and the city, Front St. is being improved with a 10-in. reinforced-concrete pavement, the relocation of tracks and the installation of safety islands for a line of steel poles. This improvement extends from Glisan St. north to Nicolai St., about 1½ miles, and its cost is estimated at $240,000.

7. Improving a vacant block in front of the union station to provide adequate parking space for automobiles and giving the city control of the parking on the northeast half of the block (see plan) until such time as it is required for railway purposes.

Under the terms of this agreement the railways are to carry out the main part of these undertakings within three years, or before July 24, 1925. In the negotiations and preparation of plans, each of the five railways had its representatives. The city was represented by O. Laurgaard, city engineer, and the Northern Pacific Terminal Co. by A. E. McKennett, chief engineer. The railway improvement work is carried out under the direction of Mr. McKennett, while the street improvements, viaducts and track work in street areas will be done under the direction of the city engineer.

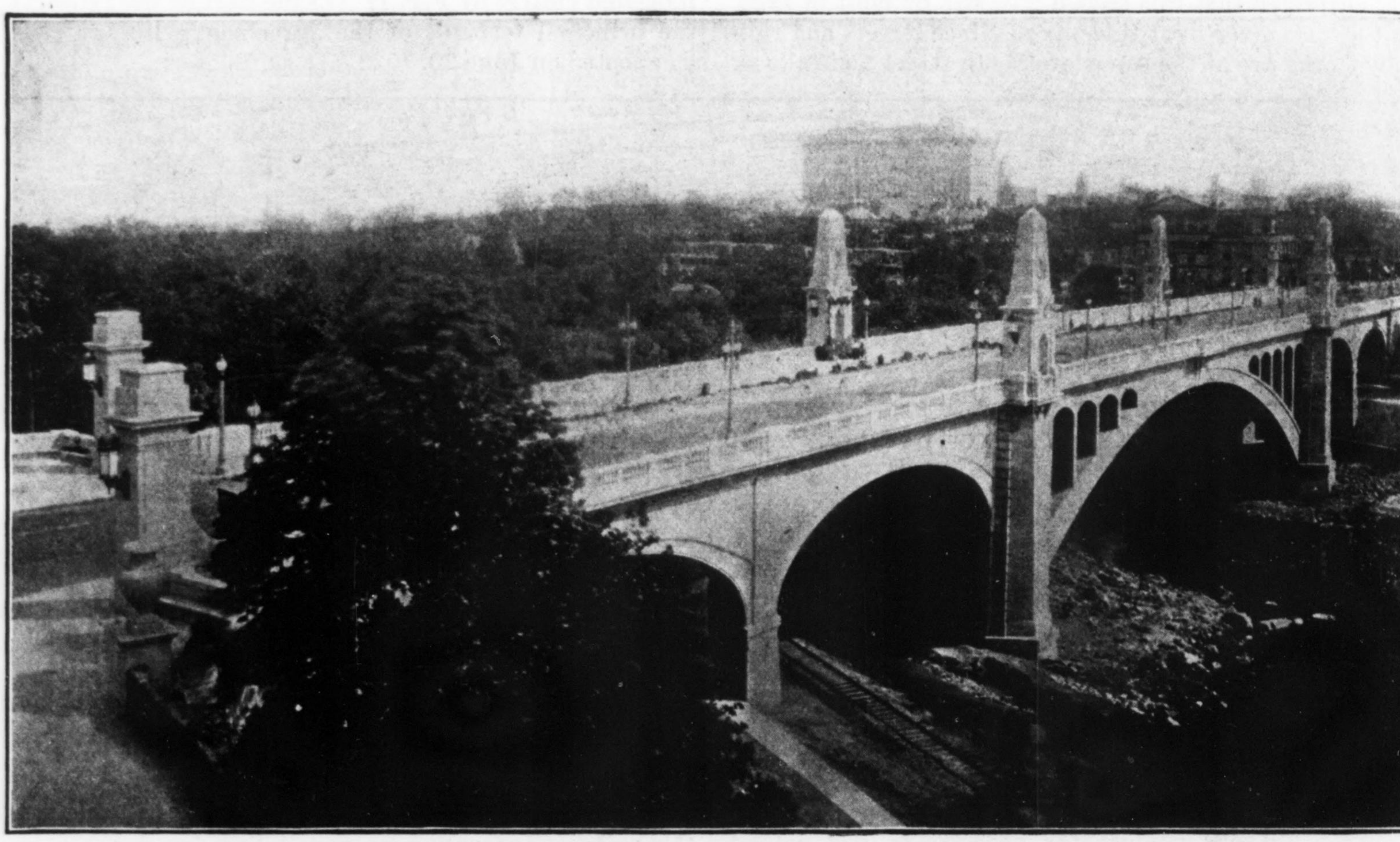
To Unify Segments of Intercoastal Canal

Col. George M. Hoffman, the district engineer for the War Department at New Orleans, has submitted a preliminary report on the whole intercoastal canal project between New Orleans and Corpus Christi, Texas, and has recommended a survey with the idea of unifying the various segments which make up the waterway. The The barge line operations on the Mississippi River, together with the purchase by the Government of three private canals which allow the free use of the existing segment between New Orleans and Morgan City, has greatly stimulated the desire of the communities further west to have the advantage of through traffic.

Concrete Memorial Bridge Has Attractive Appearance

Washington St. Bridge at Wilmington, Designed as Memorial to Delaware Soldiers, of Pleasing Line and Surface

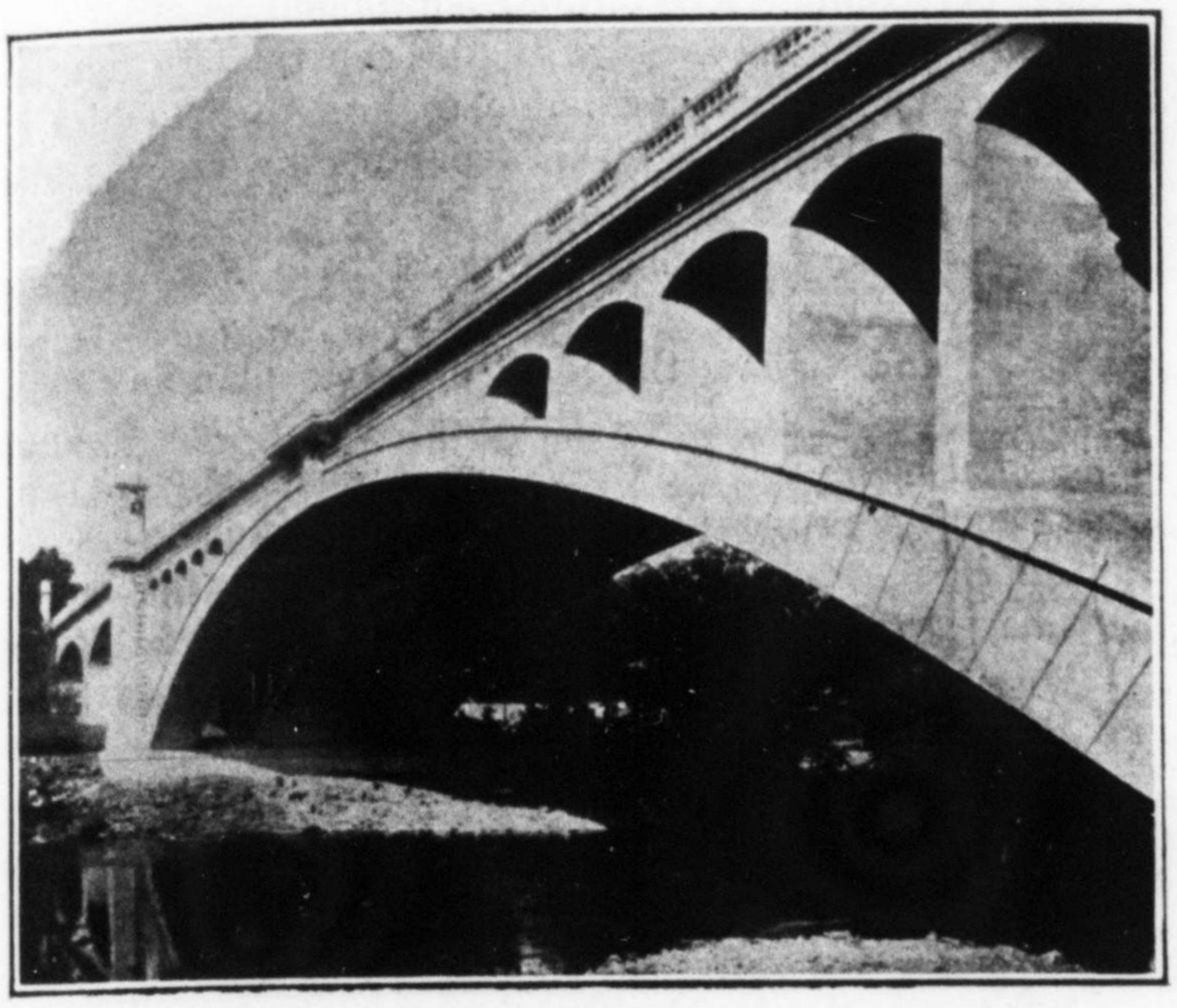
ONE of the most attractive of the several bridges which have been built as memorials to those who served in the World War is the Washington Memorial Bridge across Brandywine Creek and its valley in Wilmington, Del. The structure is a necessary element in the street plan of the city and the memorial features were added after its initiation at an added cost of about $56,000. Final cost of the whole project was $823,000. In keeping with the nature of the bridge special attention was paid to the architectural design, to make it fit more into the park-like nature of the surroundings, and memorial pylons were added bearing the names of all those from Delaware who died in the World War as well as the names of the engagements in which Delaware troops were engaged in all of the wars of the United States.



MEMORIAL CONCRETE ARCH BRIDGE ACROSS BRANDYWINE CREEK AT WILMINGTON, DEL.

The bridge is 720 ft. long and 72 ft. wide and consists of five reinforced-concrete arch spans; two 70-ft., one 250-ft. and two 85-ft., together with the necessary approaches. Each span consists of three arch ribs, 11 ft., 16 ft. and 11 ft. wide respectively. The deck of the bridge consists of a 40-ft. roadway paved with sheet asphalt, two sidewalks 14 ft. 9½ in. in width and two balustrades 1 ft. 2½ in. in width. The piers of the bridge are on a 30-deg. skew and the large 250-ft. span of 40-ft. rise is one of the longest low-rise skew-arch spans in the United States if not in the world.

There are eight of the large, ornamental pylons or shafts placed on the bridge in line with the railings. Four of the larger shafts are placed over the piers of



250-FT. MAIN ARCH OF WILMINGTON BRIDGE

the large central arch and two of the smaller shafts at each end of the bridge. The large shafts extend 40 ft. above the sidewalk level and the smaller shafts 23½ ft. The bronze tablets are placed on the inside face of the shafts where they can be viewed by pedestrians on the sidewalk. On the inside faces of the smaller shafts are placed bronze nameplates 3x4 ft. On each side of the large shafts and on the approach sides of the small shafts are placed large, ornamental bronze lanterns which are illuminated by a single incandescent lamp of 250 candle-power. On the inside and outside of the large shafts are placed carved cast-stone eagles and shields of a monumental character. The balustrades were made of cast stone to harmonize with the surface treatment of the memorial shafts.

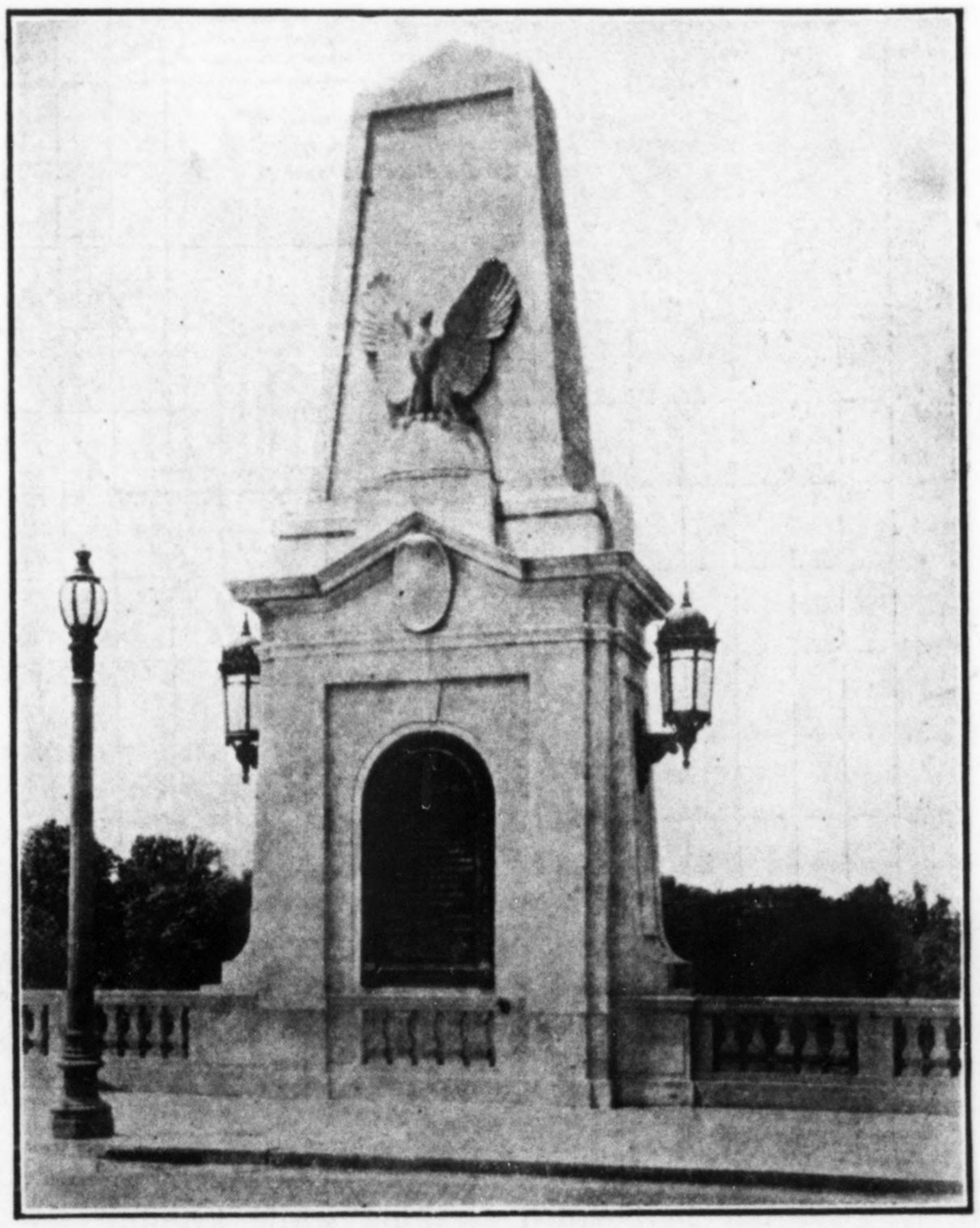
At the center of the span of the large arch a refuge bay was provided on both sides of the bridge by extending the sidewalk slightly beyond the line of the railing, thus forming a vantage point from which pedestrians may view the park below. Refuge bays were also provided at both ends of the bridge. Stone seats were placed in the refuge bays at the north end of the bridge to accommodate pedestrians who might desire to sit and rest. Large ornamental precast stone urns were placed on the end posts of the railing of the refuge bays at the north end of the bridge.

One stairway was provided for the bridge, at the south end on the east side, leading to the park sidewalk and illuminated by two bronze standards with lamps.

The lighting system of the bridge was arranged so as to harmonize architecturally with the pylons and railings, as well as to give the proper lighting effect to the sidewalks and roadway at night. The main lighting system consists of twenty-eight luminous arc lights supported by cast-iron light poles placed on the curb lines of the bridge. The secondary lighting system consists of the incandescent lamps in the twelve large bronze lanterns placed on the shafts and the two bronze standards at the stairway. The two lighting systems are on independent circuits.

The bridge was designed to carry the heaviest modern highway traffic and liberal provision was made for impact and possible future increases in traffic requirements. The assumed loads used in the design were 60-ton electric railway cars entrain on double tracks, a line of 20-ton motor trucks on the roadway at each side of the tracks and a sidewalk load of 100 lb. per square foot.

The two channel piers, each 20 ft. wide, the shore piers 8 and 9 ft. respectively and the two abutments support the 250-ft. center span with 40-ft. rise, two 70-ft. spans with 15-ft. rise and two 85-ft. spans with 18-ft. rise. Each arch has a center rib 16 ft. wide and two outer ribs 55 ft. apart on centers, that are each 11 ft. wide. The center rib of the 250-ft. span is 6 ft. deep at the crown and 11 ft. at the springing line, and the outer ribs 5 ft. and 10 ft. at crown and springing lines. Over each of these arch ribs and immediately under the floor slab there is a continuous gallery, one of which is reserved for high tension electrical conduits, the second for low tension electrical conduits and the third is used for gas and water mains. The reinforced-concrete floor slab, varying from 12 to 20 in. in thickness, exclusive of floorbeams which occur only at the expansion joints, is supported on longitudinal walls. These longitudinal bearing walls rest directly on the extradoses of the shore spans and are supported by the



ONE OF THE MEMORIAL PYLONS

spandrel columns of the channel span. The floor slab is arched transversely between ribs and is cambered 12 in. to a parabolic curve longitudinally.

The foundations of all piers and abutments were carried down to solid rock at a maximum depth of 5 ft. below water level.

The bridge was built under the direction of the Washington Street Bridge Commission, of which Frederick W. Carpenter was executive officer and consulting engineer. The design was made by Benjamin H. Davis, consulting engineer, New York, with the collaboration of Vance W. Torbert, architect, New York, as the result of a competition held by the commission. The contractor was the Walsh Construction Co., of Davenport, Iowa.