**2022 国际大学生建筑设计与数字建模竞赛**

**数字化结构设计方向竞赛任务书**

**一、设计要求**

1、总体要求：这是一个开放型的设计构想，鼓励参赛者结合实际，发挥创造及创新能力。首先，请说明所选铁路桥梁地理位置和桥址的理由，及该桥梁对区域的政治、经济及文化背景的影响，并简述该桥梁的设计理念（这部分不超过500字）。桥址区的地形、地貌、水文、地质、地震、气候、气温变化、荷载等条件及执行的技术标准由参赛者自行确定，与设计参数和设计结果等一并在设计方案、说明中使用图文及表格明确阐述。鼓励参赛者提出新颖、合理的桥梁结构类型。

2、桥梁类型：铁路桥梁。根据参赛者所在国家或地区的需求，选择铁路线路中的一座桥梁或若干座桥梁组成的桥梁群进行设计，根据选择的铁路线路的具体情况，桥梁跨越的障碍类型不限，河流、道路、山谷均可。

3、桥梁规模：桥长、跨径组合等参数由设计者根据所选桥梁的功能及设计目标自定。桥宽按照双线高速铁路进行设计。

4、参赛桥梁主要设计内容要求如下：

（1）桥型方案：悬索桥、斜拉桥、拱桥、梁桥及组合、混合、以及新概念、未来之桥等方案均可；

（2）结构设计：选定桥型结构方案后，对桥梁主要承重构件及重要附属设施进行设计，通过合理的荷载组合及内力验算确保桥梁的强度、刚度和稳定性；

（3）材料设计：钢、混凝土、组合与混合、纤维复合材料，新材料等；

（4）施工方案：根据所选定的桥型，确定先进、创新、适用的施工方案；

（5）设计理念：需遵循安全、适用、耐久、创新、美观、环保、低碳、节能、节约、可施工、可管养等桥梁设计理念，每个作品应体现至少3种设计理念。

1. **作品要求**

1、建议先用草图(最好手绘)准备两套初步设计构思来选择桥的类型，表明结构及地基基础的两种不同且可行的设计方案，并清楚说明每种方案的功能框架、荷载传递、可维护性和稳定性等。审核并建设性评估概念设计方案（如对于环境评估、设计功能, 可建性，低碳排放及整体造价等方面的考虑），并确定最终设计方案，阐述选择的理由，并进行最终设计。

2、作品说明的电子版以word格式提交，中文使用宋体四号字，28磅行距，不多于20页、1.5万字，英文使用Times New Roman四号字，28磅行距，不超过35页，1万字。

3、主要设计图纸（设计方案、主要结构构造图、施工方案等），图纸数量不多于10页，A3图幅；

4、效果图：彩色，不多于5页，A3图幅。电子版以jpg格式提交。

**2022 Belt and Road International Student Competition on Architectural Design and Digital Modelling**

**Competition Guidelines**

**(Category B: Structural Design)**

**I. Design Requirements**

1. General requirements: This is an open-ended design exercise to encourage well considered, innovative and creative solutions. Firstly， please describe the reasons for selecting the geographic location and the actual construction site of the railway bridge, and its role in the local political, economic and cultural landscape. Briefly describe the design philosophy or principles applied to this bridge. Up to 500 words for this section please. All design parameters including load and site conditions are to be determined by the participants. These should include the bridge’s design capacity, topography of the site, its groundwater, geological, geotechnical conditions as well as any potential long-term impact that the local climate change or earthquake history would have on the bridge’s structural performance. The technical design standards to be used, the design load and all other relevant site conditions, are to be specified by the participants and should be clearly presented in the design scheme with narratives. Please use tabular form or sketches to illustrate where necessary. Participants are encouraged to propose novel and reasonable bridge structure types.

2. Bridge type: Railway bridge. According to the demands of the countries or districts where the participants are located, the design work can be carried out on a single bridge or bridge group in the selected railway line. According to the specific conditions of the selected railway line, there is no limit to the type of the bridge crossing barriers, including rivers, roads, and valleys, etc.

3. Scale of the Bridge: the bridge length and span combination shall be determined by the designers to ensure it is fit for purpose and meets the design requirements for the selected railway line. The bridge width shall be designed according to the standard of double track railway.

4. Requirements for bridge types and design contents are as follows:

(1) Bridge types: Suspension, Cable-stayed, Arch bridge, Beam bridge, Truss bridge or combined, mixed, new conceptual, futuristic designs etc.;

(2) Structural design: When the bridge type is decided, participants shall design the primary load-bearing components and major ancillary facilities. Additionally, the strength, stiffness and stability of the bridge structures shall be ensured through reasonable load combination and internal force calculations;

(3) Materials: steel, concrete, combination and mixed, FRP composites; new materials, etc.;

(4) Construction schemes: advanced, innovative and applicable construction schemes;

(5) Design concepts: safety, applicability, durability, innovation, atheistic features, environmental sustainability, low carbon consideration, energy conservation, economy, constructability, easy maintenance, etc. Each work shall follow at least three of the above design concepts.

**II. Entry requirements**

1. It is recommended that the participants prepare a design appraisal with (preferably hand) sketches in preparation for the selection of the type of bridge. The appraisal should include two distinct and viable options for the proposed bridge structure, and how loading transfers from the main functioning frame to the substructure. Due consideration should be given to the bridge’s serviceability and stability aspects. Review and critically appraise the two schemes (such as sustainability, functionality, buildability, carbon reduction and whole life costing) and identify the final chosen solution. Please specify the reasons for the choice before carrying out the final design.

2. The electronic version of the work description shall be submitted in Word format. If it’s in Chinese, use Song font with 4-size characters, 28-point line spacing, no more than 20 pages and 15,000 words; For English submissions, use Times New Roman font with size 11, single line spacing, no more than 35 pages and 10,000 words;

3. The number of design drawings (design schemes, main structural drawings, construction schemes, etc.) shall not be more than 10 pages of A3;

4. Renderings: color images with no more than 5 pages of A3. The electronic version should be submitted in JPG format.