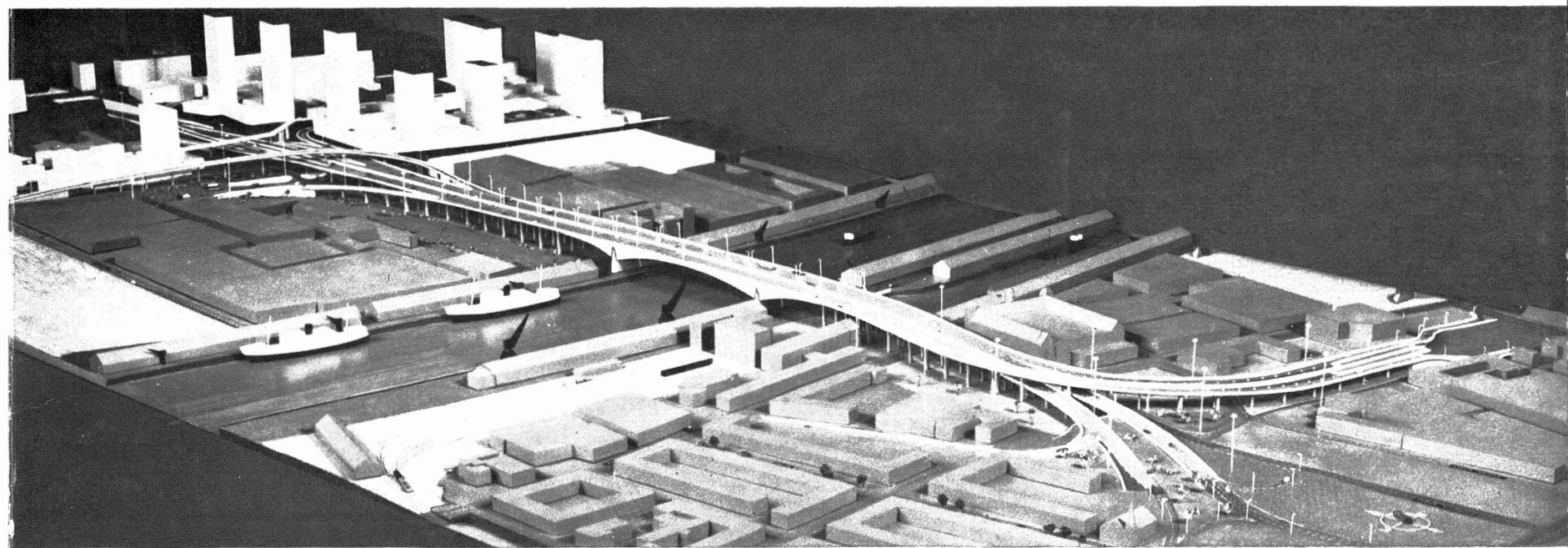
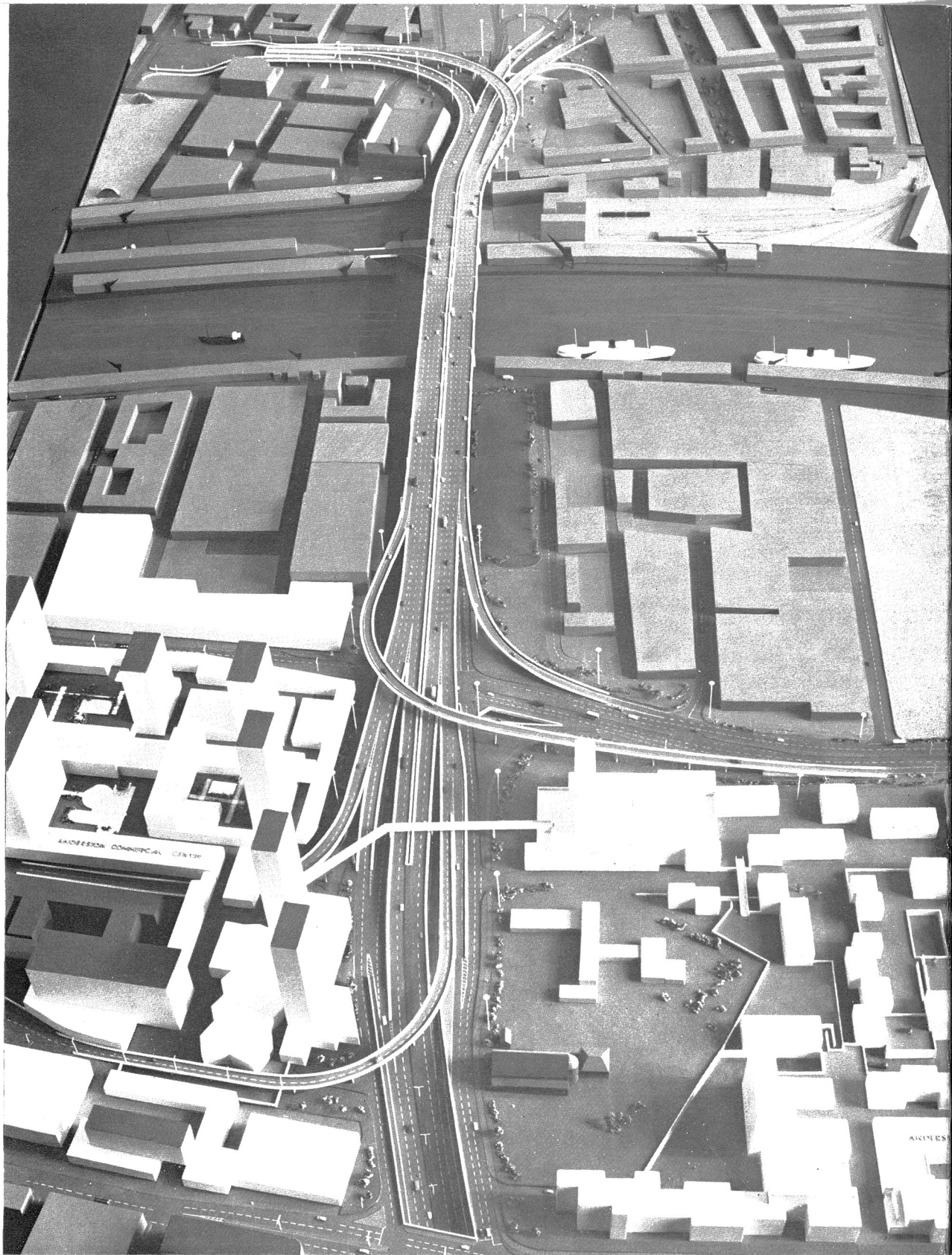


GLASGOW  
INNER RING ROAD

# Kingston Bridge

AND APPROACHES





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**GLASGOW  
INNER RING ROAD  
WESTERN FLANK-FIRST PHASE**

**Kingston Bridge  
and approaches**

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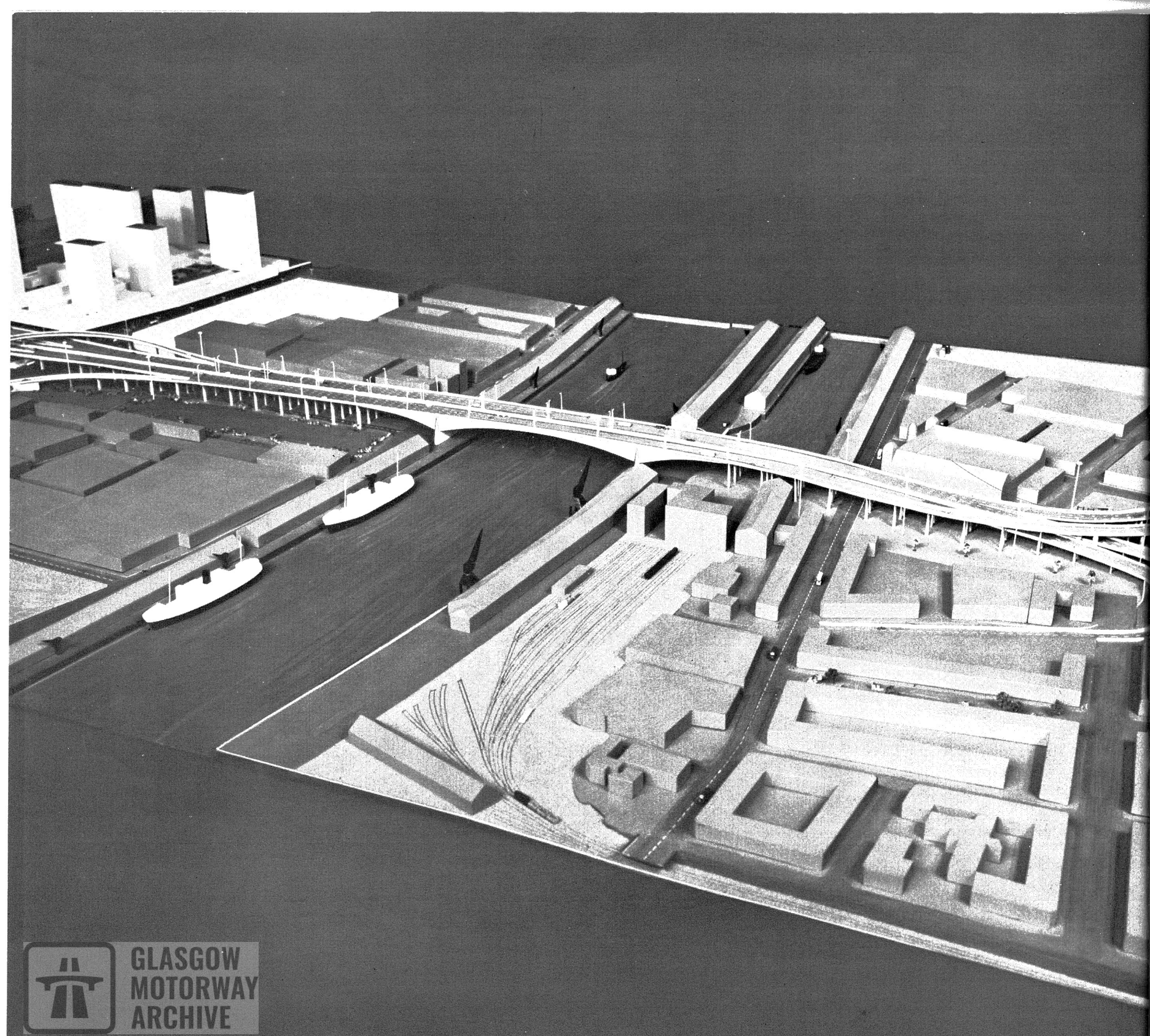
Consulting Engineers :  
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Contractors :  
Logan-Marples Ridgway



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# GLASGOW INNER RING ROAD WESTERN FLANK—FIRST PHASE

## Introduction

The Glasgow Inner Ring Road is planned as an urban motorway encircling some  $1\frac{1}{2}$  square miles of the city's commercial centre. It serves as a hub into which future radial motorways and expressways will connect. For the greater part of its length the ring road will be carried above the existing streets and for the rest it runs below ground level. The road will be completed in stages. One aim is the completion of the north and west flanks by 1971.

The initial stages are planned to relieve two of the most congested locations in the central area. The first of these is the intersection of Alexandra Parade and Parliamentary Road with Castle Street, where the Townhead Interchange is being constructed as the first phase of the north flank. The second location of congestion comprises the approaches to the King George V Bridge over the River Clyde. Relief is being obtained in this area by the construction of a new bridge less than half-a-mile downstream. This new Kingston Bridge (formerly known as Carnoustie Street Bridge) and its approaches form the first phase of the Western Flank. The value of the engineering contract for this phase is around six and a half million pounds.

The bridge and approach works extend from Scotland Street on the south side of the river to St. Vincent Street on the north side, an overall distance of approximately 0.9 miles. Most of the works lie within the Shields Road and Anderston Cross comprehensive development areas.

All structural work will be of in situ concrete construction to ensure that the sweeping lines of horizontal and vertical curves are maintained. Lines of trees and shrubs will be set in continuous soft or hard landscaped areas over the length of the project to contribute to the general amenity.

## **Glasgow Inner Ring Road Western Flank—First Phase**

### **Kingston Bridge**

Kingston Bridge will carry dual five lane carriageways. It will be a three span structure 880 ft. long. The superstructure will be of pre-stressed concrete constructed in free cantilever. The main bridge piers are founded on piles behind the existing riverside quay walls. The main span of 470 ft. is to be constructed without temporary supports in the river. Temporary propping towers will be erected at certain points under the 205 ft. side spans. Two triple cell box girders comprise the superstructure. These are each 53 ft. wide with overhanging top slabs forming the 68 ft. wide carriageways. The box girders vary from a depth of 35 ft. at the main piers to 8 ft. at the centre of the main span and taper to 4' 3" at the ends of the side spans. The bridge is straight in plan and the shallow approach gradients are joined by a 500 ft. long vertical curve of 10,000 ft. radius. The prestressing of the concrete is to be carried out using high tensile steel bars threaded at their ends and lengthened as necessary.

The main piers are of reinforced concrete. They are monolithic with the bridge girders and rest on lines of knuckle pin bearings set on massive reinforced concrete pile caps. The piles are 12" × 12" mild steel H-sections driven to rockhead which occurs at depths of about 100 ft. below ground level.

### **Bridge Approaches**

The south approaches comprise approximately 6,000 ft. of single, 2, 3, and 5 lane elevated roadways of prestressed and normal reinforced concrete construction on piled foundations and on embankment. The north approaches comprise approximately 8,600 ft. of single, 2, 3, 4 and 5 lane elevated roadways of similar construction. The major part of the construction comprises a deck slab carried on a series of longitudinal box beams which are supported on columns. In general the overall construction depth is 4' 3". Substantial diaphragms are provided at the columns and, where twin box beams are used, a transverse beam is also provided there. A transverse beam is positioned at mid-span in each case where the spacing between twin box beams warrants it.

Where possible the form of the construction has been standardised to enable full benefit to be gained from a repetitive construction procedure. This standard form consists of columns

at approximately 70 ft. centres, supporting 100 ft. long prestressed concrete box beams which alternate with 40 ft. suspended spans in normal reinforced concrete.

Where the use of this form of construction is precluded by site limitations a non-standard form is adopted. The structure is similar in appearance to that adopted elsewhere but there are variations in span, degree of horizontal curvature, etc. These sections are of prestressed concrete construction and are continuous over three or four spans.

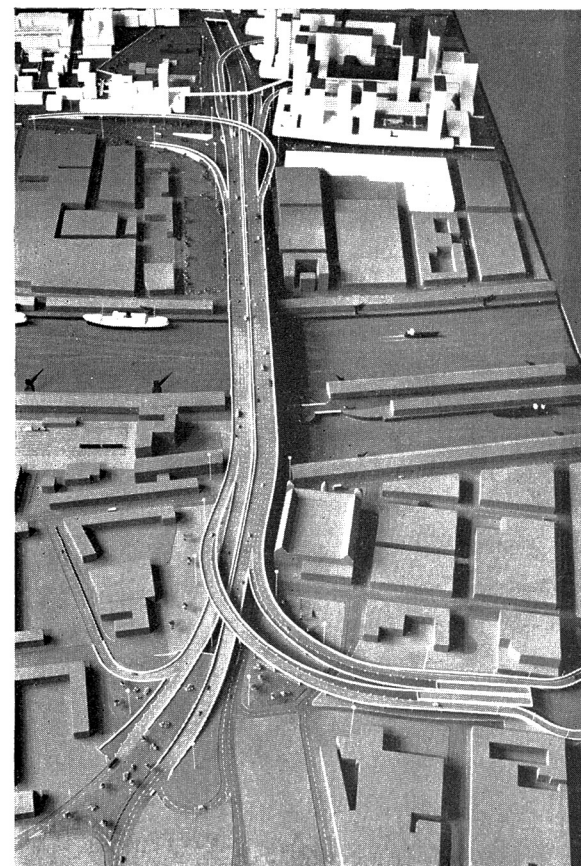
The columns are fixed at their bases and provided with either pinned or sliding bearings at their tops. Foundations to all columns are piled. Piles driven to bedrock are designed each to withstand 100 tons of vertical loading. Where the roadway is approximately 15 ft. or less above ground level, it is supported either on embankment or on a reinforced concrete cellular structure.

### **Streets and Services**

The works also include two road bridges, two footbridges, approximately 9,000 ft. of new surface level roadways, the realignment of several existing streets, together with alterations to services and the provision of new surface water drainage. The new roadways are of various lengths from about 300 ft. to 1,000 ft. while the realignments vary from a few feet up to a maximum of about 2,000 ft. The services include water mains and sewers up to 3 ft. in diameter, 2 ft. gas mains and telephone ducts 4 ft. x 3 ft. in section. An interesting feature of the street lighting is the use of 100 ft. high masts, each carrying 4 lanterns, to illuminate large areas of the complex road interchanges.

A new surface water drain 5' 6" in diameter and 5,000 ft. long will be constructed, partly in open cut and partly in tunnel, between the River and a point near St. George's Cross. This drain will serve not only the Ring Road but the areas being comprehensively developed at Anderston and Woodside.

A phased programme of demolitions has been arranged by Glasgow Corporation to enable work to start on the bridge and approaches at several places on both sides of the river. The Contractor's principal working areas are situated to the north of Scotland Street between Kinning Street and Carnoustie Street and to the south of St. Vincent Street between Bishop Street and North Street.





## Subsoil Investigation

In the boreholes for the main piers of the bridge the same general sequence of strata was encountered, namely:—

- (a) Road paving material and fill to depths between 3 ft. and 8 ft. below ground level.
- (b) Very loose to medium dense clayey sand with some gravel to depths between 70 ft. and 90 ft. below ground level.
- (c) Large gravel, cobbles and boulders in a matrix of sand or clay.
- (d) Sandstone, mudstone or siltstone bedrock encountered at depths between 78 ft. and 112 ft. below ground level.

Ground-water in the boreholes followed tidal variations between depths of 11 ft. and 20 ft. below ground level.

In most other parts of the site the materials occurring immediately under the filling are sands. The grading of the sands varies, but they are generally fine and uniform with silt in places. Near the south approach to the bridge some comparatively soft clay overlies the sand. The boreholes terminated in sandstone, which is located at a considerable depth in places near the river and in some cases the sandstone is overlain by stiff and very stiff clays.

## Traffic

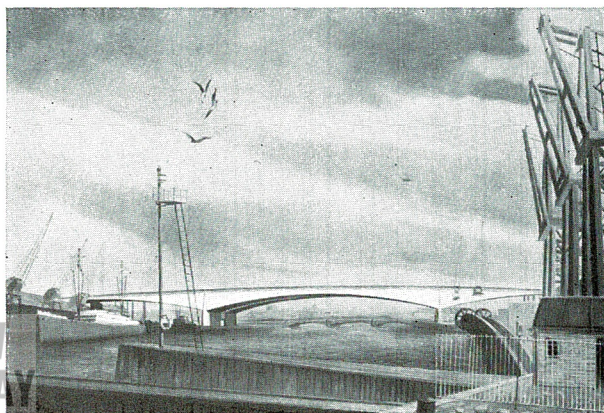
Most of the streets on which the works are situated carried only light traffic, but several main traffic routes cross the site from east to west. On three of these, i.e. Paisley Road, Springfield Quay and Anderston Quay the traffic flow will be maintained. At the remaining two, Anderston Cross and St. Vincent Street, phased diversions will be made.

By 1990, it is estimated, the bridge and its approaches will carry 120,000 vehicles per day.

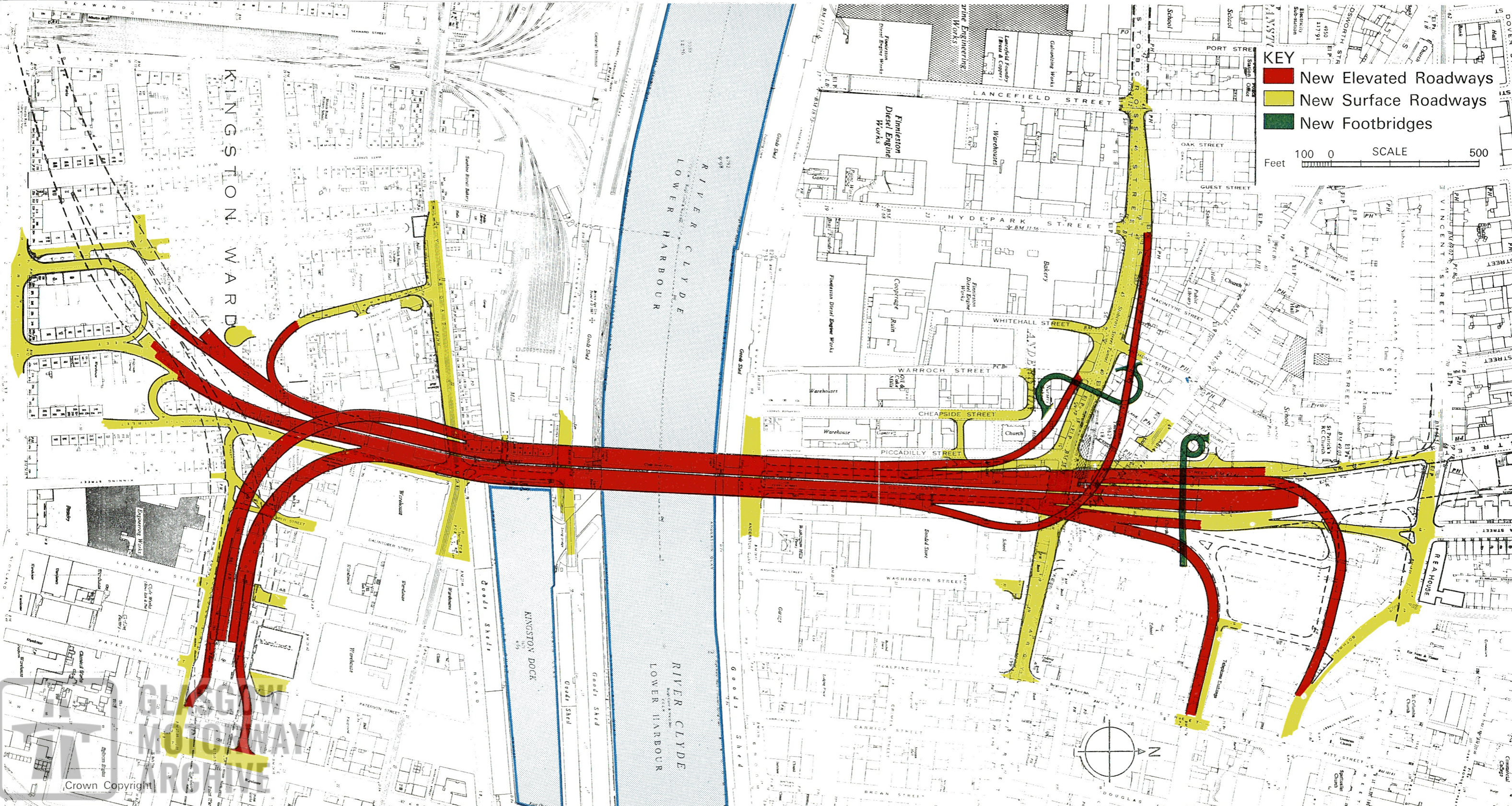
Kingston Dock will be closed at an early stage in the bridge construction but otherwise river traffic will proceed without interruption or restriction.

## Programme

Construction of the whole of the above works will be completed in  $2\frac{1}{2}$  years. It is hoped that work on the second phase of the Western Flank, to the north of the present contract, will start in the second half of the  $2\frac{1}{2}$  year period.







**KEY**  
█ New Elevated Roadways  
█ New Surface Roadways  
█ New Footbridges

SCALE  
Feet 100 0 500

KINGSTON WARD

RIVER CLYDE  
LOWER HARBOUR

RIVER CLYDE  
LOWER HARBOUR

KINGSTON DOCK

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