

August 1969

JAM McCafferty

JAMES P. McCAFFERTY.

Assistant Under Agreement.

Scott Wilson Kirkpatrick & Partners.

6 Park Circus,

Glasgow.

REPORT ON TRAINING AND EXPERIENCE.

Having spent my school days at St. Ninian's High, in Kirkintilloch, where an interest in Geology and a natural inclination towards the Mathematical and Scientific subjects led me to choose Civil Engineering as a career, I went up to the University of Strathclyde to commence my formal training and education in Civil Engineering. On completion of the four year course, in 1967, I was awarded the Degree of B.Sc. (2nd Class Honours upper division).

In July 1967 I joined S.W.K.P. as an assistant Under Agreement in the Glasgow Office, under the general control of Mr. R. Hodgen and later under Mr. M. Johnston. Initially I was posted to the Structures Section with Mr. B. McKenna, and later with Mr. C. Ford as head of Section.

My first assignment on joining the Structures Section was to produce influence lines for Bending Moment, Shear and Thrust for the piers and pier heads of Bridges 11 & 12 of the G.I.R.R. Woodside 2 Contract. *

In September, 1967 I was instructed to redesign a panel of Retaining Wall for the Woodside 1 Contract. It had been discovered during construction that no allowance had been made in the design for a large diameter sewer which was to pass through the wall. The problem was further complicated by the existence of an old sewer below footing level which could not be broken out until the flow had been diverted into the new sewer already mentioned. The old sewer was to be protected by Sheet Piling during construction and being skew to the line of the wall this necessitated a rather complex steel arrangement in the wall footing to allow for staging during construction. *

Mr. B. McKenna, in October 1967 instructed me to take over the design of Bridge 9 for the G.I.R.R. Woodside 11 Contract.

Bridge 9 (value approx. £90,000) is of reinforced concrete Beam and Slab construction. Approximately 150 ft. long it is continuous over a central column line and is supported by Abutment A - a bank seating and Abutment C - cantilever type. The Bridge is to carry the Eastbound Carriageway of the Glasgow Inner Ring Road over Ramp H, which connects the Westbound Carriageway to the Proposed Maryhill Motorway.

The Bridge is of Varying skew ranging from 60° at Abutment C to 51.5° at Column line B and 40.5° at Abutment A. In plan the Bridge is on a transition curve and in elevation follows a parabolic crest curve. The main span over Ramp H is approximately 100 ft. the shorter span being approximately 50 ft. The travelled way consists of two 12 ft. lanes with/

a 2 ft. marginal strip and a 10 ft. hard shoulder. The Bridge was designed for H.A. loading and 45 units of H.B. loading in accordance with B.S.153 part 3A (1954).

The Design of the Deck was in an advanced state when I took over, consequently my first step was to check the work which had already been done and then to extend the Deck calculations and Design the Substructure.

The Deck was analysed using the I.B.M. 'Stress' programme. From the computer analysis distribution factors for H.B. moments were derived and values for Torsion in all members and Bending Moments, Shears and reactions in transverse members were derived. The computer analysis was used since the skew of the Bridge was outwith the range of normal design techniques (e.g. Rows analysis). In addition simple hand calculations were done as a check on the computer output.

Secondary slab moments due to H.B. loading were derived from Westergaards analysis and from Pijchers 'Influence Surfaces of Elastic Plates.'

The configuration of the Deck and the large steel areas required made steel detailing a most awesome task. In fact I feel that the preliminary design on which the structural depths and beam widths of the Bridge are based, must have underestimated the stresses realised in the final design. Abutment A, a bank seating on large diameter bored R.C. piles supports the deck on three sliding bearings. The piles were designed using the I.C.T. programme 'The Analysis of Structural Piling Systems'.

The three columns pinned at the top and fixed at the bottom were designed using Savilles Analysis. The Column footings rest on large diameter bored R.C. piles which were designed on the assumption that they were pinned top and bottom.

Abutment C was designed as a simple cantilever wall bearing directly on to rock and supporting the bridge on (5) 'fixed' type bearings.

On completion of work on Bridge 9 I was instructed to Design and prepare Contract Drawings for the West Abutments of Bridges 11 & 12 of the Woodside 2 Contract plus about 100 ft. of associated retaining wall.

The design of these abutments was similar to that for Abutment C of Bridge 9 and no serious problems arose during design.

In November 1968 I was transferred to the Roads Section of the Glasgow Office under the control of Mr. J.M. Breakey and Mr. W.C. Dougall. Initially I took over the setting out of the main survey stations for/

the Woodside 2 Contract.

On completion of the survey work I spent a few weeks preparing grade sheets and completing work on Contract Drawings for the Woodside 2 Contract. Early in 1969 I started work on the 1/500 Graphic Layout for the Renfrew Motorway Stage 1 Contract. This connects the Renfrew By-Pass Motorway to the Southern approaches of the Kingston Bridge on the West flank of the Inner Ring Road.

This work has proved to be an excellent introduction to Highway Engineering.

There are numerous Horizontal geometry control points, due to the existence of industrial and residential areas which are to be preserved. The Vertical Alignment is also affected by the existence of Glasgow Corporations Underground Railway, a large diameter sewer and the decision ^{at} of the planing stage to have the motorway in cut over various stages to preserve amenity and environment. I have been involved in this project during various stages including preparation of the 1/1250 plan and profile of the complex bradied section at the Junction of the Ayr Motorway, drawing up the 1/500 plan and profile of the whole Stage 1 Contract and preparing and costing various alternative schemes to satisfy the claims of the various owners whose land or property may be affected by the proposed works. The capital cost of the road works is expected to be about £2.5 m. *

In March 1969 the emphasis on work changed to Brandon Street By-Pass Motherwell. Although a small contract (Capital value approximately £0.4 m) I have found the work most interesting since I have been involved in all the design stages. I drew up the 1/1250 plan and profile and carried out a levelling survey of the area. Later several alternative schemes for the road layout were examined and finally the 1/500 graphic plan and profile were produced. I have also been involved in cost estimates and the preparation of the Draft Bill of Quantities for this job. The final road line incorporates one carriageway of the future Motherwell - Wishaw Expressway with connections to the existing road network.

Recently I finished work on the calculated Horizontal Geometry and the Geometric Drawing is now complete. In addition, I have, on the instruction of Mr. C.R. Ford, (Structures) been supervising the ground investigation contract for this job, the Contractors being G.K.N. Foundations Limited.

In the past two years spent with S.W.K.P. I have detected no obvious attempt to provide graduates with an organised training scheme in the basics of Practical Civil Engineering. Any organised training scheme which may exist must do its work so subtly as to be hardly discerable./ *

I have, however, been given the opportunity to tackle a number of interesting and exacting tasks and I have been entrusted with a large degree of responsibility. In carrying out this work I have been given able guidance and assistance from my superiors. I feel that these last two years have given me the chance to work on Major Civil Engineering Works and I have been given the opportunity to educate myself. Consequently I have found this period most interesting and enjoyable and I look forward to an interesting period of work when I am transferred to site on September 1st 1969, to work on the G.I.R.R. Woodside 2 Contract. *

MEMORANDUM

691/JMcC/JN

9th July, 1969.

To: Miss M. Preston

From: J.P. McCafferty

Experience as Assistant Under Agreement

Please find attached a copy of my Record of Experience as an Assistant Under Agreement during the period 24th July, 1967 to 24th July, 1969.

J.P. McCafferty.

Record of Experience with Scott Wilson Kirkpatrick & Ptns.
24th July, 1967 to 24th July, 1969

NAME:- James P. McCafferty

Dates		Section & Type of Work	Contract
from	to		
24th July, 1967	31st Oct. 1968	<u>Bridges Section</u> Structural Design & Contract Drgs. for:- Deck & Substructure of a skew Bridge, Abutments, Retaining Walls	G.I.R.R. Woodside 2
1st Nov. 1968	24th July 1969	<u>Roads Section</u> Preliminary Graphic Design Horizontal & Vertical Geometry Calcs. Contract Drgs. Preparation of Bills of Quantities.	G.I.R.R. Renfrew Motorway Stage 1. Brandon Street By- -pass Motherwell
		Supervision of Ground Investigation Contract.	Brandon Street Bypass Motherwell

RESUME OF QUALIFICATIONS AND EXPERIENCE

Qualifications:-

B.Sc. Honours (Upper 2nd) Strathclyde.

Graduated June 1967.

Graduate Member Institution Of Civil Engineers (A.M.I.C.E.)

Associate Member Institution Of Highway Engineers.

Experience:-

Dates		Company/ Position.	Experience.
From	To		
Summer 1965.		Babtie Shaw & Morton, Glasgow, Student Site Engineer.	Kirkintilloch Main Drainage & Sewage Works. On Site. Setting out. Preparation of Record Drawings etc.
Summer 1966.		Clyde River Purification Board, Glasgow, Student Engineer.	Surveying, levelling. Hydrographic surveywork. Site Supervision of Construction of River gauging stations.
July 1967.	August 1969.	Scott, Wilson, Kirkpatrick & Partners, 6 Park Circus, Glasgow C.3. Assistant Under Agreement July 1967 - July 1968 Assistant Engineer July 1969.	<u>July 1967 - August 1968.</u> <u>Structural Design</u> Woodside 2 Contract. Design of Abutments, Retaining Walls and Foundations. Design of R.C. Skew Bridge. <u>August 1968 - August 1969</u> <u>Highways Design</u> Woodside 2 Contract Renfrew Motorway. Motherwell. Brandon Street By-Pass. <u>General</u> Setting out of Main Survey Stations Woodside 2. Site Supervision Site Investigation Brandon Street By-Pass Motherwell.