As a monument to the ideal of peace through understanding, the Inter-Continental Peace Bridge is envisioned as a way to utilize the wisdom and support of older generations while mobilizing the ideas and energies of youth. The proposed structure will bridge more than geographical boundaries — it will demonstrate that human energies and technical capabilities can be devoted to constructive rather than destructive ways.

# Inter-Continental Peace Bridge

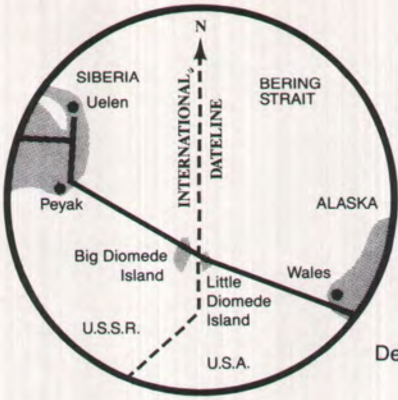
In 1958, Prof. T. Y. Lin, in concert with Senator Warren Magnuson of Washington, publicly suggested the construction of a bridge across the Bering Strait to foster commerce and understanding between the people of the United States and the Soviet Union.* Ten years later, Inter-Continental Peace Bridge, Inc. was organized by Prof. Lin. The purpose and vision of this organization is to join the continents of the world by connecting the shores of Alaska and Siberia. This union of the hemispheres would be more than just a physical connection — it would serve as a political and cultural link between the East and West.

In order to meet functional, aesthetic, safety and economic requirements, this unprecedented project will continue to need extensive engineering study and evaluation. However, there are no insurmountable technological problems concerning the building of this bridge. Design for strength, durability, wind and earthquake resistance can be attained using available knowledge and experience.

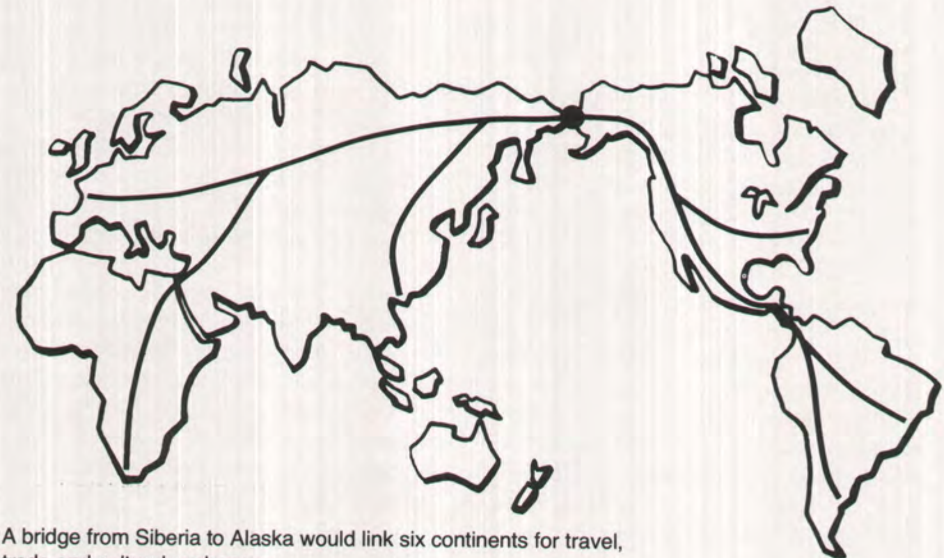
The tides and currents in this area are not severe. The one major problem is resistance of bridge piers against ice floes. Information from the U.S. Department of the Navy indicates that there are no icebergs through the Bering Strait, although ice floes up to 6 ft (1.8 m) thick are in constant motion during certain seasons. As a result, horizontal forces in the order of 5000 tons (4536 t) or more can develop on a pier.

To overcome this problem, the prefabrication and construction of this bridge will be almost entirely accomplished by using precast and prestressed concrete. This solution appears to be an entirely practical and economically feasible solution since the bridge piers could be prefabricated as one piece, then floated and sunk into position. Towers can subsequently be placed on top of the sunken piers. To reduce horizontal ice pressure on the piers their curving slope near the water surface will help to break ice floes in bending when they push forward and upward along the

*The dream to reunite the Eastern and Western Hemispheres was probably first conceived in 1894 when William Gilpin, territorial Governor of Colorado, spoke of an extended railway system to cross the Bering Strait. Since then, several proposals have been advanced, including those by E. H. Harriman, J. A. L. Waddell, and Soviet Engineers P. Borisov and A. Shumilin.




Detail of Bering Strait crossing.



A bridge from Siberia to Alaska would link six continents for travel, trade and cultural exchanges.

curves. Since ice pressure may develop on the piers in any direction, a circular design seems logical.

Bridging the Bering Strait is an enormous engineering task. Studies indicate that the typical span length should optimally be 1200 ft (366 m). For navigational purposes, an 1800 ft (549 m) main span with a vertical clearance of 200 ft (61 m) should be provided in each channel, both east and west of the Diomedes Islands. The bridge would consist of 220 spans, 1200 ft (366 m) in length, most of which will need a vertical clearance of only 80 ft (24 m).

## Substructure

The substructure will be composed of 220 precast prestressed gravity piers, each made with a shallow base raft supporting a double-curved cylindrical tower. Pier sizes may vary depending on water depth and environmental exposure. Each pier will be prefabricated in one or two pieces — the top bottle with a maximum depth of 180 ft (55 m) under water and 80 to 200 ft (24 to 61 m) above water, and the bottom slab which will be connected to the bottle. Each pier will be floated into position and sunk to its prepared foundation.

T. Y. Lin

The average concrete volume per pier is approximately 25,000 cu yds (19,115 $m^3$). Pier fabrication will follow established offshore construction sequences, beginning in a dry basin and proceeding to a nearshore protected water site.

The base raft and tower can be built simultaneously, thus shortening the estimated 5-year construction period. The raft and tower would be joined by post-tensioning, towed to the site and placed on a prepared bottom. Separate delivery of the base raft and tower is possible and will diminish the transportation period. However, this will require an additional remote hookup at the site. Subsequently, a ballast is placed inside the piers to obtain adequate foundation stability, allowing the substructure to support the superstructure.

## Superstructure

The optimum span length for this crossing is about 1200 ft (366 m), making the superstructure cost almost equal to that of the substructure as mentioned in the cost estimate section below. A single stay cable scheme has been determined to be the most economical, because the large box section can span 400 ft (122 m) between supports with a minimum number of cables. This reduces maintenance costs due to severe weather conditions at the bridge site. The 1800 ft (549 m) main spans will require two cables for each cantilever.

Each 1200 ft (366 m) long deck section, with a 600 ft (183 m) cantilever on each side of the pier, can be made using sixty precast segments 20 ft (6 m) in length. These segments would be match cast in a factory and transported to a nearby assembly plant where they are joined and post-tensioned together to form a double cantilever. These units would then be moved into a catamaran barge which will transport them to the bridge site and erect them on top of the pier.

One or more large precasting plants will need to be established at a chosen location, such as Seattle or Anchorage. The manufacturing process will be highly mechanized, so that 220 spans of 1200 ft (366 m) long double cantilevers, weighing 20,000 tons (18,144 t) each, can be produced in 4 to 5 years. Special accommodations will have to be made for the main spans.

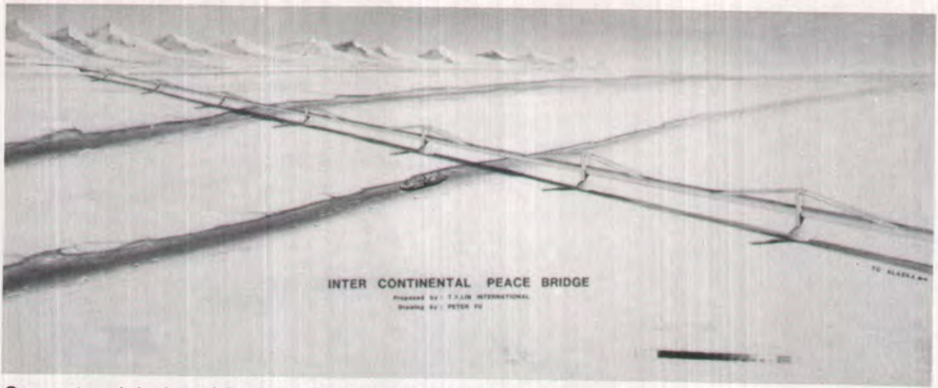
Due to the cold weather conditions at the site, erection is possible only during 5 months of the year. Therefore, the scheduling of fabrication, storage, transportation and erection must be preplanned in great detail. After casting, each span will be stored until needed at the bridge site.

## Bridge Elevation and Cross Section

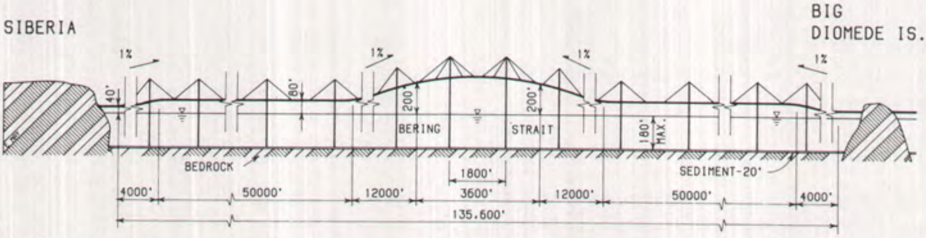
A maximum grade of 1 percent on the bridge is assumed in order to accommodate railway traffic. This results in the approximate profile for the western half of the bridge as shown above. The eastern half, between Little Diomedes Island and the Alaskan shore is similar.

The bridge section is designed to accommodate maximum anticipated traffic for 100 years or more. A box section was chosen because of its strength, efficiency and ease of maintenance.

The top deck of the box section will carry two lanes of highway traffic and will be used only under good weather conditions. A double-track railroad will be




Concept and design of the Inter-Continental Peace Bridge.



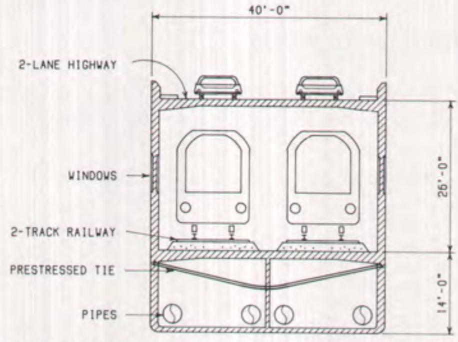

Half elevation.

housed within the main tube, providing piggy-back transportation under all weather conditions. The lower level will house pipelines for gas transportation and other uses as the northern regions of the area are further developed.

## Cost Estimates

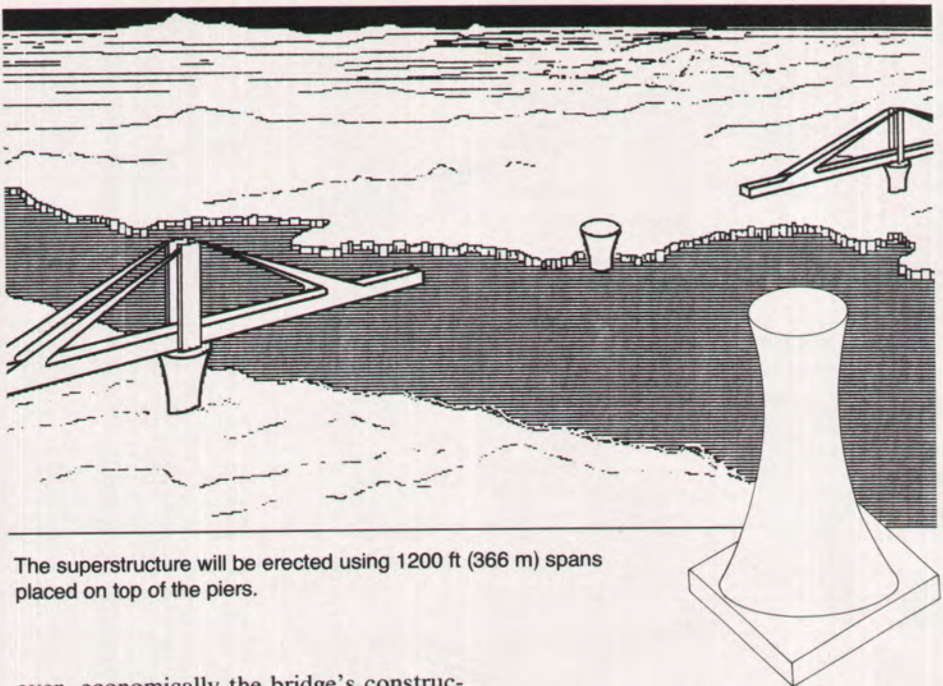
The superstructure will be built with 3,330,000 cu yd (2,546,118 m³) of lightweight concrete. The amount of steel required is estimated to be 100 lb (45 kg) of prestressing tendons plus 120 lb (54 kg) of reinforcing steel per cubic yard of concrete. Using mechanized factory production, transportation and erection, the in-place cost is estimated at $600 per cubic yard.

The substructure will require 5,500,00 cu yd (4,205,300 m³) of normal weight concrete, including 20 lb (9 kg) of prestressing tendons and 50 lb (23 kg) of reinforcing steel per cubic yard. The in-place cost is estimated at $400 per cubic yard. Thus, total cost for the project is currently projected to be $4.2 billion dollars.* How-




Deck section.

*The cost estimates for the Inter-Continental Peace Bridge are intended to include management, design, supervision, construction and overhead.



The superstructure will be erected using 1200 ft (366 m) spans placed on top of the piers.

ever, economically the bridge's construction cost is fairly trivial when compared with the combined, $600 billion annual defense budget of the United States and the Soviet Union.


## Acknowledgment

We wish to thank the following professionals for their technical contributions to this article:

**Professor Ben C. Gerwick, Jr.,** Chairman of the Board of Consultants, Inter-Continental Peace Bridge, and **Dr. Michael Rojansky** of Ben C. Gerwick, Inc.

**Dr. Albert Akl** for his Doctoral thesis on the Inter-Continental Peace Bridge.

**Mr. Myron Goldsmith,** Architect, and **Mr. Peter Seger** for his thesis on the bridge.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