Enclosed in this report are the findings of the structural evaluation of the Hurricane Creek Box Culvert, Taxiway Yankee Tunnel, and the Winchester Road Tunnel as related to the Airbus A380 design requirements. The loads and landing gear pattern used during this evaluation were outlined in the Airbus A380 airplane characteristics, as attached in Appendix A.

Hurricane Creek Box Culvert

An evaluation was performed on the above mentioned structure. All evaluation and computer output are attached in Appendix B. The loading of the Airbus A380 was applied in the landing gear pattern shown in Appendix A. The loading was distributed in a fashion to represent 0', 3', 6', and 8' of soil/pavement cover by distributing at a 45-degree angle from the gear pattern shown in Appendix A.

It should be noted that for covers greater than and equal to 3', a uniform weight for 18" of pavement was used, in addition to the remaining cover of soil. Also, for covers greater than and equal to 6', the wing gear and body gear act together, resulting in a larger load over a section of the top slab.

It was determined in the calculations that the top slab of the box can handle a maximum moment of 131 kip-ft (as seen on sheet B1A). During the evaluation, if the A380 was to be placed directly on the top slab, the slab would be overstressed by 13%. For covers equal to and greater than 3', the top slab will have a maximum moment of 56 kip-ft (as seen on sheet B22), which is well under the 131 kip-ft allowable.

During the exterior wall check, a concern was raised related to the J-bars. On the cross section supplied to our office the J-bars did not extend far enough into the top slab for the applied forces of 3' of cover. As seen on sheet B53 of the Appendix, the moment equals zero at approximately 5.8' from the wall and the actual lengths of the J-bars are only 4'-9" long. From this, a depth of 6' is required for these bars to be effective. If less than 6' of cover is in place, additional reinforcing will be necessary to account for the shortness in the J-bars. Besides the J-bars, the wall was sufficiently reinforced for covers greater than and equal to 3'.

The evaluation of the interior wall (Appendix B53 – B57) was performed with two reinforcing patterns. It was unclear on the cross section what the bar spacing and size was for the interior wall, so an evaluation was performed using both spacing and sizes shown for the exterior walls. The checks were for #8 bars @ 6" on center, and #5 bars @ 12" on center. If the interior wall has #8 bars @ 6" the wall is sufficiently reinforced. If the #5 bar option was used, the wall will not be strong enough.

The exact size and spacing of the interior wall reinforcement should be confirmed and compared with the outlined reinforcement. It is possible to use precision instrumentation for inspection of reinforcing bars in concrete to determine the size and spacing of the existing rebar in the interior wall. An example of this type of equipment is the Data Scan C-4974 Digital Rebar Locator, Rebar Finder. Further information regarding this equipment could be found on the James Instruments Inc. website (www.ndthames.com).