



M9 Motorway

NEWBRIDGE to LATHALLAN

Scottish Development Department

Souvenir Brochure of the

Opening of the M 9 Motorway

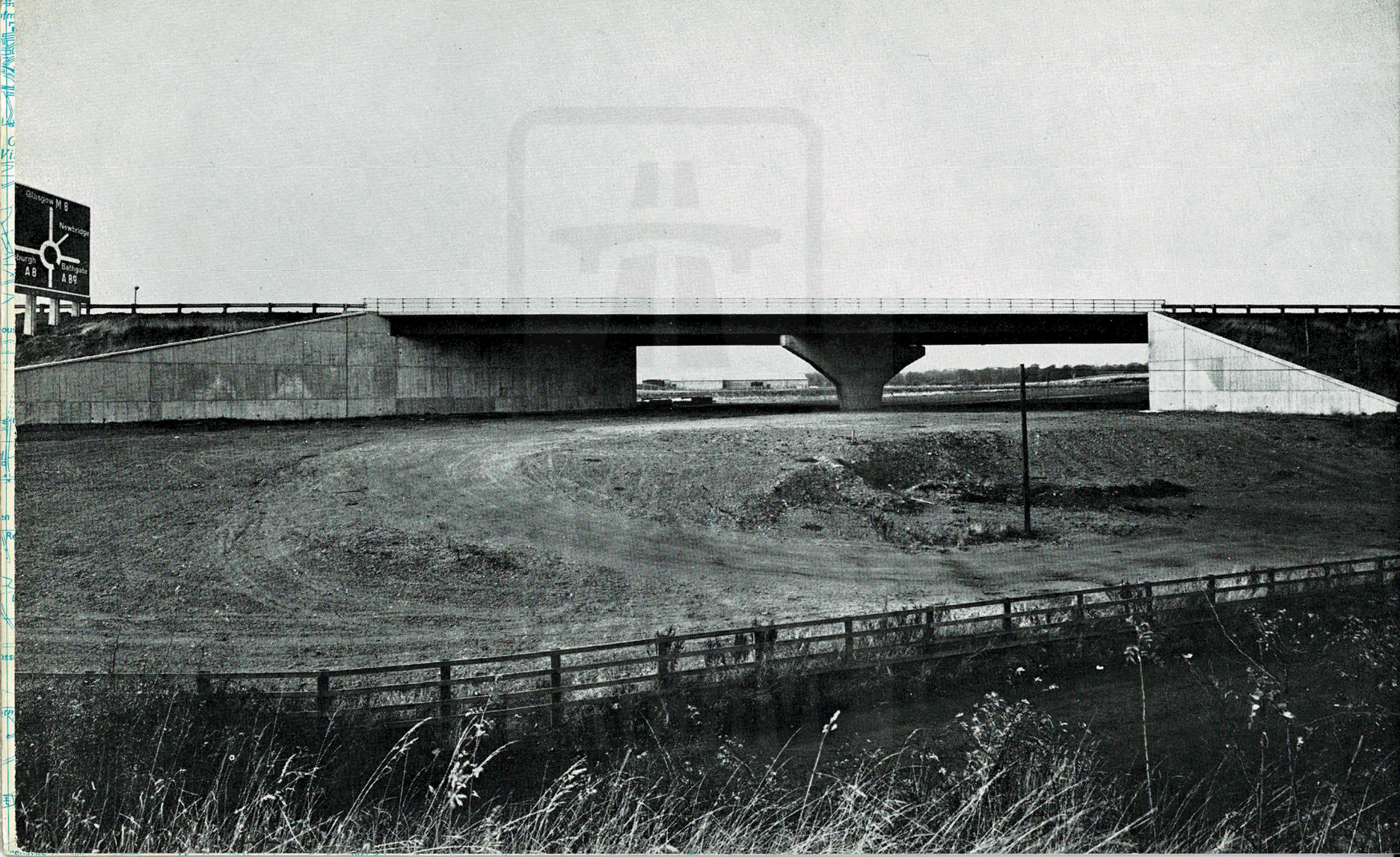
(Muriehall to Lathallan sections)

by

The Hon. George Younger, T.D., M.P.,

**Parliamentary Under-Secretary of State for Development,
Scottish Office**

on 18th December 1972



Glasgow M8
Newbridge
Edinburgh A6
Ballingate A89

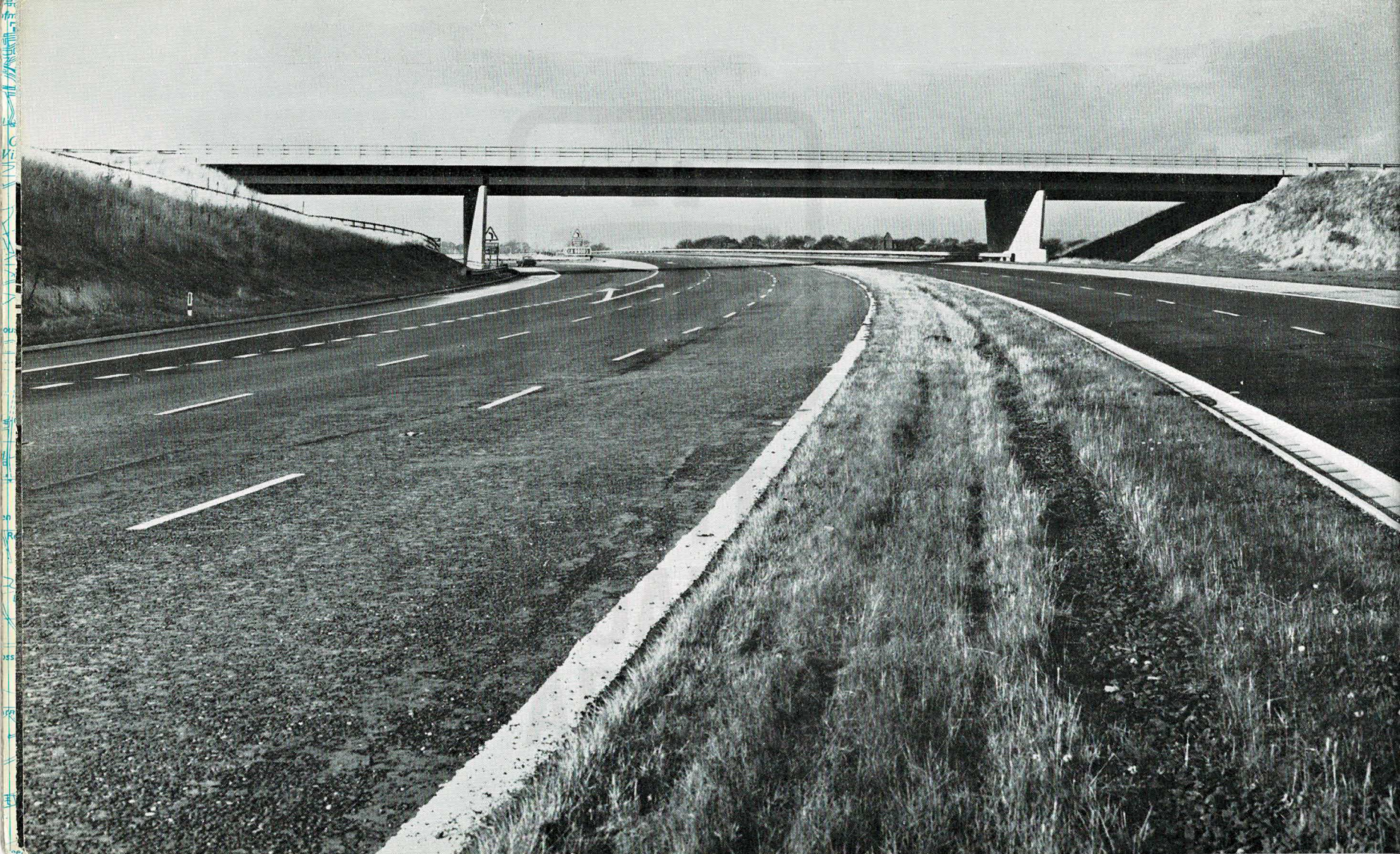


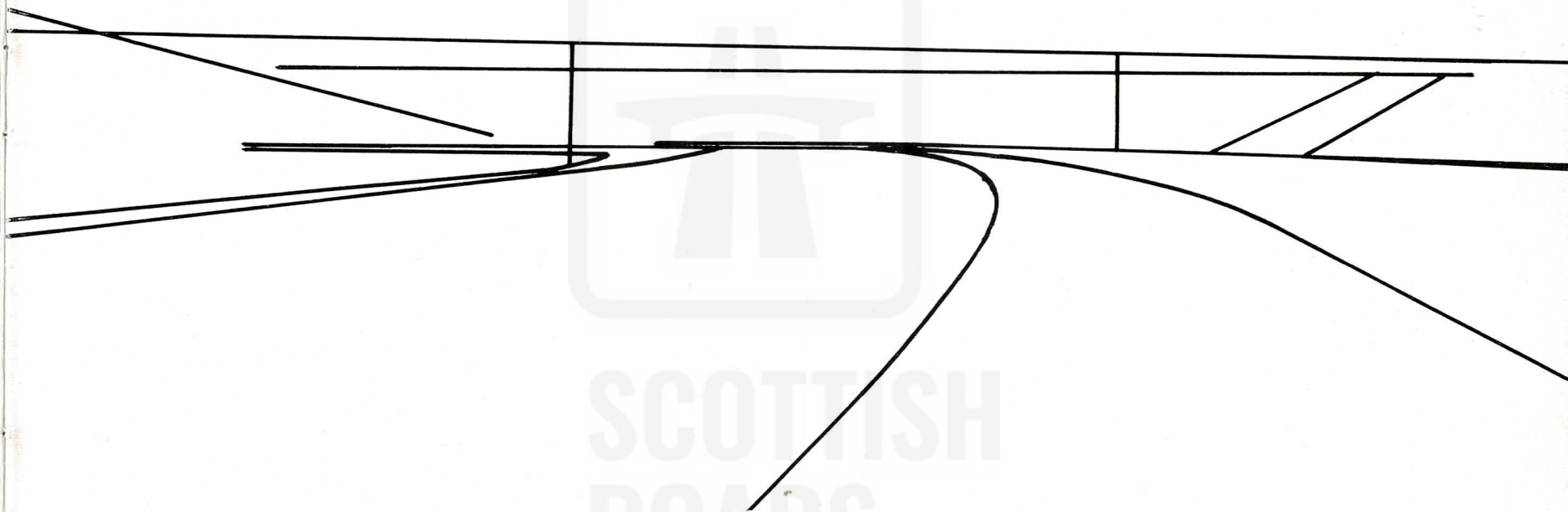
SCOTTIS
ROADS
ARCHIV

For centuries the River Forth, with its broad estuary, presented a barrier on the route from Edinburgh and the south-east of Scotland to the North. The ferry inaugurated by Queen Margaret provided an intermittent and sometimes dangerous link but most of the traffic had to take the road on the south side of the river to Stirling, where it could be bridged.

The road linked the towns of Linlithgow and Falkirk, which prospered with the trade it brought. Now, however, that very prosperity, with its intensive local traffic and activity, has a restrictive effect on the capacity of the road. Modern conditions require that the through traffic be separated from local movements and a Motorway is planned to link Edinburgh and Stirling.

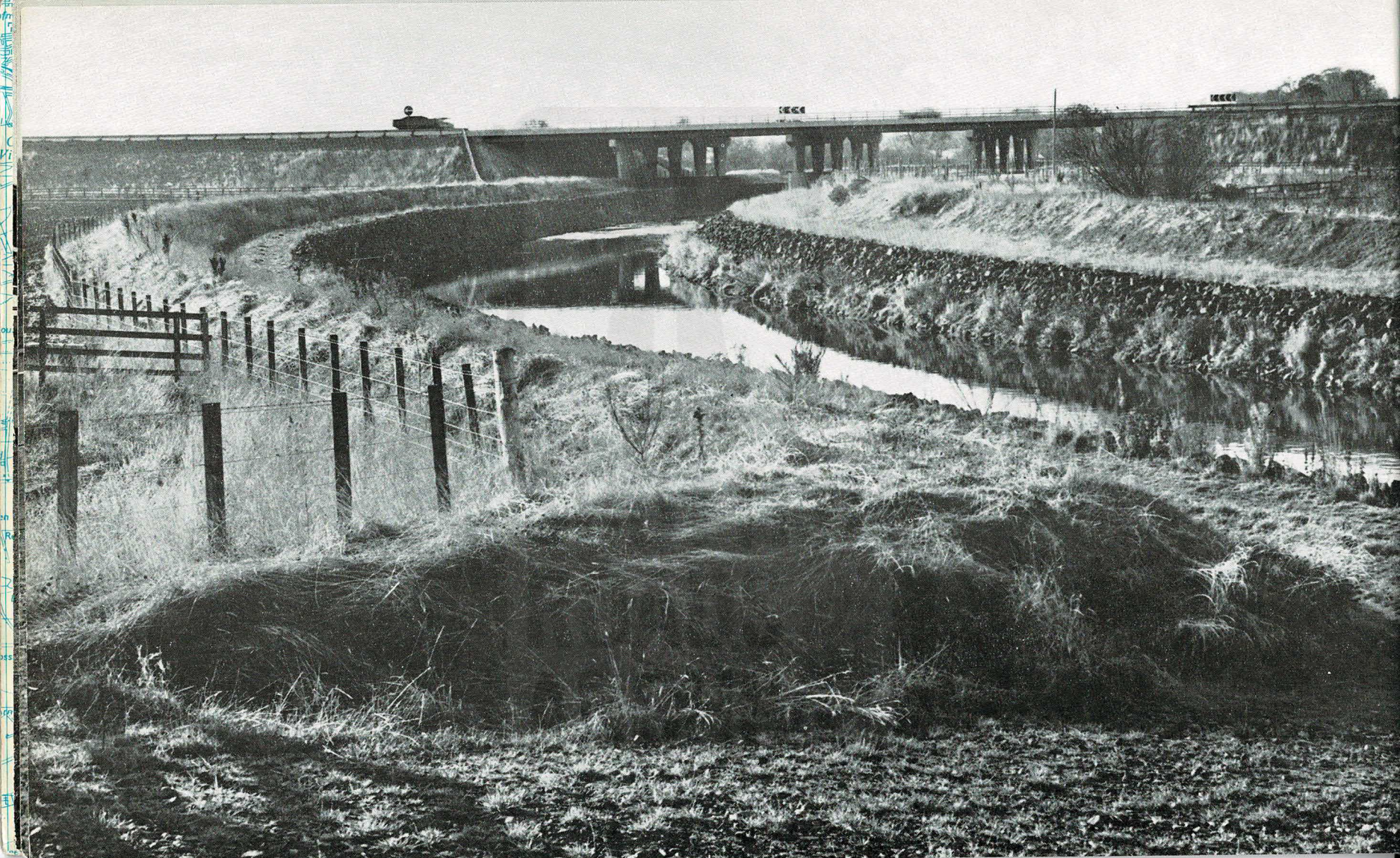
The Muriehall-Lathallan section of the Motorway links two sections already open to traffic and permits travel by Motorway from Newbridge, nine miles from Edinburgh, where there is a connection to the Edinburgh-Glasgow Motorway, to north-west of Grangemouth, a distance of eighteen miles.

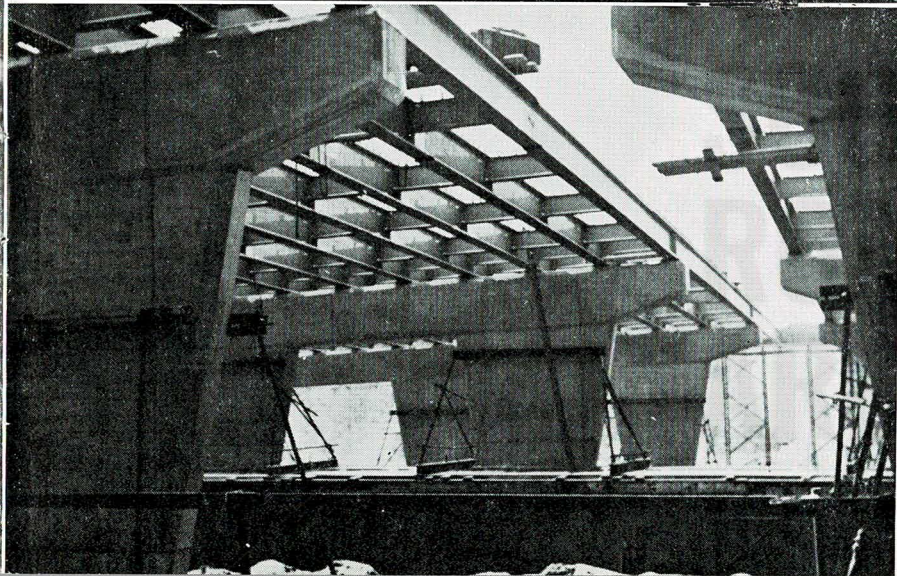
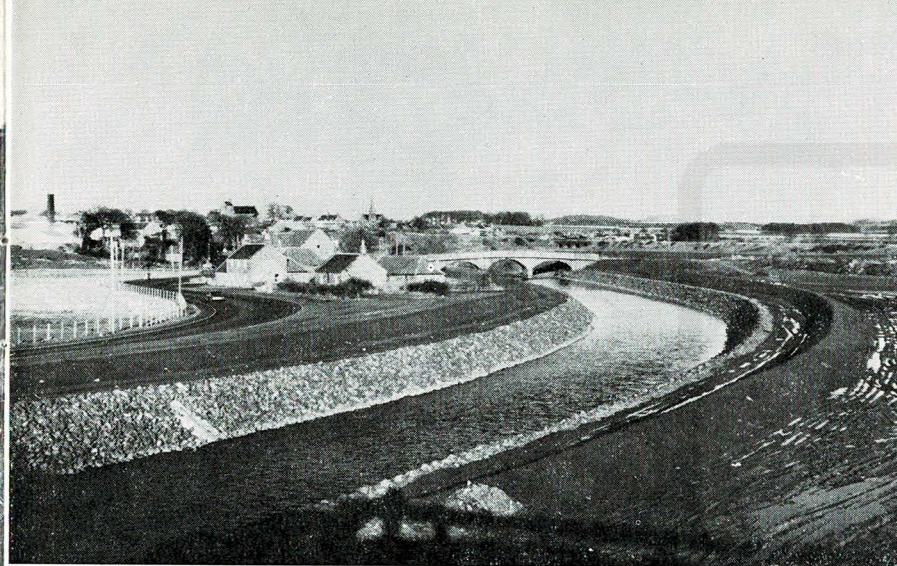




The design of the Motorway layout was based on an aerial survey, and a suite of computer programs was used to analyse the geometry of both horizontal and vertical alignments and to calculate earthworks quantities, proposed and formation level data, stake line positions and fencing lengths. The data tapes were also used as input to an automatic draughting machine, which produced road plans to 1/2500 and 1/500 scales, as well as

terrain and Motorway grade line profiles and channel profiles. Computer techniques were also used to study visual problems such as partial sightline obstruction. The computer and draughting machine were used to prepare simplified but true-to-scale perspective views from different driver positions from which, for example, the effect of changing the location of large signs could be assessed.





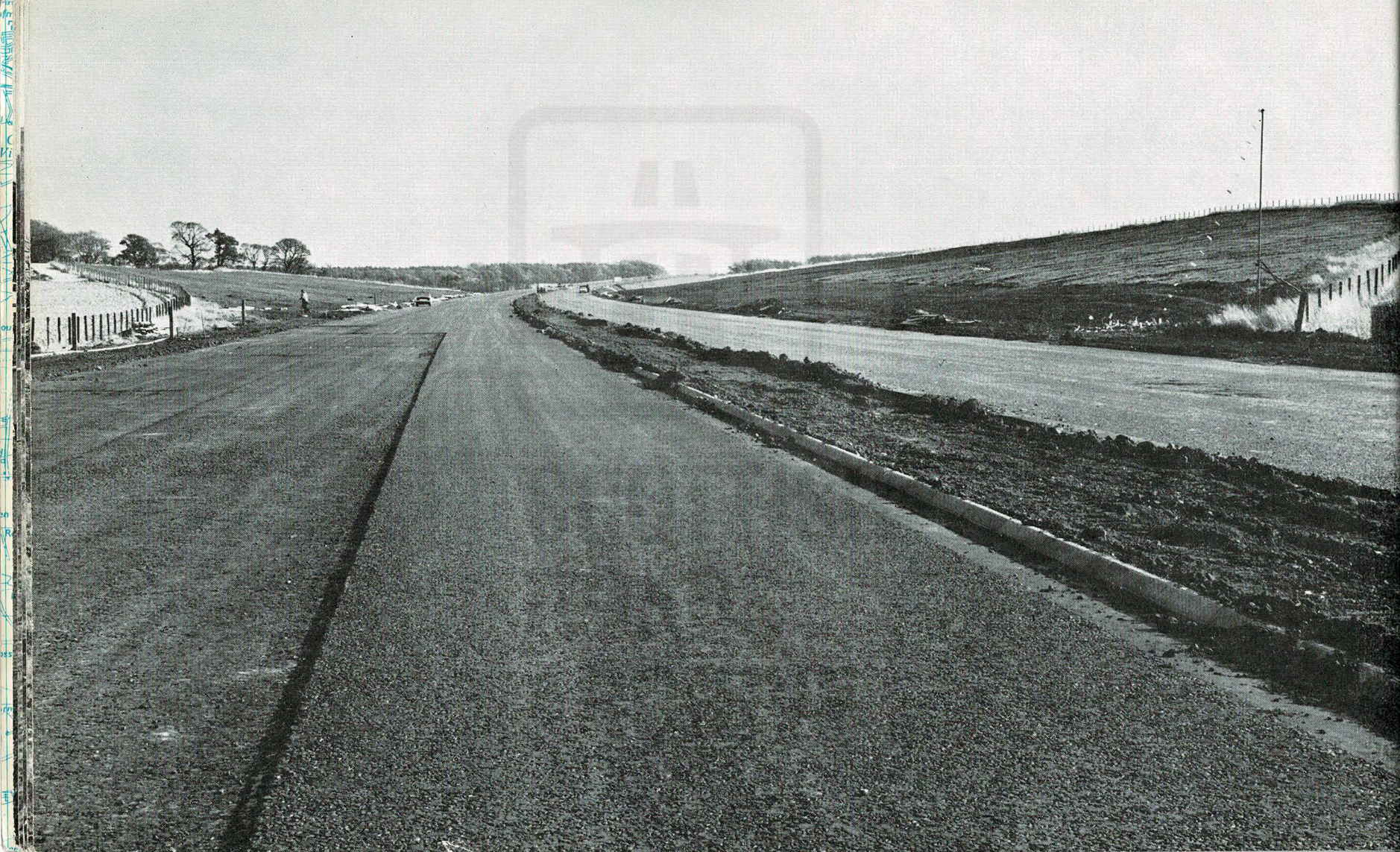
Near Newbridge the line of the Motorway crosses the River Almond in the middle of a large loop, and a short distance further on crosses the former B 800 road at the point where the eastbound carriageway divides for the future M 8-M 9 interchange. This would have required two bridges over the river and a third over the road. Investigation showed that a substantial financial saving could be made by diverting the river into a new channel close to the road (which was realigned to improve a sharp bend), and crossing both road and channel with one structure. The bridge was built "in the dry" and the river subsequently diverted into the channel, which is 50 ft. wide, 10 ft. deep and 1,800 ft. long.

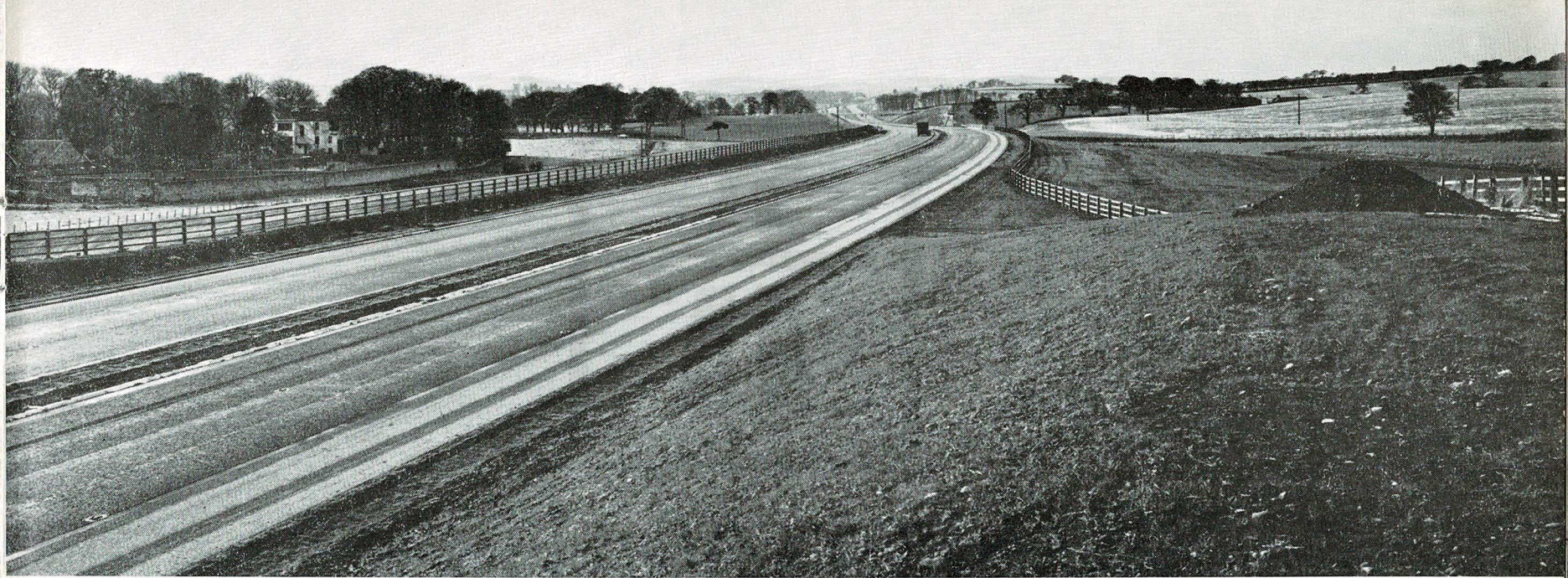




Extensive use has been made of spent oil shale (a by-product of the now defunct shale oil industry), which is found in large quantities in the "bings" which are prominent features of the West Lothian landscape. The shale has been used in all three contracts for general earthworks, and in contract 1 it was also used in the 6 in.-thick lowest course of the road construction, being stabilized against frost heave by ploughing in 5% cement.

In forming the "Myre" embankment (between Muriehall and the B 8020 road), which consists almost entirely of spent oil shale, use was made of the formation of an abandoned mineral railway to construct a half-mile-long conveyor belt, passing under A9 and the railway line, to supply this material from Niddrie Castle Bing to a central point on the Motorway line, from which motorized scrapers distributed it.

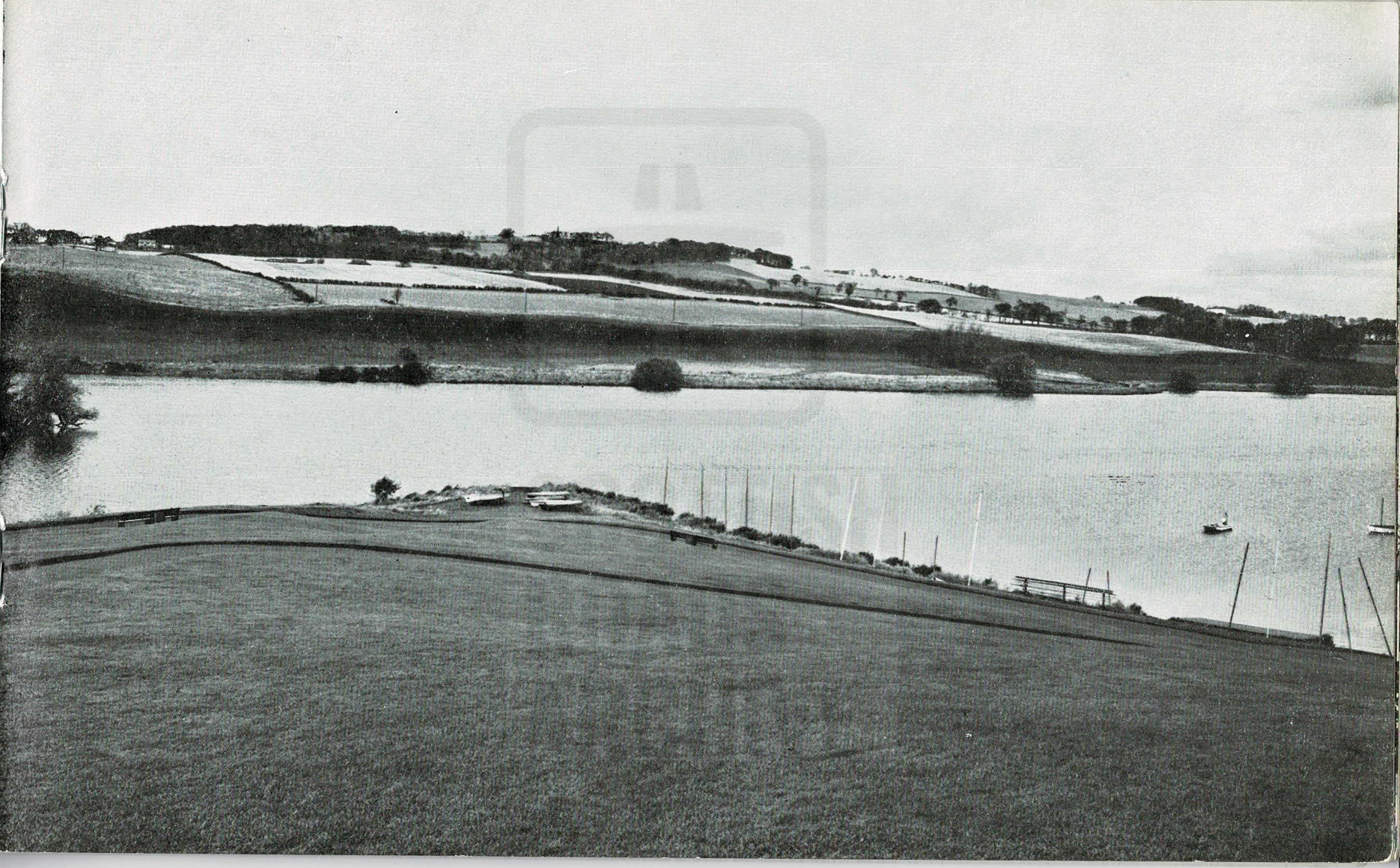


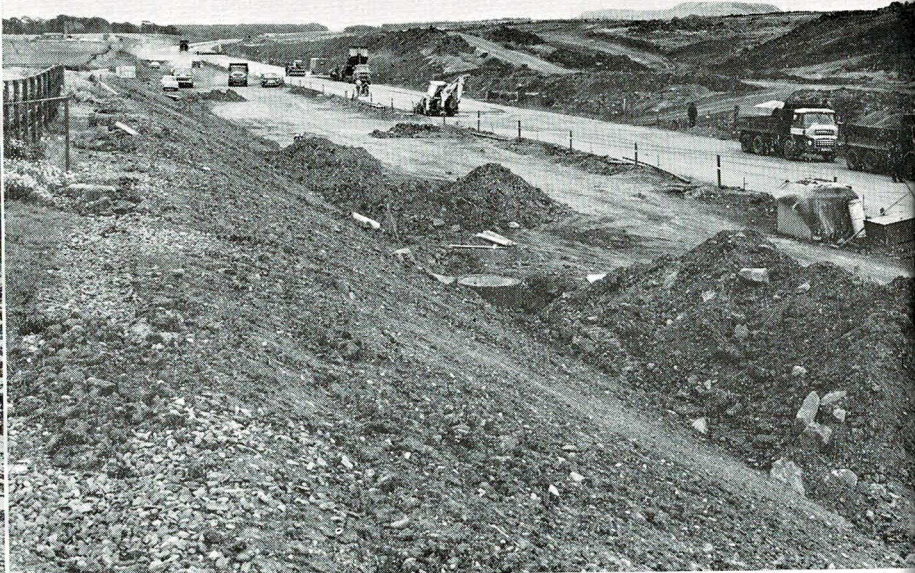


In order to ensure that the Motorway will blend into the countryside and be pleasing to use, Messrs. Wm. Gillespie & Associates, Landscape Consultants, were appointed to advise the Consulting Engineer. In some areas side slopes of embankments and cuttings have been made much flatter than engineering requirements would dictate so that the land occupied by them could be returned to agricultural use. Typical examples are shown at Duntarvie and Springfield Farms.

Near Linlithgow, where the Motorway passes through an area of notable scenic beauty and historical interest, particular care has been taken to make the road as unobtrusive as possible whilst taking advantage of the remarkable view from it. Extensive moulding of the earthworks, separated carriageways at different levels, the use of earth bunds to mask the road and reduce noise transmission, and planting groups carefully chosen to match the indigenous pattern have all been adopted to create a high standard of amenity.



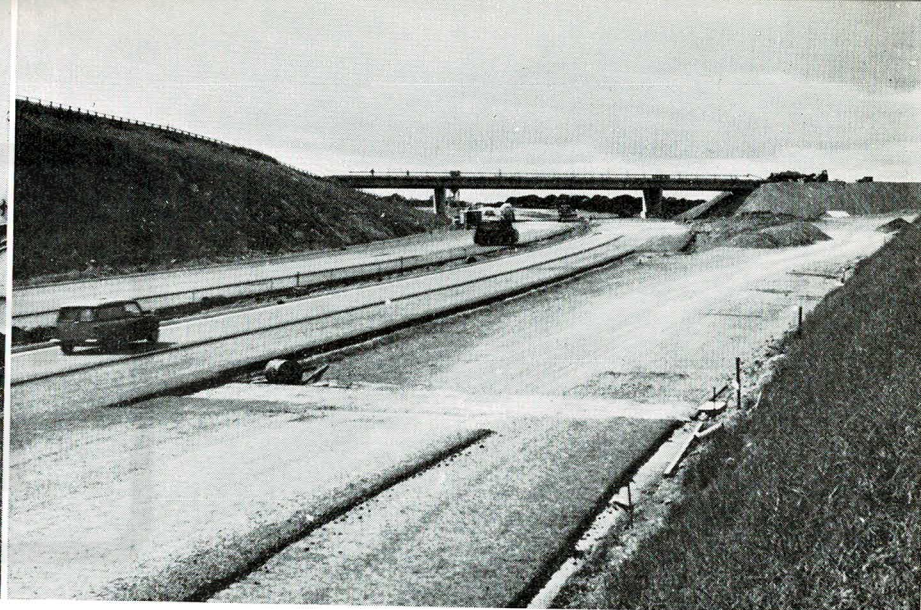
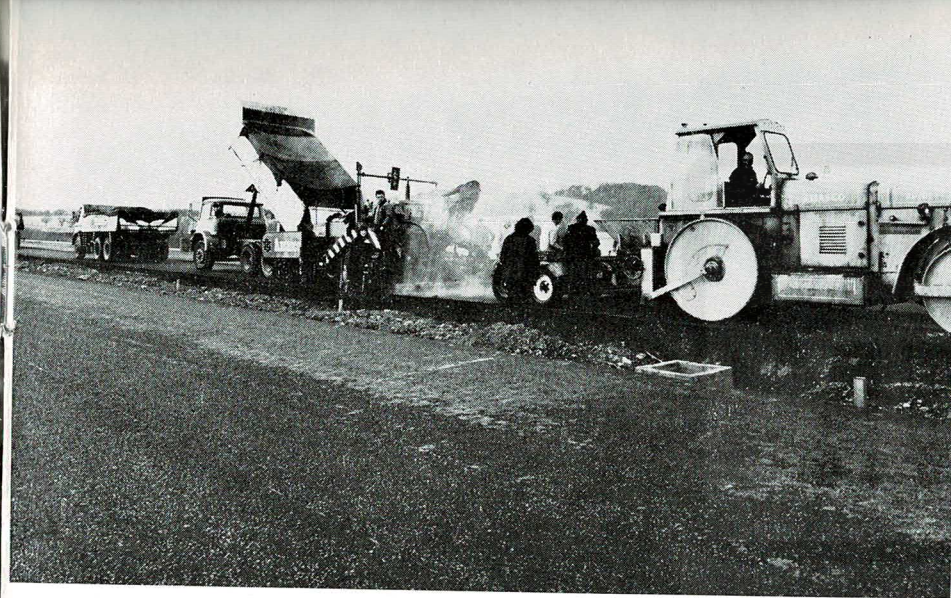




SCOTTISH
ROADWAY

The road construction consists of 4 in. hot rolled asphalt surfacing on a base composed of 3 in. bitumen macadam on 7 in. lean-mix concrete. The 6 in. thick sub-base consists of cement stabilized spent oil shale on contract 1 and type 1 granular material on contracts 2 and 3. Kerbs are provided at the lower side of carriageways, with gullies connected to a single pipe drainage system of perforated carrier drains, which also drain the sub-base and formation. On contracts 2 and 3 the verges in cuttings and the central reserves are drained by a "sodswale" arrangement which collects the run-off in a turfed channel and discharges it through hoppers into the main drainage system. This avoids the intrusion of a rubble drain in an otherwise green sward.

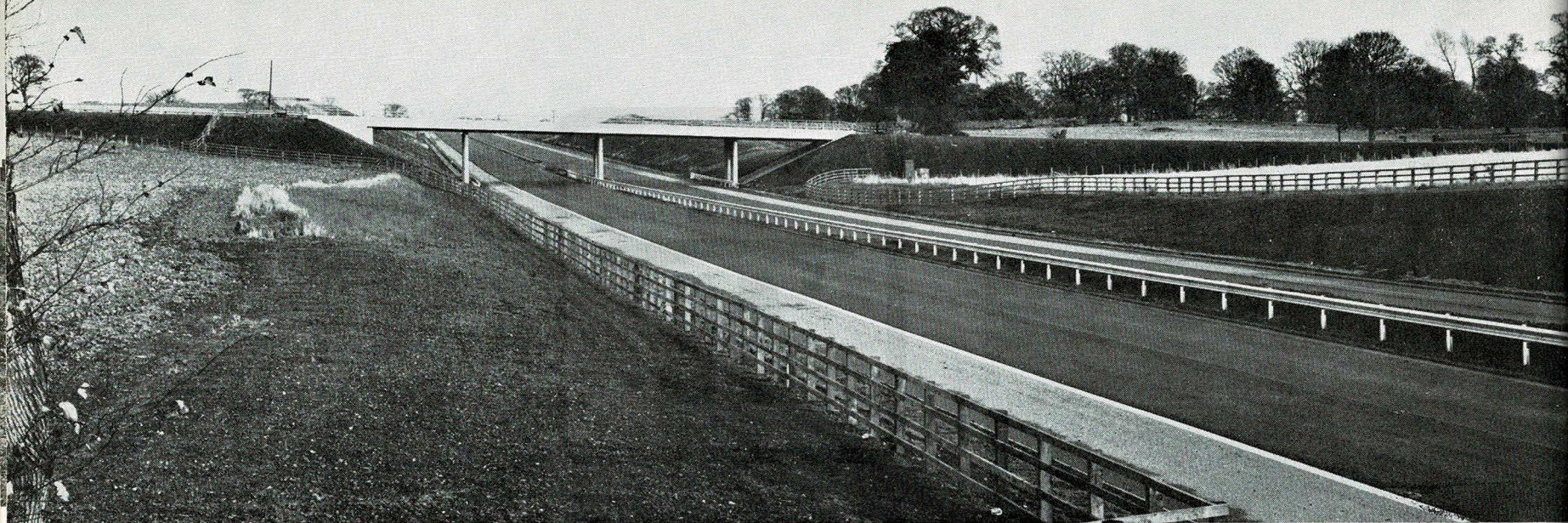
At peak periods plant valued at £1,000,000 has been in use on the contracts.



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Earthmoving plant included four 24 cu. yds. rubber-tyred tractor scrapers, five large tracked tractors with bowl scrapers, and up to seven additional bulldozers. Six hydraulic excavators have been used to deal with unsuitable material, loading into dump trucks of 10 cu. yds. capacity. Various kinds of rollers have been used for compaction, including smooth wheeled and vibrating tandem types. Self-propelled graders were used on the construction of haul roads and trimming of formation, and self-loading rubber-tyred scrapers were used for top soil work.

The lean-mix concrete was produced at a rate of 80 cu. yds. per hour from a portable batcher located at Burghmuir. It was placed by a self-propelled paver and compacted by a vibrating tandem roller.

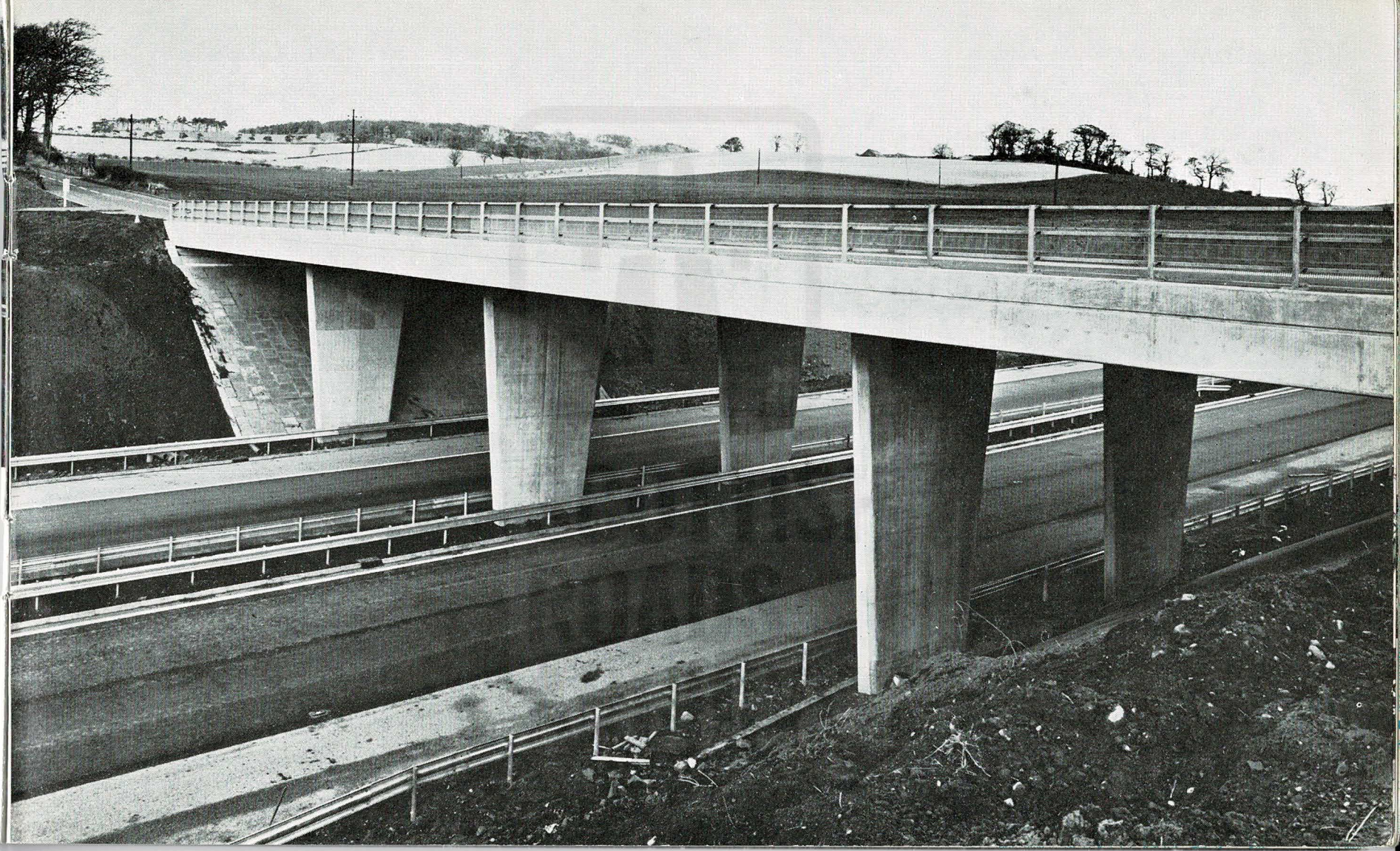


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In the design of bridges prime consideration was given to the development of a pleasing appearance by the use of good proportions, a high standard of finish and attention to simple detail, rather than by the use of expensive cosmetic claddings of little or no structural value. Economy of construction was also taken into account, with repetition of standard details wherever appropriate. This is shown in the illustration above of the four span continuous slab overbridge at Bonnytoun Road.

The variation in physical features between bridge sites prevents

the use of standardised designs, but where possible details have been repeated to give a sense of continuity from structure to structure. There is also a gradual development in the supporting piers of overbridges from the massive single cantilever pier of Hallyards Bridge near Newbridge (shown on page 2) to the slimmer piers of the four span overbridges, such as Loch House Bidge shown opposite. These lead towards the multiple columns adopted on the already open Polmont-Falkirk Bypass, thus striving for a sense of continuity in the whole Motorway.

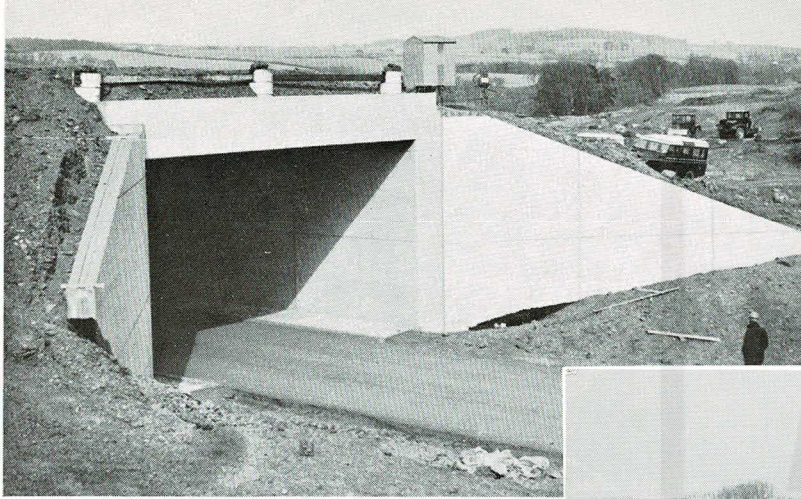




The structural forms of the bridges were chosen to suit their particular locations. Bonsyde Road Bridge, shown above, has a continuous reinforced concrete deck and exhibits the deck edge detail common to most bridges on the Motorway, but its columns are set in echelon to suit the considerable skew of the road underneath. The lesser structures along the Motorway include reinforced concrete portal type bridges, single span slab deck

bridges with cantilever or counterfort abutments, and reinforced concrete box culverts. One smaller bridge of considerable interest was the steel footbridge at Newbridge. The whole structure was designed, fabricated and erected in four months. The main span is 112 ft. 0 in. long and was lifted into place in one operation.

Three photographs taken during construction

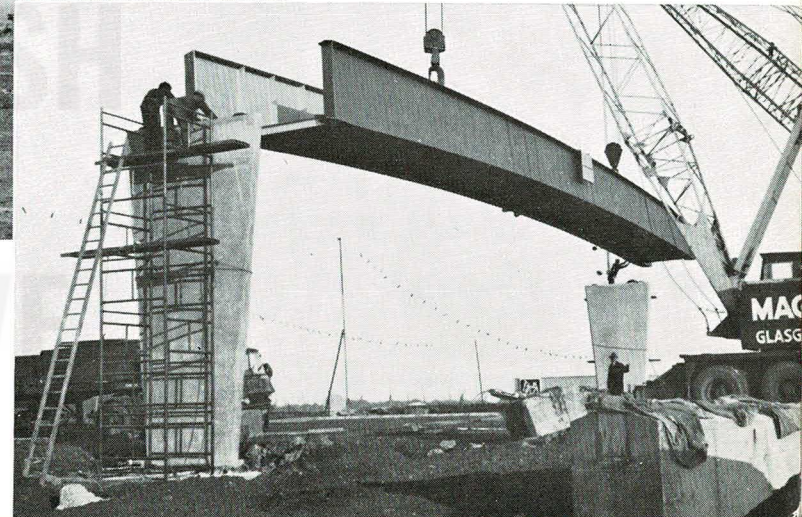


Sandyford Bridge—Reinforced Concrete
“ Box ” Design



Muriehall Bridge—Four span skew
bridge of composite construction

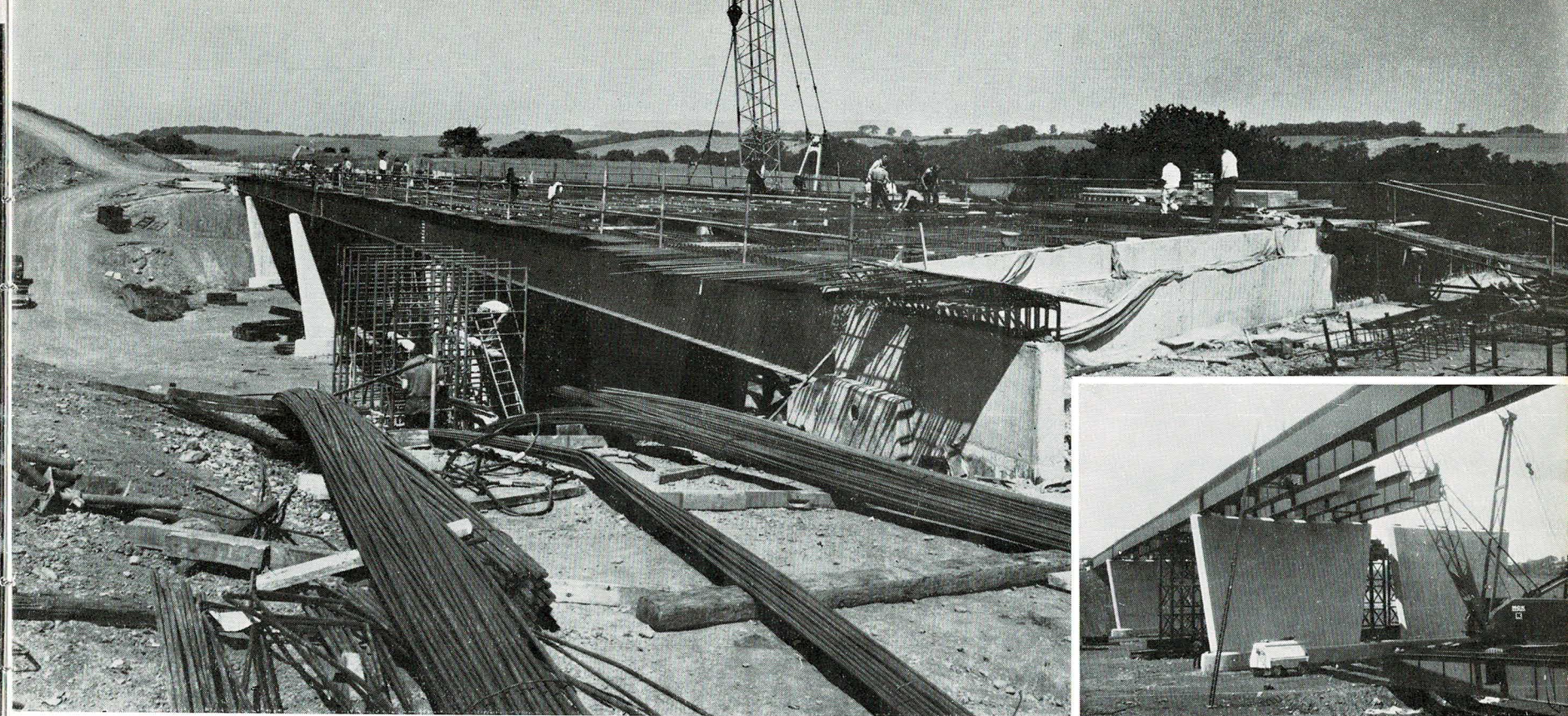
Newbridge Footbridge—Erection of main
span





Two bridges over the railway were built with single span pre-stressed concrete beam decks, resting on solid abutments of post-tensioned precast concrete blocks. This is a very rapid

method of construction causing little interference with train operations, and the erection clearances required are minimised.



On the Motorway there are five bridges of composite construction in which the concrete deck and steel girders act together as a single structural unit. The largest of these (and, indeed, the largest bridge on the Motorway) is that over the River Avon just

west of Linlithgow. It is 404 ft. long and 37 ft. above the river, and is in effect two bridges side by side, each carried on large piers repeating the design conception expressed in the other four bridges.

Mineral Workings

The shale oil industry, which left on the surface the large deposits of excellent road construction material in the form of "spent" shale, also left large underground cavities, some of which are at shallow depths. The existence of the old workings influenced the Motorway route location, and Messrs. J. W. H. Ross & Co., Mining Consultants, were appointed to advise on the problems arising from their presence.

In those places where the cavities are near to the surface there is a danger of sudden subsidence in the form of "plump holes", so the ground under the Motorway was consolidated by filling the voids with special grouts in such areas.

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TECHNICAL DETAILS
(MURIEHALL TO LATHALLAN)

ROADS

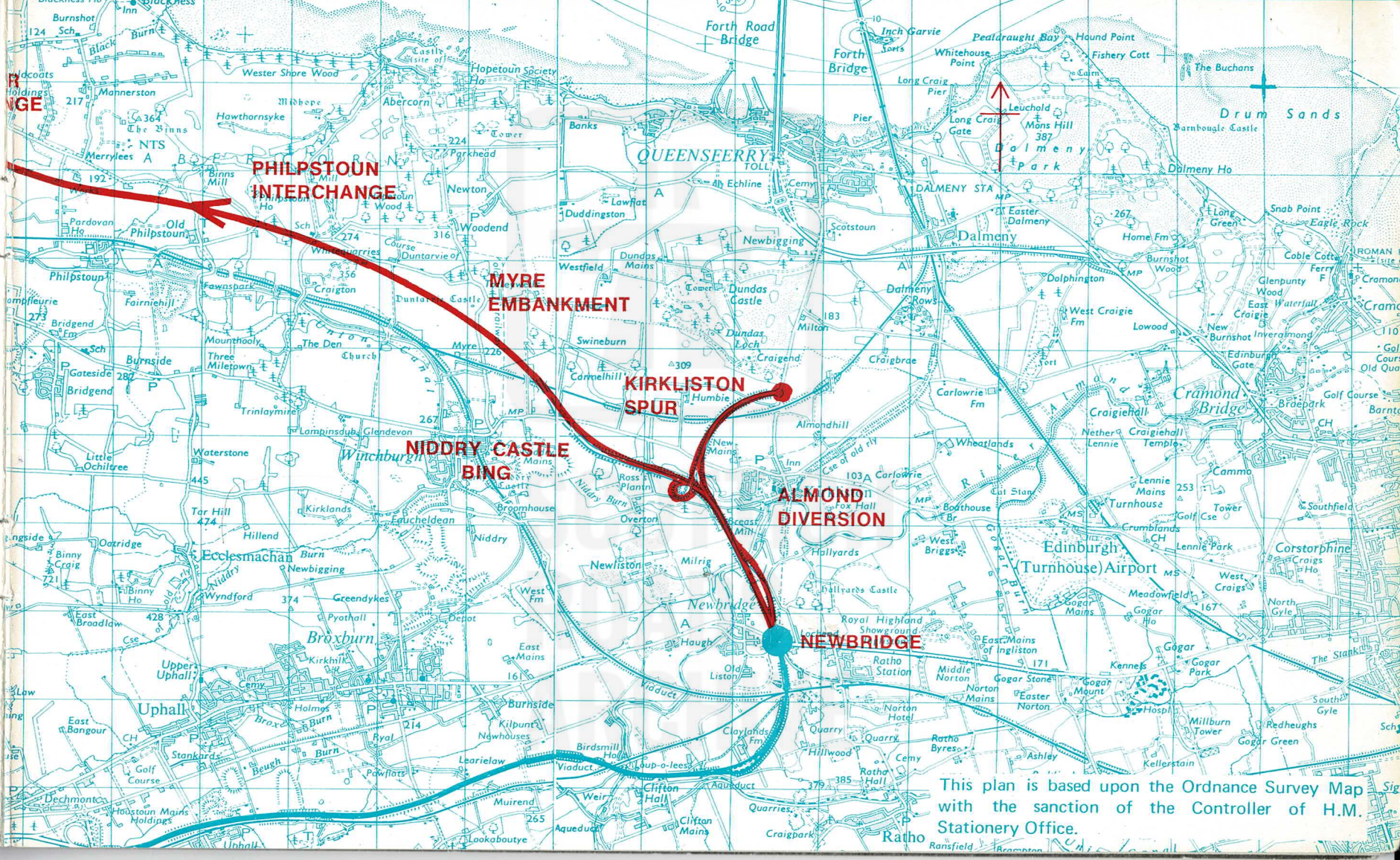
Length	10 miles
Design Speed	70 m.p.h.
Carriageway Dimensions	Two-lane Dual Carriageway with Hardshoulders 2 × 24' 0" Carriageways, 2 × 10' 6" Hardshoulders 2 × 8' 0" Verges 13' 0" Central Reserve
Minimum Radius of Curves	4,250 ft.
Pavement Construction	1½" Hot-Rolled Asphalt Wearing Course with ¾" Chippings on 2½" Hot-Rolled Asphalt Base Course on 3" Dense Bitumen Macadam } 10" Road Base on 7" Lean-Mix Concrete on 6" Type 1 Sub-base Material
Paved Area of Motorway	416,000 sq. yds.
Paved Area of Side Roads	35,000 sq. yds.
Earthworks	
Excavation	2,000,000 c. yds.
Imported fill	1,000,000 c. yds.
Topsoil	263,000 c. yds.
Fencing	27 miles
Guard Rail	7 miles
Drainage Pipes	35 miles

BRIDGES

- 6 Four-Span Reinforced Concrete Overbridges
- 8 Reinforced Concrete Underbridges including One Railway Bridge.
- 1 Composite Construction Bridge over River Avon. Total length 404 ft. ; height above the river 37 ft.

Total Length of Piling in Bridge Foundations	6 miles
Structural Concrete	21,000 c. yds.
Structural Steel	600 tons
Reinforcing Steel	2,500 tons

<i>Client</i>	Scottish Development Department
<i>Consulting Engineers</i>	W. A. Fairhurst & Partners, 43 George Street, Edinburgh EH2 2HT
<i>Resident Engineer</i>	F. J. Richardson
<i>Mining Consultants</i>	J. W. H. Ross & Co.
<i>Landscape Consultants</i>	Wm. Gillespie & Associates
<i>Materials Testing</i>	Messrs. Sandberg Solus Schall Limited
<i>Main Contractor</i>	Tarmac Construction Limited
<i>Project Manager</i>	R. J. Clements, C.Eng., M.A., F.I.C.E., M.Inst.H.E.
<i>Agent</i>	R. Campbell, C.Eng., M.I.C.E.
<i>Principal Sub-Contractors</i>	
Emergency Telephones	John Boyle Limited
Fencing	James Strang & Son (Contract 2) Donald Park (Contract 3)
Landscaping	Sportworks Limited
Parapet Railings	Barnet & Morton (Engineering) Limited
Piling	A. Johnson Construction Limited
Road Marking	Prismo Universal Limited
Soiling and Grassing	Gavin L. Hamilton (Contracts) Limited
Steelwork	The Cleveland Bridge & Engineering Company Limited
Surfacing	Limmer Roads Scotland (Contract 2) Amasco Roads Scotland (Contract 3)
Traffic Signs	L.M.S. Contractors Limited
<i>Contractor for Consolidation Work</i>	Cementation Ground Engineering Limited



PHILPSTOUN INTERCHANGE

MYRE EMBANKMENT

KIRKLISTON SPUR

ALMOND DIVERSION

NEWBRIDGE

This plan is based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.



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