1086-03-2063 **Stephen Flood*** (sdf15@psu.edu). *The Logic of Graph Decompositions.* Preliminary report.

The theory of simplicial graph decompositions studies the infinite graphs that can be built using a sequence of irreducible graphs which are attached together at complete subgraphs. We study the strength of several "existence theorems", which say that certain classes of graphs admit such a decomposition.

More formally, we say that a graph G has a *simplicial decomposition* $(B_\lambda)_{\lambda<\sigma}$ if σ is an ordinal, if $\{B_\lambda\}_{\lambda<\sigma}$ is a collection of induced subgraphs, and if three conditions hold: (1) $G = \bigcup_{\lambda<\sigma} B_\lambda$, (2) for each λ, the intersection of B_λ with $\bigcup_{\mu<\lambda} B_\mu$ is a complete graph, and (3) there are no "redundant" factors. A decomposition is *prime* if its factors cannot be decomposed further. There are a variety of existence theorems which say that certain graphs will admit a prime decomposition.

We will discuss the strength of a number of these existence theorems from the perspective of reverse mathematics and computability theory. In addition, we will give bounds on the ordinal length σ of prime decompositions for different graphs G. (Received September 24, 2012)