# Structural Performance of the Hotel Grand Chancellor

## Peer Review for the Commission

William T. Holmes

Structural Engineer, San Francisco

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  - The derivation of drifts estimated from displacement spectra not clear—certainly not the vertical distribution of drifts (Section .5.2)
  - The derivation of loading on the failed wall D 5-6 is not clear (Section F.1).
  - Very high vertical accelerations are noted in the February event, but their relative contribution to the failure is not estimated. In fact, it is stated that the wall probably would have failed anyway.

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- Comparison of inelastic displacement spectra with estimated displacement is Sept do not agree.

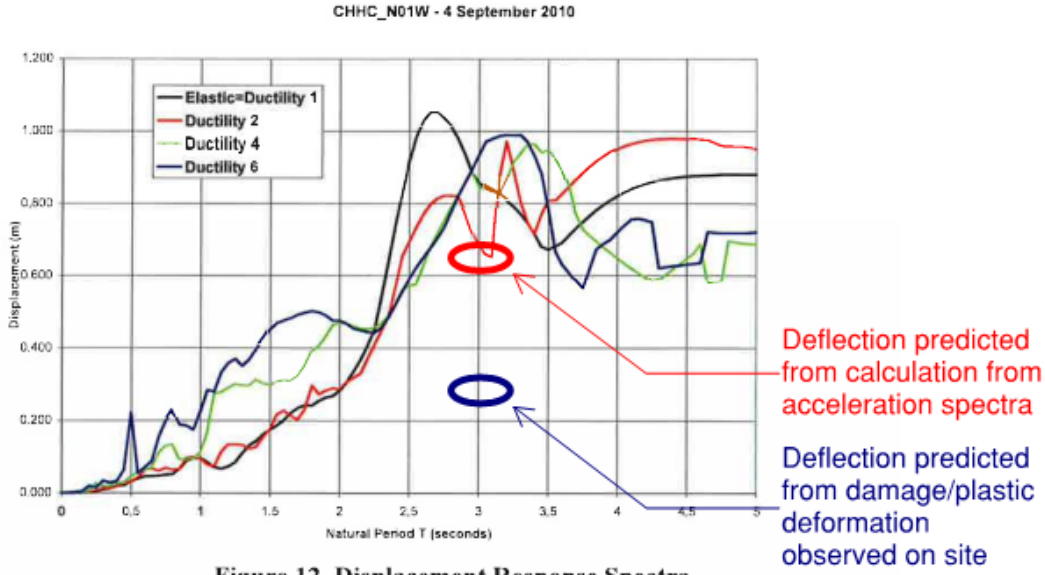


**Figure 12. Displacement Response Spectra**
**Christchurch Hospital, 4 September 2010- North 01° West Component**

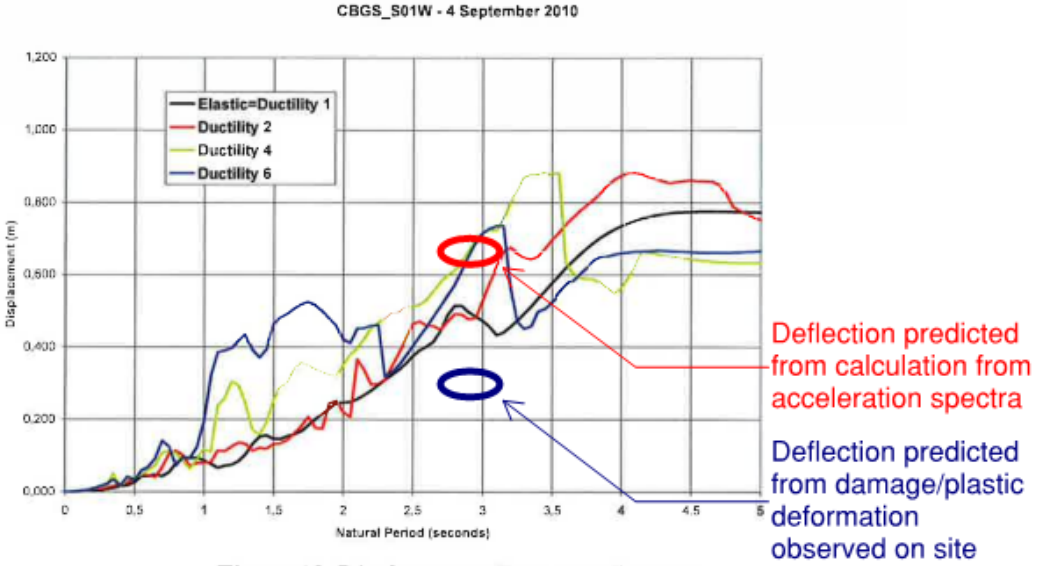


**Figure 13. Displacement Response Spectra**
**Christchurch Botanic Gardens. 4 September 2010- South 01° West Component**

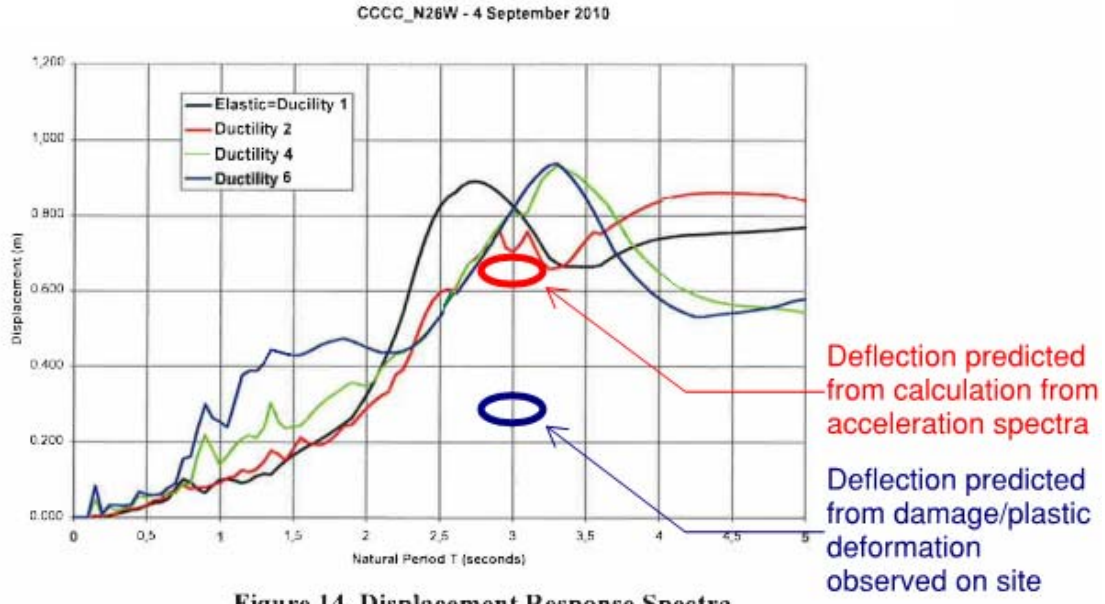


**Figure 14. Displacement Response Spectra**
**Christchurch Cathedral College. 4 September 2010- North 26° West Component**

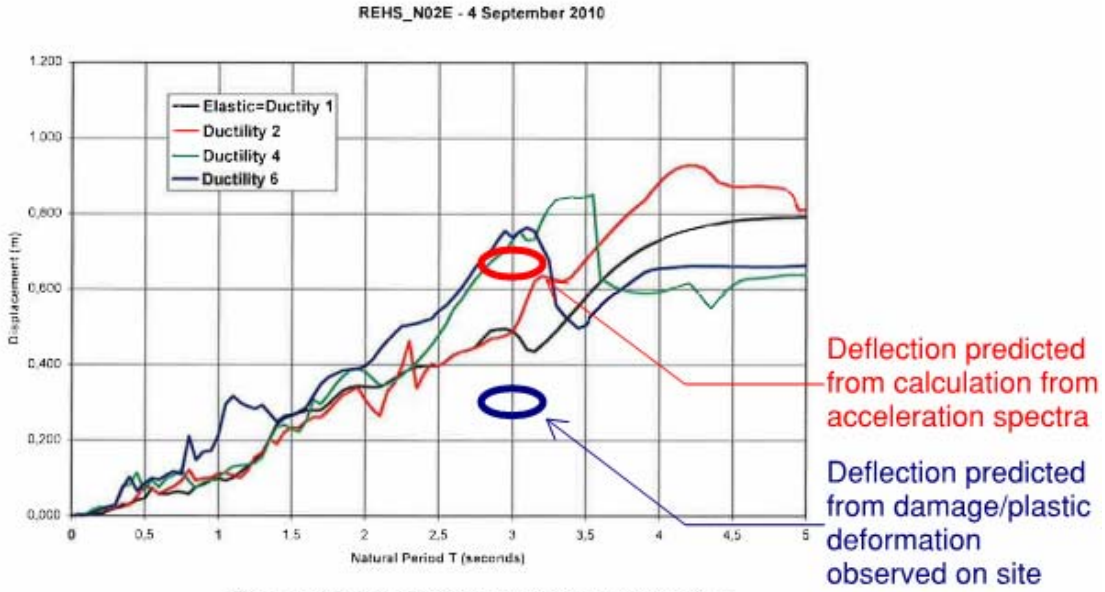


**Figure 15. Displacement Response Spectra**
**Resthaven. 4 September 2010- North 02° East Component**

# Possible Explanations

- Direction of strongest motion in Sept was NS which minimizes interaction with global moment from cantilevers on east face (potential ratcheting). In Feb, strongest was EW.
- Damage in September in frame superstructure was greater than reported.
- Inelastic spectra at base of upper moment frame was filtered by walled base structure in some way that response was miminized. Brittle Wall D5-6 did not go past its failure point (but did in February)

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- Structures that incorporate major elements affected by shaking in two directions must be carefully considered (most structures designed one direction at a time).
- Interaction of gravity framing with lateral load system must be carefully considered (leaning columns, massive amounts of cantilevers, etc) including the potential for ratcheting.