APPENDIX NF

Naples, Florida (2007-2008)

Quarry Blasting

Kosnik 2008

Figure NF-1 - Photograph of the one-story house with 3 instrumented cracks

Background

The house shown in Figure NF-1 was monitored with the hybrid combination of the research-oriented ITI ACM system and a commercial GeoSonics system. This combination allows recording of vibratory response time histories of crack response to ground motions or air over-pressures as well as well as long term,climatological crack response. Figures in this appendix were copied directly from Kosnik (2008).

The exterior wall of the slab on grade CMU one-story house was covered with stucco as shown in Figure NF-1. Two exterior cracks were monitored on the south side of the house (stucco), and one was monitored inside the garage (drywall). The locations of these sensors are shown in Figures NF-2 and NF-3. Figure NF-4 shows vibratory time histories of crack displacements in all three cracks compared with longitudinal, vertical, transverse ground motions from an

8/21 blast. The ground motions from this blast produced the largest crack response of the study period. The interior drywall crack displaced 11.6μm (456μ-in).

Figure NF-5 shows the maximum response to frontal effects of all three cracks. Hourly readings are shown in orange, 24-hour central-moving-average in blue, and 30-day central-movin-average in green. The difference between the blue and green is the frontal effect caused by changes in humidity and temperature. Figure NF-6 then compares the magnitude dynamic crack responses from blasting to the climatological responses before and after the day of the vibratory excitation. Figures NF 7 and 8 show the long term seasonal responses for the entire six months of observation. Figure NF 9 compares in bar chart form the magnitudes of the crack responses to maximal climatological and vibratory effects. The max response of crack 7 at the transition of CMU to door frame to blasting (11.6μm) is only 5.6 % of the max crack response from climatological effects (200.0μm). Thus climatological crack responses can be seen to be more than an order of magnitude greater than dynamic crack responses from blasting.

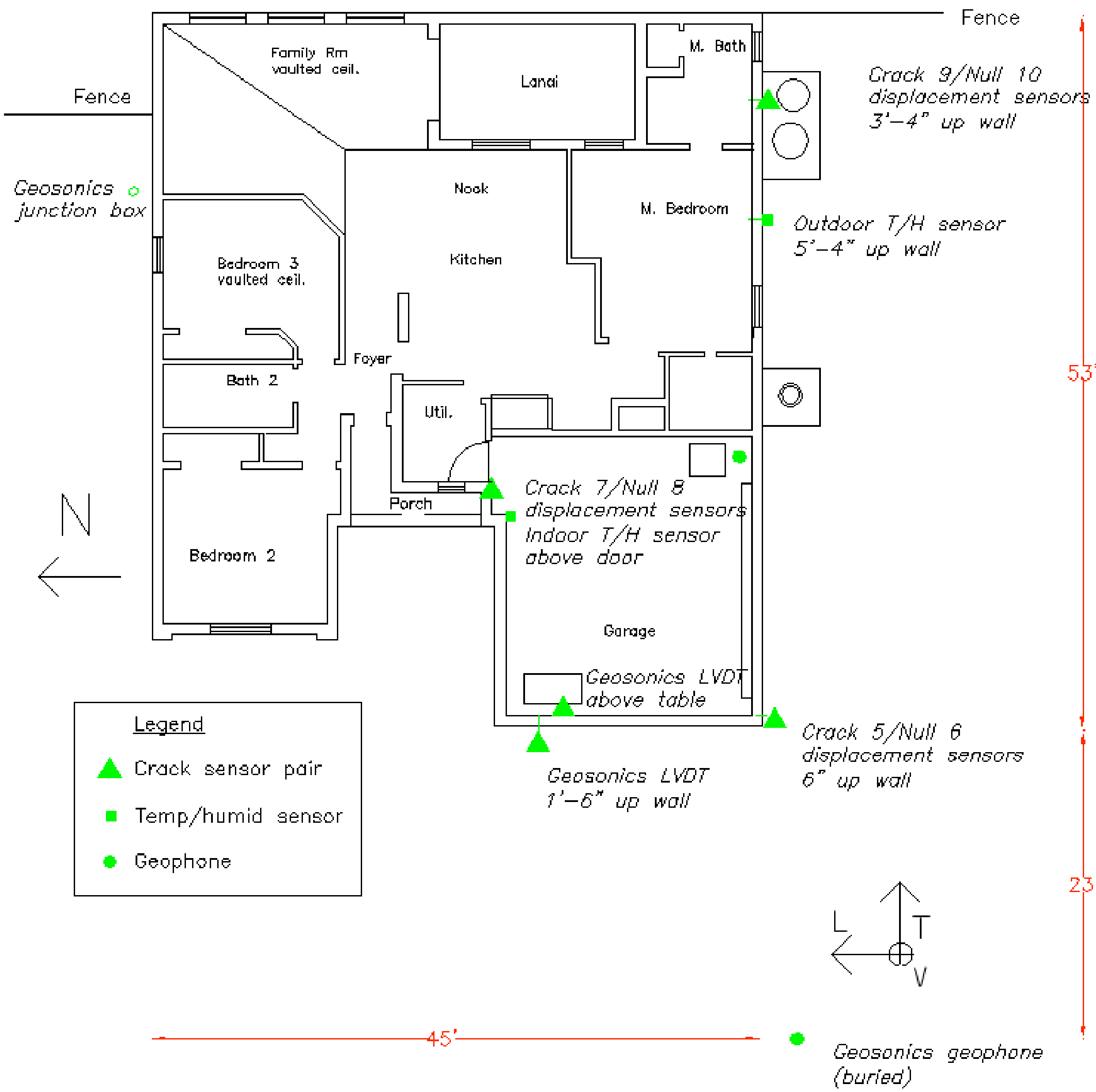
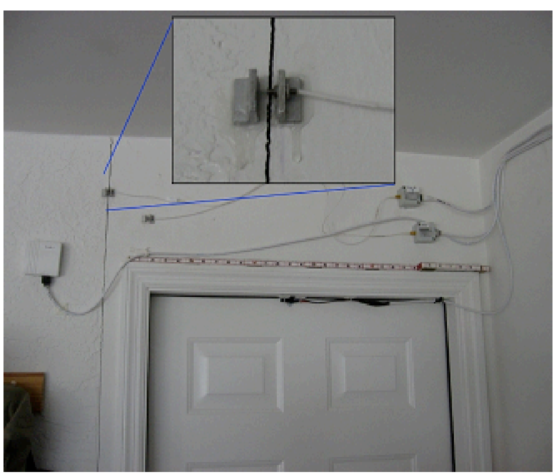


Figure NF-2 - Instrumentation plan of the house

(a) South face of house

(b) Crack 5



(c) Crack 7

(d) Crack 9

Figure NF-3 - General locations of crack displacement transducers with insets showing details of cracks and sensors

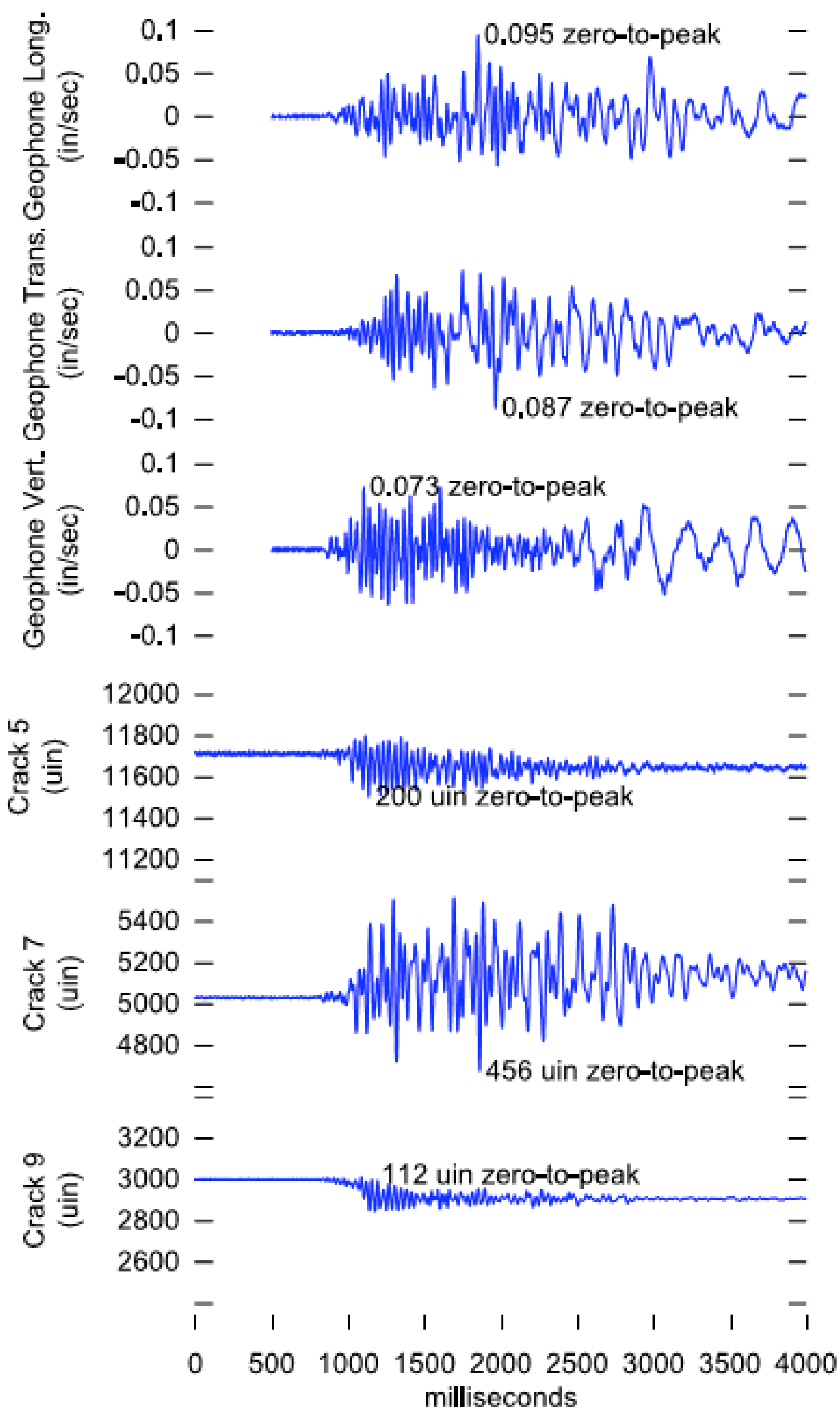


Figure NF-4 - Comparative Time History Plots for 8/21 blast

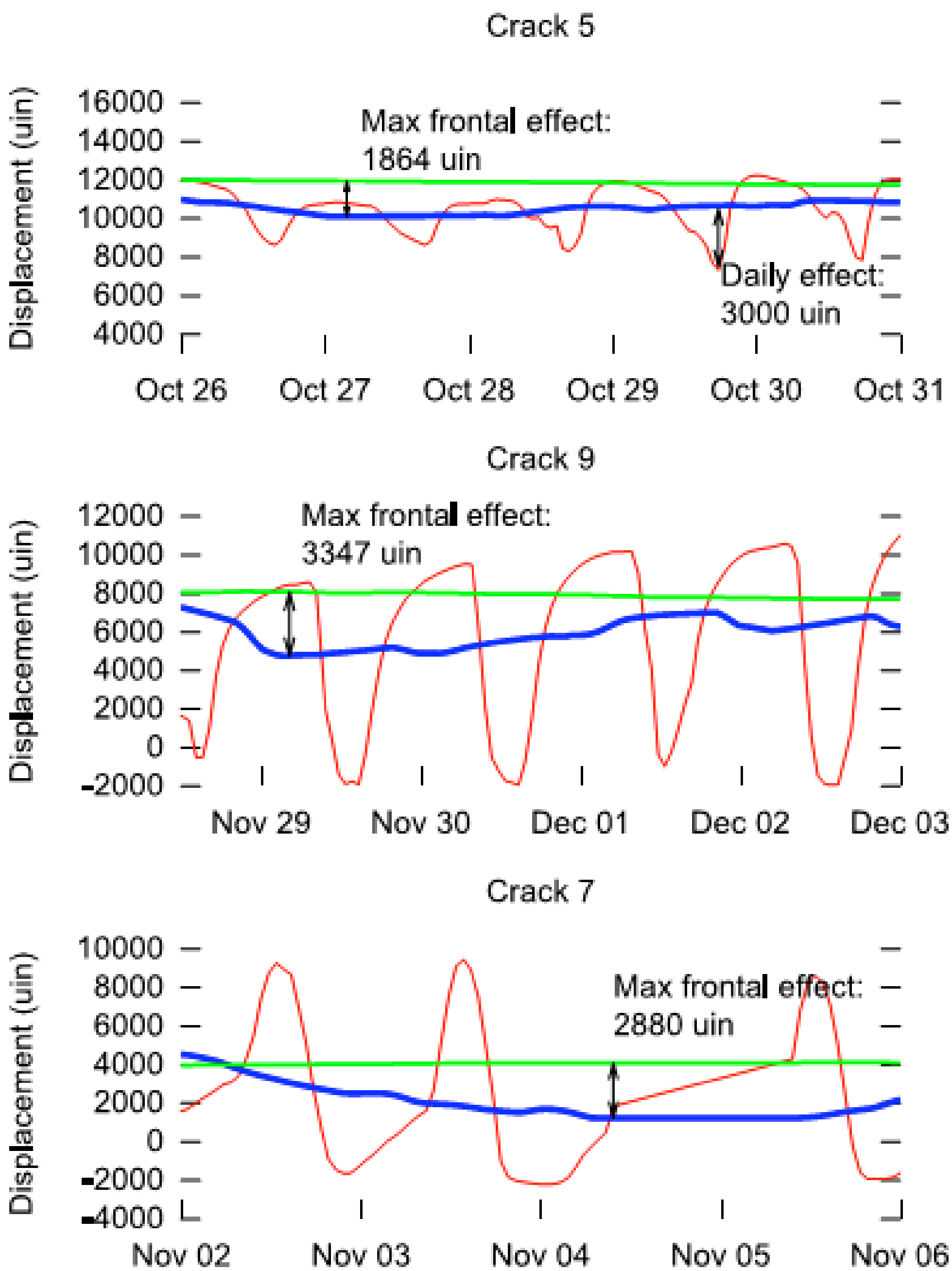


Figure NF-5 - Daily and frontal (max) weather effects on cracks 5, 7,

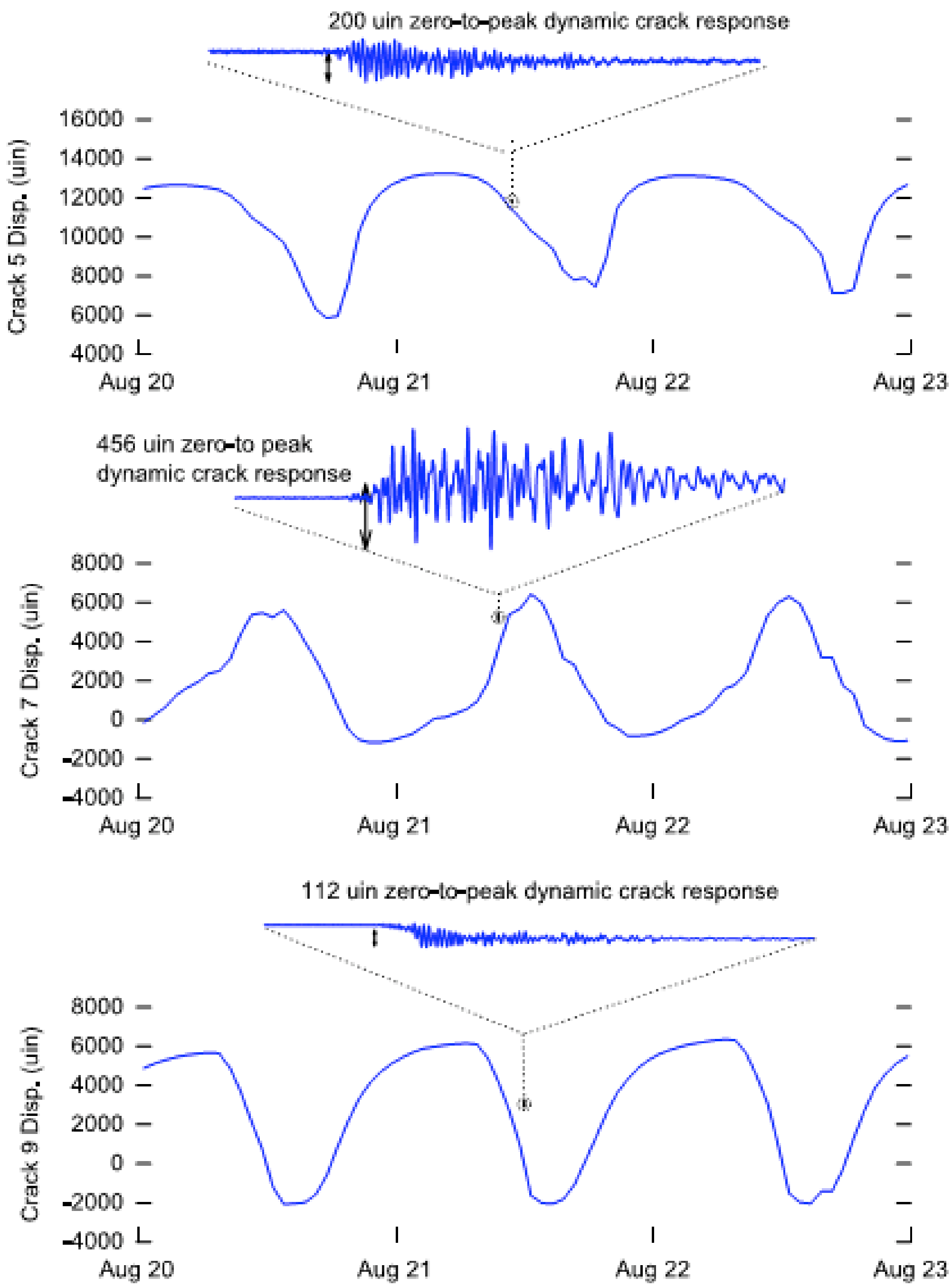


Figure NF-6 - Comparison of static changes in crack width from weather and blast-induced dynamic crack motion for the blast on 8/21

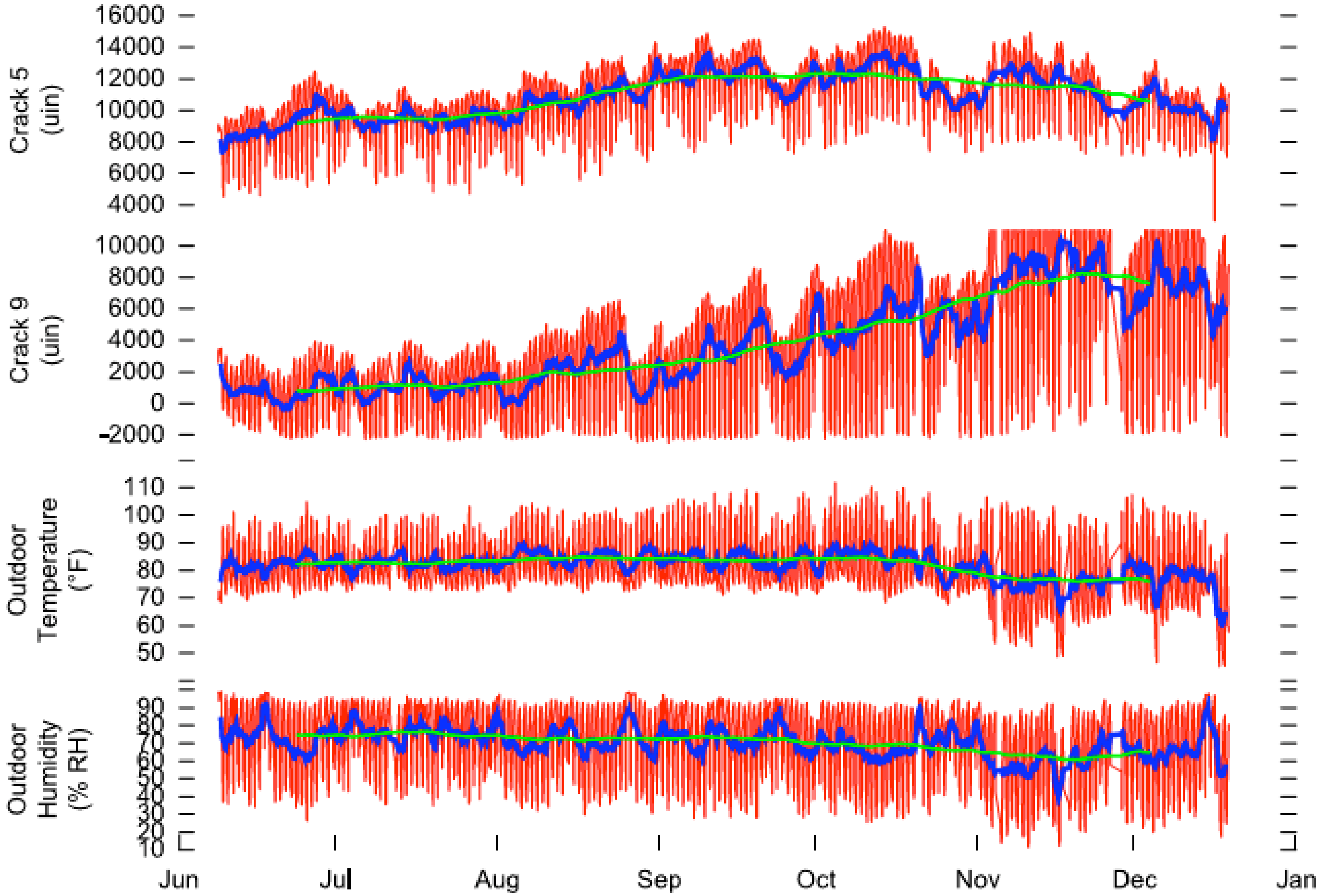


Figure NF-7 - Comparison of hourly readings (shown in orange) with 24-hour central moving average (blue) and 30-day central moving average (green) for exterior cracks and environmental conditions

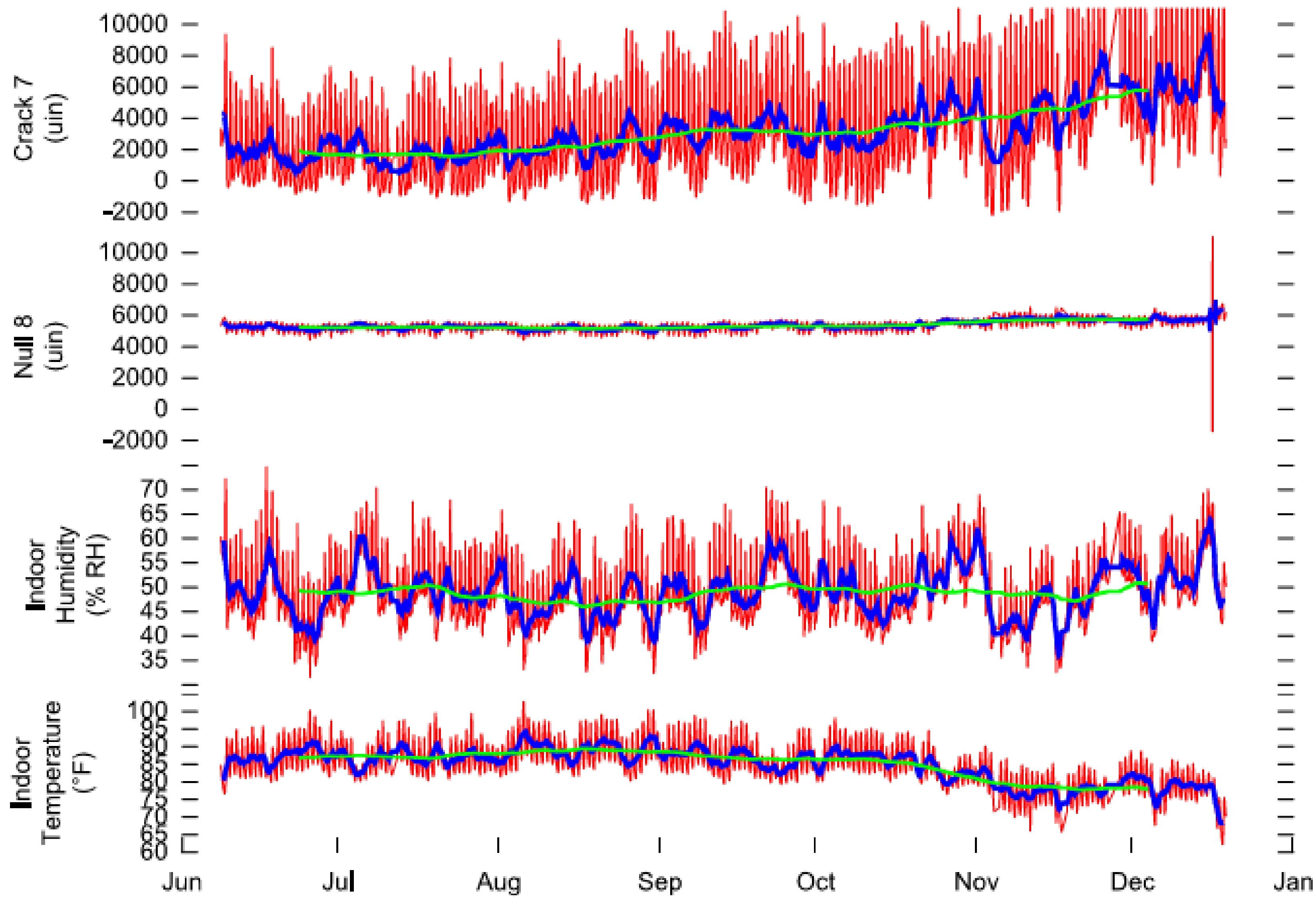


Figure NF-8 - Comparison of hourly readings (shown in orange) with 24-hour central moving average (blue) and 30-day central moving average (green) for interior crack, null sensor, and environmental conditions showing sensitivity of crack to environmental conditions and negligible null sensor response

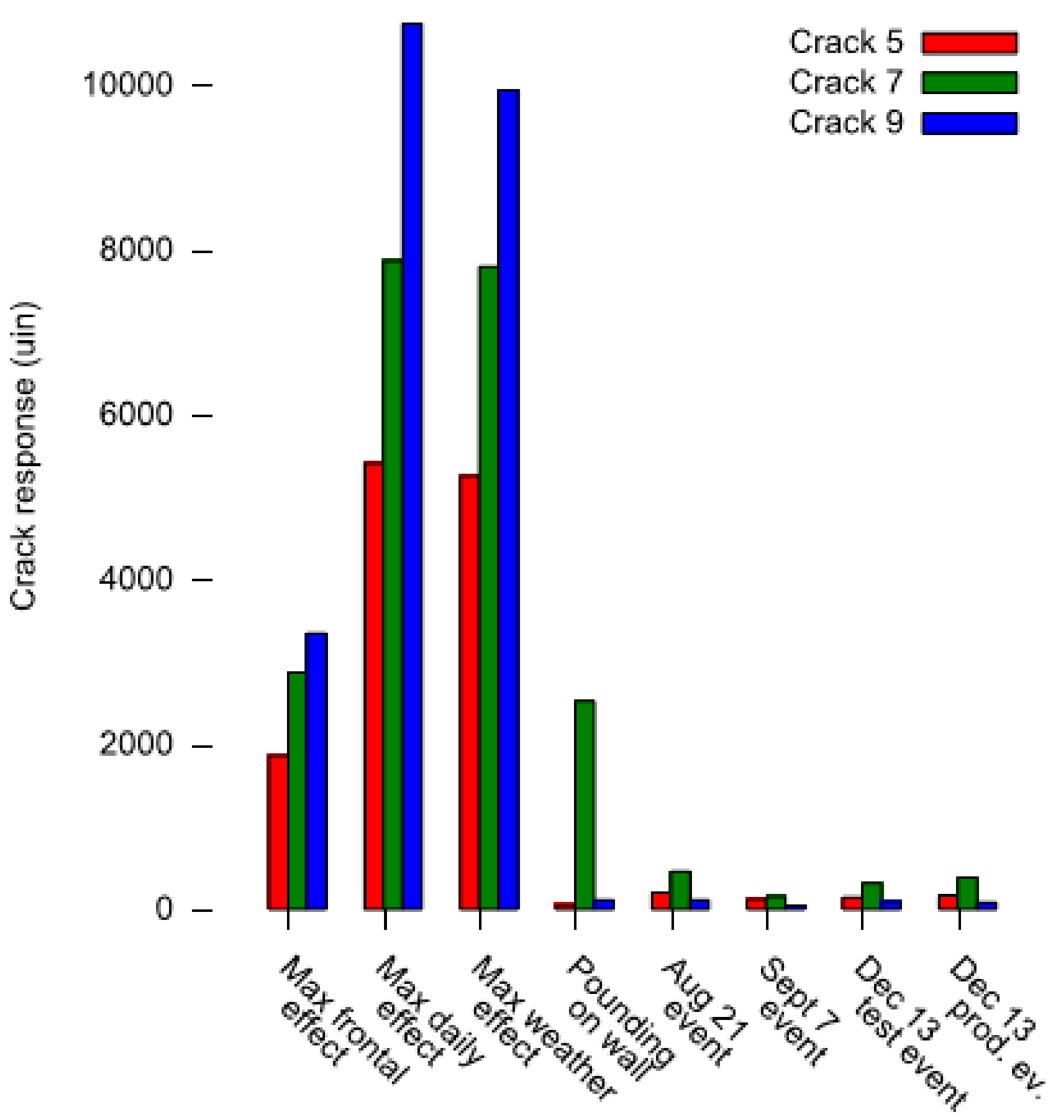


Figure NF-9 - Comparison of crack response to environmental effects, occupant activity, and blast-induced ground motion