

## STUDY OF SEGEMENTAL BRIDGES

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### ABSTRACT

When building span-by-span or as balanced cantilevers, precast concrete segmental construction has become increasingly popular. The completed structure must match-cast the segments in segmental construction against one another in the same order. The moulds that are used to cast precast members must offer excellent segmental geometric control. In the segmental construction, the method of erection is based on the employment of gantries that support the segment from above or below. attractive aesthetics. Sections have a great capacity for transporting loads and require less maintenance. The joints between segments are provided by a thin coating of epoxy, allowing alignment without harming the shear keys. Highway bridges benefit from using this technique.

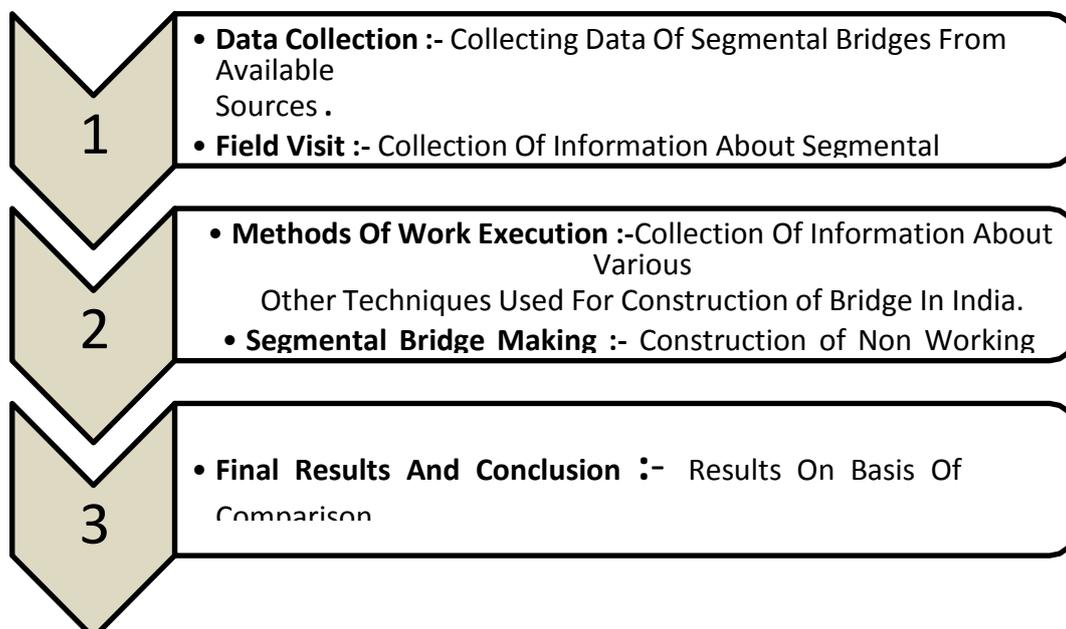
**Keywords:** Concrete Box Girder Bridge, Prestressed Girder Bridge, Prestressing , Reinforcement, strength, Durability, Prestressing .Rehabilitation.

### I. INTRODUCTION.

Today, the importance of building bridges is felt throughout the entire world. Conventional cities have been replaced by an inventive, cost-effective structural system as a result of the rapid advancement of technology. Box-type bridges are more common in contemporary road networks, especially urban interchanges, due to the effective dispersal of crowded traffic, economic reasons, and aesthetic desirability. Due to their structural effectiveness, serviceability, improved stability, appealing aesthetics, and cost-effective construction, they are widely used in highway and bridge systems. They are a successful method of building bridges because it reduces weight while enhancing flexible rigidity and power. When compared to the equivalent element of the open section, it is much stiffer and stronger in the torsional direction.

The urban environment frequently necessitates taking aesthetic factors into account. The typical duration of heightened.

### II. METHODOLOGY



### III. MOULD AND ANALYSIS

Mould and Material which are used is presented in this section.

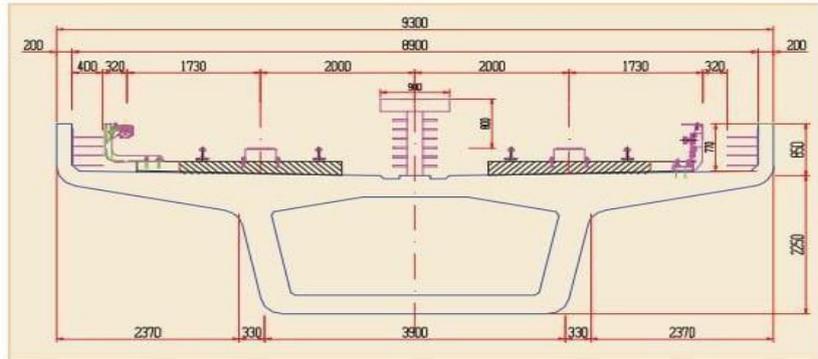


Figure 1: Cross Section Of Metro Bridges.

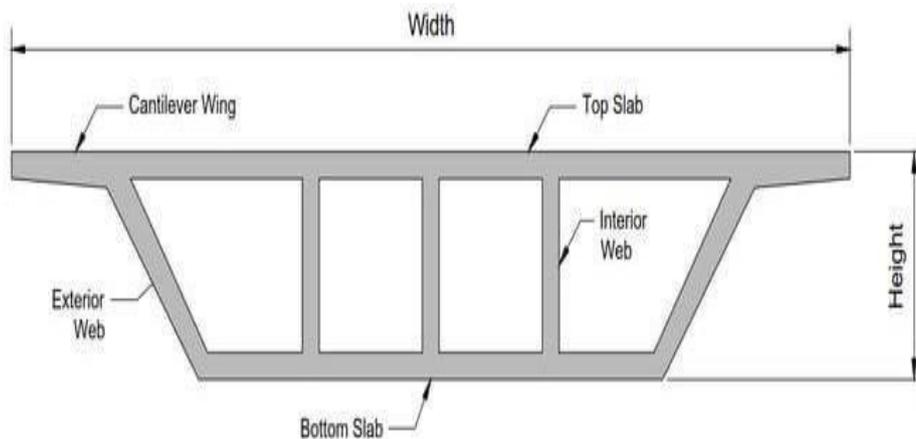


Figure 2 : Cross Section of Highway Bridges.

### IV. RESULTS AND DISCUSSION.

Table 1. Comparison of all functions on basis of visit .

COMPARISON:-

Type Of Bridge	Segmental Bridge	Beam Bridge
Construction Cost	Initial Cost Of Construction IsHigh.	Initial Cost Of Construction IsLow.
Manpower Requirement.	Less ManpowerRequired.	More ManpowerRequired.
Machinery Requirement.	Advanced LiftingEquipments Required	No AdvancedEquipments Required.
Maintenance	Less Maintenance.	More Maintenance
Durability.	High Durability	Less Durbility
Formwork Requirement.	Moulds Are UseInstead Of Formwork.	Scaffolding Required For Deck Construction.
Impact To TrafficFlow.	Less Impact To Traffic Flow. Henceno Staging IsRequired.	More Impact ToTraffic Flow. Hencestaging IsRequired.
Prestrssing Requirement.	More PrestrssingRequired	Less PrestrssingRequired.
Number Of Joints	More No Of Joints	Less No Joints.

### V. FIELD VISIT AT HADAPSAR, PUNE, MAHARASHTRA INDIA, BEAM BRIDGE

Here we observed that after 10 to 12 years of construction this bridge developed diagonal cracks in girder, crash barriers and deck slab due to excessive loading, design failure, faulty workmanship and due to use of defective materials. Hence structural audit and routine maintenance was necessary and it was not done properly. And it came for rehabilitation.



**Fig. no.3** Cracks Developed On Psg Girder At Hadapsar, Pune, Maharashtra Bridge. Due To Excessive Loading And Design Failure.



**Fig. No.4**

### SEGMENTAL BRIDGE MOULD MAKING AT INSTITUTION.



**Fig. No.5**



Fig. No.6



Fig. No.7

#### Design Process of Segmental Bridge With Basic Parameter:-

configuration need to withstand the stresses imposed by different load combinations. The following equation expresses this basic concept of structural safety (MacGregor 1997, p14):

$$fR_n \geq \sum a_i S_i + L_w$$

f = strength reduction factor (less than 1)

R<sub>n</sub> = nominal resistance [i.e. computed] a<sub>i</sub> = load factor (greater than 1)

S<sub>i</sub> = load effects based on the specific loads.

### VI. ANALYSIS AND DIMENSIONING

Based on a profound understanding of structural behavior, the structure will then be analyzed. Attention needs to be given to both overall system and also to structural details, such as expansion joints, hinges, and bearings. The structure will evolve to its final form by optimization of its structural members. This dimensioning process attempts to minimize the use of material while keeping the maximum stresses in the respective member well within the limitations given by allowable values from the codes. For the largely iterative process between size of members and the stresses and deformations within the structure the use of computer software is very valuable.

### VII. ADVANTAGE OF SEGMENTAL BRIDGE CONSTRUCTION

- Very economical for long spans.
- Prefabricated segments provides more quality control.
- The structure can be fully loaded immediately after being prestressed.
- The pre-stressed cables can be inspected and replaced at all times.
- Low weight due to thin bridge sections.
- Low maintenance costs.
- Speed of construction, time taken less as compared to cast in situ bridges.

### VIII. DISADVANTAGE OF SEGMENTAL BRIDGE CONSTRUCTION

- High construction loading or high technology is used.
- Need high safety precautions during construction.
- Extra cost due to more prestressing required.

#### **Durability:-**

The goal to be achieved in precast is high early strength. Structure can be immediately loaded after erection and prestressing of segments ( sections).With strong and durable concrete ingredients, on its age and consolidation when placing it, and on proper curing. Admixtures can assist in obtaining early strength.

#### **Economy:-**

Segmental bridge construction is more affordable, less expensive, makes best use of resources in structures with greater flexibility in terms of length and curvatures, and makes the best use of labourers.

### IX. FUTURE SCOPE

Segmental bridges are utilised throughout India for all of the metro routes listed below. There are metro rail systems in India today. Of them, metro rail systems have experienced the quickest growth, increasing from a network length of 222 km in three Indian cities in 2011 to 751.9 km in 15 cities by 2022. Up to 26 cities will be served by the approved 1,032 km extension to the metro train network. Research has led us to the conclusion that these segmented bridges will take the place of cast-in-place or regular beam bridges.

### X. CONCLUSION

According to our research Pune Metro line via segmental bridge have become beautiful urban landscape & convenient transportation system for residents of pune as long as geometric shape control technology where master and extended commendably & ensure segment precasting quality, the Span By Span Method must be developed and applied in bridge construction in India. considering various points like man power, impact to traffic flow, etc of Beam bridge. Segmental Bridge can be preferred in future scenario.We suggest competent authority to use segmental bridge for replacement of HADAPSAR ,PUNE NH-65 PUNE –SOLAPUR highway bridge for good durability, strength and less maintenance aspects.

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