APPENDIX C
Example of Real-World Surface Profile Formatting for Simulator Use

Figure C1 shows an example of a real world runway profile prior to formatting. This profile was selected to provide an example of surface roughness due to intersecting runways. The surface elevation change at the runway intersection occurs between 3800' and 4000' along the profile. The vertical red lines delineate the 5100' section selected for use in this study.

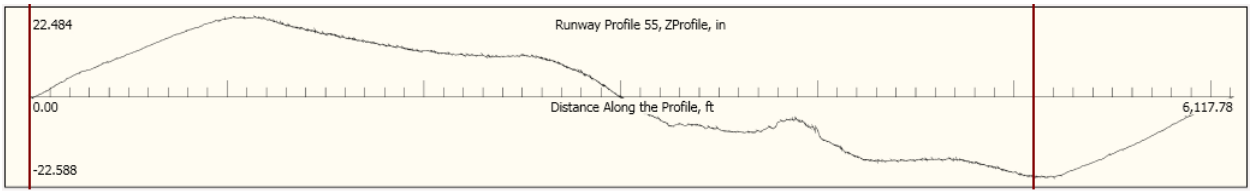

Figure C1. Real World Runway Profile Showing Selected 5100' Section

Figure C2 shows an expanded view of the selected 5100' profile section.

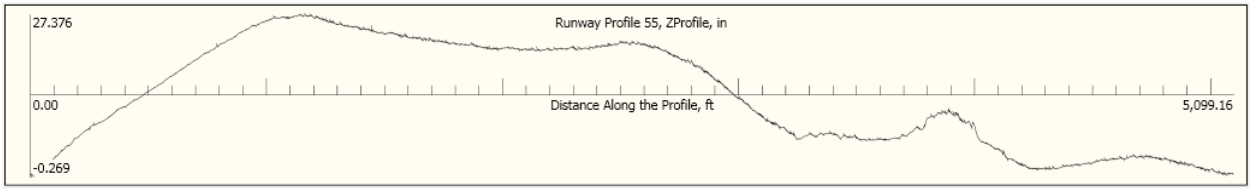

Figure C2. Expanded View of Selected 5100' Section

The profile was filtered using a 1000' cutoff high pass filter to remove low frequency height variations. Removal of low frequencies was necessary due to the flight simulator's inability to provide sustained low frequency motion response. Figure C3 shows the profile height and modeled accelerations after filtering.

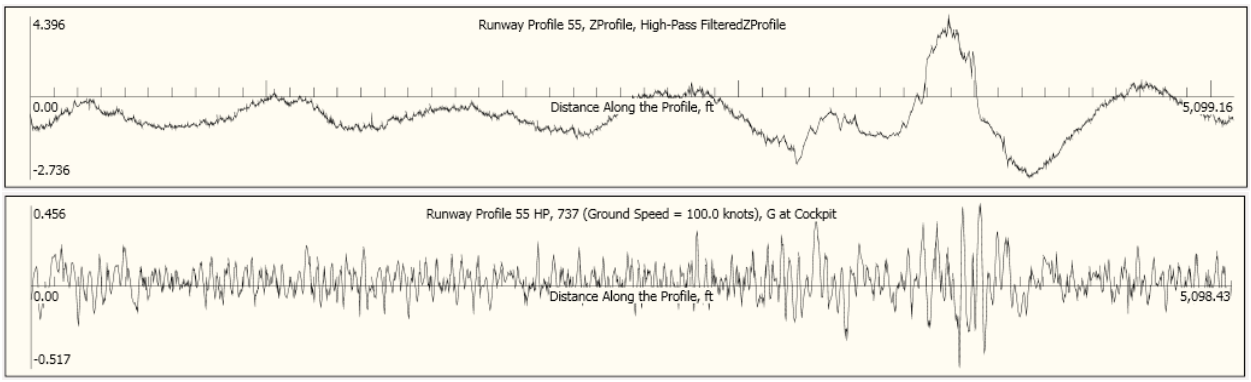

Figure C3. Profile Height and Cockpit Acceleration after High-Pass Filtering

After high-pass filtering, the profile height units were converted from inches to feet and the profile sample rate was changed to two feet to align with the flight simulator format. After conversion the profile was loaded in the flight simulator for testing and the ground model surface height and resulting cockpit accelerations were recorded. B737-800 simulator cockpit

accelerations were obtained from the accelerometer installed below the pilot seats. Figure C4 shows the recorded simulator surface height and cockpit vertical acceleration.

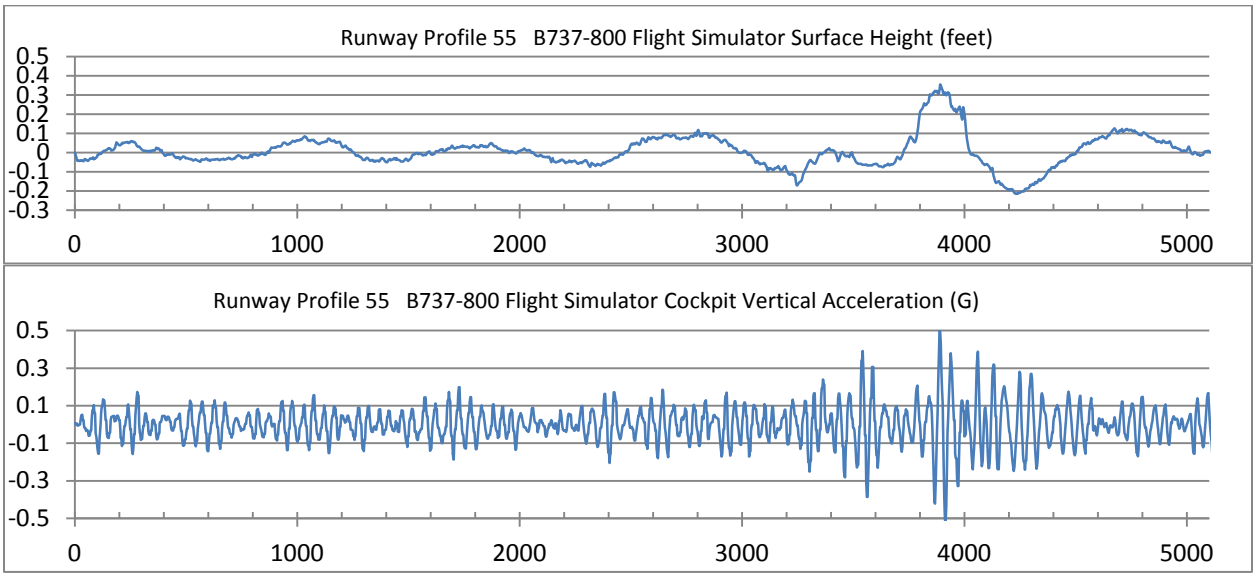

Figure C4. B737-800 Flight Simulator Profile Height and Cockpit Vertical Acceleration

After the real world profiles were installed in the B737-800 flight simulator, each profile was tuned using a profile height gain to provide a range of roughness levels. Figure C5 shows the average cockpit acceleration after tuning for each of the 37 real world taxiway and runway profiles

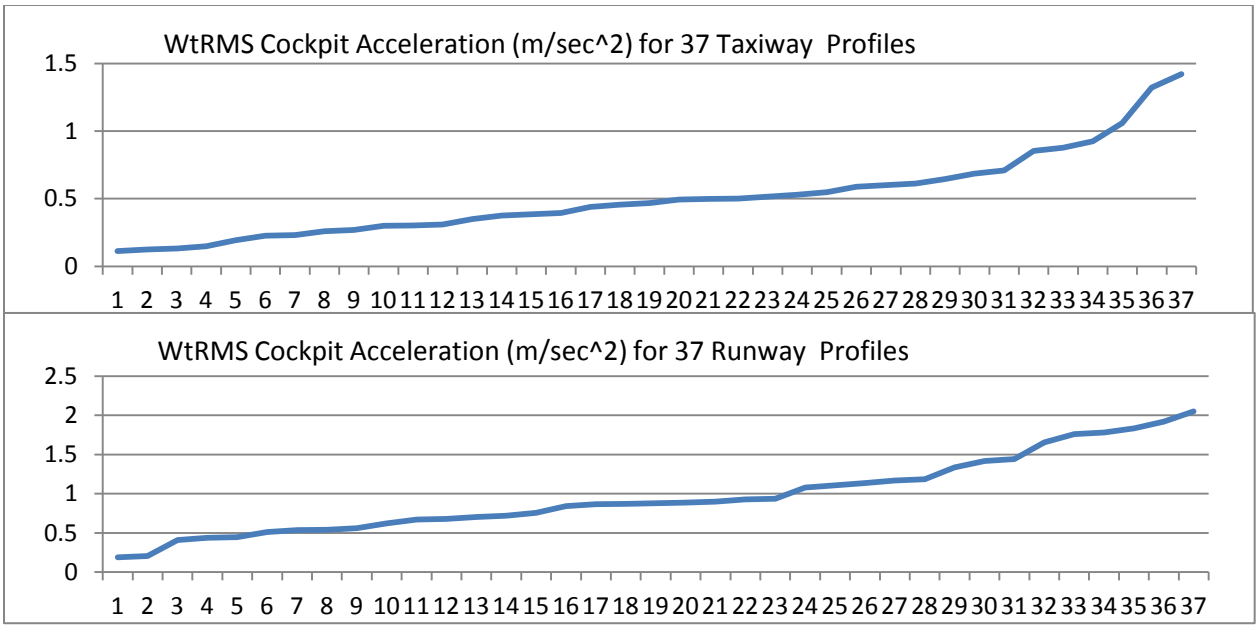

Figure C5. B737-800 Average Cockpit Acceleration for Tuned Taxiway and Runway Profiles