GUIDELINES FOR ROOF STRUCTURES AND SPECIAL ISSUES FOR STADIA SPANS

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DECLARATION

I declare that is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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ABSTRACT

Sports begin in early childhood of the human being and last throughout the life span of the people. The stadium is a theater to conduct organized sport events. The critical structural point in a stadium project is provision of large clear span to attain unobstructed view to the spectators in stands. Optimized steel roof structure to provide unobstructed view is the primary objective of the project.

Thousands of spectators gather in stadia at sport events safety is therefore a significant consideration. So that stadia are designed for efficient movement without congestion and stands to be designed for crowd invasion of dynamic excitation.

Chapter one introduce the project. Chapter two describes the stadium architecture in detail. Chapter three presents design of stadium for safety.

Chapter Four presents methods to design stands of stadia for dynamic excitation and it is the secondary objective of the project. Primary objective introduces optimized roof structure for spans of stands and chapter five is the main chapter and comparison and guidelines for development of past land mark roof structures and stadia roof structures in Sri Lanka presents.

Chapter four to present the stadium stands to survive under high energy events which are described under special issues. Stands of stadia are proposed to design to achieve lowest natural frequency of empty structure above 6 Hz. The existing structures are to be checked to satisfy the requirements stated in Route 2.

The research has gone though the existing stadia in Sri Lanka and landmark stadia presented in research papers, text books and internet web sites to search relevant details of roof structures and proposals for improvement are described in chapter five.

Propped cantilever solution to satisfy $l_s = (5)^{1/2} l_c$ where l_c= cantilever span and ls = critical supported span, then it will produce an attractive dynamic architecture which would required at the primary objective of a stadium.
The span/depth ratio of 6-10 is proposed to size the root of cantilever and the critical span at the preliminary sizing of roof trusses.

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