Columbia River Bridge (Oregon - Washington, USA)

Autor(en): **Blanchard, F.P.**

Objekttyp: **Article**

Zeitschrift: **IABSE structures = Constructions AIPC = IVBH Bauwerke**

Band (Jahr): **6 (1982)**

Heft C-20: **Structures in the United States**

PDF erstellt am: **24.09.2024**

Persistenter Link: https://doi.org/10.5169/seals-17571

3. Columbia River Bridge (Oregon – Washington, USA)

Owners:	*States of Oregon and Washington*
Designers:	*Sverdrup & Parcel and Associates, Inc., St. Louis, MO*
Contractors:	*Reidel International, Portland, OR* *Peter Kiewit Sons Co., Omaha, NB* *S. J. Groves & Sons Co., Minneapolis, MN*
Construction Duration:	*About 5 years*
Service Date:	*Early 1983*

Introduction

The I-205 Columbia River Bridge, one of the largest single posttensioned-concrete projects in the U.S.A., will be the final link in a circumferential highway east of Portland, Oregon and Vancouver, Washington. The dual structures, each 20.7 m wide with a 2.7 m pedestrian trail mounted between, are 2,286 m long on a curvilinear alignment. The main feature of the structures is the five-span continuous rigid-frame unit shown below. This unit is flanked on the north with eight 43 to 91 m long spans, and on the south by twelve 73 to 110 m long spans. Structure depths for these approach spans vary from 2 to 5.2 m.

Design

Final design followed a type study which recommended building the bridge using cast-in-place-on-falsework posttensioned box girders for the 536 m northern overbank approach and precast segmental cantilever posttensioned box girders for the remaining 1,750 m over the river. The superstructure segments, designed with 34.5 MPa concrete, were posttensioned transversely with 1,102 MPa bars and longitudinally with 1,800 MPa strand. A complete set of contract documents was prepared on this basis.

An early plate and pile load-test program, which followed a geotechnical study, indicated that the northern overbank approach and the two navigation span piers could be set in a dense conglomerate with allowable bearing pressures up to 958 kPa. Since this dense conglomerate dips sharply to the south, the southern portion of the structure was designed using steel H-piles seated in the conglomerate and driven to a capacity of 1,780 kN.

The bridge site is in an active seismic zone which led to the concept of designing the structure with a series of rigid frames. At the abutments and intermediate expansion joints, neoprene bumpers and high-strength rod restrainers were provided to mitigate any damage from a seismic event.

Construction

Three construction contracts have been awarded to date with a fourth (roadway wearing surface, expansion dams, and roadway lighting) to follow. Each contract contains a Value Engineering incentive Clause inviting contractor modifications (with the Owner's approval) if serviceability, maintainability, standardization, and economy are not compromised. All contractors exercised this option to some degree, with the major accepted revision being the substitution of a two-cell box girder in place of three cells as designed.

Pile Caps and Piers

The pile caps for the river spans were constructed using a bell-shaped form which the contractor substituted for the precast segmental-concrete bells as designed. In this operation the river bed was prepared by excavation and pile driving, a prefabricated reinforcing cage was inserted into the form, and the form was lowered to-grade over the piles and sealed. The remaining reinforcement and concrete work was then completed in-the-dry before tripping the form. Hollow pier shafts varying from 3 to 6.7 m diameter were then extended above the pile caps.

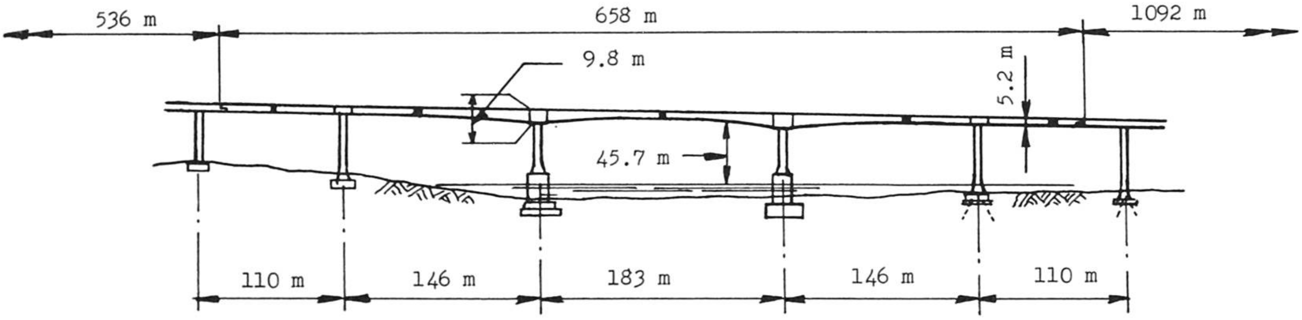

Fig. 1 Navigation span rigid frame

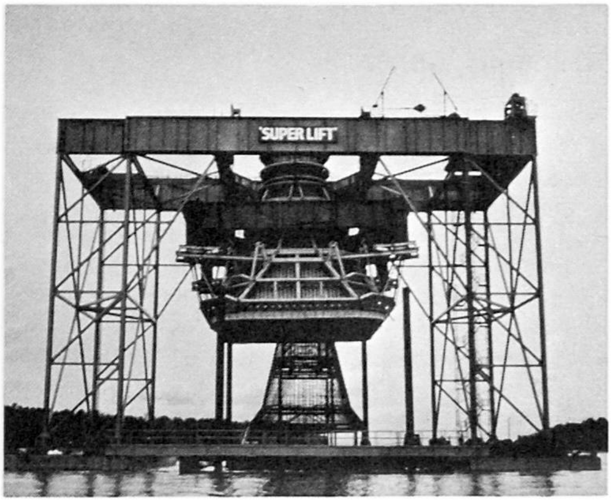

Fig. 2 Pile cap form

Superstructure

A visitor to the bridge site in mid-1980 would have been able to observe three separate construction operations for posttensioned concrete girders proceeding simultaneously. The northern overbank approach was being cast-in-place-on-falsework in 6 m segments, and continuously posttensioned. The main-channel rigid frame was being constructed by cast-in-place segmental cantilever methods (a contractor revision) and the southern approach was being constructed by precast segmental cantilever erection.

(F. P. Blanchard)

Fig. 3 Cast-in-place falsework
Cast-in-place cantilever

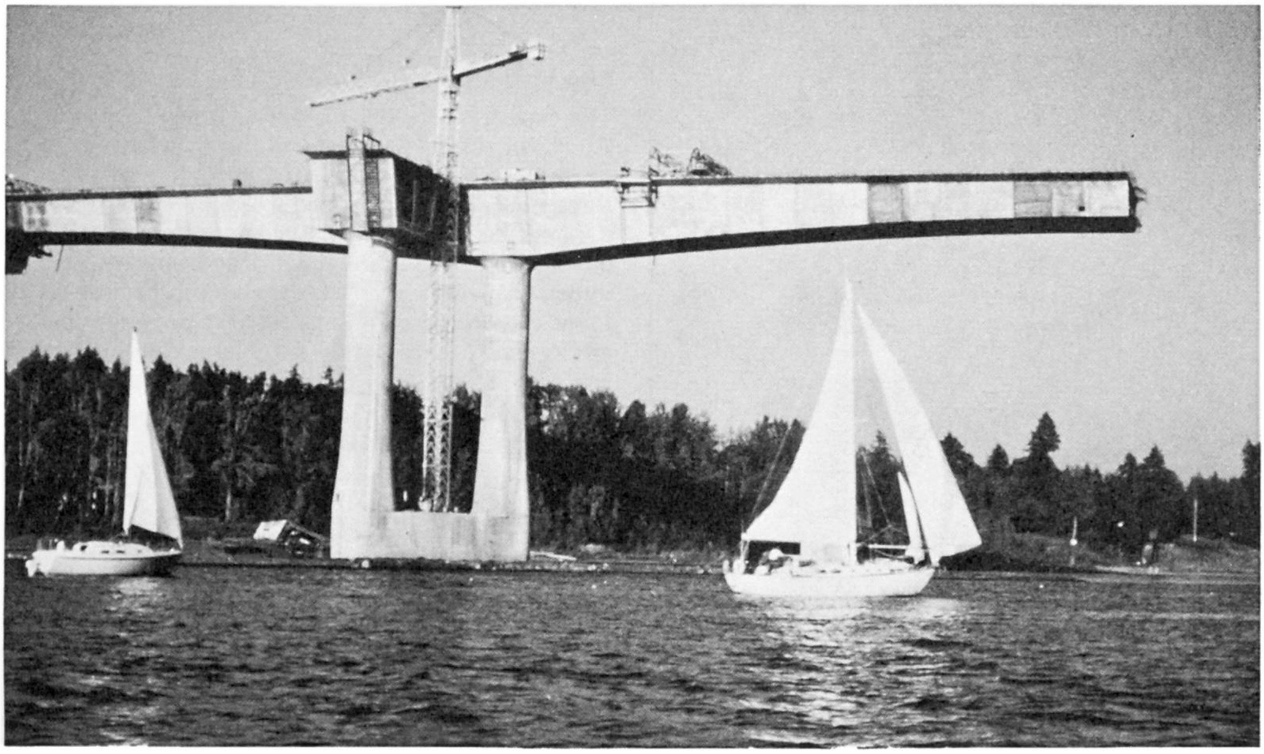

Fig. 4 91 m cantilever