VINCENT COUNTY:

CLUTHA RIVER BRIDGE - (LOWBURN)-REINFORCED CONCRETE:

Length 400 ft - roadway 10'6" - spans 8/47', 2/12', Plan No. 973

(2 sheets).

SCHEDULE OF QUANTITIES & COST:

The quantities given are the nett quantities required and shall be adopted for tendering and the contract price adjusted at schedule rates if they are later found to be materially incorrect. Excess quantities, if required, shall be allowed for in the unit rate; but contractors shall add to the schedule, giving details, any items considered to be omitted and shew price of same.

Item	Description of work	Unit	Qty	Unit Rate	£	s	d
1.	Reinforced concrete piles 1:1½:3	lin ft	1375				
2.	Concrete piers, spans, abutments 1:2:4	cuyds	507				
3.	Concrete handrail, posts, and panels 1:1½:3	cuyds	32				
4.	Reinforcement (not including piles)	cwt.	686				
5.	Pile shoes, expansion plates and ironwork	lbs	3000				
6.	Embankment etc	cuyds	4064				
7.	Bituminous covering Roadway	sq yds	35				
8.	Shingle on roadway	cuyds	176				
	Total for bridge without test piles						
9.	Providing and driving three test piles	lin ft	100				
10.	Providing and driving three additional test piles	" "	100				
	Total for driving 6 test piles						

shall be fully competent and qualified for their particular work.

(a) Cement shall be Portland Cement of approved make, conforming to B. S. Specification for Portland Cement (No. 12, 1931). Quick setting cement shall not be used and rapid hardening only with the Engineer's consent and to his approval. All cement shall be stored at the site in a weather and damp-proof shed of ample size to which the engineer or his appointee shall have access. The contractor shall inform the engineer fully as to orders placed, so that tests may if necessary be made at the works, but in spite of these/any found proving satisfactory defective at the works shall be condemned and destroyed or at once removed from the works. The engineer shall, if required, be given such full information as will enable him fully to check the quantities of cement ordered, received, on hand, or used, any labour necessary for this to be provided.

(b) Water shall be clean water free from injurious vegetable, organic or alkali matter and means for measuring and fixing the quantity used per batch shall be provided.

(c) Aggregate shall be a mixture as required of coarse and fine materials consisting of sound hard gravel or crushed rock and of sand, all free from deleterious coatings or other materials of any kind which might, in the engineer's opinion, adversely affect the strength of the concrete, all to be stacked and stored so as to be kept clean.

Before commencement the engineer shall be furnished with a sample of the materials proposed for use and advised as to the source of supply and, if approved, equally good quality shall be maintained for all the aggregate required. Unless specially agreed the gravel and sand shall be separated by screening out and proportioned before mixing concrete.

(d) Gravel or Crushed Rock shall be a mixture of stones of various sizes ranging from those passing a sieve having a square mesh 1 inch in the clear to those retained on one having a square mesh 1/4" in the the clear, with a predominance of from 3/4" to 1/4".

(e) Sand shall be a mixture of grains ranging from coarse to fine and of sizes such that all shall pass through a sieve having/a square mesh 1/4" in the clear; 75% through one 1/8" clear (No. 5 B.S. mesh sieve); 10%

at least, but not more than 20%, through one made of No. 36 S.W.G. wire and having a square mesh 1/84 inch clear (No. 52 B.S. mesh sieve). Not more than 2% of the fines shall be removeable by decantation.

(f) Concrete shall be composed of Portland Cement, gravel or crushed rock, sand, and water, all mixed and proportioned as directed below. The nominal proportions to be used for the different parts of the work shall be as stated hereunder, the quantities of gravel, sand, cement, and water to be measured separately by weight, or volume, taking 94 lbs cement as one cubic foot and measuring the water in Imperial gallons. Tests shall be made during the course of the work, to ascertain the shrinkage and the best proportions, and the nominal proportions of sand and gravel varied, if necessary, and without change of price, as directed by the engineer to obtain the most satisfactory results and the required strength. The quantity of water shall be fixed by the Engineer from slump tests and shall not be varied without his consent. Generally it shall be the minimum yielding the required workability. The means adopted for measuring and weighing shall be such as will ensure easily obtainable and correct results to the engineer's full approval.

Section of Work	Nominal Proportions Cement:Sand:Gravel	Cement per compacted yard of concrete
Piles	1 : 1½ : 3	746 lbs (= 6 bags)
Handrail panels & Posts	1 : 1½ : 3	746 " (= 6 ")
All other work	1 : 2 : 4	592 " (= 4¾ ")

Tests of the strength will be made as the work proceeds and as the engineer directs, all labour and materials involved to be supplied by the contractor, but the costs otherwise to be borne by the principal. Any work proved defective may be condemned.

(g) Mixing Concrete. All concrete shall be uniformly mixed in an approved power driven batch mixer run at the maker's rated speed for at least 25 revolutions after all the materials and the water have been placed in it. The mixer shall be kept clean and the whole of the contents removed before another batch is made. Before recommencing after stoppage of work sufficient additional mortar shall be first introduced to coat the interior.

(h) Deposit of Concrete. All concrete shall be deposited as soon as possible after mixing and none shall be placed after the initial set has occurred; neither shall it be placed in water without special approval, nor when the temperature is below 35^{0}, nor when any conditions may result in damage to the concrete.

Concrete shall be placed in horizontal layers not more than 12" thick unless otherwise approved, and so as to bond with and cause no damage to the preceding layer and before initial set in this. Concreting once started shall continue without break till the portion in hand is completed or so as to ensure joints only in approved positions which will not affect the final strength.

In placing, segregation of materials and displacement of reinforcement shall be avoided and the drop shall in no case exceed 5 feet. Suitable tools shall be used to ensure the expulsion of air, and the concrete filling solidly round and coating the reinforcement, and a good smooth surface free from coarse aggregate on the parts of the work which will remain exposed, any defects to be made good as the engineer may direct.

Where new concrete is placed on concrete already set, the surface of the old work shall be hacked up, scrubbed with a stiff steel brush and washed till quite clean and then coated immediately before placing the new concrete with a 1/2" layer of fresh mortar composed of 1 cement to 2 sand.

Where chutes are employed these shall be to approval and metal lined and furnished, where steep, with baffles or arranged to reverse the direction of movement. Chutes shall be kept clean and regularly flushed, the water used to be discharged clear of the work.

(i) Joints in Concrete shall be avoided so far as reasonably possible. They shall be either horizontal or vertical, except in arch work where they shall be radial. In all cases they shall be in approved positions.

In beams they shall be made at the centre of spans and in slabs either at the centre or the end. Where beams and slabs are concreted at different times a horizontal joint shall be left in the beam 1" below the fillet between beam and slab.

(j) Forms shall be supported on falsework of strength and type such as to avoid any material deflection or chance of movement and these supports shall not be removed without the engineers consent.

The forms shall be to the engineer's approval and may be timber or metal and the same general requirements shall apply to each.

When constructed of timber they shall have dressed surfaces against the concrete, and shall be thoroughly stiff and of sufficient thickness and so supported braced and stayed as to prevent distortion when filled. Their joints shall at all times be watertight and all sharp edges chamfered and sharp corners filletted not less than ¾" and where curved so constructed and faced as to ensure a true smooth finish. Where below water level they shall be tight against inflow. Their interiors shall be such that when the forms are removed the concrete shall present a smooth true surface and no work defective in this respect will be accepted without repair to the engineer's satisfaction.

Their construction shall be such that removal will be easy and not attended by any damage to the concrete, the sides for beams to be removeable before the bottoms.

All forms shall be set correctly to line and level and so maintained, and immediately before commencing any work they shall be cleared of all dirt or refuse and means of ensuring this shall be provided.

Their interiors shall before concrete is placed, be soaked with water and coated with approved material to prevent adherence or discolouration but such coating shall be kept clear of the reinforcement. Where forms are used a second time their surfaces shall be thoroughly cleaned.

Where metal ties are required these shall be such that they can be subsequently removed to a depth of 2 inches below the surface without damage, and this shall be done and/the surface ~~to be~~ repaired by plastering without adversely affecting the appearance.

The time for the removal of forms shall be to the engineer's approval and shall depend on circumstances. For ordinary standard cement the following shall generally apply:- Bottom of beams, 28 days; side of beams, 7 days; bottom of slabs, 14 days, and generally

for all other work from 7 to 14 days. In removing care shall be taken that the concrete takes stresses due to its own weight gradually and uniformly.

(k) Reinforcement shall be plain round mild steel rods in accordance with British Standard specification for "steel for bridges".

It shall be protected from damage after arrival at the site and when placed in position shall be free from paint, grease, dirt, loose mill and rust, scale or anything adversely affecting a good bond.

Rods shall be of the required length without welding and shall be accurately bent without damage to the shape and furnished with hooked ends as shewn, all sharp bends to be avoided.

They shall be correctly placed as required by the plans and securely fastened and held in this position by blocks, hangers, ties or other approved means so that no displacement can occur and the full cover is maintained when the concrete is poured and rammed. Blocks shall be of precast mortar of approved size and tie wire shall be soft black not lighter than No. 18 S.W.G.

6. PIERS:

The piers shall be of the types shewn on the drawings.

The piles shall be made perfectly straight, of reinforced concrete, as shewn, the rods at the shoe end to butt squarely on the shoe point and to be securely bound to the helical winding which shall, if possible, be in one length for each pile or otherwise overlapped one complete turn at the joint. The length of the pile at every 5 feet starting at 10 feet from the point shall be inscribed on the pile in Roman figures 3" long by 1/4 inch deep before the concrete sets and also the date of manufacture.

Piles shall mature for at least one month before handling and two months before driving unless rapid hardening cement is used when the respective periods may, subject to approval, be reduced to five days and ten days.

Piles shall be driven truly in the position shewn on the drawings as pulling or wedging after or during driving will not be permitted. Any piles damaged in driving or materially out of place

shall be withdrawn and replaced with new piles at the contractor's expense.

Piles shall be driven to at least the depth shewn, the driving to be done with a 4 ton gravity operated monkey or by other approved equally efficient means, with maximum drop of 6 ft. the head of the pile to be protected by steel helmet and wooden dolly and the final set not to exceed one foot with the last 16 blows of the 4 ton monkey falling freely 6 feet. Should any pile drive more freely than this the engineer may order the contractor to lengthen it, payment for the additional length to be at schedule rates plus £3 for each joint, the contractor to proceed with other work whilst the joint is setting.

The engineer may, however, call on the contractor to make six piles in advance of the others using rapid hardneing cement and to drive these at selected points to serve as test piles, and, depending on the results, he may order an adjustment in the lengths of the other piles, the contractor to be compensated for any loss on account of wastage of steel, and the amount payable under the contract for piles to be adjusted at schedule rates.

A record shall be kept by the contractor/of the dates of driving and general particulars of all the piles driven. This shall shew the number of blows and height of drop taken to drive the last two feet. The driving of the last foot shall be done in the presence of the engineer or his representative.

After the piles are driven the concrete, including the core, shall be cut away so as to incorporate the reinforcement into the piers and these shall be carried up in the manner and to the level indicated on the drawings and thoroughly bonded into the superstructure.

7. ABUTMENTS:

The abutments shall be built as shewn on the plans and shall have the end and bottom clearances indicated between them and the bridge.

Where they stand on embankment this shall be filled as soon as possible after the contract is let, to a level 2 feet above the base of the abutment, and trimmed off to the correct level when the concrete work is undertaken. The filling shall be of approved material which will readily solidify, placed in layers 12 inches deep and thoroughly

consolidated by ramming or rolling at the time and again before concrete is laid which shall not be done till the bridge is approaching completion. The filling to make up the roadway inside the abutment walls shall be similarly placed and thoroughly consolidated to approval after the concreting is completed.

8. SUPERSTRUCTURE:

~~Full details of the superstructure and the required levels are~~

Instead of bitumen coating the deck, its surface shall be of concrete and the slab thickened for this purpose to the dimensions shewn on the amended drawings. But the engineer may demand that the road surface be bitumen coated as specified over the full width for a length of 9 feet extending from each end of the concrete deck and an item for this work shall be included in the schedule.

rendered inconspicuous, shall be provided through the posts and kerbing to deck level at each pier. The panels shall be precast and made by a vibratory process, with a smooth and true surface and set in as shewn.

Drainage and expansion shall be provided for as indicated.

9. APPROACHES:

The contractor shall clear to ground level all trees and hedges on the site or the approach banks and remove and re-erect any fences that may be interfered with as directed by the Engineer.

The approach banks shall have side slopes of 1-1/2 to 1 and shall be 24 ft wide for 20 feet from the bridge, thence drawing in to 16 feet,/in the next 20 feet, and continuing 16 feet wide to the point of connection with the existing roadway. They shall be built of material obtained at points approved by the engineer and the top 9 inches shall consist of gravel suitable for road surfacing. The toe of the bank at the abutments shall be protected, as indicated, with netted (No. 8 wire) boulder gabions. The bank shall be consolidated and trimmed off as necessary before gravel is laid and special attention shall be given its consolidation at the abutments as specified above. The work shall be done so as to cause the minimum of interference with existing traffic and the methods adopted and materials used shall all be to the engineer's approval.

10. BRIDGE SURFACE:

The contractor shall provide on the top of the concrete forming the bridge deck and for 9 feet beyond each end, and extending from kerb to kerb, but so as not to interfere with drainage holes, a 1-1/2" thick bituminous-concrete surface course (fine aggregate type), made either with pure bitumen in conformity with the Main Highways Board specification for such work; or with approved bitumen emulsion in general conformity with the maker's specification, but so as to meet with the Highways Board's requirements and the approval of the Engineer.

After this coating is laid and satisfactorily completed, it shall receive a sealing coat of bitumen uniformly applied to approval at the rate of one quarter of an Imperial gallon per square yard and then immediately covered with 3/8" gravel or chips and well rolled.

In making up his schedule of prices the contractor shall assume that no test piles will be driven, but shall shew at the foot of the schedule an item quoting the cost of driving six test piles. If this course is followed, this item will be payable, but if the piles are made use of in the structure, the total price of same will be adjusted accordingly by reducing at schedule rates the item for piles. The Engineer will decide whether piles are to be driven and will instruct the contractor as to their length, position, and the number required.

contract.

12. TIME FOR COMPLETION:

All the work shall be completed within 10 months from the date of acceptance and an amount of £6 per week shall be forfeited by way of liquidated damages and will be deductible from payments due for each weeks delay in completion beyond that time.

13. TIME FOR MAINTENANCE:

The works shall be maintained for three months to the satisfaction of the Engineer after he has passed them as completed.

14. TENDERS & CONDITIONS:

Tenders will close with the County Engineer, Vincent County Council, Clyde, on the date advertised and shall be for a lump sum but

accompanied by a detailed schedule conforming to that attached shewing quantities, itemised schedule unit cost rates, and how the total is computed. For this purpose the quantities given on the attached schedule shall be adopted, but if any items of work are considered to have been omitted they shall be added in detail and included in his price by the contractor. If the quantities given are afterwards found to be materially incorrect and/or alterations are made involving changes the contract price will be adjusted accordingly either way, by the Engineer in accordance with the schedule rates.

A deposit of 2-1/2% of the contract price is required with the tender, also the names of two persons, to be approved before the tender is accepted, prepared to act as bondsmen in a bond amounting to 10% of the tendered price for the due observance and completion of the contract.

Payments will be made on the following scale subject to the Engineer's certificate:

Monthly - 75% of the value of the work completed.
50% of the value of materials on hand and paid for and made over to the County, reducible as these are incorporated in the work.
50% of the value of plant on the work and paid for and made over to the County, and extinguishable within the term of the contract by regular monthly deductions from monies ~~and~~ due under the contract.
25% and return of deposit when the engineer certifies the work is completed and no liens have to be met.
5% on the engineer certifying that the maintenance has been satisfactorily completed.

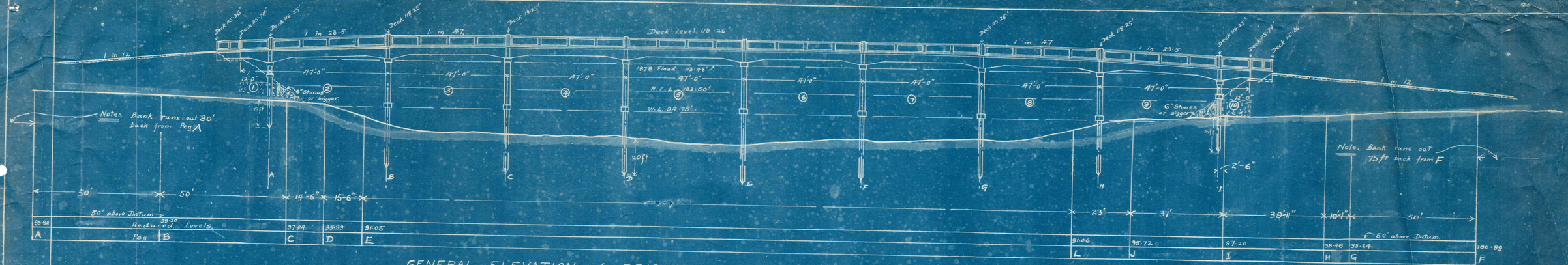
The contractor shall insure himself and his employees in accordance with statutory requirements and shall produce the policy when the contract is signed or whenever demanded.

The general conditions of contract are those adopted and used by the Vincent County and which may be seen at the County office.

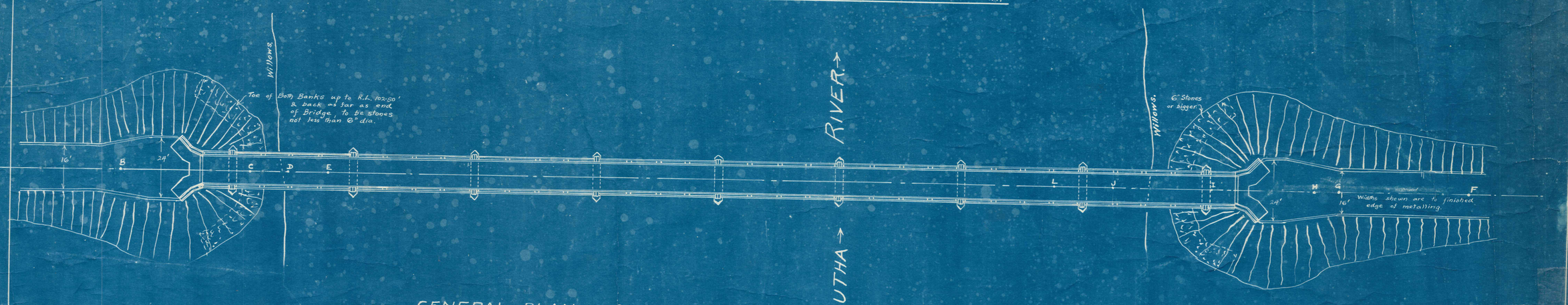
No tender need necessarily be accepted. A copy of the schedule will if required be supplied by the County Engineer.

Vickerman & Lancaster,
Consulting Engineers,
P. O. Box 920,
WELLINGTON:

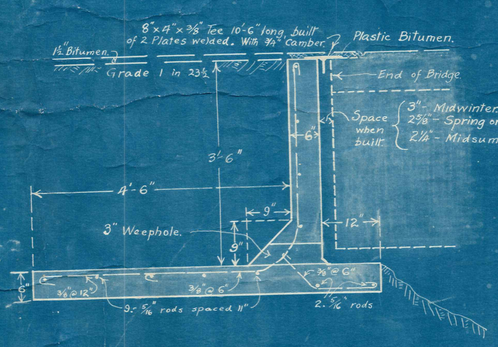
30th August 1935.



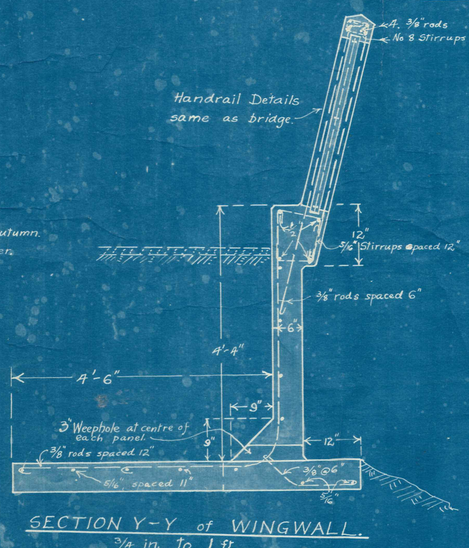
GENERAL ELEVATION of BRIDGE & SECTION of SITE. 20 ft to 1 inch.



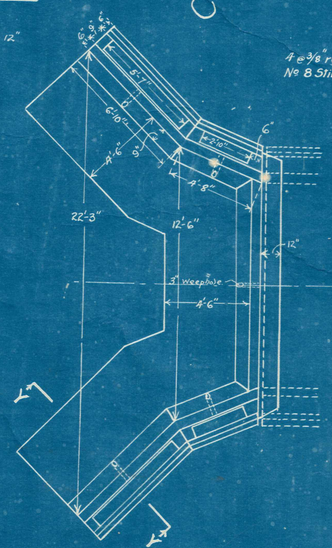
GENERAL PLAN. 20 ft to 1 inch.



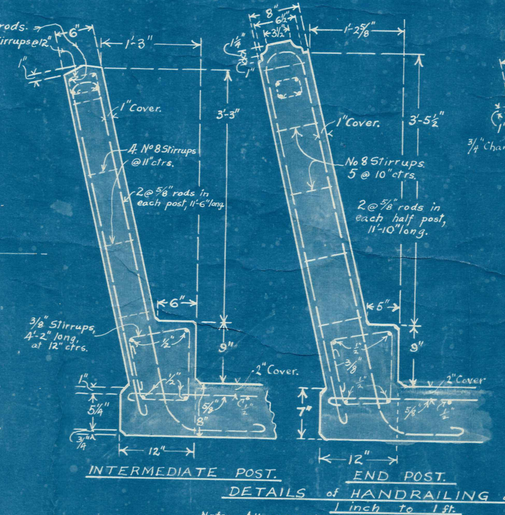
SECTION on C/L ABUTMENT.
¾ in. to 1 ft.



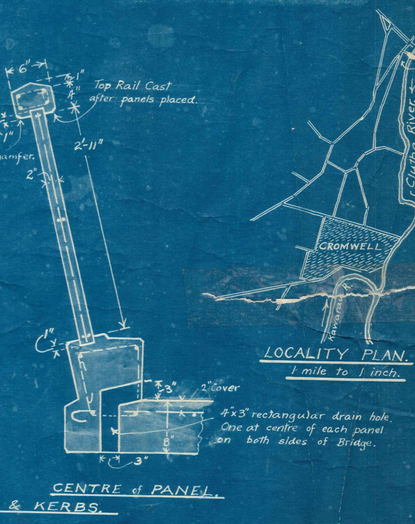
SECTION Y-Y of WINGWALL.
¾ in. to 1 ft.



PLAN of ABUTMENT.
¼ in. To 1 ft.



INTERMEDIATE POST. END POST.



CENTRE of PANEL.

DETAILS of HANDRAILING & KERBS.
1 inch to 1 ft.

Notes. All concrete above top of Kerbs to be 1:1½:3 mix.

LOCALITY PLAN.
1 mile to 1 inch.

Vickerman & Lancaster.
Wellington.

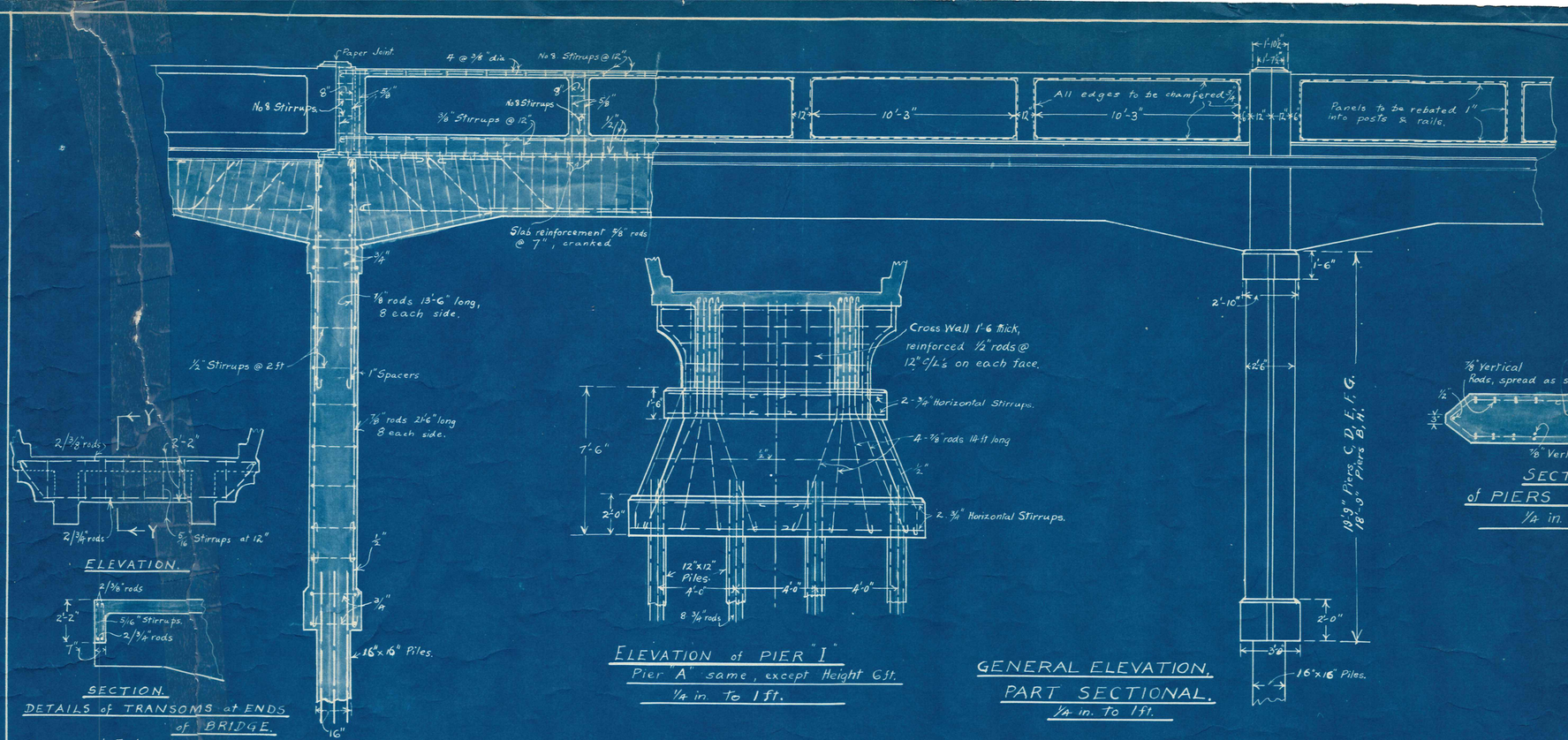
CLUTHA RIVER BRIDGE. AT LOWBURN.

Scales as shewn.

Designed		Sept 1935
Drawn		Mar. 1936
Amendments		

Reference	Drawing No
	973. Sheet 1.

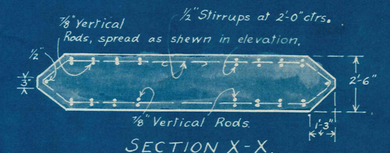
55/3.



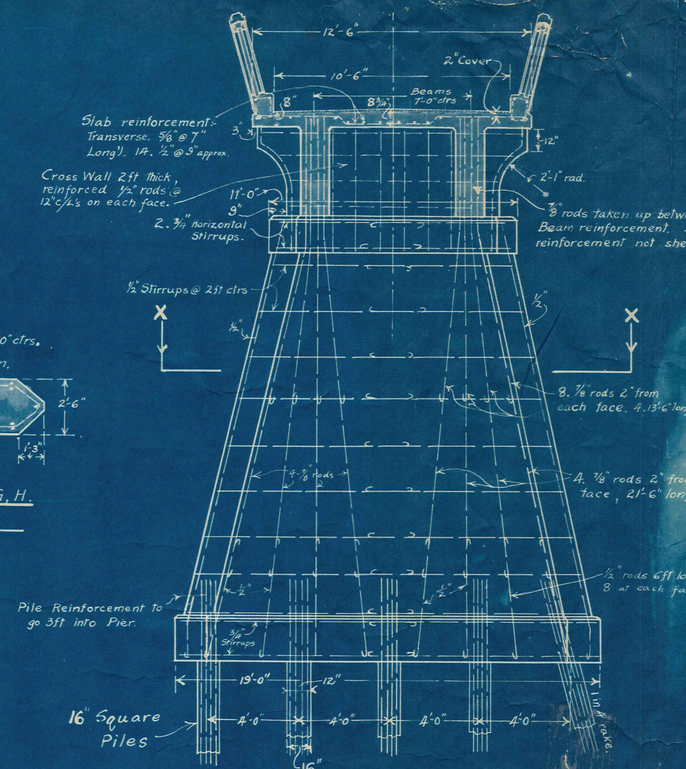
ELEVATION of PIER "I"
Pier "A" same, except Height 6ft.
1/4 in. to 1ft.

GENERAL ELEVATION, PART SECTIONAL.
1/4 in. to 1ft.

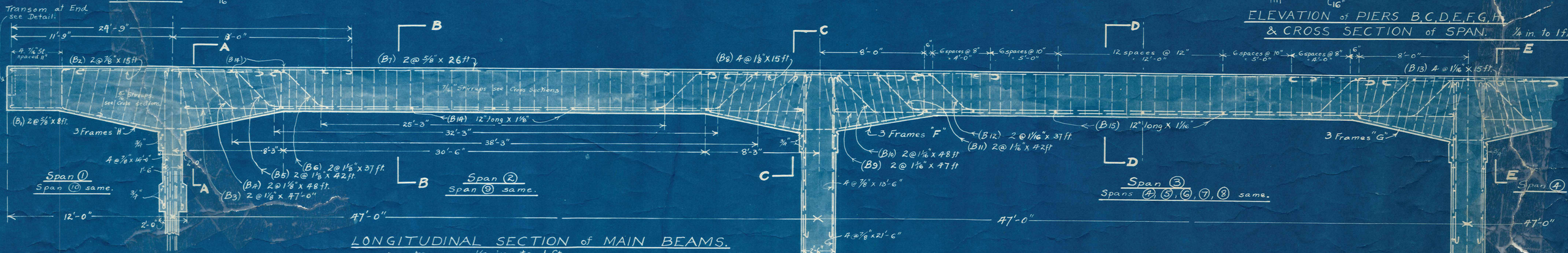
ELEVATION.
SECTION.
DETAILS of TRANSOMS at ENDS of BRIDGE.



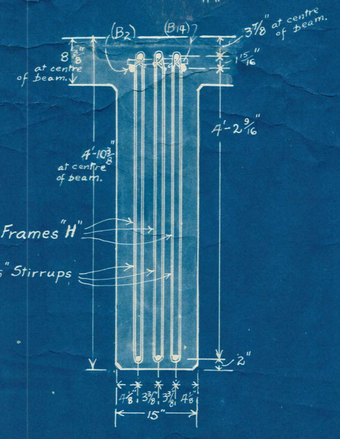
SECTION X-X.
of PIERS B,C,D,E,F,G,H.
1/4 in. to 1 ft.



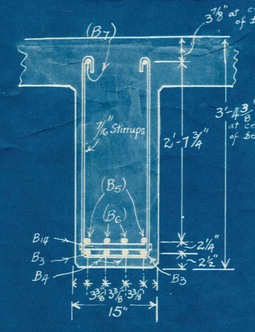
ELEVATION of PIERS B,C,D,E,F,G,H
& CROSS SECTION of SPAN. 1/4 in. to 1f



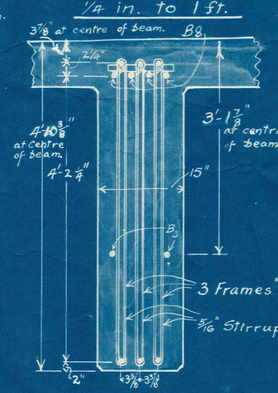
LONGITUDINAL SECTION of MAIN BEAMS.
1/4 in. to 1 ft.



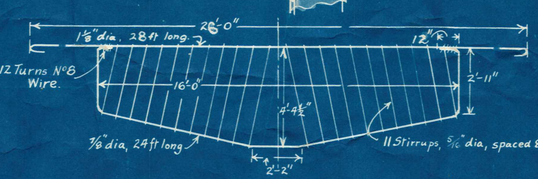
SECTION A-A.



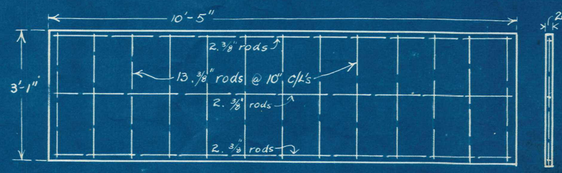
SECTION B-B.
Section D-D same except diam. of Main rods 1/16".

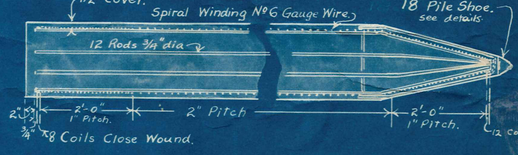


SECTION C-C.
Section E-E same except diam. of Main Rods 1/16".

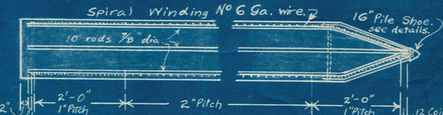


Frame "F" 1/4 in. to 1ft.
Frame "G" same except Main Top rod 1 1/16" dia.
Frame "H" same except { Main Top Rod 1" dia, 26'-9" long. Stirrups, 9 each end, spaced 10"





20"x12" REINFORCED CONCRETE PILE.
1/2 in. to 1 ft.
Use same forms, blocked off, for 12"x12" Piles, with 8 3/4" rods.

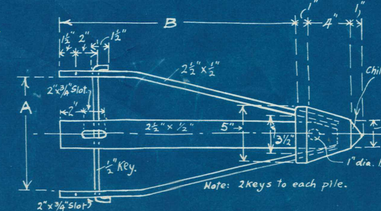


16" SQUARE REINFORCED CONCRETE PILE.
Piles To be driven with Main Reinforcement across the strea

BEAM SECTIONS. 3/4 in. to 1 ft.

Note: Dimensions are given to Centres of Rods.

	14" Pile	16" Pile	18" Pile
Dimension A	11"	13"	15"
Dimension B	1'-9"	2'-0"	2'-3 1/2"
Straps.	34·64 lbs	39·09 lbs	49·84 lbs.
Keys.	1·67 "	1·89 "	2·12 "
Point.	17·51 "	17·51 "	17·51 "
Total.	54·02 "	58·49 "	69·57 "



DETAILS of PILE SHOES.

PRECAST HANDRAIL PANEL.
1/2 in. to 1 ft.

64 required Thus.
4 required 10'-2" long, at ends of bridge.
4 required 5'-9" long, in wingwalls.
4 required 3'-0" long, in wingwalls.

To be rebated 1" into Handrails all round, & grouted in.
Concrete 1 : 1 1/2 : 3 mix.

NOTE:
16' Square Pil
be used in Ma
unless otherw

CLUTHA RIVER BRIDGE
AT LOWBURN.
Scales as shewn.

Vickerman & Lancaster.
Wellington.