STATE MINISTRY OF RURAL ROADS

AND OTHER INFRASTRUCTURE

CONNECT

STATE BRIDGE DESIGN COMPETITION - 2021

2021 January

Content

1. Introduction

State Ministry of Rural Roads and other Infrastructures is formed according to the government policy document “VISTAS OF PROSPERITY AND SPLENDOUR” with priorities in the Development and Modernization of Rural Road Network, developing an alternative road system with a high level of access to main roads and expressways and modernizing the bridge system linked to the road network.

Assisting in the formulation of policies in relation to the subject of Rural Roads and Other Infrastructure for a "Modernized Integrated Highways System" under the direction and guidance of the Minister of Highways in conformity with the prescribed Laws, Acts and Ordinances and implementing, projects under the National Budget, State Investment and National Development Programme, and implementing, monitoring and evaluating subjects and functions of the below-mentioned State Corporations and Statutory Organizations.

Modernizing the bridge system linked to the road network is one of the special priorities of the State Ministry. Under the programs initiated by the State Ministry of Rural Roads and other Infrastructure, the connectivity points (such as the bridges) of the rural economy to the urbans were identified as critical elements to improve the livelihoods of communities. Existing bridges which require upgrading and development to cater the increasing transport requirements are to be modernized under the initiative.

The State Ministry has a target of completing 2000 rural bridges in 2021. CONNECT – State Bridge Design Competition is organized by the State Ministry of Rural Roads and other Infrastructure as a key milestone in the Rural Bridge Program.

The State Ministry has identified following **challenges** in developing rural bridges of Sri Lanka.

- Ever increasing traffic and loads
- Mobilization of construction material and equipment
- Site and access constraints for construction
- Schedule
- Cost
- Durability/Service life/Sustainability

Innovative engineered solutions may serve the program in overcoming all the challenges.

2. Objectives

Educate engineers to understand that their job is not only to design safe bridges to carry the required loads, but also to make them constructible, cost effective, and fulfil the social and environmental needs.

Identify bridge designs that can successfully address at least three challenges related to the construction of longer lasting rural bridges.

2.1 Definition(s)

Rural Bridge: Technical definition of a rural bridge is that any bridge that does not located in a national road (A, B, and E type roads).

2.2 Approach

CONNECT – State Bridge Design Competition requires competitors to submit bridge designs to fulfill the aforementioned objectives.

3. Competition Phases

3.1 Letter of interest:

A single page letter with the name of the institute, member(s) of the group, contact person, contact information, and a brief description of the idea (with a couple of sketches).

3.2 Phase One: Idea Submission

A report with the bridge configuration, design, and adequate information describing the specific challenges addressed by the team. With computer aided designs and report.

3.3 Phase Two: Idea Presentation

Selected individuals/teams will be called up to present ideas in front of an expert panel.

4. Competition Categories

CONNECT – State Bridge Design Competition is conducted under three categories.

School Category: Schools can enter as teams or as individuals with the approval of Principal.

University Category: Undergraduates of any discipline can form teams with up to seven members and compete.

Open Category: Any individual or any other entity/organization can compete with a team formed up to seven members.

4.1 Submission Requirements

School Category: Minimum – A conceptual design of the bridge idea

University Category: Minimum – Computer aided model and comprehensive report with technical details as described in the section 6.2. Competitors are encouraged to include any further items and be innovative.

Open Category: Minimum - Computer aided model and comprehensive report with technical details as described in the section 6.3. Competitors are encouraged to include any further items and be innovative.

5. Bridge Specifications

1) School Category

Competitors are required to submit conceptual designs for any challenging location selected by themselves, with following minimum conditions.

Length: up to 6m

2) University Category

Competitors are required to submit designs for two types of bridges, short span and long span.

Bridge type 1 (Short Span)

Length: up to 6m

Width: Should be able to cater day to day activities of a rural community with 100 families who cultivates a 5000 acres of land, also the hospital and school are located outside of the community area.

Bridge should be able to tolerate floods.

If precast sections are used and/or any special construction equipment is needed according to the design, such elements or equipment should be able to be transported on 3m wide roads with 90 degree bends.

Bridge type 2 (Long Span)

Length: 15m to 30 m

Should be able to cater day to day activities of a rural community with 100 families who cultivates a 5000 acres of land, also the hospital and school are located outside of the community area.

Bridge should be able to tolerate floods.

If precast sections are used and/or any special construction equipment is needed according to the design, such elements or equipment should be able to be transported on 3m wide roads with 90 degree bends.

3) Open Category

Competitors are required to submit designs for two types of bridges, short span and long span.

Bridge type 1 (Short Span)

Length: up to 6m

Width: Should be able to cater day to day activities of a rural community with 100 families who cultivates a 5000 acres of land, also the hospital and school are located outside of the community area.

Bridge should be able to tolerate floods.

If precast sections are used and/or any special construction equipment is needed according to the design, such elements or equipment should be able to be transported on 3m wide roads with 90 degree bends.

Bridge type 2 (Long Span)

Length: 15m to 30 m

Should be able to cater day to day activities of a rural community with 100 families who cultivates a 5000 acres of land, also the hospital and school are located outside of the community area.

Bridge should be able to tolerate floods.

If precast sections are used and/or any special construction equipment is needed according to the design, such elements or equipment should be able to be transported on 3m wide roads with 90 degree bends.

6. Evaluation Criteria

1) School category

Selection of conceptual location (10% of the total score)

Comprehensiveness of the Drawing (50% of the total score)

Innovation and novelty (40% of the total score)

2) University Category

- The Letter of Interest (5% of the total score): The letter of interest are to be submitted as one page document including following sections
    1. Title Section: Include name of the competition, team name, logo, organization
    2. Abstract: Maximum 200 words. Include design gap, methodology of design and approach
    3. Plan view, Section view, and Elevation view with dimensions
- Report (5% of the total score): Idea reports will be evaluated on formatting, presentation, and design and construction. Reports should be well thought out and provide substantial information with following sections
    1. Title page: Include name of competition, type of bridge, team name, team logo (each team must have a unique logo), name of the school or organization, names of students, name of teacher or advisor.
    2. Table of contents
    3. Executive summary: No more than one page
    4. Team details: Names and roles
    5. Body (Main part of the report)
        a. Explain the scientific principles behind your design.
        b. Engineering challenges encountered
        c. Graphs and charts representing bridge design
        d. Social impact
        e. Environmental impact
        f. Innovation and novelty
        g. Benefits and application
    6. Conclusions
    7. Acknowledgments
    8. Bibliography
    9. Appendix 1: Structural design
    10. Appendix 2: Design drawings
    11. Appendix 3: BOQ and cost estimation
- Structural Design (30% of the total score): Based on the Appendix 1 of the report. Comprehensiveness of the calculations, accuracy and the value engineering aspects are evaluated.
- Design Drawings (20% of the total score): Base on the Appendix 2 of the report
- BOQ and Cost estimation (20% of the total score): Based on the Appendix 3 of the report

- Innovation and Novelty (10% of the total score): Based on the section 5-f of the report
- Benefit and application (10% of the total score: Based on the section 5-g of the report

3) Open Category

- Letter of Interest (5% of the total score): The letter of interest are to be submitted as one page document including following sections

    4. Title Section: Include name of the competition, team name, logo, organization
    5. Abstract: Maximum 200 words. Include design gap, methodology of design and approach
    6. Plan view, Section view, and Elevation view with dimensions

- Report (5% of the total score): Idea reports will be evaluated on formatting, presentation, and design and construction. Reports should be well thought out and provide substantial information with following sections

    12. Title page: Include name of competition, type of bridge, team name, team logo (each team must have a unique logo), name of the school or organization, names of students, name of teacher or advisor.
    13. Table of contents
    14. Executive summary: No more than one page
    15. Team details: Names and roles
    16. Body (Main part of the report)
        a. Explain the scientific principles behind your design.
        b. Engineering challenges encountered
        c. Graphs and charts representing bridge design
        d. Social impact
        e. Environmental impact
        f. Innovation and novelty
        g. Benefits and application
    17. Conclusions
    18. Acknowledgments
    19. Bibliography
    20. Appendix 1: Structural design
    21. Appendix 2: Design drawings
    22. Appendix 3: BOQ and cost estimation

- Structural Design (30% of the total score): Based on the Appendix 1 of the report. Comprehensiveness of the calculations, accuracy and the value engineering aspects are evaluated.
- Design Drawings (20% of the total score): Base on the Appendix 2 of the report
- BOQ and Cost estimation (20% of the total score): Based on the Appendix 3 of the report
- Innovation and Novelty (10% of the total score): Based on the section 5-f of the report
- Benefit and application (10% of the total score: Based on the section 5-g of the report