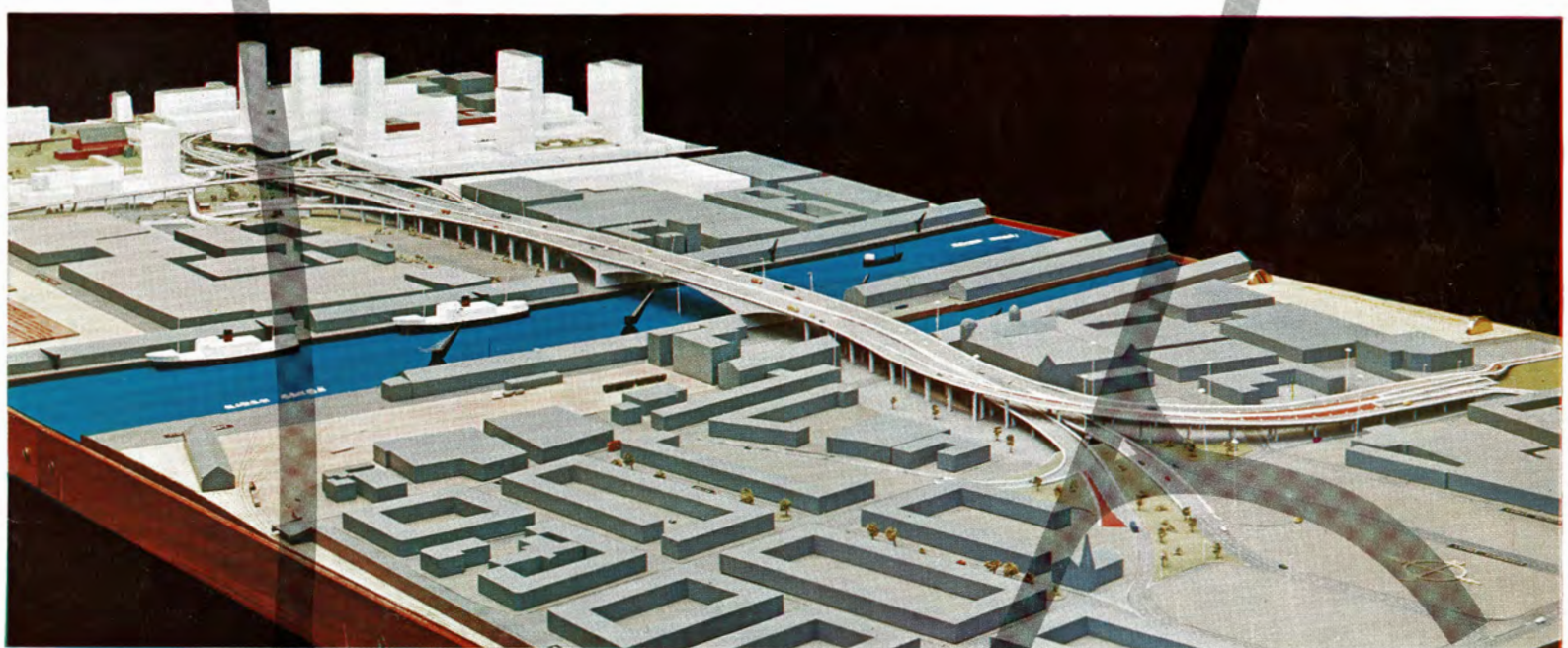
GLASGOW
INNER RING ROAD

Kingston Bridge

AND APPROACHES



THE CORPORATION OF THE CITY OF GLASGOW

Souvenir Brochure

of the

OPENING of

THE KINGSTON BRIDGE and APPROACHES

by

Her Majesty QUEEN ELIZABETH The Queen Mother

on

26th June, 1970

Her Majesty QUEEN ELIZABETH The Queen Mother

Portrait by
Anthony Buckley

THE CORPORATION OF THE CITY OF GLASGOW
HIGHWAYS COMMITTEE 1970-71

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Bailie Jane E. H. Mallard, *Sub-convener*

Special Sub-committee on the Highway Plan

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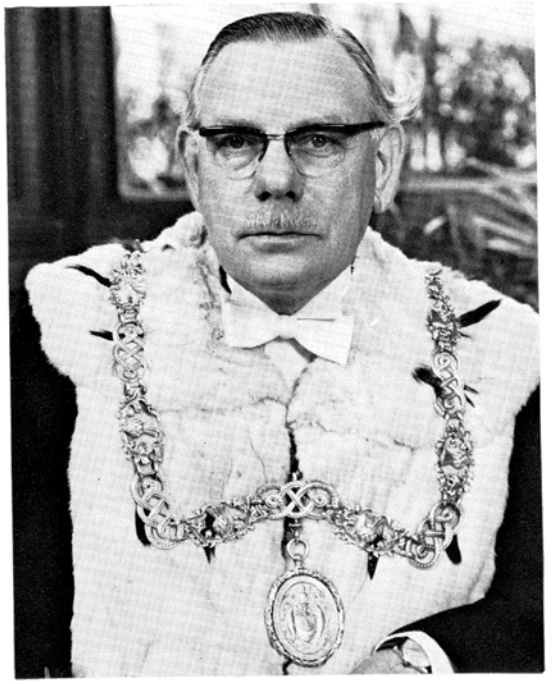
Councillor William C. Hunter, *Convener*

Master of Works and City Engineer:
John Armour, C.Eng., F.I.C.E., F.I.Mun.E., M.T.P.I.

Contractors:
The Logan-Marples Ridgway Joint Venture
(Duncan Logan Ltd. and Marples Ridgway Ltd.)

Consulting Engineers:
W. A. Fairhurst & Partners

Consulting Landscape Architects:
Wm. Holford & Associates (Glasgow)



The Right Honourable The Lord Provost
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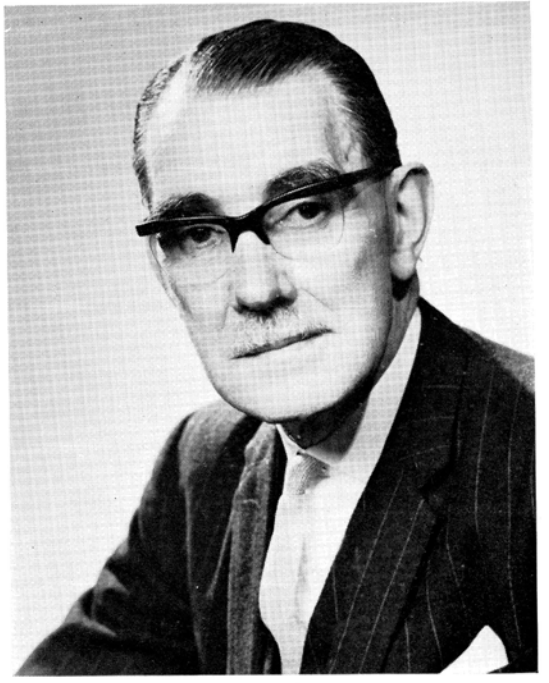


Councillor WILLIAM C. HUNTER, *Convener*

Ariel view looking northwest

THE KINGSTON BRIDGE and APPROACHES

Introduction

The opening of the Kingston Bridge and its extensive approach roads brings into operation one of the most ambitious urban motorway projects in the United Kingdom. The main bridge, which spans 470 ft. across the River Clyde, is the largest urban bridge in the country and will carry five lanes of traffic in each direction. It will form an integral part of the West Flank of the Glasgow Inner Ring Road, which has featured in the Corporation's proposals for the central area of the city since 1945.

The rapid increase in post-war traffic accentuated the need to relieve the existing central area bridges over the River Clyde and the Corporation approved of two additional facilities for cross-river communication, the Clyde Tunnel and a new bridge on the present alignment. In 1961 W. A. Fairhurst and Partners were appointed as Consulting Engineers to investigate and report on the proposal to span the Clyde at this locus and, early in the following year, they reported favourably on the feasibility of constructing a single span bridge.

The publication in 1965 of "A Highway Plan for Glasgow" indicated the optimum route for the West Flank of the Inner Ring Road and the Consulting Engineers were instructed to proceed with the final design of the main structure (now to be known as the Kingston Bridge) and its approaches. A Parliamentary Order for the scheme was submitted and confirmed in June, 1966. This Order sanctioned the acquisition of property not already included in the Anderston Comprehensive Development Area. Negotiations with the Clyde Port Authority on the impact of the new bridge with navigation on the River Clyde were concluded and rapid progress was made by the Corporation in re-housing and the demolition of properties.

Tenders were invited in October, 1966, and in May, 1967, construction work was started when the former Lord Provost, John Johnston, Esq., LL.D., J.P., performed the inaugural ceremony by driving the first foundation pile on the North Approach.

Construction (April 1969) work in progress on North Approach Roads

Road Lay-out

The bridge and approach works extend for almost a mile from Scotland Street on the south side of the river to St. Vincent Street on the north side. Most of the works lie within the Shields Road and Anderston Cross comprehensive development areas.

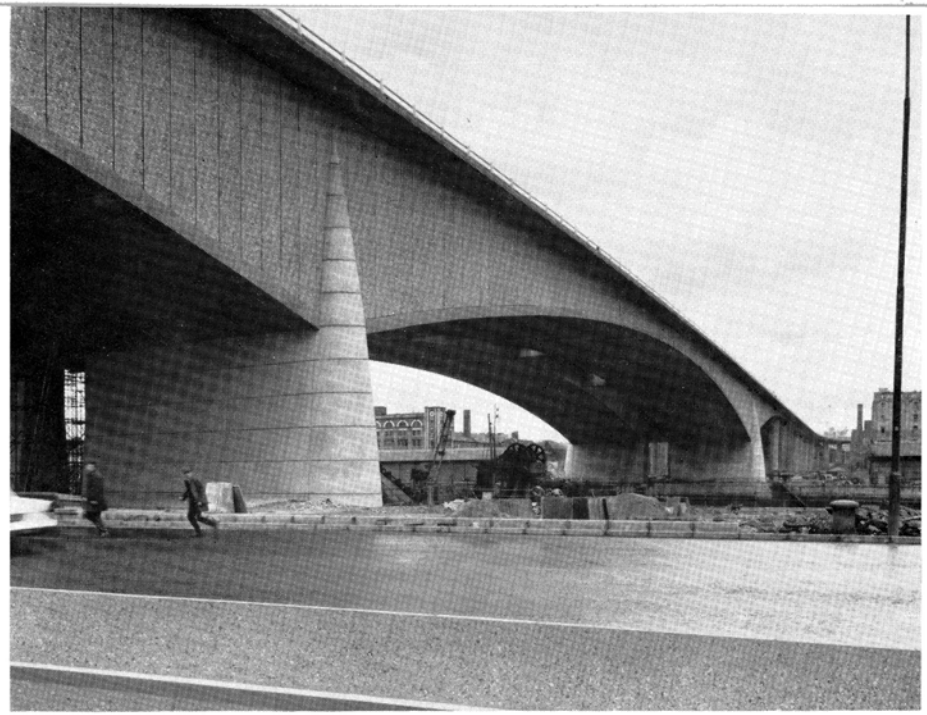
The contract comprises the construction of almost 3 miles of elevated motorways and ramps and 2 miles of new or re-aligned surface streets. The layout provided for two "free flow" interchanges with provision for connection to the improved surface street pattern and to the future motorway network.

It is anticipated that by 1975, 70,000 vehicles will use the motorway every day and that this number will increase to over 120,000 by 1990. Traffic will be permitted to travel at speeds up to 50 m.p.h. on the main carriageways of the Ring Road.

Services

One of the problems to be dealt with on major urban schemes is the effective relocation of water, drainage, gas, electricity and telephone services. That this work cost over £400,000 will give an indication of its magnitude. In addition, a new 6 ft. diameter surface water sewer, a mile long and mostly in tunnel, was constructed within the contract at a cost of £450,000.

Kingston Bridge from Springfield Quay

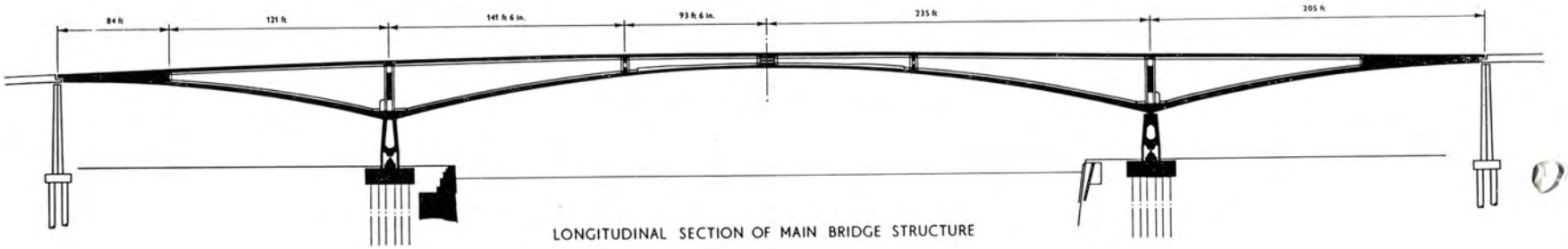


Kingston Bridge

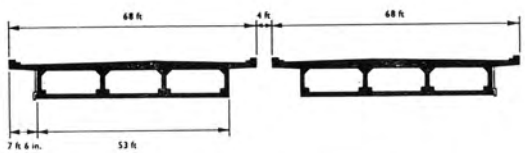
The two structures which comprise the bridge are each 68 feet wide. With a main span across the river of 470 feet and side spans of 205 feet each, the total length of the bridge is 880 feet. The requirements of The Clyde Port Authority were that a minimum clearance of 60 feet be provided at high tide and that no supporting structure of any sort, either permanent or temporary, be built in the river. The bridge was, therefore, built (in 10 feet lengths) in "free cantilever" working in both directions from the main piers and utilising temporary props under the landward spans. Prestressed concrete was chosen as the most suitable and economical material. The concrete mix used had a high early strength to ensure the maximum rate of progress consistent with a quick "turn round" of formwork and plant.

The apparent slenderness of the structure in its finished form perhaps belies the fact that the bridge is 35 feet deep at the piers and 8 feet deep at mid span. Each of the two five-lane roadways is carried by a 53 feet wide triple cell box girder with edge cantilevers.

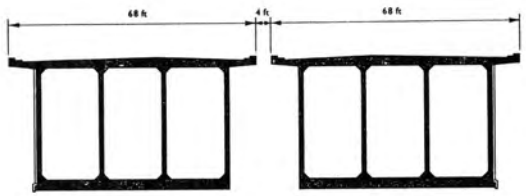
The main piers are of reinforced concrete which rest on lines of knuckle pin bearings set on massive concrete pile caps behind the existing riverside walls. Curved cutwaters are formed at both ends of each pier and a feature is made by tapering them upwards to an apex.



LONGITUDINAL SECTION OF MAIN BRIDGE STRUCTURE

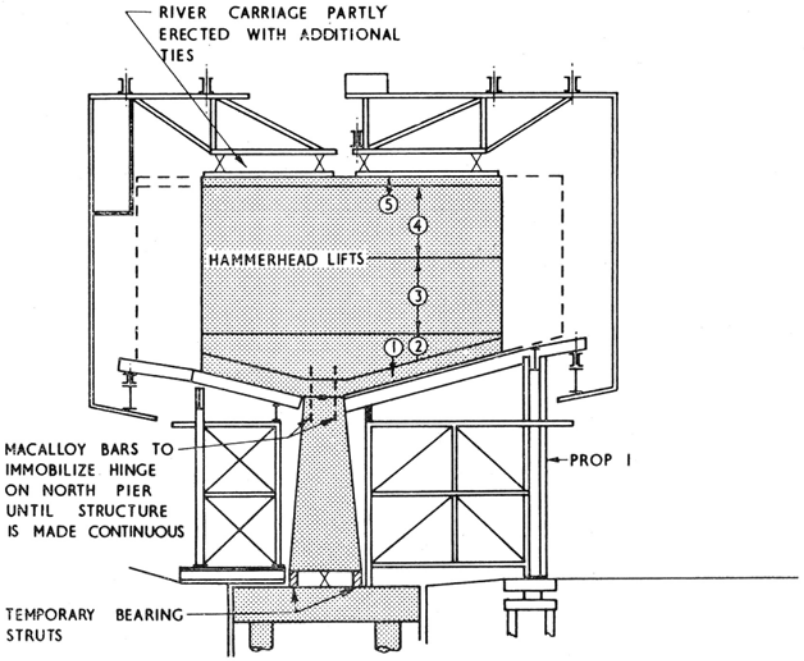


TYPICAL CROSS SECTION OF DECK NEAR CROWN

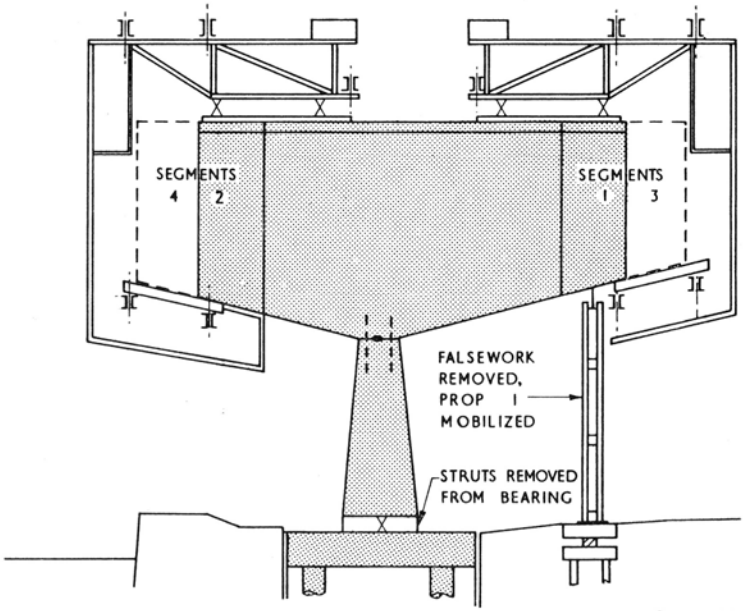


TYPICAL CROSS SECTION OF DECK NEAR SPRINGINGS

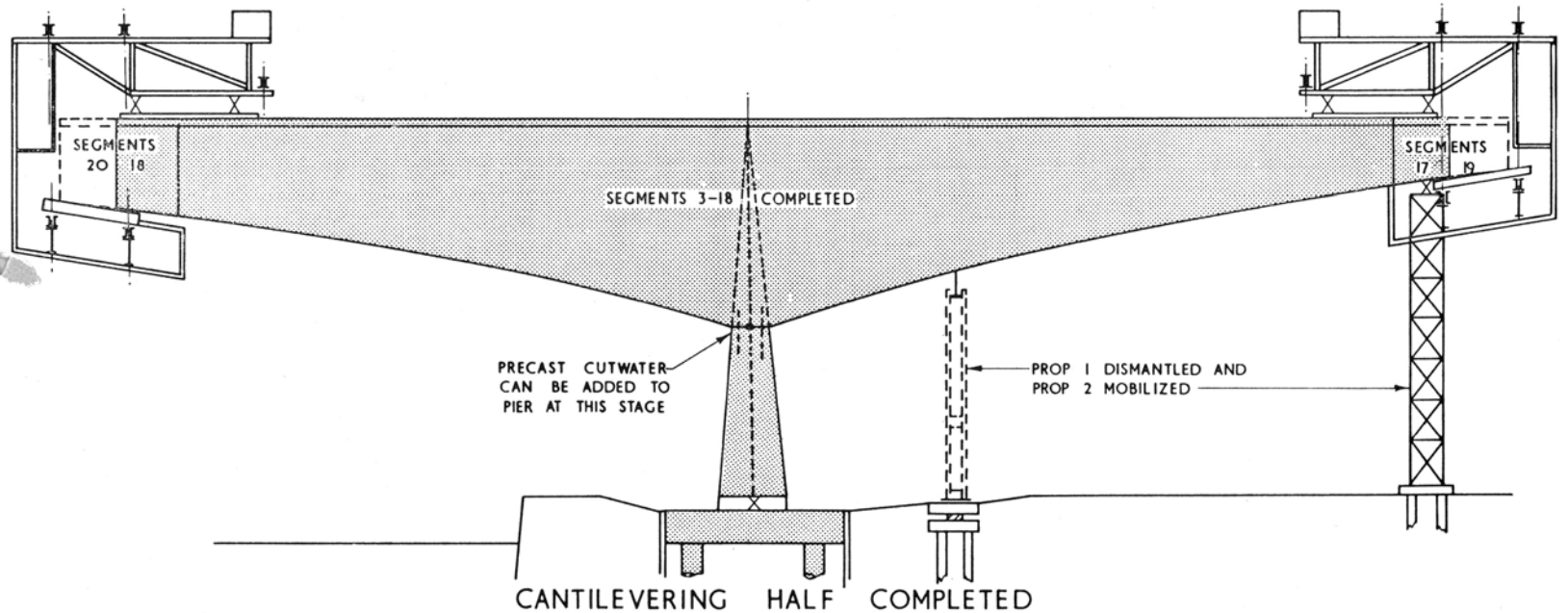
KINGSTON BRIDGE



HAMMERHEAD COMPLETED



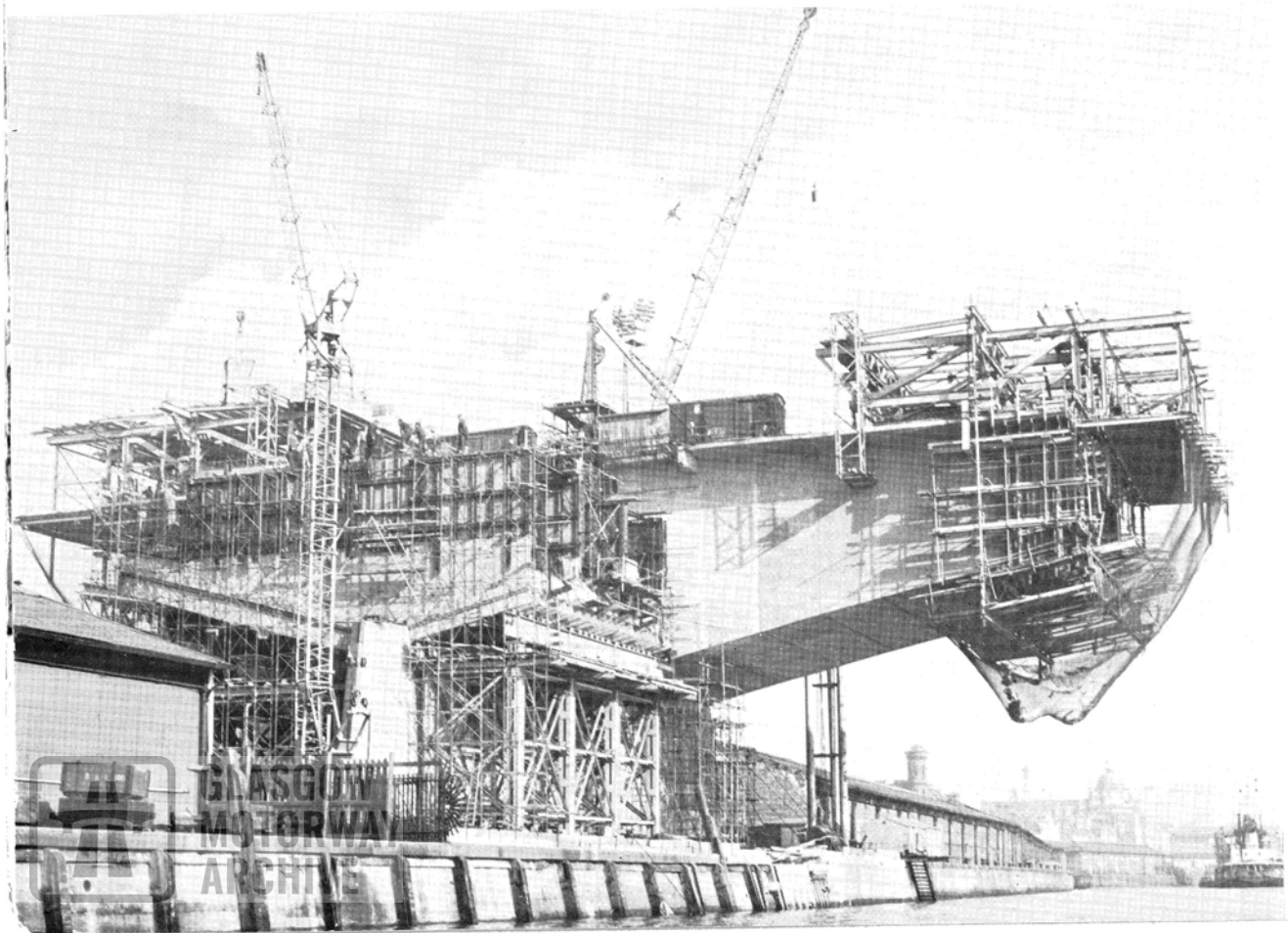
START OF CANTILEVER CONSTRUCTION

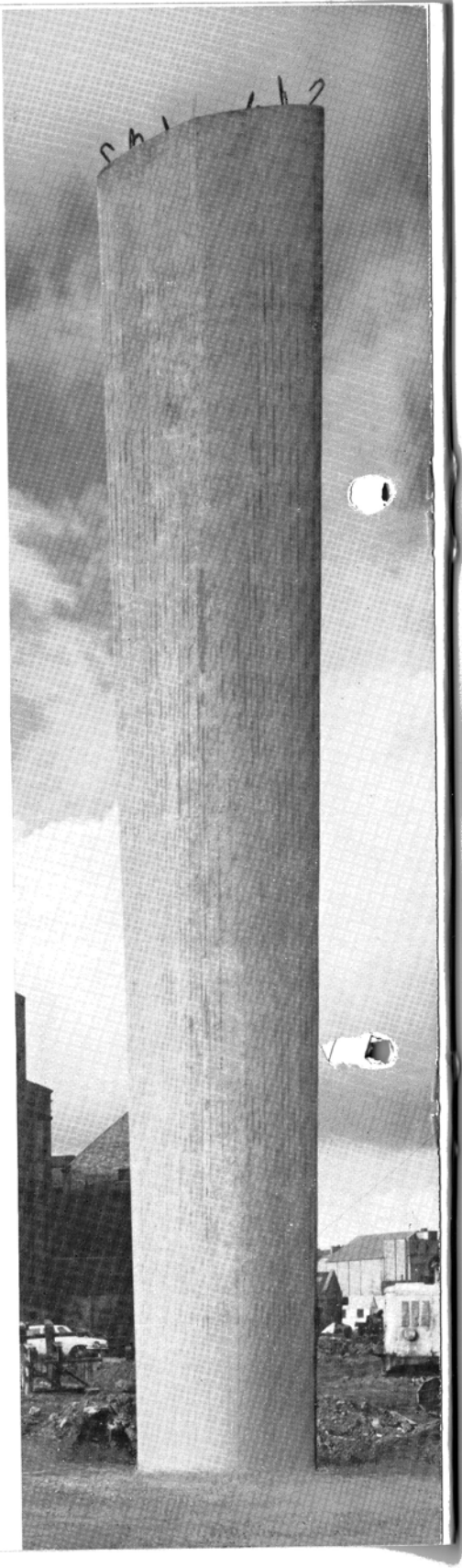


CANTILEVERING HALF COMPLETED

DETAILS OF BRIDGE CONSTRUCTION

Cantilevering construction in progress (March 1969)





Approach Structures

The great number of variations in width, curvature and crossfall along the length of the approaches necessitated a comprehensive and careful study to produce a versatile form of structure combining elegance with flexibility of construction method and minimum cost.

The result of these considerations is a series of longitudinal box beams, generally 4 feet 3 inches deep, with a deck slab which spans between the beams and overhangs them at the sides. The maximum use and re-use of shuttering and staging was achieved by constructing most of the elevated roadway in 100 feet lengths with support columns at 70 feet spacings. The 40 feet lengths between these sections were constructed independently using a suspended shuttering platform. Where it was not possible to use this standard form of construction a similar method, but employing a more continuous form, was used. In such cases the spans are generally greater than 70 feet and the structure has been deepened; an example can be seen in the cusp effect where the motorway passes over Strobcross Street.

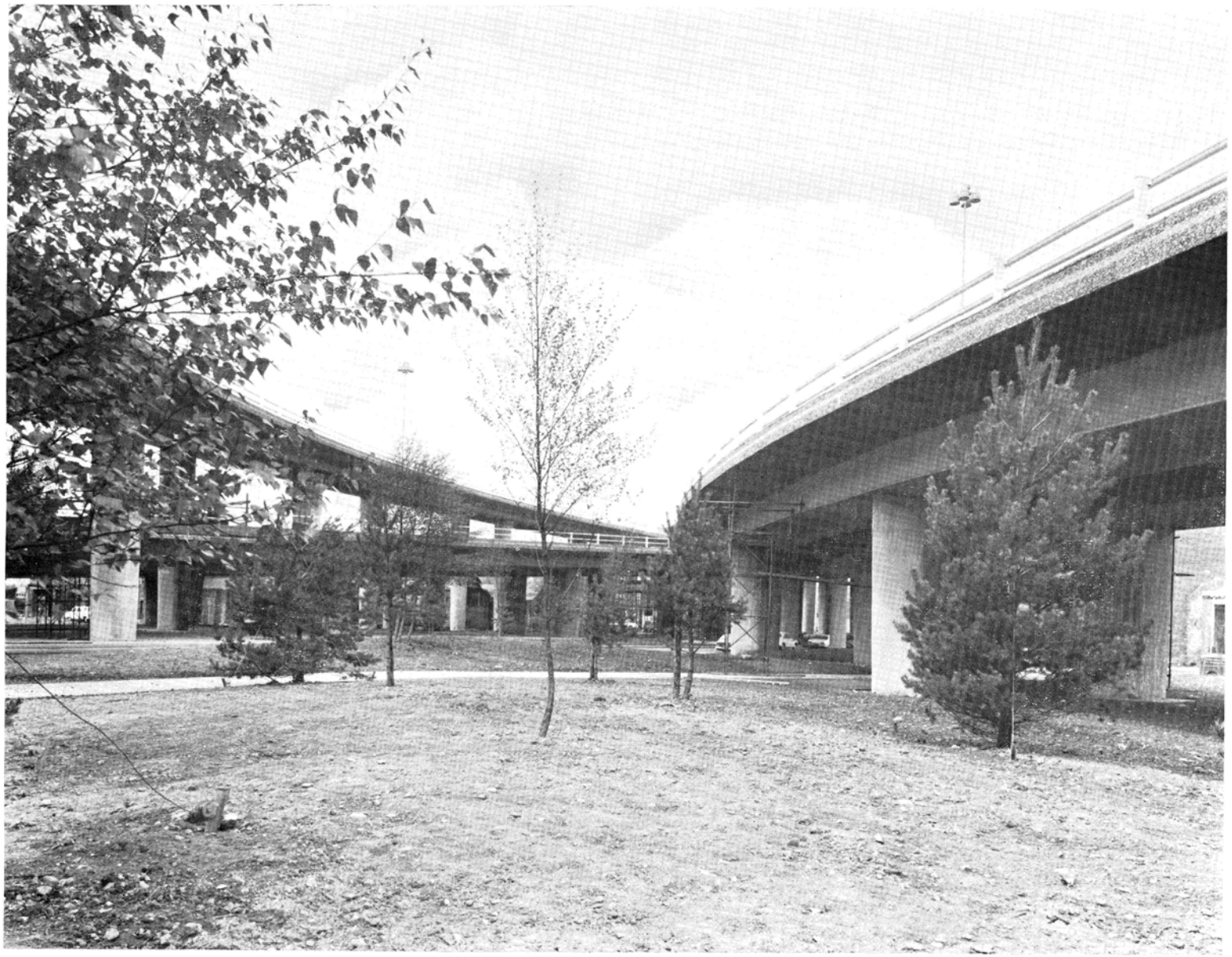
Particular attention has been paid to the design of the supporting columns to ensure that, despite their numbers, they would provide an interesting, elegant and functional shape. The parabolic form finally chosen is suitable whether the columns are high or low and because it was possible to use each mould more than fifty times the cost of achieving the unusual shape was remarkably small.

Finishes

In general the concrete required little attention following removal of the shutters whose boards or ply sheets were arranged to ensure a pleasing pattern of markings. The sides of the main bridge are clad with large precast concrete units with an exposed gravel face while those of the approach structures have been bush hammered to expose the aggregate.

The edges of the deck are strengthened with a longitudinal beam within precast concrete facings for which a dark finish was chosen to combat staining from atmospheric grime.

The aluminium crash barriers, steel lighting columns and road sign gantries are finished in colours which suit the structures and their surroundings and which conform with standards evolved for the whole ring road.



3-level interchange at Carnoustie Street showing soft landscaping

Pedestrians and Landscaping

An elevated roadway, and particularly one having widths to cater for ten lanes of traffic, leaves, large areas beneath it. Such areas can be most useful and attractive but there is the likelihood that if not landscaped properly, they can look most unsightly. At Kingston they have been planned to accommodate new surface streets and car parking while the remainder has been finished in patterned paving.

Outwith the structures a semi parkland setting has been produced by planting grass, trees and shrubs. This work was carried out by the Corporation Parks Department.

Footpaths have been constructed through the landscaped areas and under the elevated structures and two new footbridges will ensure that pedestrians and vehicles will be kept apart wherever possible.

Lighting

Most of the lighting to the elevated structures and surrounding landscaped areas is provided by 100 feet lighting masts, each of which supports four 1000 watt lanterns. Many of these masts were erected early in the contract and were available to provide construction lighting.

Conventional 40 feet and 25 feet high columns were used on the main bridge and some of the ramps, while the surface streets and other areas under the structure are lit by lanterns attached to the structures. The high mast lighting and conventional lighting was designed by the City Lighting Engineer.

Costs

Construction costs amounted to almost £7m while property acquisition, compensation and other costs brought the total to over £11m. The contract has qualified for a 75 per cent. grant from The Scottish Development Department and the remainder has been financed directly by The Corporation of Glasgow.

Arrangement for pedestrians at Stobcross Street

View illustrating ramps linking Motorway to Clydeside Expressway at Anderston Cross

PRINCIPAL SUB-CONTRACTORS—

Osram (G.E.C.) Ltd.—High mast lighting.

Drummond Lithgow & Co. Ltd.—Construction of electrical sub-stations for road ramp heating and miscellaneous building works.

James Kilpatrick & Son Ltd.—Street lighting and associated electrical works on elevated deck and bridge.

M.T.D. Cranes—Erection of structural steelwork for gantries and other associated temporary works.

Cosmos Decorators Ltd.—Painting of vehicle parapet and hand-railing.

James Scott & Co. (Electrical Engineers) Ltd.—Road ramp heating and associated electrical work.

Franco Traffic Signs Ltd.—Gantry signs.

West's Piling & Construction Co. Ltd.—Concrete shell in situ piling for elevated approach roads.

G.K.N. Foundations Ltd.—Steel cased in situ piling for piers of Kingston Bridge and ancillary bridges.

G.K.N. Someset Wire—Prestressing Strand.

Scaffolding (Great Britain) Ltd.—Supply and erection of temporary works for construction of elevated approach roads.

Constable Hart Ltd.—Road asphalt surfacing.

Duncan Logan Construction Ltd.—Supply and erection of vehicle parapet system, and associated pedestrian railing, together with the fabrication of structural steelwork for travelling carriages and associated temporary works on Kingston Bridge.

Hulland Products Ltd.—Kerbs, paving slabs.

Koni (J. de Koning Azn. N.V.)—Hydraulic dampers for approach structures.

PRINCIPAL SUPPLIERS

Aberdeen Concrete Co. Ltd.—Precast concrete cladding panels for Kingston Bridge.

Cement Marketing Co.—Suppliers of cement.

Expandite Ltd.—Sealants and jointing materials.

Craig Hubbuck Ltd.—Paint.

Fyfestone Ltd.—Reconstituted stonework.

J. &. W. Henderson—Sand, gravel, etc.

McCalls Macalloy Ltd.—Prestressing tendons and stressing equipment.

C.C.L. Ltd.—Stressing equipment.

McLellan Rubber Co. Ltd.—Expansion joint materials.

Clyde Reinforcement Ltd.—Reinforcement for concrete.

Springbank Sand & Gravel Co. Ltd.—Sand and gravel.

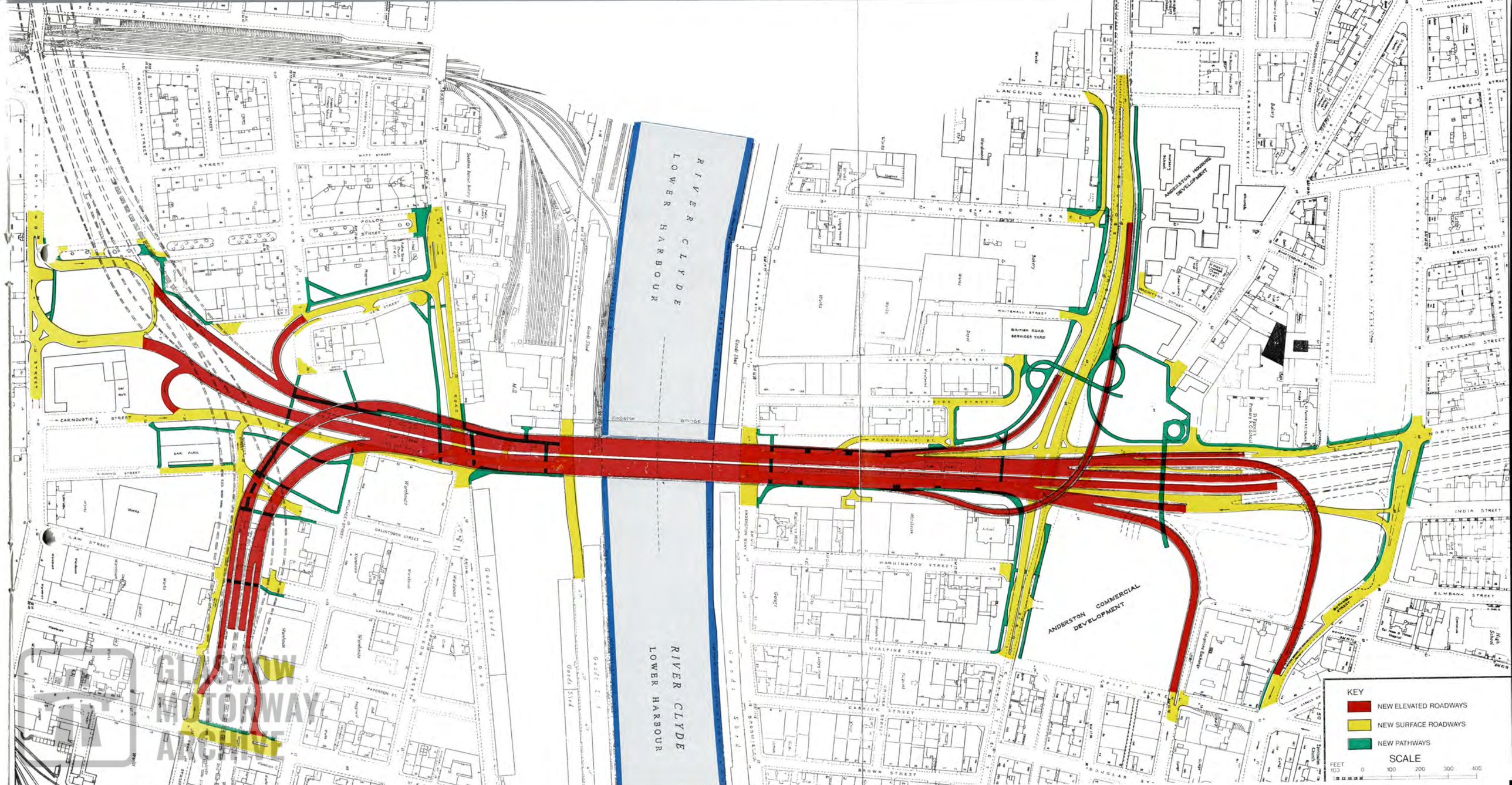
Trocoll Industries (Scotland) Ltd.—Concrete pipes.

Sandholme Iron Co. Ltd.—Bridge bearings and associated steelwork.

P.S.C. Ltd.—Bearings for bridge works.

British Steel Piling—Steel piling and piling plant.

British Aluminium Co. Ltd.—Suppliers of aluminium for parapet system.


RIVER CLYDE
LOWER HARBOUR
RIVER CLYDE
LOWER HARBOUR
ANDERSTON COMMERCIAL DEVELOPMENT
ANDERSTON HOUSING DEVELOPMENT
KEY
NEW ELEVATED ROADWAYS
NEW SURFACE ROADWAYS
NEW PATHWAYS
SCALE
FEET
100 0 100 200 300 400
GLASGOW MOTORWAY ACHIVE