, the damage caused by the Santa Ana winds was minimal. In all, 3 fragments and 1 fragment group (all glass) were found on the morning of Thursday, December 1st. Two of the fragments were found near the West Tower (see **Figures 5-8**); 1 fragment was found next to the Central Tower (see **Figure 9-10**); the grouping was found on the sidewalk adjacent to the South Wall (see **Figure 11-12**). The site was checked for fallen fragments again on Friday morning, but none were found.

Higher elevations of the towers were visually inspected using a 60X spotting scope. No new damage was noted in the upper elevations. TellTale crack monitors and plaster bridges installed on the sculptures were inspected and showed no change in crack width as a result of the wind gusts. Cracks in the Gazebo, West, Central and East Towers that currently being monitored for propagation were also inspected and photographed, and found to exhibit no new change.

Figures 5-6. Blue glass fragment (left), found next to the West Tower, Zone 6 (right).

Figures 7-8. Green glass fragment (left), found next to the West Tower, Zone 6 (right).

Figures 9-10. Brown glass fragment (left), found between the Central Tower and South Wall, Zone 8 (right).

Figures 11-12. Grouping of green glass fragments (above) found on the side walk next to the South Wall (right).