

# **GUIDELINES FOR ROOF STRUCTURES AND SPECIAL ISSUES FOR STADIA SPANS**

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## DECLARATION

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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 through 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  $l_s$  = 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.

## TABLE OF CONTENTS

Declaration of the candidate & supervisor	i
Acknowledgments	ii
Abstract	iii
Table of contents	iv
List of figures	vii
List of tables	x
1.0 Introduction	1
2.0 The stadium	3
2.1 The stadium architecture	3
2.2 Structures in a stadium	7
2.2.1 Field of play	7
2.2.2 Stands	11
2.2.3 Press box	12
2.2.4 Score board	13
2.2.5 Other facilities	13
2.2.6 A case study	13
3.0 Stadium architecture for safety	15
3.1 Crowd zoning and efficient mobility in an emergency	16
3.2 Design guides for safety	17
3.3 Crowd control measurements	19
3.3.1 Perimeter fence	20
3.3.2 Moats	20
3.3.3 Changes of levels	21
4.0 Design of stands for dynamic crowd action	22
4.1 Introduction	22

4.2	Past developments	22
4.2.1	Route 1: Lowest natural frequency approach	23
4.2.2	Route 2: Highest acceleration approach	29
4.3	Crowd induced dynamic loading	37
4.4	Over view: Design for dynamic crowd action	38
5.0	Types of roof structures for large clear spans	39
5.1	Introduction	39
5.2	Post and beam structures	41
5.3	Goal post structures	42
5.3.1	Australia stadium in Sydney Olympic Park	43
5.3.2	Thomond Park in Limerick, Munster, Ireland	46
5.3.3	San Siro stadium, Milan, Italy	49
5.4	Cantilever structures	52
5.4.1	Mahanuwara Pallekelle international stadium	54
5.4.2	Kettarama intrnational stadium	58
5.4.3	Suriyawwa international stadium	60
5.4.4	Dambulla international stadium	64
5.4.5	Sugathadasa multi sport stadium	67
5.4.6	Olympic stadium in Berlin	70
5.4.7	Kingston Communications stadium in Hull	74
5.4.8	Yishun Indoor stadium and Sport complex, Singapore	77
5.4.9	Sydsney football stadium	80
5.5	Tensioned structures	84
5.1.1	The City of Manchester stadium in United Kingdom	84
5.5.2	Olympic stadium in London	88

6.0	Summary of stadia roofs	92
7.0	Summary, Conclusion and Recommendation	97
7.1	Summary for design of dynamic excitation	97
7.2	Conclusion and Recommendation	98
7.2.1	Dynamic excitation of stands	98
7.2.2	Design of roof structure of stadia stands	98
	References	99



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## LIST OF FIGURES

Figure 2.1	: Olympic stadium in London	3
Figure 2.2	: Olympic Park in Munich	4
Figure 2.3	: Beijing National stadium (Bird's Nest)	4
Figure 2.4	: An example for a multistory car parking system	5
Figure 2.5	: Pitch size of football	7
Figure 2.6	: Pitch size of tennis	8
Figure 2.7	: Pitch size of base ball	8
Figure 2.8	: Pitch size of cricket	9
Figure 2.9	: Pitch size of hockey	9
Figure 2.10	: Pitch size of athletic track and field	10
Figure 2.11	: Rangiri Dambulu stadium	12
Figure 2.12	: Press box of Kettarama stadium under construction	13
Figure 2.13	: Structures in a stadium	14
Figure 3.1	: Zoning diagram of an organized stadium	15
Figure 3.2	: Part of pavilion structure in Sugathadasa stadium	16
Figure 3.3	: Collosium of Rome	19
Figure 3.4	: A perimeter fence	20
Figure 3.5	: An accessible moat	20
Figure 3.6	: A Change of level	21
Figure 4.1	: Limits in natural frequencies in Route 1	26
Figure 4.2	: Management action to attend for improvement of existing stadia	28
Figure 4.3	: Finite element model of crowd units	29
Figure 4.4	: Mode shape of empty structure	30
Figure 4.5	: Limit of scenario 2 acceleration	32
Figure 4.6	: Limit of scenario 3 acceleration	33
Figure 4.7	: Limit of scenario 4 acceleration	34
Figure 4.8	: Limit of scenario 4 displacement	35
Figure 4.9	: Dynamic crowd factors which are defined by various codes	37
Figure 5.1	: Wind circulation in a stadium without roof	39
Figure 5.2	: Wind circulation in a stadium with partial roof	40
Figure 5.3	: An example for post and beam structure	41
Figure 5.4	: Old White City stadium	41
Figure 5.5	: A goal post roof	42
Figure 5.6	: Australia stadium	43
Figure 5.7	: Diagrid structure of secondary trusses at 10 m grid module	45
Figure 5.8	: Grand stand in elevation	45
Figure 5.9	: Structural behavior of 2-pinned arch	46
Figure 5.10	: Thomond Park in Limerick	46
Figure 5.11	: Orientation of stand structure	46



Figure 5.12	: The roof in elevation	48
Figure 5.13	: The support of the roof	48
Figure 5.14	: San Siro stadium, outside view	49
Figure 5.15	: Structure of primary and secondary roof beams	50
Figure 5.16	: Layout of main and secondary trusses	50
Figure 5.17	: Bracing arrangement	51
Figure 5.18	: The grids of raft for the roofing	51
Figure 5.19	: Suspended raft	52
Figure 5.20	: Simplified behavior of main beam	52
Figure 5.21	: Cantilever structure	52
Figure 5.22	: Propped cantilever structure	53
Figure 5.23	: Architectural model of Mahanuwa Pallekelle stadium	54
Figure 5.24	: Grandstand of Pallekelle stadium under construction	55
Figure 5.25	: View of the grandstand in elevation	55
Figure 5.26	: Bending moment diagram	56
Figure 5.27	: Critical axial stresses under gravity	57
Figure 5.28	: Kettarama stadium	58
Figure 5.29	: Sectional view of the grand stand	59
Figure 5.30	: Suririyawewa stadium	60
Figure 5.31	: The Suririyawewa grandstand under construction	61
Figure 5.32	: Sectional view of grandstand structure	61
Figure 5.33	: The set of trusses of roof	61
Figure 5.34	: Plan view of roof	61
Figure 5.35	: Sectional view of press box	62
Figure 5.36	: Sectional view of pavilion	63
Figure 5.37	: Dambulla international cricket stadium	64
Figure 5.38	: A Sectional view of grand stand	65
Figure 5.39	: An example for a method of shortenings the overhang	66
Figure 5.40	: Sugathadasa multi-sport stadium	67
Figure 5.41	: Front cantilever span of grandstand roof	68
Figure 5.42	: Internal span of grandstand roof	68
Figure 5.43	: Rear span of grandstand roof	69
Figure 5.44	: Simplified behavior of grandstand roof structure	69
Figure 5.45	: Sectional view of old grand stand roof of Berlin Olympic stadium	70
Figure 5.46	: Roof structure in Berlin stadium	71
Figure 5.47	: Cross bracings and dilation joints	72
Figure 5.48	: Kingston Communications stadium in Hull, England	74
Figure 5.49	: A view of cellular beam and bracings in completed stadium	74

Figure 5.50	: West stand roof in a view of elevation	75
Figure 5.51	: Structural unit in west stand roof	75
Figure 5.52	: Site layout of Yishun stadium	77
Figure 5.53	: Suspended roof option at sport complex	77
Figure 5.54	: A main truss in outdoor stadium	78
Figure 5.55	: Front tie down at 20m spacing	79
Figure 5.56	: Sydney football stadium	80
Figure 5.57	: A view from outside	80
Figure 5.58	: Assumed wind pressure distribution	81
Figure 5.59	: Statically determinant roof bay at the final design	82
Figure 5.60	: Stable frames in alternative bays	83
Figure 5.61	: 3D dynamic skeleton of the Manchester stadium	84
Figure 5.62	: The main structural unit of the roof	85
Figure 5.63	: Location of the catenary cable after completion of the roof	86
Figure 5.64	: A group of cables in fan shape	86
Figure 5.65	: A view of back stay anchors	87
Figure 5.66	: Olympic stadium in London	88
Figure 5.67	: Structural elements of the roof	89
Figure 5.68	: a) Simplified unit b) Integration in real construction	90
Figure 5.69	: A Sketch at structural view	90
Figure 5.70	: An example to compare cantilever solution and propped cantilever solution	91
Figure 6.1	: Variation of span/depth ratio	96

## LIST OF TABLES

Table 3.1: Description of use of zones	16
Table 3.2: Number of exit points required	18
Table 3.3: Minimum width at exit	18
Table 4.1: Additional lateral load to account for lateral stability	24
Table 4.2: Guidance for $\lambda$	31
Table 4.3: Allowable limits under Route 2 assessment	35
Table 4.4: Practical uses of Route 1 and Route 2	36
Table 4.5: Dynamic Crowd Factors proposed by Willford	38
Table 5.1: Comparison on wind uplift given by BS6399 and wind tunnel testing	49
Table 5.2: Detail of roof trusses in Pallekelle stadium roof	56
Table 5.3: Parameters at roof trusses at Kettarama stadium	59
Table 5.4: Depth at the root of cantilever in Suriyawewa stadium grandstand roof	62
Table 6.1: Summary on landmark structures in records and major sport stadia in Sri Lanka	92
Table 6.2: Conceptual analysis of structural form	93
Table 6.3: Summary of past records of Span/Depth for trusses	95
Table 6.4: Summary of past records of Span/Depth for cellular or solid beams	95
Table 7.1: Summary of Route 2	97

