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STUDY OF OPTIONS FOR THE DESIGN OF THE ROOF OF THE 2,000-SEAT ROWING CHANNEL TRIBUTARY

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Abstract
Where the 2,000-seat grandstand of the rowing canal is commonly utilized in roofing, the essay advises developing and comparing arches as an alternative to trusses. The arches' efficiency over the trusses is explicitly stated, as is the fact that their belts are directed along a curved line, the tiny amount of stresses generated in the rods, and the fact that they are formed of closed contour profiles. A profile rope with a parallel strap, single-angle truss, for example, is developed and compared to each other. The grandstand is meant to be 24x80 meters in size.

Keywords:roof-covering,truss,interval,base,knot,bar,eccentricity,bending moment,share force,axial force,angular, tribune, paddle, arches.

Introduction

Various metal trusses and arches are now frequently employed as roof constructions. When creating the roof of the 2000-seat rowing channel grandstand, metal trusses or arches are also appropriate. Both choices were designed in this situation, and the best one was picked. These metrics verify the design's cost-effectiveness.

Main Part

The key difficulty in the design of tribune roofs is the proper selection of their structural scheme and cross-sectional shapes in order to design steel usage as efficiently as possible. A truss with a span of 24 m and a rear arch were contrasted in the ideal design of the roof covering for the 2000-seat rowing canal tribune. The seats are arranged in 14 rows for a total distance of 80 meters. Every 8 meters, a 1 meter passage was left.

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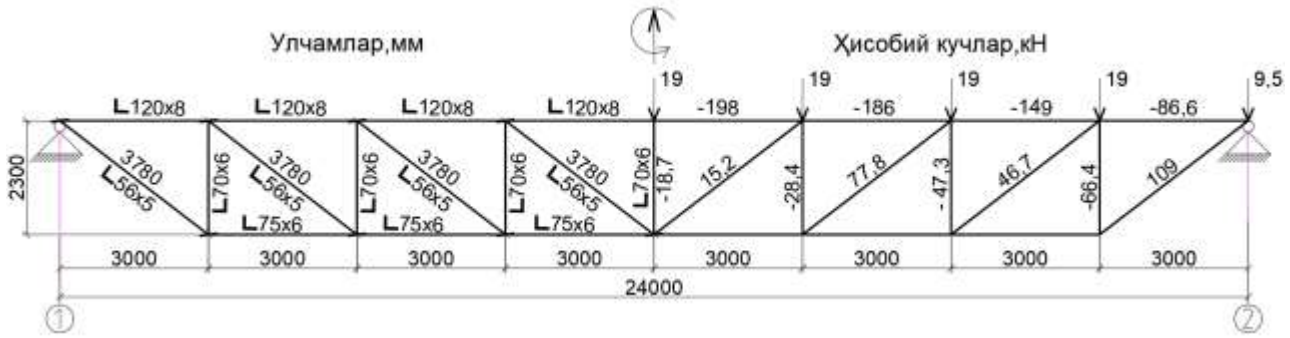
OPTION 1. The following must be used to create a single angle farm. The farm is 24 meters tall, with a pitch of -6 meters. The steel is of the C235 low carbon grade. (R_y=235 MPa).
There are two types of spread loads: normative and computed spread loads. q^H=0,83 kH/м², q=1,054 kH/м².

Figure 1. A parallel belt farm's calculation scheme.

a-



geometric dimensions, mmb-stresses, кН

Loads operating on the farm without roofing are transmitted via prongs arranged in 3 m steps.
We determine the loads that have an impact on the farm. Table 1 shows the normative and design loads for roofing.

TableNº1:

№	Shipping names	Normative load, кН/m²	Reliability Coefficients	Accounting load, кН/m²
1	“SANDWICH” panel	0,15	1,1	0,165
2	Progon, binders, farm	0,18	1,05	0,189
3	Snow	0,50	1,4	0,70
	Total:	q_n=0,83		q_o=1,054

Solve. Calculated and accumulated loads influencing the farm's top belt.

$$P=q\cdot B\cdot d=1.054\cdot 6\cdot 3=19.0 \text{ kH}.$$

Here; d, B - the distance between nodes and farms, respectively.
The geometric shape of the farm is created using the above recommendations.

H=2,3m; L=24m

We select each aspect of the farm from a different perspective.
Using **LIRA-SAPR,** the stresses occurring in the truss rods were found and the selected sections were chosen.
OPTION 2. An arch composed of a 24 m arched profile was used as a comparison alternative, and the loads were dispersed along the stem (Fig. 2).

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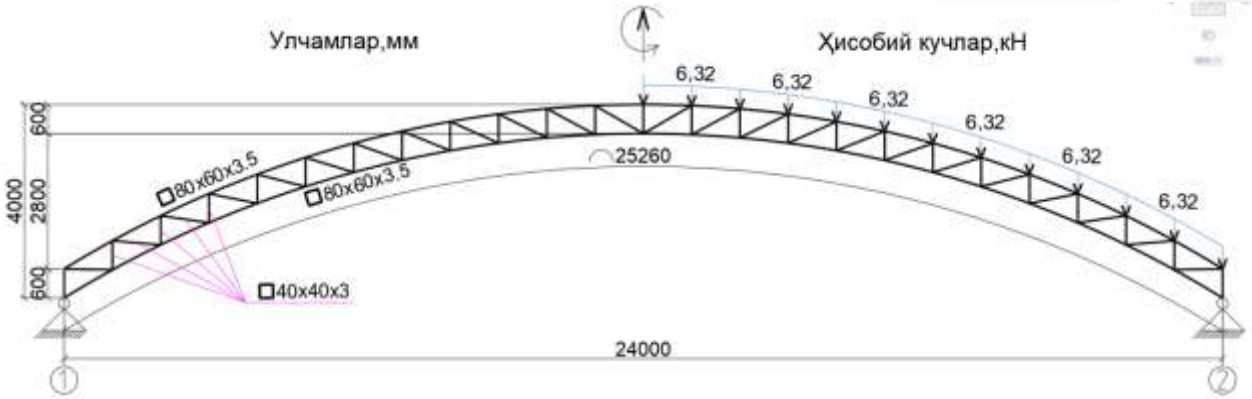

a-geometric dimensions, mmb-stresses, кН
Figure 2. Computational scheme of profiled arch.

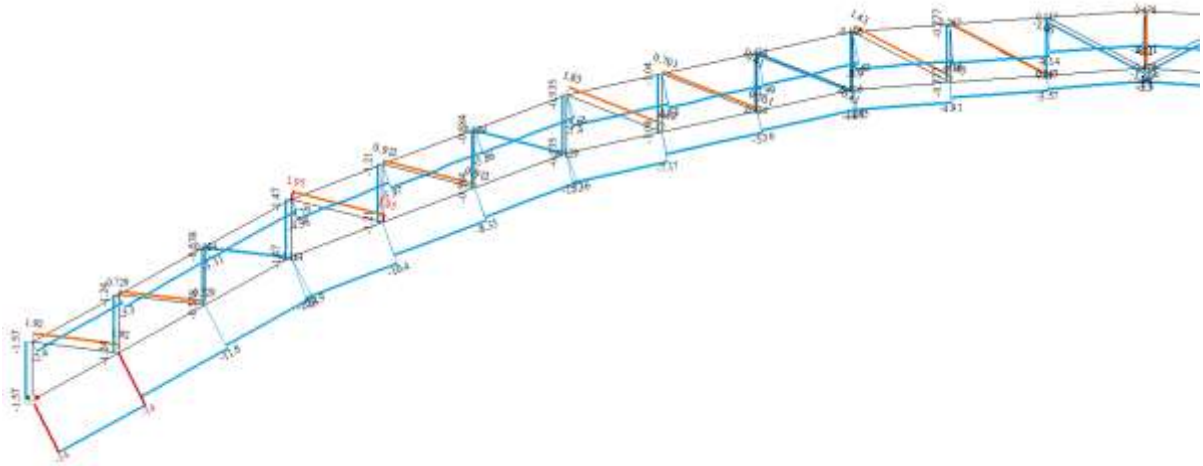

Figure 3. Longitudinal force epitaph of the arch.

Working drawings for both choices were created based on the selected cross-sections of the truss and arch elements, and the amount of steel consumed for each was calculated. The LIRA-SAPR program was used to determine the tensions in their rods.

Table No. 2 shows the results of the comparison.

TableN°2:

Farm type	Number of rods	Number of nodes	Consumable Steel, KG.
Farm	19	17	762.4
Arch	53	50	438.0

Conclusion

To cover the ceiling of the 2,000-seat rowing canal, trusses and arches were designed and compared. Simultaneously, the usage of arches as a viable alternative is expected. In terms of metal use, arches are 43% more efficient than farms. Furthermore, the arches are a more enduring and artistic arrangement. The main disadvantage is that bending the straps takes a lot of effort. This suggests that using arch

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arches to cover a 24x80 m area is effective. The primary computations were done with the Lira-SAPR-2017 program, and the results are provided in tables.

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