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HIGHWAY PLAN FOR GLASGOW

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# 10 Year Plan

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Phase 2 1972-76

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10 YEAR PLAN

PHASE 2 1972-76







## INTRODUCTION

In 'Roads in the Glasgow Area' under the heading 'Glasgow Today' mention is made of the integrated transportation plan dealing with Public Transport and parking in addition to the development of a network of motorways and expressways, the greater portion of which lie within the boundaries of the City of Glasgow.

In 1965 Glasgow Corporation adopted a 'Highway Plan for Glasgow' which set out the network required based upon predictions made for traffic development in the Glasgow area up to 1990 and beyond: This plan was incorporated into the Greater Glasgow Transportation Study 'Forecast and Plan' in 1968, which is now being implemented. The plan is being fulfilled in five-year stages, taking cognisance of the fact that it must be dynamic, liable to change as change in trends are observed, and subject to policy review but with commitment far enough ahead to enable adequate control and planning. Each stage is, in turn, further reduced to projects each of which must be justified within itself and give immediate benefits. The plan is thus self-perpetuating and each stage can be integrated into the existing street system with maximum relief.

The first major stage of the implementation of the Highways aspect of the over-all plan is presently under way in the form of a 10 year programme terminating in 1976. At this moment the first five-year phase has been completed with the opening of the North and West Flanks of the Inner Ring and the Clyde Tunnel and Approaches. The second phase is under way with the Clydeside Expressway open to traffic and work started on the first stage of the Monkland Motorway and Great Western Road Expressway. Renfrew Motorway—Stages 1 and 2 and advanced contracts for Monkland Motorway—Stage 2 will commence construction during 1973. Monkland Motorway—Stage 2, Townhead Interchange—Stage 2 and Ayr Motorway—Stage 1 will commence in 1974.

More detailed reference will be made later to these works in progress together with other projects scheduled for the period under review.

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*Monkland Motorway: Looking west towards the city from above Hogganfield Loch, Cumbernauld Road Interchange is seen in the middle distance. The road beyond passes between the districts of Riddrie and Blackhill/Provanmill to cross this line of the Stirling Motorway on Provan Viaduct. In this view the interim connections to existing streets are shown but these will eventually be replaced by the ramps connecting the Monkland Motorway to the Stirling and East Link Motorways. From the viaduct the route skirts the north edge of Alexandra Park and crosses the Glasgow (Queen Street) to Springburn electrified railway lines before joining the Inner Ring Road in Townhead Interchange.*

### CHANGES IN DAILY TRAFFIC FLOWS ON RIVER CROSSINGS

Year	Stage	Clyde Tunnel	Kingston Bridge (West flank of I.R.R.)	George V Bridge	Glasgow Bridge	Victoria Bridge	Albert Bridge	Total Traffic
1963	Before opening of Clyde Tunnel ... ..	—	—	41,350	26,800	26,000	26,000	120,150
1965	After opening of Clyde Tunnel and central area one way system ... ..	28,400	—	31,000	32,850	24,100	27,300	143,650
1970	Before opening of Kingston Bridge ... ..	43,500	—	32,900	29,000	23,700	22,300	151,400
1970	After opening of Kingston Bridge ... ..	40,500	31,400	20,000	22,900	22,000	21,750	158,550
1971	Before opening of North and West Flanks of Inner Ring Motorway ... ..	41,600	39,700	19,500	20,600	22,200	20,600	164,200
1972	After opening of North and West Flanks of Inner Ring Motorway ... ..	40,700	57,200	19,000	20,800	21,400	20,200	179,300
1973	After pedestrianisation of central area streets ... ..	42,000	66,000	19,000	18,800	20,700	19,800	185,300



The second phase of the current 10 year plan which called for the construction of the first two radial motorways—the Monkland and the Renfrew—will achieve the prime object of providing an east–west route of continuous capacity across the city, reducing the volume of traffic in the city centre, providing access to it and giving relief to existing radial routes.

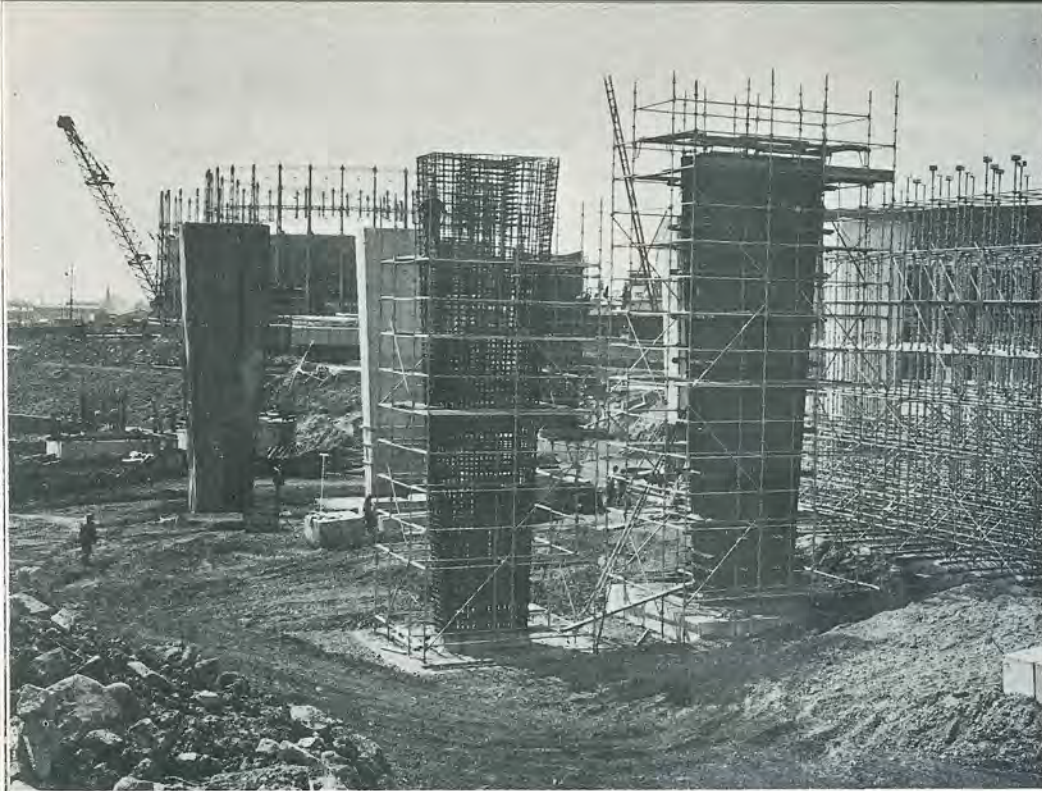
Reference has been made to the changing nature of the plan and this is illustrated by bringing forward projects into Phase 2 which were scheduled for later phases; namely Townhead Interchange Stage 2, the Crow Road/Bearsden Road Expressway and the Ayr Motorway Stage 1.

The Principle of seeking short, medium and long range benefits from each individual contract can be seen acting on the Clyde Bridges when additional river crossings were provided in the city centre. As a preliminary to the plan proper, The Clyde Tunnel connecting Whiteinch and Govan was opened in 1963 with almost immediate benefit to the upstream bridges. This improvement was further increased by the construction of the Kingston Bridge as can be seen from the traffic flow figures in the table shown opposite.

Other benefits have been obtained. Traffic now flows more freely in the central area of the city than it did 10 years ago despite the rising number of vehicles on the road, e.g. Traffic into the city centre over the old bridges has dropped to 70-75% of the 1963 figure whereas total cross-river traffic has increased by 50% in the same period. Pedestrian precincts with the attendant benefits to shoppers and traders alike which were part of the original plan have now been implemented. There are many reasons for such improvements but it is felt that it is justifiable to claim that the development of the motorway system is an essential part of the transportation plan and that the part completed to date has derived many essential benefits for the whole community which will increase in value as the plan continues to progress.



*Great Western Road*



### **Monkland Motorway**

The existence of the Monkland Canal—a branch of the Forth and Clyde Canal—provided a natural line for a motorway from the interchange of the M.73, A.80, and A.889 to connect into the Urban Motorway system. This canal had, for over a century, formed a natural boundary to areas and districts in the east part of the city and this in turn eases the problems, frequently created by Urban Motorways, when communities are bisected by a new line of severance.

To make available the solum of the canal for motorway construction it was necessary to pipe the canal from the city boundary to the Pinkston Basin. The twin pipes installed are capable of transmitting fourteen M.G.D. i.e. at least 100% reserve capacity, and the flow of water for various industrial purposes to the western reaches of the Forth and Clyde Canal has been maintained. Within the city this motorway will be constructed in two stages.

Stage 1—Townhead Interchange (Inner Ring Road), to Cumbernauld Road (A.80).

Stage 2—Cumbernauld Road to the City Boundary at Easterhouse.

A short section between the City Boundary and Baillieston Interchange will require to be constructed to complete the Monkland Motorway. It is the Secretary of State's intention that this part will be constructed in phase with Stage 2 above and he has appointed Messrs. Babbie, Shaw and Morton as Consulting Engineers.



## Monkland Motorway—Stage 1

Engineering Design and Supervision—Office of Public Works, Glasgow.

Consulting Landscape Architects—William Holford and Assoc. (Glasgow).

This Contract provides for the construction of a four-lane dual carriageway to motorway standard between the Inner Ring Road at Townhead Interchange and the A.80 (Cumbernauld Road at Gartloch Road). The length of the section is approximately 3.1 kilometres with 1750 metres of associated ramp connections to surface streets. The cost of the civil work is £5.313m. (total cost including land estimated to be £6.589m.) and is being carried out by Costain Civil Engineering Ltd.

Three grade separated interchanges will link the motorway with the existing and proposed surface streets as follows.

- (i) Blochairn Link Road on the western side of Glasgow Fruit Market.
- (ii) Provan Road just east of Alexandra Park; and
- (iii) Cumbernauld Road at the eastern end of the contract.

At the Blochairn Interchange the Motorway will be carried over the new Blochairn Link Road and the Glasgow (Queen Street) to Springburn electrified railway line on two bridges each of three spans. It has been necessary to arrange for the necessary track possessions with British Rail to allow the construction of these bridges. Ramp connections are to be constructed to Blochairn Link Road for traffic travelling eastwards on the motorway and from Blochairn Link Road for traffic requiring to travel westwards.

At Provan Interchange the motorway is carried on two viaduct structures at an elevation suitable for a future motorway-to-motorway connection. The north structure carries the eastbound carriageway on nine spans and the south structure carries the westbound carriageway on eight spans. Ramp connections are to be constructed to give access to, and exit from the motorway in both directions.

At Cumbernauld Road the existing roadway is to be reconstructed between Provanmill Road and Tay Crescent to form a dual carriageway road which will be carried over the motorway on two four-span bridges.

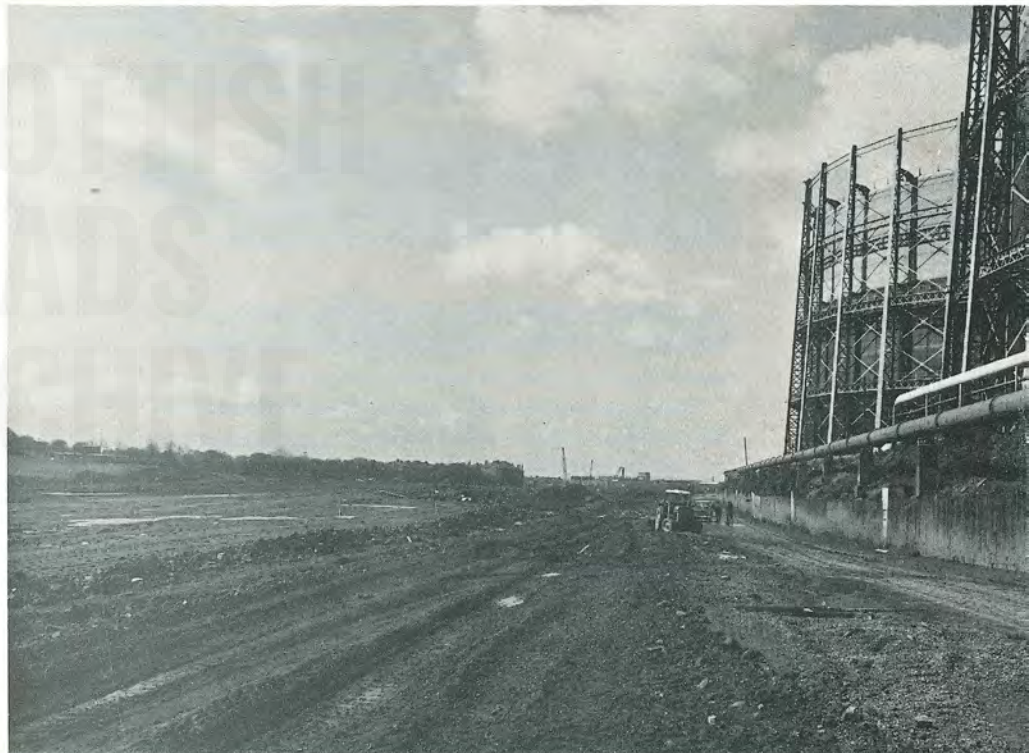
Ramp connections will give access to Cumbernauld Road for eastbound traffic and allow westbound traffic to join the motorway. Work on diversions, reconstruction and new construction of services are included in the contract with the contractor having the responsibilities of co-ordinating the activities of the Public Utility Undertakers who will carry out the diversions of their own apparatus.

Work on British Rail property includes demolition of two sections of the tunnel at Blochairn Road Interchange, 32 metres being demolished on the north side and 42 metres on the south side.





*Blochairn: New portal at south end of railway tunnel.*



*Embankment on west side of Provan Viaduct, looking towards the city.*

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Permanent facilities for pedestrians include the construction of underpasses at Alexandra Parade and under Cumbernauld Road, three footbridges over the motorway and two footbridges over ramp connections at Blochairn Interchange all with associated footpath and ramps.

In addition to these principal works the contract includes:

- (a) Realignment of Alexandra Parade between Wishart Street and Castle Street;
- (b) The construction of a single span bridge to carry a future realignment of Castle Street.
- (c) The construction of Blochairn Link Road to connect Blochairn Road with the motorway and provide access to the Fruit Market from the west; and
- (d) the construction of a new road, called Market Link Road, along the south side of Provan Gasworks, to give access to the Fruit Market from the east.

Provan Interchange will eventually be a motorway-to-motorway interchange but in the contract now in progress the motorway eastbound and westbound ramps are to be connected to existing surface streets, these interim connections being dispensed with when the Stirling and East Link Motorways are constructed.

The natural ground conditions underlying the area traversed by the motorway are generally glacially derived sandy, silty clays, with gravel resting on glacial boulder clay. Deposits of laminated silty clay were encountered in some boreholes indicating the former existence of a small loch but the relatively small area should not affect the roadworks to any degree.

Over the length of the route areas of fill material have been encountered, generally granular in nature being ash and slag fill. On the site of the former Blochairn Iron Works large slag lumps have proved a minor problem.

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## Monkland Motorway—Stage 2

Engineering Design and Supervision—Office of Public Works, Glasgow.

Consulting Landscape Architect—William Holford and Assoc. (Glasgow).

This contract will require the construction of a three-lane dual carriageway to motorway standards from end of construction of Stage 1 at Cumbernauld Road to the City Boundary beyond Easterhouse. The estimated cost of the work is approx. £15.6m. The link up with Baillieston Interchange (approximately 1,000 metres beyond the boundary) will be effected by a separate contract prepared by Messrs. Babbie, Shaw and Morton for the Scottish Development Department but phased to be completed at the same time as the portion of the route within the city.

Work on Stage 2 has reached the final design stage in the Office of Public Works and tender documents will be ready for issue by mid-1974.



Within the city there will be 5.8 kilometres of dual carriageway and grade separated interchanges will be provided as follows:

- (1) Cumbernauld Road Interchange will be completed to provide a full directional interchange between Cumbernauld Road (A.80) and the motorway in the form of a three-quarter diamond and a quarter clover leaf.
- (2) Fully directional interchange facilities will also be provided at Stepps Road in the same geometric pattern as at Cumbernauld Road.
- (3) At Westerhouse Road the pattern is varied by providing a half diamond plus half clover leaf; and
- (4) at Easterhouse Road only a half diamond on the west side is planned.

All bridge works are over the motorway, the principle structures being:

- (1) Gartcraig Road—a three-span single carriageway (open abutment on south side).
- (2) Stepps Road—a four-span dual carriageway carried on twin bridges (open abutments).
- (3) Westerhouse Road—a two-span dual carriageway carried on twin bridges.
- (4) Wardie Road—a two-span single carriageway bridge.
- (5) Easterhouse Road—a four-span dual carriageway carried on twin structures.

(Note : The above interchanges and structures are planned but in the case of Easterhouse Road the ramps may be added at a later date.)

Ground conditions in this section are considerably more difficult than in Stage 1. The principle difficulties are:

- (1) There has been considerable mineral extraction in the area in the past and further coal working is likely.
- (2) Over a length of 2,000 metres in the Stepps Road/Westerhouse Road area the motorway passes over a bed of peat of considerable thickness (up to 7 metres) which will have to be removed. This problem is compounded by adjacent unstable slopes.

In the case of the mineral workings the problem resolves itself into two parts:

- (a) Dealing with existing conditions i.e. treatment of past workings and mineshafts.
- (b) making provision for future workings.

It has been decided that a preliminary contract should be carried out to consolidate the workings as within the area of influence of the motorway 16 old shafts are known to exist. When rock head is accessible a reinforced concrete raft with adequate bearing will be constructed, but if rock head is at an inaccessible level the existing fill will be investigated and, if suitable, a 'stopper' created by grout injection below and above rock head. If the shaft is unsuitable for this treatment other techniques will be employed, e.g. collapsing shaft and refilling.

Shallow workings will be investigated, and treated, either by exposing and hand packing or grouting.

The possibility of future mineral working creates a number of problems relating to both structural and motorway design. Over the greater part of the section allowance will have to be made for settlement up to 800mm causing maximum strain of 0.15% and producing gradients of up to 0.33%.

Road construction must be of a suitable flexible design which will allow for subsequent repair and drainage arrangements will have to be able to accommodate these factors. Structures will be designed to be three dimensionally statically determinate.

The problem of the peat is being dealt with, in a separate contract in advance of main construction, by removing the peat over the motorway width for the length of approximately 1200 metres and replacing it with rock fill. Consideration was also given to other possible solutions but they were discarded for economic or practical reasons, e.g. a scheme to construct a piled table top was discarded because of the possibility of further mining subsidence.

The slope on the south side of the motorway adjacent to Queenslie Industrial Estate was judged to be (marginally) unstable. This was catered for by moving the line of the motorway 15 metres to the north and by the method of excavation and replacement of peat. This method requires the peat to be removed by drag line with the infill following very closely behind to ensure that only a very narrow band of excavation is open at any time, thus ensuring that if a slip does occur at the edge of excavation it will be local in nature. This contingency is further protected against by excavating under water since the bulk density of the peat is less than 2% above water density. It is estimated that 320,000 cubic metres of peat will be removed in this fashion.

The remainder of the peat, which is generally of less depth, will be removed during the main construction contract.

Surface water from the motorway will be disposed of at three major outfalls. The largest is the Baillieston Stormwater Sewer which is currently nearing completion and to which a connection will be made in Easterhouse Road area. It will deal with all surface water east of Craigend. A second outfall, west of Stepps Road will handle drainage between Gartcraig and Craigend by connecting to the existing Lightburn Sewer, this outfall will also cater for drainage from the North Link Motorway at a later stage in the over-all plan. The Carntyne Burn Sewer will accept the greater portion of the drainage in the section west of Gartcraig.

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## **Renfrew Motorway**

This motorway, the west limb of the through route, will extend from the south end of the Kingston Bridge to the City boundary at Shieldhall Road, where it will connect to the M.8 Motorway.

In the case of the Monkland Motorway a 'natural' route existed in the solum of the Monkland Canal—no such route exists for the Renfrew Motorway.

Between the bridge and the area west of Cornwall Street the problem is somewhat reduced as the route passes through areas due for comprehensive redevelopment although even in this section the existence of industrial enterprises creates controls.



From the bridge to the Plantation Park area the motorway consists of four multi-lane carriageways which are braided with the carriageways of the Ayr Motorway in the Plantation Park Interchange. Ayr Motorway Stage 1 will probably be constructed as a continuation of Renfrew Motorway Stage 1 Contract. The reasons for this are that:

- (1) overloading on surface streets and ramps on the south-west approaches to the Renfrew Motorway may occur should access from Dumbreck Road, provided by the Ayr Motorway, not be available.
- (2) Traffic to/from the south end of the Kingston Bridge can be canalised early with consequent improvement to safety.

Beyond the redevelopment area the motorway passes through playing fields which are being replaced temporarily, but immediately, pending their permanent replacement in the over-all landscaping of the area.

The route then crosses the main Glasgow/Paisley Railway Line and follows the south side of the track through Dumbreck, across the corner of Bellahouston Park, through the site of the old White City Stadium until it recrosses the railway near Craigton Park. It then follows the north side of the railway to Cardonald Interchange where it connects with the south approaches to the Clyde Tunnel. The final section between this interchange and the City boundary is across open fields.

This route has much more impact on the area it passes through than in the case of the Monkland Motorway but advantage has been taken where possible of redevelopment and the natural severance line of the railway. In all areas extensive and detailed landscaping will be carried out to mould the motorway into the existing landscape and shield the neighbouring properties as far as possible from the sound and sight of traffic.

The motorway will be constructed in two stages.

Stage 1:— Kingston Bridge to Helen Street.

Stage 2:— Helen Street to the City boundary at Shieldhall Road.

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### **Renfrew Motorway—Stage 1**

Engineering Design and Supervision: Scott Wilson Kirkpatrick & Company, (Scotland).

Consulting Landscape Architects: William Holford & Associates, (Glasgow)

Renfrew Motorway Stage 1 consists of approximately 1.85 kilometres of motorway comprising four multi-lane carriageways between the south end of the Kingston Bridge and the Plantation Park Interchange, and beyond that approximately 1.35 kilometres of motorway comprising dual multi-lane carriageways to Helen Street.

The major interchange is the connection with the Ayr Motorway, whose dual three-lane carriageways are connected to the Renfrew Motorway by four directional ramps, each with hardshoulders. These merging with the Renfrew Motorway form the four carriageway section and provide access to the Inner Ring Road via the Kingston Bridge or surface streets via the half diamond at Seaward Street and the temporary connections to Paisley Road and Cook Street. Provision is made for connection to the proposed South Flank of the Inner Ring Road. The anticipated traffic flows in this section in 1980 and 1990 are 125,000 and 150,000 vpd. West of the Plantation Park Interchange there is a half diamond intersection between Dumbreck Road and the east, and a full diamond interchange at Helen Street provided to draw traffic from the surface streets into the motorway, thereby giving relief to the residential areas.



Between Kingston Bridge and the main Glasgow/Paisley Railway Line the motorway is founded on the water bearing alluvial deposits of the Clyde River Valley overlying rock at up to 25 metres deep. This makes it necessary to pile all structures, and in the cutting near the Plantation Park Interchange to lower the water table, and consolidate the existing ground before constructing the road pavement. West of the Railway the motorway is constructed in boulder clay overlying rock, which occurs approximately at formation level. The major cut in this area contains a quantity of silty sands and soft clay which will be used as earth mouldings on this or adjacent motorway sites and also material from old mine workings which, it is anticipated, will be suitable for embankments.

It has not been possible to drain the motorway into the existing drainage systems and, therefore, a new 1.65 diameter outfall sewer has been constructed from the motorway to the River Clyde under an advance contract. This sewer is being constructed in open trench and also in tunnel with the use of compressed air. The surface water drainage system for the motorway has been designed on the basis of a one-year storm, but to minimise the possibility of flooding in the cuttings, certain sections of sewer including the outfall section have been designed on a five-year storm basis.

A flexible road pavement will be constructed using an asphalt wearing course.

The structures are as follows:—

*Helen Street.* This bridge carrying Helen Street over the motorway in two spans is constructed of precast M beams on reinforced concrete closed abutments founded on rock.

*Paisley Road.* This bridge carrying Paisley Road over the Motorway has a skew of 56° and consists of two independent four span continuous prestressed concrete spine beam boxes on reinforced concrete piers founded on rock.

*Dumbreck Road.* This bridge carrying Dumbreck Road over the motorway consists of a continuous four span reinforced concrete deck with service bays to carry substantial water and gas mains on reinforced concrete piers founded on rock.

*Bellahouston and Gower Street Bridges.* These carry the motorway over the electrified Glasgow/Paisley Railway Line. They consist of precast M beams on reinforced concrete closed abutments connected to form a portal frame. The footings are on boulder clay or shale.

*Plantation Park Interchange Ramp Bridges.* These bridges consist of multi-span continuous prestressed concrete spine beam boxes on reinforced concrete piers. The concrete footings are piled using large diameter bored piles.

*Scotland Street Viaduct.* This structure spans the railway line, two roads and the Glasgow Corporation Transport Department's underground railway. The underground railway here is very shallow and would not have withstood the loading of an embankment. The structure consists of prestressed concrete, boxed, of a tabletop and suspended span construction. The footings are piled using steel H piles and precast concrete piles.

*Footbridges.* There are five footbridges constructed of reinforced and prestressed concrete elements which have been designed to provide repetitive construction.

Old mine workings exist under the site of Bellahouston and Paisley Road Bridges and it will be necessary to consolidate them by injecting grout before construction commences.

Service diversions are primarily confined to the west end of the project, but consist of large diameter water and gas mains as well as two 132 kv electricity cables in oil filled pipes.

The motorway will be lit by high mast lighting throughout its length using masts up to 40 m high and signed by internally illuminated gantry signs fitted with motorsign units.

The total cost of Civil Engineering work is £13.275m. and is being carried out by Balfour Beatty Construction (Scotland) Ltd.

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## **Renfrew Motorway—Stage 2**

Engineering Design and Supervision—W. A. Fairhurst and Partners.

Consulting Landscape Architects—William Holford and Assoc. (Glasgow).

Work on the construction of this stage of the motorway system is scheduled to commence in late 1973 and is planned to be complete and the motorway opened to traffic in the autumn of 1976.

The stage is approximately 3.43 km. long and includes an interchange with the Clyde Tunnel South Approaches. The cost of the civil works is £11.834m. and is being carried out by Leonard Fairclough Ltd.

Dual 3 lane carriageways to urban motorway standard extend from the end of construction of Stage 1 of the Renfrew Motorway at Helen Street to the Cardonald Interchange with the Clyde Tunnel Approaches and dual 4 lane carriageways continue westwards to link up with the existing M8 (Renfrew By-Pass) immediately east of the existing Hillington Road Interchange. The urban motorway speed restriction of 50 m.p.h. will apply east of, and including, the Cardonald Interchange, west of the interchange the speed restriction will be 70 m.p.h.

The ground conditions over the length of this stage are generally of silty sand and soft clays, overlying rock to depths ranging from 7 metres to 30 metres. Structures will be supported on piled foundations. Earthworks are for the most part embankments, notably at the west end of the stage, and approximately 1,000,000 cu.m. of imported fill will be required. Substantial settlements are expected due to the strata below ground level. Embankments will be built at the beginning of the contract to allow major movement to take place and sand drains and surcharged banks will be formed to promote early settlement. Piling operations, foundations, drainage and road construction will be deferred until late in the contract period.

Flexible road construction has been specified.







Several major structures are required on this stage of motorway:

- (i) Craigton Road Railway Tunnel; where the motorway crosses the Glasgow to Paisley electrified railway line at a 70° skew. The 175 m. long deck is formed of precast concrete M beams of 22 m. span set on piled abutments which can be of precast concrete blocks or in situ concrete construction. A pedestrian underpass and service ducts are set below the general deck level. Construction of this tunnel is subject to severe restrictions to maintain railway traffic at all times.
- (ii) Cardonald Interchange with the Clyde Tunnel and provision for the South Link Motorway—five bridges and a temporary road bridge over the electrified railway line.

The bridges required comprise:

- (a) Berryknowes Road—single 20 m. span in situ reinforced concrete voided slab bridge over slip road off west bound carriageway to Clyde Tunnel approach road. Provision is made for pedestrians and for public services including a 900 mm. water main.
  - (b) Berryknowes Road Viaduct—3 span continuous post-tensioned cellular box construction (33.3, 33.4, 24.3 m.) carries Berryknowes Road 7.9 m. wide over the motorway with provision for pedestrians and public services. A temporary road bridge must be built to maintain Berryknowes Road traffic over the railway line during construction of the permanent bridge works.
  - (c) Clyde Tunnel Approaches Bridge—5 spans (10, 22, 18, 18, 10 m.) the end spans of in situ concrete, centre spans precast, pre-stressed beams, carries the tunnel approach road over the motorway.
  - (d) Ramp A footbridge—a 33 m. single span reinforced concrete bridge between landscaped embankments over motorway slip road.
  - (e) Footbridge over railway—a multi-span structure in reinforced concrete except for precast, pretensioned box beams over railway. Spans North to South 12, 15, 21 (over railway), 15, 12, 10, 10, 10, 10, 10 m.
- (iii) Cardonald Park vehicular and pedestrian underpass—11 m. wide reinforced concrete box to maintain access to the extensive playing fields.
  - (iv) Woyka Viaduct. Two separate bridges each of 9 spans to carry the motorway carriageways over an existing timber yard, railway line and surface road. Designed with 10 m. in situ concrete end spans and 7 No. 20 m. spans of precast concrete M beams to ensure speedy construction and minimise compensation costs.
  - (v) King George V Bridge—to carry the motorway over existing railway lines. This skewed 3 span structure (12, 35, 12 m.) with in situ concrete end spans has centre span cantilevers to carry 26 m. precast concrete box beams to meet railway requirements for minimal interference with traffic.

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*Renfrew Motorway: This aerial view looks east from above the Craigton district. In the upper right can be seen the 'braided' section of Renfrew Stage 1 and its interchange with the Ayr Motorway. In the middle distance it passes under Dumbreck Road and Paisley Road West crossing the corner of Bellahouston Park between the two bridges. Stage 1 terminates at Helen Street, in the foreground, where the ultimate arrangement, a full diamond interchange, is shown.*



## **Ayr Motorway—Stage 1**

It is planned to start construction of the first stage of the Ayr Motorway in June, 1974 as a follow on to the construction of Renfrew Motorway Stage 1.

Dual three-lane carriageways will be provided from the proposed half diamond connection with Dumbreck Road to Plantation Park Interchange with the Renfrew Motorway, a distance of approximately 1.4 Km.

The principal bridges to be constructed consist of two structures carrying surface streets over this motorway and two motorway bridges carrying the motorway over a surface street and a railway line.

The area through which the Motorway passes has been the subject of heavy mineral workings in the past and some stabilisation may be necessary.

The total cost is estimated to be £5.06m.

## **Great Western Road Expressway—Stages 1 and 2**

Engineering Design and Supervision: Office of Public Works, Glasgow

Consulting Landscape Architects: William Holford & Associates, Glasgow.

Great Western Road forms one of the main radial routes, A82, leading north-west from the recently formed part of the Inner Ring Road.

To carry the predicted increase in traffic flow, up to 30,000 vehicles per day, the existing single carriageway, 40 feet wide, will be converted to dual two-lane carriageway formation over a total length of about two miles in two stages. Existing footpaths alongside the existing carriageway will be utilised to accommodate the widened carriageway formations and central reserve. Pedestrians will then be catered for on the footpaths of existing parallel service roads. Combined with a traffic management scheme of side street closures, additional traffic lanes will be provided at the main traffic light controlled junctions where there will be pedestrian segregation.

Stage 1, between Shelley Road and Kersland Street has boulevard characteristics and, being frontaged mainly by listed Victorian terrace buildings and part of the Botanic Gardens, forms a most attractive approach to the City. The improvements now proceeding at an estimated cost of £1,994,000 include the provision of four pedestrian underpasses. By suitable landscaping it is intended to conserve the outstanding amenities which are a feature of the road. The work is expected to be completed by the end of 1974.

Stage 2, south-eastward to this Inner Ring Road is planned for the period 1974/75 at an estimated cost of £1,856,000 and will include the provision of three pedestrian overbridges and three pedestrian underpasses.

## **Stirling Motorway**

It is hoped to commence construction of this section of the Urban Motorways System in mid-1975, which will form the portion of the M80 Motorway within the City, connecting to Monkland Motorway at Provan Interchange.

Engineering design and supervision will be by the Office of Public Works where work is currently at the project planning stage.

Public participation exercises involving all the relevant Corporation Departments have recently been held to help ascertain the final alignment of the Motorway from all environmental and engineering aspects.



## Crow Road—Bearsden Road Expressway

Engineering Design and Supervision: Messrs. Crouch & Hogg.

Consulting Landscape Architects: William Holford & Associates, Glasgow.

The Crow Road—Bearsden Road Expressway is 2.1 km. in length which when complete will act as the main north-south link road joining the Clydeside Expressway and Clyde Tunnel in the south to the Lomond Motorway and residential districts in the north.



The expressway will have dual two-lane carriageways with a major interchange at Anniesland Cross comprising a grade-separated roundabout with the expressway depressed beneath. A series of ramps will link the main carriageways to the roundabout and the surface roundabout will cater for the intersection of Great Western Road to the east and west and Anniesland Road.

Over the length of Crow Road the expressway will have a landscaped strip on both sides along its length and the existing Crow Road will be retained as a service road to cater for the local traffic only. This will substantially reduce the amount of through traffic within the surrounding residential areas.

The major considerations from a civil engineering aspect are the obstructions caused by two main electrified rail lines at Jordanhill and the Forth and Clyde Canal at Temple. These problems will be overcome by the construction of two new railway overbridges for the former and a reinforced concrete bridge at the Canal.

The major interchange will consist of a roundabout at Anniesland Cross at about existing ground level with the expressway constructed in cut and cover throughout its passage beneath. This will allow an open landscaped area to be developed within the central portion of the roundabout, and five underpasses giving access to this central area will allow pedestrians free movement through the interchange completely segregated from traffic. Further grade separation of pedestrians is achieved with three pedestrian overbridges across the expressway.

The project is scheduled for commencement in Autumn 1974 and the estimated cost is £5.02m.

*Crow Road, south of Anniesland Cross*



## The Motorway in the Environment

'A Highway Plan for Glasgow' sets out the future strategic highway plan for the City. These proposals were broadly confirmed by the Greater Glasgow Transport Study and subsequently the tactical study for the first 10 years saw the realisation of the proposals.

The study suggested that a future programme should incorporate the same basic design principles so as to ensure the best acceptable solution for the physical imposition of the new scale of vehicular movement on the existing and future urban form.

The tactical study further concluded that two important aspects of urban motorway routes should be seriously considered at the design stage and which are; the effect on the area through which it passes as seen by the pedestrian, and its relationship to the general urban structure as seen by the motorway driver.

By integrating the motorway structure into its surroundings it is possible to achieve harmony for those who must live and work in its vicinity; also by integration with the general urban form an internal harmony can be achieved which can act as a stimulus for the motorway driver. Subsequently a broad planning strategy was formulated in depth throughout the motorway corridors in order to pursue the above principles.

The scale of urban motorways being so vast and directionally powerful means that they cannot be considered secondary to their surroundings and this makes it imperative to give careful thought to their siting in relation to the existing urban structure as well as those areas subject to renewal within the redevelopment programme.

Due to technological developments within the building industry, and the ever increasing demand for more space, the next twenty years may see a more rapid turnover of building development than that at any other time in its history. A planning framework was therefore required which would allow for a changing urban pattern, yet contain restraints which could conserve a basic civic design policy at the City scale. It was felt that could be best achieved by the treatment of the areas of ground between the motorway and adjoining developments as a flexible pattern of open spaces.

The extent of the proposed open space pattern requires that careful consideration be given to the nature and extent of adjoining land uses. Where the motorway route had been located through parks, golf courses or woodland, the visual rhythm was used to present the City not as an amorphous built up mass, but as a complex, yet orderly series of inter-related spaces and buildings; this, it was felt could permit sufficient expression within the design for each community development or identifying landmark.

The introduction of this open space pattern as part of the planning policy for the highways could reconcile the greatly differing function, form and scale of the motorways to the areas through which they were aligned, and would achieve the aim of external harmony. The scale of this landscape setting provided an opportunity of being not merely to provide landscaping but it was hoped would make a positive contribution to the working and living conditions in the adjoining urban environment.

In the detailed study of the Monkland and Renfrew Motorways, it was decided to prescribe two important lines. That of the construction line and the landscape boundary line. These lines resulted from a detailed land use study throughout the corridor and included much more land than was physically necessary to construct the motorway.

In both motorways an excess of 'cut' material would result during the construction and the principles referred to above were beneficial on two counts:

- (i) That with an extensive construction line it was possible to accommodate all the excess material on site with a saving in construction costs.
- (ii) With the suitable upgrading of this land, an opportunity to increase the open space pattern throughout the route presented itself to the ultimate benefit of the adjoining land uses.

In both quadrants of the City the development plan revealed that the areas alongside the Monkland and Renfrew Motorways alignment were deficient in open space.

The Monkland Motorway particularly being aligned on the solum of the disused Monkland Canal, provides a greater scope to produce a landscape/land use solution for this important motorway, due to the past land use definition resulting from the canal alignment.

On a large area of reclaimed quarry adjoining Stage 2 of the Monkland Motorway it is proposed to provide a 'Tree Bank' for future use by the City Parks Department in order that they can provide sufficient plant material for tree planting throughout the Motorway and Redevelopment programme.

In the case of Renfrew Motorway, the urban form consists of well established industrial uses as well as medium life tenement property. Much of these areas are the subject of redevelopment in the long term City programme, and when a future land use has been determined it will be possible to provide a degree of open space consistent with the scale and form of the new buildings alongside the Motorway within these basic planning principles.

Excess 'cut' material in Stage 1 of the Renfrew Motorway unsuitable for motorway construction will be deposited to pre-arranged levels on existing open space in Stage 2 of the project. This will eventually provide a comprehensive open space which will be jointly used for recreational purposes between the Education Department and the Parks.

Along the lines of both motorways, considerable open space will be provided for recreational purposes as well as provide additional playing fields to supplement school land. The resultant open space pattern envisages both 'passive' and recreational open space use linked by pedestrian access from the adjoining established land uses.

The tree planting programme envisages a close knit planting form from a suitable ecological group which gives immediate foliage cover during the initial stages of its life and has the advantage of providing the additional material, partly matured providing further material to strengthen the planting pattern, within the principles of good husbandry and forestry practice.