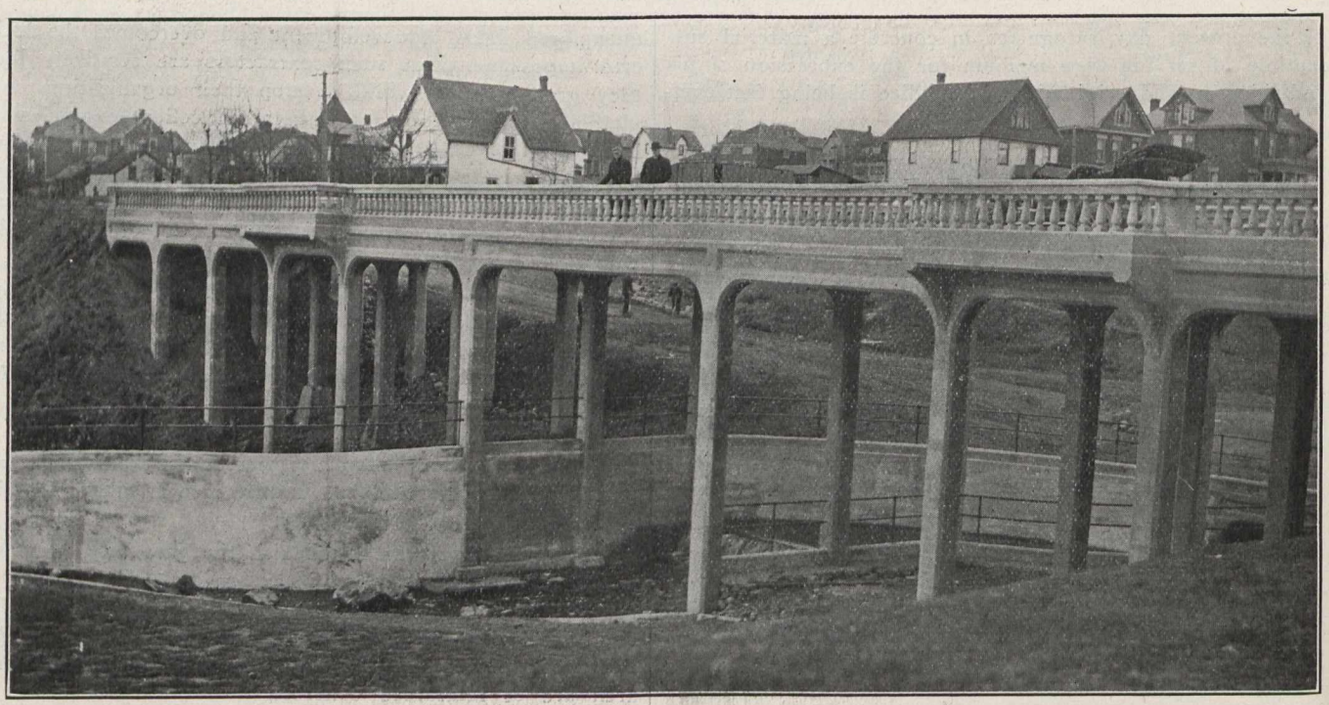
One of the most artistic and at the same time practical applications of cement has been in the reinforced concrete bridge, where utility is combined with attractiveness. The illustration of the single span Walley Bridge at Williamstown, Mass., built by the Aberthaw Construction Co., well serves to emphasize this point. The span is 80 feet, the arch and overhanging cap which are in slight relief accent the principal lines. The simple pipe rail fence is in perfect harmony. With such a structure maintenance expenses vanish, it is built for time unknown. It is well then that it should artistically be the best, for it should stand as a monument to some one's wisdom or sense of beauty, otherwise it may but speak of some one's folly and failure to realize the truth of the trite saying that "a thing of beauty is a joy forever."

But not to the arch alone is pleasing effects in concrete bridge building confined. The city of Port Arthur, Ont., has just completed a girder bridge of unusual design. The bridge spans the creek crossing Algoma Street on the intersection of Dawson Street. Mr. J. Antonisen, city engineer, was in charge of the work, which was executed by Messrs. Stewart and Hewitson. The finished structure reflects great credit upon the engineer and contractor in charge on account of the careful and good workmanship done. The accompanying illustrations clearly show the effect obtained. The structural design and reinforcing material used in both bridges was supplied by the Trussed Concrete Steel Company of Canada, Limited, the Kahn system being used throughout. The bridge was designed for vehicular and street car traffic, with a sidewalk on one side for foot passengers.



Girder Bridge

The bridge is 182 ft. 6 in. long, 25 ft. wide, the design consisting of a series of flat girder spans, resting upon concrete columns. The spans in this case vary from 31 ft. 8 in. down to 15 ft., centre span being 31 ft. 8 in., adjoining spans on either side of centre being 22 ft. 2 in., and the remaining spans 15 ft., reinforcement used throughout being Kahn trussed bars and cup bars. The column footings are 5 and 8 feet square, respectively, and are reinforced with 3-4 x 2 in. bars running in both directions. The columns are from 15 to 27 ft. high, and are 20 ft. square. They are reinforced with four 1 in. cup bars, laced every 12 in. with 5-16 in. steel wire. The girders of 15 in. span are 12 x 32 in., reinforced with three 3-4 x 2 in. bars at bottom of beam, two running straight through from support to support, the third one being bent at an angle of about 30 degrees from a point about two feet from the centre to the point of support. They also are reinforced with two 3-4 x 2 in. bars, placed over the points of support, with the diagonals bent down to assist against shearing, and to take up reverse moments due to continuity. The 22 ft. girders are 12 x 32 in., and are reinforced with three 1 x 3 in. bars placed in the same manner as the 3-4 in. bars in the shorter span, and also have two 1 x 3 in. reverse moment bars over the supports. It will be noted that these girder beams are of the same dimensions as those used in the smaller span, this being done for effect in design. The central span girders are 14 x 32 in., and are reinforced with three 2 x 3 1-2 in. bars, one 1 x 3 in. bars, and two 1 in. cup bars; also with two 2 x 3 1-2 in. continuity bars. The manner of placing the reinforcement in these larger spans is plainly shown on the line drawing accompanying this article.

Running across bridge at right angles to the main girders between columns, stiffening beams in the form of spandel arches were built. These stiffening beams were reinforced with 3-4 x 2 in. bars. The floor slab rests upon the three lines of concrete girders already described, span being 12 ft. 6 in. from centre to centre of girder. The slab is 10 in. thick, is reinforced with 3-4 x 2 in. bars spaced 9 in. on centres, having 12 in. diagonals, sheared from the third points to the end, the centre third of the bars being left plain; 3-4 in. cup bars, 24 in. on centres, were laid on top of and at right angles to the bars to take up temperature stresses.

On one side of the bridge a sidewalk was formed by building up the slab 6 in. higher than the main road slab. On either side of the bridge provision was made in a raised curbing to receive a balustrade handrail, the design and method af building this balustrade having been particularly happy and successful. The rail consists of concrete stringer and moulded concrete balustrades, with square posts placed equi-distant throughout the length of the bridge. To further enhance the architectural design two balconies were added, placed symmetrically on each side of the bridge. These balustrades are cantilevered from the main structure.

The finished bridge presents a pleasing and solid appearance, and it is but another example of what may be obtained through the use of concrete in the way of artistic, permanent and durable construction.

VALUE OF FLUE GAS ANALYSIS.

In a recent boiler plant test made by the Coal Department of the Arthur D. Little Laboratory, Boston, the loss due to unburned gases from a thick, uneven fire was illustrated by an interesting occurrence in connection with the