Proof is a central and essential component in mathematics. However, studies have shown proof is challenging to students at all levels. Some researchers have pointed out the necessity of establishing a view of proof construction to help students. This report offers a model of the structure of proof construction, which provides a comprehensive view that can encompass the aspects, factors, patterns, and features involved in cognitive processes in proof construction across mathematical subjects. In creating the model, the think-aloud method was employed. While considering multiple aspects involved in proof construction, the investigation of the model revealed the types of operations used to generate a new statement from the previous statement in constructing a proof. The model was tested and refined through solving more than 40 proofs from some mathematical subjects, including undergraduate algebra, analysis, and topology. The model can serve as a tool to understand sources of students’ difficulties with proving and as methodological and metacognitive knowledge to help students with proving. This report may contribute to a body of knowledge of pedagogical approaches for teaching proofs and to the development of a theoretical framework for proof construction. (Received September 16, 2014)