

FILE **S**.....

HUTT COUNTY COUNCIL

BOX 8012 - - - WELLINGTON

SUBDIVISION FILE

FILE..... **S**.....

OWNER.....

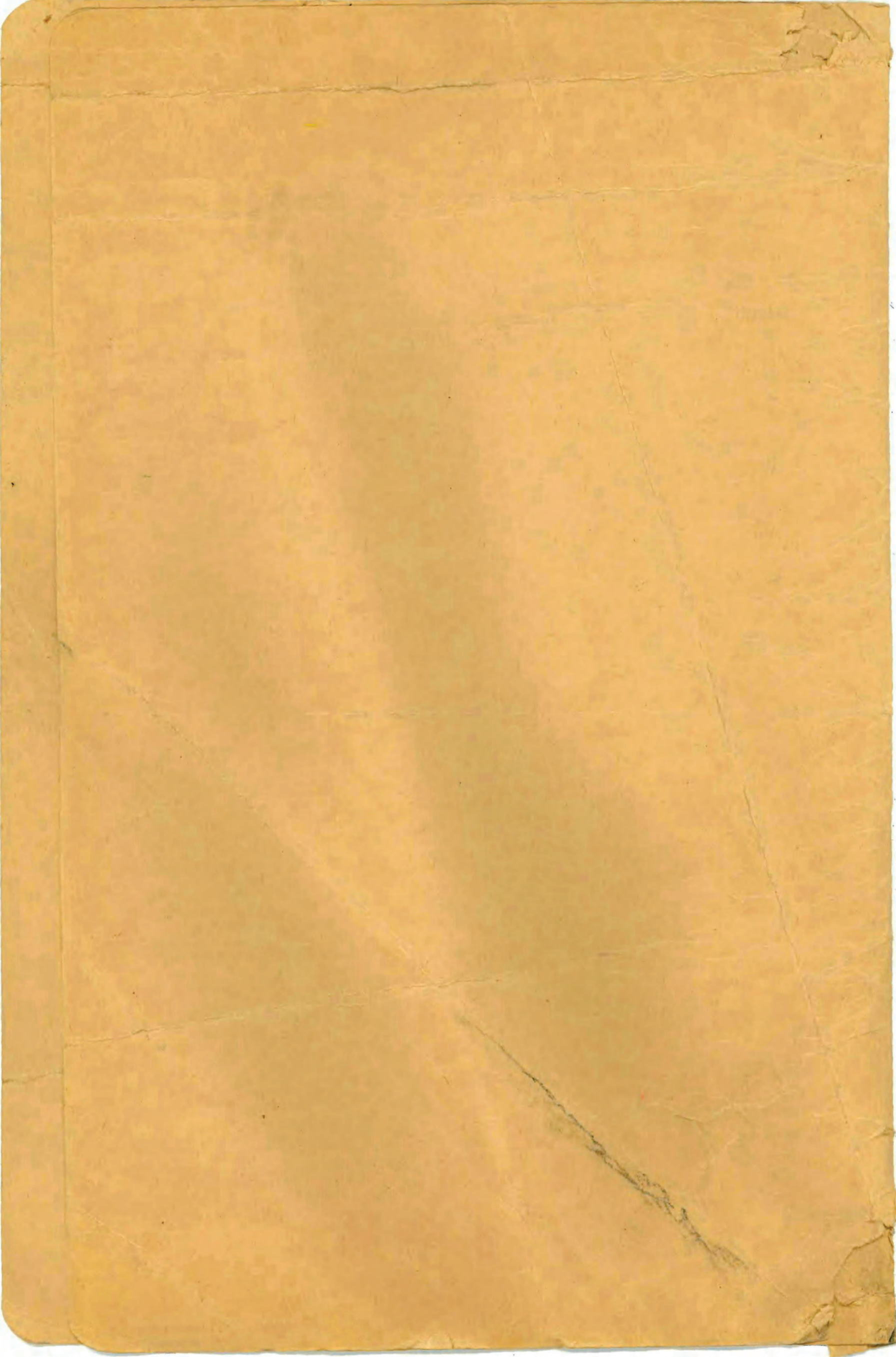
TOWN of.....

EXTN. No.....

PLAN No.....

D. P.....

FILE **S**.....





CONTRACT FOR TUNNEL AND APPROACHES:

SPECIFICATION:

1. GENERAL:

The works referred to herein are the Tunnel and Approach Roads etc. (except as already completed) proposed to be built to provide improved access from the Hutt Valley into the Wainui-o-mata Valley and Wainui-o-mata Township. The point of commencement on the Hutt Valley or Western side is near the junction of Park and Gracefield Roads and the point of termination on the Wainui-o-mata Valley, or Eastern side, is about one mile distant, being not far from the inlet to the Wellington City Corporations Wainui-o-mata Water Tunnel.

2. EXTENT OF CONTRACT:

The contract includes constructing in accordance with the requirements and intention of this specification, the accompanying plans and the general conditions and as necessary to fully complete and leave in a thoroughly serviceable working order to the engineers approval the following works. The uncompleted portions of the Western approach road from Gracefield Road to the Western tunnel portal; the tunnel; the Eastern approach road from the Eastern tunnel portal to the Wainui-o-mata flats.

And further, it includes the supply of all material, plant, labour, and any other thing required to finish and maintain the said works.

3. Plans.

The levels, layout, and general details are shown on Plan No. 785 - sheets 1 to 4 -. Figured dimensions shall be adopted should they differ from scaled.

4. Alignment & Levels.

The Contractor will be responsible for setting out and for building all works to the line and levels shown on or required by the drawings and specifications.



311

5. WORKMANSHIP
& MATERIALS:

All workmanship shall be first class and carried out by competent tradesmen in the most approved manner and to the satisfaction and approval of the engineers.

All materials shall be the best of their respective kinds and shall be subject to the approval of the Engineers and in conformity with the details given below, or otherwise with the latest applicable specification of the British Engineering Standards Association or with the requirements of the best practice.

(a) Cement shall be Portland Cement of approved make to the British Engineering Standards Association requirements. It shall be stored on the works in a water tight and damp proof shed. This shed shall be kept locked and the Engineers or their deputy shall be furnished with a key and given every facility for checking daily the amount of cement used.

The Contractor shall inform the Engineers when and where he orders his cement in order that any tests desired may be made before the cement arrives on the works but any damaged in transit, or in store, or subsequently found to be not up to specification, will, even though tests may have shewn it to have been good originally, be condemned, and shall be at once destroyed by the contractor or removed from the works.

(b) Gravel and Sand shall be approved materials free from all dirt, clay, loam, vegetable or deleterious matter or soft or decomposed stone and shall, if necessary be washed until clean..

Subject to the contractor carrying out such tests as shall satisfy the Engineers that the correct proportions of sand and gravel are contained in the natural unscreened shingle and subject to his maintaining such correct proportions the sand and gravel need not be separated out before mixing the concrete, but if the



311

Contractor does not observe these conditions satisfactorily the sand and gravel shall be separated by screening the shingle and remixed in approved proportions when the concrete is mixed.

(c) Sand shall be of hard grains of various sizes all of which shall pass a sieve having a square mesh one quarter inch in the clear and not more than 10% through one made of No. 37 S.W.G. wire and having 2500 meshes per square inch. Gritty sand with grains about 1/8" and downwards to fine material is required and very fine dusty sand will not be accepted.

(d) Gravel shall be selected or screened to contain hard stone of from 1/4" diameter up to 2 inch, stones of about 1 inch to predominate. Approved broken stone may be used instead of gravel.

The Engineers may, in order to determine whether the material proposed to be used is suitable direct the contractor to at his own expense make test cubes or test bars to specification and these shall be tested by the Engineers either on the works or wherever desired, the cost of the actual testing to be borne by the Company.

(e) Concrete shall be composed of Portland Cement, gravel, sand and water mixed to approval in a power driven batch mixer, the amount of cement unless specified as different below to be 462 lbs per finished cubic yard of concrete and the aggregate to contain such proportion of sand as will ensure workability and absence of harshness and voids, that is a proportion approximately of 1 part cement to 2-1/2 parts sand to 5 gravel, but the amount of sand shall in each case be regulated and if necessary varied so as not to be excessive but to at the same time ensure good workability and a dense mixture. The cement shall be measured by weight taking the weight of 1 cubic foot as 90 lbs and the gravel and sand or unscreened shingle loose in approved gauges. The water

used in each batch shall be measured so as to keep an uniform mixture and shall not exceed what is required to produce a smooth flowing mass that will work readily into the forms. In order to admit of checking the quantity of cement used the Contractor shall supply the Engineers with all documents necessary, including bills, railway accounts etc. or whatever may be required. Any deficiency of cement shall make the contractor liable for heavy penalties if the work is accepted and such penalty shall not merely cover the value of the cement omitted but also include the damage done to the whole structure by reason of the weaker or less suitable material used.

Due notice shall be given to the Engineers or their representative of intention to concrete and the mixing shall be done under their supervision.

(f) Boxing shall be made truly to shape of dressed timber or of metal and shall be thoroughly stiff and so supported braced and stayed as to prevent distortion when filled. The joints shall be watertight and all sharp corners filleted unless otherwise shown, not less than $3/4$ inch. The boxing shall be coated as necessary with soft soap, oil, or other approved material so as to prevent the concrete adhering and before depositing any concrete the boxing shall be thoroughly cleaned of all dirt, shavings, etc. Boxing shall not be removed from the bottom or underside of work, unless special permission is given for any particular portion till from 14 to 28 days, depending on the class of country, after placing concrete. Boxing on the side of work may be removed after 5 days or sooner as the Engineers may approve, provided this can be done without wedging or forcing from and damaging the concrete.

(g) Deposit of concrete. All concrete shall be deposited as soon as it is mixed and none shall be placed after the initial set has taken place; nor shall it be

placed in water unless the water is still and then only with special permission and by approved methods; nor when the temperature is below 35° F; nor when any conditions may result in damage to the concrete. It shall be transported from the place of mixing to the work in an approved manner and so that there shall be no alteration in the composition of the concrete nor separation of the cement or other ingredients when put into the work. Concrete shall, after placing in the boxing, be worked with suitable tools, or by other approved methods, to expel the air and to make it fill solidly, and, if reinforced, so as to thoroughly coat the reinforcement and leave a good smooth surface on the parts of the works which will remain exposed. Any defects in the surface shall be made good as the Engineers may direct at the Contractor's expense by recasting the part in question or plastering, and or cement washing the whole surface. All concrete shall be kept damp by wet sacks or approved spraying for seven days after it has set.

Where new concrete is placed to join concrete already set, the surface of the old concrete shall be hacked up scrubbed with a stiff steel brush, and washed till quite clean and coated with thick neat cement immediately before the new concrete is placed. Timber and rock faces against which concrete is to be deposited shall be cleaned and wetted before placing. Concrete once started shall continue without break till the portion of work in hand is completed, and where joints are necessary these shall be made in such a manner as not to affect the final strength, generally, they shall be straight and square and in arched work radial.

(h) Reinforcing Rods: Reinforcing Rods shall be plain round mild steel reinforcing bars in accordance with B.E.S.A. specification for "steel Bridges" free from paint, grease, dirt, pitted rust or scale, though no objection will be made to a slight coating of rust.

Rods shall be of the length shewn without welding which will

not be permitted and shall be accurately bent to shape and furnished unless specially shewn otherwise with approved hooked ends having a radius of 1-1/2 diameters and all sharp bends shall be avoided. Where joints are necessary these shall be made by lapping rods 40 diameters. Where walls or adjacent portions require bonding together, rods shall, even though not specially shewn, extend 40 diameters to give the required connection. All rods shall be framed together and so bound at crossings of rods with No. 16 gauge black wire as to effectively prevent displacement or strain to the steel whilst the concrete is being filled and rammed and so as to leave the correct cover on the outside.

(i) Cast Iron and Steel. Cast iron shall be tough grey iron of the best quality free from holes or other defects. Cast steel shall be uniform in character, free from hard or soft spots and capable of being properly tool finished. All castings shall be perfectly true to shape, finished smoothly, free from cold shuts, air holes and other defects. Castings shall receive one coat of tar laid on hot before rust sets in, but in no case shall it be put on till after the casting has been inspected. In cases where castings are to be painted, they shall receive a coat of hot linseed oil instead of tar.

(j) Forgings: All forgings shall be made true to shape and size shewn or required and finished without defect and without damaging the material. Forgings shall be annealed. Except with special permission and under approved conditions, welding will not be allowed.

(k) Bolts. Bolts shall be wrought iron screwed with a clean Whitworth thread and when bearing on timber shall be provided at each bearing with a washer whose diameter is three times that of the bolt and whose thickness is one quarter the diameter of the bolt. Bolts for wood shall have square heads and nuts the width over sides to be twice the diameter of the bolt and the thickness one diameter; all others to have Whitworth hexagon heads and nuts.

(l) All Steel and Ironwork, except where specially noted or otherwise treated or parts to be set in concrete, shall receive two coats of thick hot tar or other approved bituminous protective coating.

(m) Paint and Tar. Paint shall be a mixture of boiled or raw linseed oil, white or red lead, tinting colours and driers, all in proper proportions to suit each particular case. All materials and mixing to be approved. Bituminous paint shall be an approved preparation of bitumen. Tar shall be cold tar boiled for at least three hours till free of light oils, before application and put on hot.

(n) Pipes: Earthenware pipes and pipe tiles shall be of the best stoneware, salt glazed on both sides well burned and perfectly sound with approved joints suitable for the particular purpose.

Concrete pipes shall be spun concrete of approved make.

(o) Road Metal: Road Metal shall consist of broken stone, such broken stone to be clean hard tough and durable and able to satisfy all tests that may be required by the Main Highways Board.

6. ROADS:

The contract includes building the road approaches from 0 chain to 16.75 chains on the west and from 65.75 chains to 80 chains on the East.

On the West the concrete bridge shewn across the pipe line and the formation, pipe culverts, and concrete kerbing, but not channels, from there to 16.57 chains near the Western Tunnel Portal have been completed but trimming as may be necessary for metalling is included herein.

It is intended that the road embankment at each end shall be constructed with spoil from the tunnel or from the road cuttings. The width of road, shape of formation, side slopes of cuttings and banks and the necessary information is shewn on plans and the work shall be carried out accordingly, due

allowance to be made in the height of banks for settlement. All batters of cuttings and banks to be true to requirements and neatly finished.

The size and position of culverts is indicated on the drawings, the pipes to be approved reinforced span concrete pipes jointed with cement mortar of 1 part cement to 3 parts sand. Clean out grade evenly and prepare foundations and, after approval of foundation, lay pipes straight and evenly graded on a well rammed bed ~~of~~ made of a mixture of thoroughly pugged clay and shingle, this to be at least 12" thick all round the pipes and to be rammed to completely fill the excavation. Provide neatly constructed concreted inlets and outlets of standard type with front wall, two wing walls and apron with cutoff in front, the length of apron to be 1-1/2 times the pipe diameter and the thickness of concrete 8" and the mixture 1 part cement to 5 parts shingle aggregate. Clear inlets and outfall drains as necessary.

Provide concreted kerbing and channelling as shewn of concrete 1 part cement and 4 parts shingle aggregate.

In preparation for metalling dress foundation to grade, camber etc and so as to conform to the cross section shewn on plan. After dressing, drench with water and whilst wet roll with an 8 ton or heavier roller till the surface is unyielding. Make up and roll in material where not true to required shape or where foundation is soft. After final shaping protect from traffic.

Metal roadway with approved crushed metal put on in two courses the bottom when consolidated to be 6" thick and the top 3 inches. For the bottom course use stone which will pass a 3" screen and be retained on a 1-1/2" and for the top course stone which will pass 1-1/2" and be retained on a 3/4" screen.

Stone must be tipped about 6 feet in front of the work in progress and shovelled back to the face of the work and spread in layers true to shape and of a uniform thickness suitable for rolling and compacting solid.

After spreading roll the layers separately with a 10 ton or

heavier roller. Keep metal saturated during rolling using a thin layer of 1/4" screenings as a binder. Roll repeatedly till all voids are filled and the surface tends to puddle. Finish off road surface with a 3" layer true to shape and grade of bituminous concrete compacted by rolling to 2-1/2" and of the track width shewn, the shoulders to be made up with water bound Macadam as above.

The bituminous concrete to be composed of 1" crushed metal, 1/2" ditto and approved sand so proportioned as to ensure a minimum of voids mixed in the most approved manner in a suitable mixer with about 6% by weight of bitumen cement. The bitumen may be pure and mixed at a temperature of between 250° and 325° F. with the stone and sand already heated to from 300° to 375° F., or it may be an approved bitumen emulsion and mixed and laid cold to approval and the maker's specification.

After the wearing surface has been fully rolled and while the surface is still fresh and clean apply a thin seal coat of bitumen at suitable temperature or of bitumen emulsion spread with squeegees or mops. Spread over the seal coat a light layer of 3/8" stone of about 20 lbs per sq. yard of surface covered.

7. TUNNEL:

The tunnel including the portals is 49 chains long extending from 16.75 chs. to 55.75 chs.

The cross sections and dimensions of the tunnel are indicated on the plan and the excavation shall be taken out accordingly and so as to ensure the lining being the thickness shewn or as may be ordered in special cases, and the finished interior of the tunnel being true to grade and to the shape figured. The excavation for the portal shall be taken to 18" below road level on both sides of each entrance and it is intended that the portal wall shall be carried up solid and 2 ft. thick beneath the footpaths.

Blasting shall be carried out as required by the Stone

Quarries Act 1910 and subsequent amendments and so as to cause no undue shattering of and damage to the rock outside the limits required for the excavation. If this is caused the shattered material shall be removed and any holes filled to the Engineers satisfaction with concrete by the Contractor at his own expense. Particular care is to be taken not to damage the side walls nor the rock at the springing of the arch which shall be cut to ensure a good bearing, the final excavation being, unless otherwise approved, done after concreting the side walls. No extra payment will be made for excavation nor concrete outside the limits of the section line unless the extra work is authorised by the Engineers.

The tunnel floor shall be trimmed evenly to the shape shown and surfaced with coat of bituminous concrete at least 2-1/2" thick as specified under section No. 6 the bitumen surface to be finished true to grade and cross fall as shown.

The tunnel shall be lined and the portals built with 1:2-1/2:5 concrete as indicated, the finished surface to be smooth.

Generally, the concrete work shall not be reinforced, except as shown for the portal wall and its junction with the tunnel lining.

The thickness of the lining shall depend on the class of country encountered, but it is anticipated that that shown on the cross section will suffice, except at the entrances where at each end for the first 16'6" the arch thickness shall be increased by 1 foot and the side walls 6" and for the next 16'6", by 6" and 3" respectively. Any variations from the above, if authorised by the Engineers, will be paid for at schedule rates.

The method of excavation and of placing concrete shall be approved by the Engineers. It is preferred that the lining be built in place from the footings upwards finishing at the crown without underpinning, but this method may be waived if contractors undertake to carry out in accordance with requirements by another method more satisfactory to themselves and duly approved.

Voids between the inner surface shown for the lining and the excavated face of the rock shall be filled solid with concrete unless for any extraordinary reason specially approved by the Engineers when the void may be packed with well rammed gravel or broken metal the work to be done in the presence of the Engineers or their representative.

No timber shall be left behind the finished lining/with the special permission of the Engineers. except

A footpath 3 feet above the roadway shall be provided as shown, along one side of the tunnel to be built as shown on the cross section for the length between the inner faces of the portal walls. Ramps on 1 in 6 grade shall be built on the outside leading up to the footpath. The ground may be left solid to support the ramps but otherwise they shall be supported as necessary on mass concrete of 1 part cement to 6 parts shingle aggregate and with up to 20% of clean boulder or stoneplums. Pathway to be of concrete to the ends of the ramps and of 3" fine gravel beyond to the ends of the road.

The handrailing along the edge of the footpath shall have 1-1/2" galvanised pipe posts and top railing, with the panels filled with wirenetting of "Cyclone" or other approved make, 2" diamond mesh of No. 8 heavily galvanised wire held in frames to approval and securely and neatly attached to the posts and rail. The posts shall be set for 9" in the concrete and the tops cut and screwed so that the top railing is straight and true to grade.

A pipe drain of 4" stoneware tile pipes shall be set in concrete in the upper part of the wall footings on each side with sumps 15" wide by 2'6" long, covered with approved cast gratings supported as indicated, at 66' intervals, the pipes to extend from 16 chains to 66 chains. The concrete covering the pipes shall be finished off smooth at road level to form a water table drain.

Weepholes shall be provided in the tunnel walls with drainage along the back as indicated in the section and also as indicated

or required along the retaining walls and portals.

A half tile drain set in concrete shall be provided along the top of the portals and as shewn along the top of the retaining walls at the Eastern end with the necessary outfall drains to ensure efficient discharge.

The corners left between pathways and walls or batters at each portal shall be filled with soil and rocks to provide a small rock garden in each corner.

The tunnel spoil shall be utilised to build the road embankments as already mentioned. Stone, of good quality and clean, may be crushed and utilised in concrete and for road metalling. The balance of the spoil shall be used to raise the ground level at the old quarry at the Western end as shewn on plan sheet No. 2; to fill in parts of the gully on the right at the Western end; and the balance shall be stacked on the left hand of the road opposite 74 chains.

The whole of the walls and arch including the side wall below the footpath shall be coated white to approval with whitewash as manufactured and supplied by the Acetone Illuminating Coy., Wellington.

6. LIGHTING SYSTEM:

(a) General: The Lighting System shall cover a complete installation including

216 points inside tunnel
2 points outside portals.

(b) Scope of Contract. The contract shall include the Supply and Installation of Service Box, cables and conduit between Service Box and Tunnel, Aerial cables and supports, Fuse Boxes and Fuses, Conduits and Wiring for inside lights, Span wires, Insulators, cables and conduits for outside lights, but not poles for same, and everything else necessary to make a first class job including the taking delivery and installation of fittings and lamps purchased under the P. C. Sum.

(c) Service Box. The Service Box shall be a substantial galvanised sheet metal case mounted in an approved position in

one of the wing walls of the western approach to the tunnel. The box shall be provided with waterproof hinged door fitted with Yale lock, and arranged to be flush with the surface of the concrete.

The electrical gear within the box shall include

- 1 neutral link
- 1 - 60A 3 pole I. C. Switch and 3 Fuses.
- 1 - 10A Watertight Switch and Fuse
- 1 - 10A S. Pole Time Switch of approved make.

Provision for Hutt Valley Power Board meters.

The box shall be provided with fittings for receiving the incoming Power Board Mains and Conduits and outgoing mains and conduits, to be 2" water pipe, and also for 3/4" conduit to outside lighting point.

It is assumed that the H. V. Power Board will provide the conduit and mains to the box, but all other conduits and wiring shall be included in this contract.

(d) System. Supply will be at 400/230V 3 phase with multiple earthed neutral.

From the Service Box 3 Phase 4 wire Mains consisting of 3 - 19/064 and 1 - 7/052 V.I.R. cables shall be run in conduit through the tunnel wall to a point on the crown of the arch 15' from the western portal and terminate there in a bell mouth. From such point 3 - 19/064 V.I.R. and 1 - 7/052 bare hard drawn cables shall be run as aerials to the corresponding point 15' within the eastern entrance. These main cables shall be deadended at the two ends of the tunnel on suitable pull off brackets and shackle insulators, and shall be carried between such points on galvanised M. S. brackets 2" x 1/4", spaced on 15' centres along the centre line of the tunnel arch, and each supported by 2 - 5/8" galvanised bolts supplied and fixed under this contract.

At each of the two points 15' within the portals, and at intervals of 30' between such points ironclad boxes each containing two fuses shall be provided such boxes to be provided with bellmouths for incoming leads from the supply mains, one

fuse for control of 2/100 watt lamps, one solid fuse to be used as a neutral link, lugs for attachment of box to ceiling, conduit outlets for outgoing conduit to two lighting points, and hinged door opening downwards, the whole to be substantial and waterproof.

From each fuse box the conduits shall run across tunnel to a 100 watt lighting point such points to be along straight lines 5 feet from the centre line of the tunnel. The conduits shall be rigidly supported and bent down at the lighting fitting which will include a bowl type reflector and finished off with lock nut and watertight holder. All fittings shall be truly vertical and arranged so that the lamps are 15' above the roadway. All conduits, pipes, fuse boxes, brackets, bolts and clips shall be galvanised.

Fittings including only shades and lamps for inside the tunnel and including fittings complete for the two outside lights shall be provided by the contractor under the P. C. sum to be expended as the Engineers may direct.

Connections between wires to fuse box and main cables shall be made by means of suitable approved connections, which shall be properly taped up. All tape and braiding shall be thoroughly treated after installation with P & B paint.

Insulators shall be of the deep grooved type and cables properly tied in.

Fuses shall be of the bridge replacement type and one fuse - on the neutral side - shall be solid, and connected to the metal work of the box at the stud to which the incoming neutral lead is fixed.

From the last fuse box, located 15' within the eastern portal a second pair of wires shall be taken through conduit concealed in the tunnel roof and walls to one of the standards of the outside point located 15' without the portal. An approved time switch in weatherproof box shall be provided on the pole. Centre Suspension Fittings shall be erected on 7/16 steel cable, insulated as required under the regulations and shall be

arranged so that the lamps are 20' above the roadway.

Galvanised conduits shall be run from the service box at the Western end and from the last inside point at the Western end, to the top of one of the supports in each case, the wires carried therefrom on insulators to the lighting fitting. Outside fittings shall be provided with transverse stay wires so that they will not swing in the wind.

All work shall be in accordance with the Electrical Wiring Regulations 1927 and any amendments thereto.

Prices shall include

- (a) To specification for a total of 218 points
- (b) P. C. Sum for fittings and lamps £400
- (c) Schedule Rate per pair of 100 watt points in event of number being slightly altered.

9. CAMPS,
FENCES ETC:

Camps and workshop sites may be established only where the Company approves on Company land at either end. Any fences damaged shall be repaired as necessary and the contractor shall be liable for trespass by his employees.

The Contractor will be responsible for complying with Local Body by-laws and regulations.

Care shall be taken that no damage is done to the Wellington City Council property, pipes and tunnel and any restrictions imposed on this account by the Council shall be strictly complied with.

10. TIME
FOR
COMPLETION:

The whole of the work shall be completed within fifteen months from the date of acceptance of tender and an amount of £50 per week shall be forfeited by way of liquidated damages and will be deducted from payments due for each weeks delay in completion beyond that time. This clause shall be read in conjunction with Clause 22 of the General Conditions.

11. TIME
FOR MAINT-
ENANCE:

The work included shall be maintained so as to be in accordance with the contract for four months after being passed by the Engineers as satisfactorily completed.

This clause shall be read in conjunction with Clause 25 of the General Conditions.

12. Payments:

Payments will be made as set out in Clause 29 of the General Conditions.

13. TENDERS & CONDITIONS:

Tenderers are referred to ~~xxx~~ the conditions mentioned in Clauses 2, 3, 5 and 6 of the General Conditions. Tenders accompanied by a deposit cheque of £1000 close with the Engineers in Wellington on the date advertised and shall be for a lump sum but shall be accompanied by a detailed schedule as per the attached, with itemised prices shewing how the total is made up.

VICKERMAN & LANCASTER
Consulting Engineers,
P. O. Box 920,
WELLINGTON:



