The Fort Hood Military Installation is a karst landscape characterized by Cretaceous-age limestone plateaus and canyons in Bell and Coryell counties, Texas. The area is located in the Lampasas Cut Plain region of the Edwards Plateau and is stratigraphically defined by exposures of the Fredericksburg Group, namely the Comanche Peak and Edwards carbonates. The topography is dominated by plateaued draining divides capped by the resistant Edwards limestone and bordered by steep scarps exposing alternating layers of the Comanche Peak and Edwards units. This interfingering relationship has created a variable slope along the edges of the plateaus, defined by lithology.

The study area is located in the northeastern portion of the installation, and provides numerous outcrops of the Fredericksburg Group carbonates for terrain analyses. Traditional methods such as field surveying can yield accurate results; however, they are limited by time and physical constraints. Airborne Light Detection and Ranging (LiDAR) provides an alternative for high-density and high-accuracy three-dimensional terrain point data collection. For the purposes of this study, a 1-meter Digital Elevation Model (DEM) derived from LiDAR captured in March of 2009 was used as a base map to determine the slope of selected outcrops, and slope analysis derived from the DEM was used to create a profile graph of these outcrops. These data were used to create a slope profile to predict outcrop patterns for the Comanche Peak and Edwards limestones. Field verification and refinement of this model was conducted in order to correct for anthropogenic modifications of slope by Army training activities and road building. Steeper slopes and recessed outcrops associated with the interfingering of the Comanche Peak and Edwards carbonates were not easily resolved by the digital elevation model with regard to slope outcrop pattern, while gentler slopes were portrayed more accurately with regard to slope but the resolution associated with outcrop patterns were less clear.

Although the increasing capabilities of GIS (Geographic Information Systems) and accuracy of geographically referenced data has provided the basis for detailed terrain analysis and modeling, research on terrain-related surface features is highly dependent on terrain data collection and the generation of digital models. Although LiDAR analysis can be a powerful tool, filter mechanisms must be employed to remove major natural and anthropogenic terrain modifications resulting from military training exercises, road building and maintenance, and the natural influence of water bodies throughout the study area.

The LiDAR data and models derived from it was not well suited for the detailed scope of the project due to the interfingering nature of these units, but could be applied on a more regional scale to predict major formation boundaries. Higher resolution data might be better suited for differentiating the interfingering units.

Field verification and refinement of this model was conducted in order to correct for anthropogenic modifications of slope by Army training activities and road building. This slope is on the western section of the study area and was modified for road building (L). Because of the modification to this slope, no outcrop pattern could be determined.

There are many limitations to using spatially derived data to predict outcrop patterns. Dense vegetation and talus prohibited verification of formations. Steep scarps could not be resolved well by the interpretable software. Figure (J) shows a steep but smooth drop in elevation, but in outcrop, the cliff face varies with the protruding Edward's and the recessed Comanche Peak. The LiDAR data and models derived from it was not well suited for the detailed scope of the project due to the interfingering nature of these units, but could be applied on a more regional scale to predict major formation boundaries. Higher resolution data might be better suited for differentiating the interfingering units.