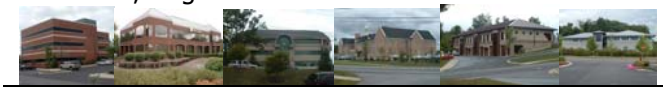

EXECUTIVE SUMMARY

The Signal Hill Professional Center, designed to be an addition to the Manassas Town Center in Northern Virginia, is a 68,000 square foot, four story office building. The building is made up of two sections: a 75' x 165' office structure, with appropriate open office loads, resting on a 110' x 200' parking structure, which must support relatively large 250 psf fire-engine live loads. Like many suburban office structures, this building employs a composite steel system with moment frames. Though the lateral forces were only assessed at above-ground diaphragms, lateral load resistance continues into the underground parking area with shear walls, piers, and moment frames.

Two methods were used to assess lateral force resistance in the two perimeter moment frame systems in the Signal Hill Professional Center. The first uses a STAAD analysis of each moment frame to determine stiffness for lateral force distribution, and then combines lateral forces and gravity loads from a previous RAMSteel analysis to determine maximum moments and shears. The second alters the original RAMSteel model to incorporate the two moment frames and lateral loads. Both seek to follow the lateral forces from the floor diaphragms, to the first floor, and then down into the foundation.

These two analyses revealed that:

- Generally, members in both moment frames were sufficient for the given lateral loadings. Where one beam was at over capacity in the STAAD Analysis, the same beam was well within its strength in the RAM model.
- More attention needs to be brought to the connection between the moment frame columns and the first floor / parking diaphragm. After modeling only the top four floors in RAM with approximated pin connections at the first floor diaphragm, all columns at the first floor were at over capacity. Possibly, moment distribution to moment frames in the underground parking structure would help reduce moments in these members.
- The large length and thickness of the basement walls indicates that shear forces will not control basement wall reinforcement design. Rather, lateral earth pressures will be most critical. The piers adjoining the basement walls, assumed to take all vertical loads from the moment frames, were determined sufficient for both the maximum compressive and tensile forces. Like in the basement walls, lateral earth pressures will again play a larger role in pier design.
- Due to the relatively low height, small lateral forces, and large building weight, overturning moment will not be a concern in structural design.
- Drifts were calculated both on RAMSteel and by hand using a Fleischer Drift Analysis. Both determined maximum drift to be around 2.3", which is greater than the accepted maximum drift of H/400 (1.6"). This discrepancy in drift control is most likely due to improper modeling of support conditions; as the supports range from pinned to fixed, drift should reduce.