

Specifications,
Drawings
and Data
to be
Supplied
by the
Contractor

16. The Contractor shall submit to the Engineer for approval five (5) sets of complete specifications, drawings and data for materials and equipment to be supplied under the Contract within fourteen (14) days from the Engineer's order to commence.

However, it is to be understood that approval of the specifications, drawings and data will not exonerate the Contractor from any responsibility as stipulated elsewhere in the Contract.

MEASUREMENT AND PAYMENT

Temporary
Works

17. (1) Payment for temporary works such as access road Contractor's staff quarters, office, stores, water and power supply systems, etc. stated in SECTION A of the Bill of Quantities shall be made in such manner that fifty (50) percent of the Lump Sum prices in the Bill of Quantities is paid when the Engineer certifies that the Contractor has provided his offices stores, access roads, etc. and has become operational. The rest of fifty (50) percent shall be paid upon completion of the whole Works and upon their removal, where directed, from the Site.

Land
Clearing

(2) Payment for land clearing and removal of trees specified in Clause A.01 in the Technical Specifications shall be made at the Lump Sum in the Bill of Quantities. No payment will be made until the completion of the work under this item.

Assistance
of
Engineer's
Staff

(3) Payment for the assistance of the Engineer's staff in the Bill of Quantities shall be made at Lump Sum, and no payment shall be made until the completion of the whole Works.

Excavation

(4) Measurement for excavation will be made for the net volume in cubic meters of earth excavated from the natural ground surface to the lines and grade shown on the Drawings or as directed by the Engineer. Payment for excavation measured as above shall be at the Rate entered in the Bill of Quantities, which shall include the cost of excavation, trimming of side slopes, draining, earth slip or slide prevention; laying out, constructing and maintaining catch-water drains in good order during the works; hauling and disposal of the excavated material; backfilling for structures, except if it is already covered under other items in the Bill of Quantities; removal of materials in earth slips or slides, including the costs of all materials, labor, depreciation of equipment, and all else necessary therefor and incidental thereto.

Embankment and Backfill (5) Measurement of embankment shall be made for the net volume of filled materials measured in cubic meters after compacting and trimming of the slopes as shown on the Drawings or as directed by the Engineer. Payment for earthfill in any embankments measured as above will be made at the Rate in the Bill of Quantities for:

- (a) Embankment, and
- (b) Embankment with borrowed materials

The Rate of any embankment shall include the cost of stripping, foundation preparation, placing the material, sorting, strewing, harrowing, trimming, watering, compacting in accordance with specifications for respective embankment, and finishing-up of side slopes, extra filling and all else necessary therefor and incidental thereto.

In addition, the Rate of "Embankment" shall be deemed to include the cost of handling and hauling of the material excavated which will not be covered in the Rate for excavation. The Rate of "Embankment with borrowed material" shall include the cost of all works involved in opening borrow pits, such as clearing, stripping, drainage, slope protection, etc., finishing of side slopes of borrow pits; and all costs for excavation in borrow pits, handling and hauling fill materials to the fill site from the borrow pit.

Backfill for Structure (6) Measurement for backfill for structures shall be made for the net volume of filled materials measured in cubic meters after compacting and trimming of the slope as shown on the Drawings or as directed by the Engineer.

Payment for backfilling of the structures measured as above shall be made at the Contract Rate per cubic meter in the Bill of Quantities, which Contract Rate for backfilling shall include the cost of supplying suitable material, placing by hand tools or machines, mixing, harrowing (if required), spreading, trimming, watering and compacting, and the cost of all other works connected therewith. The Contract Rate shall apply whatever the source of the material.

Concrete (7) Measurement of concrete for payment shall be made only to the neat lines of the structures as shown on the Drawings or as established by the Engineer. In measuring concrete for payment, the volume of all cavities, depressions and openings shall be deducted. Payment for concrete in any concrete measured as above shall be made at the Rates in the Bill of Quantities for:

- (a) Concrete Type-A (1 : 2 : 4), and
- (b) Concrete Type-B (1 : 3 : 6).

Payment of concrete in the various parts of the Work shall be made at the Rates per cubic meter in the Bill of Quantities. The Rate shall include the cost for excavation, cost of all labor and materials, depreciation of equipment required in the construction, handling of cement, and the cost for concrete form of furnishing all labor, equipment and materials, erecting and removing the forms, depreciation of the forms, scaffoldings, backfilling and also the cost of all other necessary works connected therewith.

- Brick (8) Measurement of brick for payment shall be made for the net volume in cubic meter after compaction to the dimensions shown on the Drawings or as directed by the Engineer. The Rates for brick shall include the cost of furnishing bricks and of pointing, cutting and fitting to spandrils, masonry and concrete, etc., and of all templates, centering, scaffolding and labour required to complete the Work as specified or as shown on the Drawings.
- Plastering and Cement Mortar (9) Measurement of plastering and cement mortar for payment shall be made for the net volume in cubic meter of cement mortar shown on the Drawings or as directed by the Engineer. Payment for plastering measured as above shall be at the Rate entered in the Bill of Quantities, which shall include the cost for plastering of all labor and materials except cement, depreciation of tools and equipment, and other necessary works.
- Reinforcing Bar (10) Measurement for payment for furnishing and placing reinforcing bars shall be made only of the weight of the bars placed actually in the concrete in accordance with the Drawings or as directed by the Engineer. Payment for furnishing and placing of reinforcing bars shall be made at the Rate per unit weight in the Bill of Quantities, which shall include the cost of furnishing and attaching wire ties and metal supports, if used, and of delivering, unloading, hauling, storing, sorting, cutting, bending, cleaning, placing, and securing the maintaining in position all reinforcing bars, as shown on the Drawings or as directed by the Engineer.
- Precast Concrete Pipe (11) Measurement for precast concrete pipes shall be made for the length from end-to-end of the pipes in place, and no allowance shall be made for lap at joints or of connecting pipes shall include the cost of furnishing of all labour required in handling, hauling, and storing the pipe; preparing a suitable and even bedding; and laying the pipe and constructing the joints.

- Roof,
Window
and Door
- (12) Payment for roof, window and door shall be made at the Lump Sum in the Bill of Quantities, and no payment shall be made until the completion of the works under these items. The Lump Sum price in the Bill of Quantities shall include the cost of furnishing, unloading, hauling, handling and installing materials such as glasses and timbers, furnishing all labourers, tools and coating materials, and furnishing all nuts, bolts and other necessary items.
- Installation of
Irrigation
Pipelines
- (13) Measurement for the installation of irrigation pipelines shall be made for the length from end to end of the pipes in place as shown on the Drawings or as directed by the Engineer, and no allowance shall be considered for laps at joints or of connecting pipes to wall, collars or structures. The payment for the installation of irrigation pipelines shall be made at the Rate stated in the Bill of Quantities, which shall include the cost of furnishing, unloading, hauling and handling the necessary materials such as sand, etc. except pipes and fittings, furnishing all labourer's tools and other necessary items.
- Installation of
Sub-
surface
Drain
- (14) Measurement for the installation of PVC pipes for sub-surface drain shall be made for the length from end to end of the pipes in place as shown on the Drawings or as directed by the Engineer, and no allowance shall be considered for laps at joints or of connecting pipes to wall, collars or structures. The payment shall be made at the Rate stated in the Bill of Quantities, which shall include the cost of furnishing, unloading, hauling and handling all the necessary materials except PVC pipes and their fittings, the cost of furnishing all labourers and tools for storing, processing and installing the PVC pipes, and other items necessary for the works under this item.
- Fencing
Works
- (15) The measurement for the fencing works shall be made for the linear meter of the fence completed by the Contractor. The payment shall be made at the Rate set force in the Bill of Quantities. The Rate shall include the cost of furnishing, unloading, hauling, handling and storing materials such as verbed wires, coating materials, etc., and of furnishing labourers and tools for excavation, installation and fabrication, etc. necessary for the works under this item.
- Gravel
Pavement
- (16) The measurement for the gravel pavement shall be made in net volume of the material placed in accordance with the Drawings or as directed by the Engineer. The payment for the gravel pavement measured as above shall be made at the Rate entered in the Bill of Quantities, which shall include the cost of furnishing, unloading, hauling, handling, placing, compacting, finishing the gravels, and of furnishing all labourers and tools necessary for the works under this item.

Land
Grading

(17) The measurement of land grading for payment shall be made for only the area where the land grading has been done in accordance with the Engineer's direction at Site. The payment shall be made at the Rate provided in the Bill of Quantities, which shall include the cost of tools, labourers and materials necessary for completing the works under this item including excavation, handling and hauling the excavated materials, placing and spreading in fill, smoothing and finishing the ground surface within the allowance to satisfy the Engineer, and other incidental items of the work. No extra payment shall be made for the extra volumes due to shrinkage, swelling, losses or compaction of soil, increasing or decreasing of volume to cause repairment or additional works.

Installation of
Vine
Trellis

(18) The measurement for payment of the installation of vine trellis shall be made for the area where the vine trellis has been completely installed in accordance with the Drawings or the Engineer's instructions. The payment for this work shall be made at the Rate stated in the Bill of Quantities, which shall include the cost of furnishing and handling all the necessary materials except such materials as timber woods for posts, steel posts, wires and grips that stipulated in Clause 4 of the General Specifications to be supplied to the Contractor by the Employer, of storing and installing the materials including those supplied by the Employer, and of furnishing all necessary labourers, tools and other materials for completing the works under this item. The costs of materials, labours and tools, etc. for providing anti-decay preservation shall also include in the Rate stipulated in the Bill of Quantities. No payment shall be made until the whole Works are judged, in the opinion of the Engineer, to have been completed in one (1) plot.

Installation of
Pumps,
Generator,
etc.

(19) The payment for the installation of pumps, generator and related facilities including the electric facilities shall be made at the Lump Sum prices stated in the respective items of the Bill of Quantities, and no payment shall be made until the respective works are judged, in the opinion of the Engineer, to have been completed and operational. The price shall include the cost of furnishing and handling necessary materials except those stipulated, in Clause 4 of the General Specifications, to be supplied to the Contractor by the Employer, of storing and installing the materials including those supplied by the Employer, and of furnishing labourers, tools and other necessary items therefor.

Painting

(20) Payment for the painting works shall be made at the Lump Sum price entered in the Bill of Quantities, which shall include the cost of all labourers, tools and materials including all surface preparation and making goods such damages as may be caused by other trades and any other items necessary to complete the works under this item.

Others (21) Measurement for payment for each of the items other than the items specifically mentioned above shall be made on the basis of the respective units indicated in the Bill of Quantities. The respective Contract Rate shall include the cost of furnishing all labour, materials, Constructional Plant, plant and appliance, and the performance of all work necessary to complete the works intended to be covered under the items, including minor works not mentioned but normally deemed to form a part of the works.

TECHNICAL SPECIFICATIONS

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SECTION A EARTHWORKS

Land Clearing

A.01 The Contractor is to clear the parts of the Site, subsequently to be occupied by the Works, in a manner approved by the Engineer. He is to remove all vegetation, all bushes and all trees including all roots, and dispose of them either by burning or at approved locations.

The Contractor shall not clear the Site of or damage any living tree without the written permission of the Engineer. Each tree which the Contractor is permitted to cut down is to be trimmed and the trunks neatly stacked as directed by the Engineer. No timber shall be removed from the Site without the Engineer's authority.

Stripping of Farm Pond and Borrow Area

A.02 After site clearing, surface soil shall be stripped over the whole area between the outer toes of the farm pond earthfill and the land where fill materials are to be borrowed and disposed as directed by the Engineer. The minimum depth of stripping shall be 5 centimeters, unless otherwise directed.

The Engineer may direct deeper stripping to remove soil exposed by the initial stripping, which is in his opinion, unsuitable as a foundation for the earthfill or as fill material.

Excavation- General

A.03 All excavation shall be carried out to the lines and levels shown on the Drawings or to such lines and levels as the Engineer may direct. The Contractor shall trim all permanent excavations to the levels and dimensions shown on the Drawings.

Before commencing excavation, the Contractor shall survey and take levels over the entire area in which excavation is to be carried out. The surface levels so determined shall be subject to the Engineer's Approval, and measurement of excavation shall be based upon the approved surface levels.

When any excavation has been taken out and trimmed, the Engineer shall be informed accordingly so that he may inspect the completed excavation, and no excavation shall be filled in or covered with concrete until it has been inspected and the Contractor has been authorized to proceed with the Works.

If from any cause whatsoever excavations other than for concrete work are carried out beyond their true line and level other than at the direction of the Engineer, the Contractor shall at his own cost make good to the required line and level with approved material and in such a manner as the Engineer may direct.

If from any cause whatsoever excavations for concrete works are carried out beyond their true line and level other than at the direction of the Engineer, the Contractor shall at his own cost fill in to the required line and level with concrete similar in grade to that intended to be used in the true excavation unless otherwise directed.

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| Excavation
for
Structures | A.04 Excavation for foundation work shall be carried out in a safe manner and to the lines and levels shown on the Drawings or to such lines and levels as may be approved by the Engineer. Firm foundations are to be achieved by moistening and tamping if necessary. |
| Excavation
for Trenches
of Irrigation
Pipelines | A.05 Excavation for trenches of irrigation pipelines shall be made in accordance with Clause A.03 hereof, and excavation is to be executed in such a manner as shown on the Drawings or as directed by the Engineer. |
| Excavation
for Farm
Pond and
Drainage
Canals | A.06 Excavation for farm pond and drainage canals shall generally be carried out in accordance with Clause A.03 hereof, and excavation is to be executed in such a manner as to ensure that the side slopes, as shown on the Drawings, are not in any way endangered by undercutting. The Contractor may propose slight modifications to the side slopes for farm pond and drainage canals shown on the Drawings provided that the sectional area of the canal is maintained and the proposed slope is stable. |
| Disposal of
Materials | A.07 Except as otherwise specified, all suitable materials excavated in the construction of farm pond and drainage canals or structures shall be used in the construction of adjacent embankments. If there is an excess of materials in the excavation, it shall be used to strengthen the embankments in a manner approved by the Engineer. |
| <p style="margin-left: 40px;">Materials removed in excavation and not suitable for embankment construction and any suitable material not required for embankments or for embankment enlargement may be disposed at approved locations. The Contractor shall trim and regulate the spoil tips to profiles and to levels as directed by the Engineer.</p> | |
| Backfilling-
General | A.08 No excavations for foundation work shall be backfilled before they have been inspected by the Engineer. Backfilling shall, unless otherwise specified, be carried out with approved materials and shall be well compacted in 15-centimeter layers compacted thickness to the satisfaction of the Engineer. Topsoil, vegetation or other organic material shall be excluded from backfilling material. |

Backfilling for Trenches of Irrigation Pipelines A.09 Trenches of irrigation pipelines shall be backfilled after completion of the field test as directed by the Engineer. Backfilling shall be carried out in accordance with Clause A.08 hereof. Backfill is to be executed such a manner as to deposit material without any damage to the pipe and to fill completely all spaces surrounding the pipe. The material shall be compacted in 7.5-centimeter layers compacted thickness below the crown of the pipe and in 15-centimeter above the crown of the pipe, to the satisfaction of the Engineer.

Fill Adjacent to Structures A.10 Fill materials adjacent to structures shall be placed in such a manner as will ensure that they can be satisfactorily compacted without damage to the structures. Compaction adjacent to all structures shall be carried out by hand or by a suitable hand operated plant.

Unless otherwise specified, no fill material shall be placed and no compaction shall be permitted adjacent to concrete for fourteen (14) days after the placing of the concrete.

Compaction of backfilling material placed above buried concrete, however mature, shall not be permitted to be carried out with vibrating rollers within 0.5 meter vertically of the surface of the concrete, except with the prior approval of the Engineer.

Foundation Preparation for Earthfill of Farm Pond A.11 Foundation where earthfill for farm pond is to be built shall be stripped in accordance with Clause A.02 hereof, and suitably prepared for placing fill. Test pits, trenches and cavities made for the removal of unsound foundation materials or for the inspection of subsurface foundations shall be filled with selected material and properly compacted as directed by the Engineer.

Foundation material which, in the opinion of the Engineer, has insufficient density in its undisturbed condition shall be moistened and compacted by means of compaction equipment or shall be removed and refilled as directed by the Engineer.

The foundation surface under earthfill shall be scored with a plow or ripper making open furrows not less than 20-centimeters deep below natural ground surface at intervals of not more than one (1) meter. This scarified foundation surface upon which compacted fill will be placed shall be moisture-conditioned immediately prior to placing of fill.

No material shall be placed on any portion of earthfill foundations until such foundations have been approved by the Engineer for placing fill.

Foundation Preparation for Earthfill of Farm Road A.12 No special treatment will be required for the foundation where earthfill for farm road is to be build unless otherwise directed by the Engineer. No filling shall be made until such foundation has been inspected and approved by the Engineer for placing fill.

Fill for Farm Pond A.13 Earthfill for farm pond are to be formed of fine material, no particles of which sizes are greater than 5 centimeters. The material shall be free from clay lumps, organic or perishable matter and is to be obtained from the adjacent borrow area or as otherwise directed by the Engineer.

Placing of material shall be in layers not exceeding 15- to 20-centimeters compacted thickness as directed by the Engineer. Compaction shall be carried out at a moisture content directed by and to the satisfaction of the Engineer.

Fill for Farm Road and Approach Road A.14 Unless otherwise specified, material for farm road shall be free from clay lumps, vegetable matter and perishable material. Lumps of earthy material shall be broken down to such a size that they will not interfere with the compaction of the material. The material shall be obtained from the adjacent excavation, borrow area or as otherwise directed by the Engineer.

Compaction shall be carried out by means of compaction equipment approved by the Engineer. All compaction equipment must operate over the whole area to ensure uniform compaction. All filling shall be compacted in layers of not greater than 20 centimeters compacted thickness, or such other thickness as may be approved by the Engineer. Longitudinal and transverse joints in any two successive layers shall be staggered by a minimum distance of 3.0 meters.

Finish of Earthfill A.15 The side slopes of all earthfill are to be in accordance with those shown on the Drawings or such other slopes as may be approved or ordered by the Engineer.

The finished surface of the top and sides of the earthfill shall present an even and neat appearance. The alignment, bank heights and regularity of surface shall be to the satisfaction of the Engineer and shall be trimmed as necessary.

Borrow Area A.16 The Contractor shall make arrangements for obtaining fill materials from the borrow area. The borrow area may be the land adjacent to the place of the earthfill, but no excavation shall be made within 2 meters from the toe of the earthfill. Before excavation of any borrow pit the Contractor shall submit to the Engineer details of his proposed lengths, widths and locations of borrow area, and shall not proceed the Works until the Engineer's Approval thereto is obtained or until such modification has been made as the Engineer may order. The borrow area shall not be excavated more than 25 centimeters from the original ground surface.

The Contractor shall leave all borrow areas in a tidy and natural state, and he shall ensure that they are self-draining at all times and do not constitute a danger to health.

Gravel
Pavement for
Farm Road
and Approach
Road

A.17 Materials for road pavement shall be graded gravel consisting of a natural mixture of hard, durable particles of coarse aggregate, sand and silt. The materials shall be relatively free from soft particles and excess clay, and shall be uniformly graded so that it can be compacted into a hard and dense mass. Unless otherwise approved by the Engineer, no particles of greater than 25 millimeters in size shall be included in the materials, and fine materials passing 0.074 millimeters sieve shall not exceed 15% of the material in weight.

The materials shall be spread longitudinally and compacted separately in uniform layers to produce the correct finished thickness. Care shall be taken to ensure that no segregation occurs. Compaction of the materials shall be made at the moisture content approved by and to the satisfaction of the Engineer. The surface of the metalling shall be formed so that the finished surface is true to the line and the level without appreciable irregularity.

Land
Grading

A.18 The land grading shall include the supply of all labourers, materials and tools, excavating, hauling and filling the excavated soils, planning and finishing the ground surface, and other incidental operations pertaining to land grading works as directed by the Engineer.

The land grading operation shall generally include the followings:

- (1) Cut of high places, haulage, fill in low places in each land-grading plot to adjust the inclinations and levels in each plot as directed by the Engineer.
- (2) Cut, haulage, heaping of suitable materials for construction of roads and any other embankments extracted from land grading plot as directed by the Engineer.
- (3) Planning and finishing to remove any difference in levels and to obtain a surface totally smooth and inclined to the satisfaction of the Engineer.

SECTION B CONCRETE WORKS

Cement

B.01 The Cement to be used throughout the Works shall be ordinary Portland cement and shall be provided to the Contractor by the Employer. The Portland cement shall comply with the requirements of B.S.12 "Ordinary Portland Cement" or its equivalent.

The cement shall be packed in paper bags sufficiently strong to withstand rough handling and each bag shall contain net 50-kilogrammes cement.

Storage of Cement on the Works

B.02 Immediately after the cement is handed over to the Contractor, it shall be stored in a dry, weathertight, properly ventilated structure, to adequately prevent absorption of moisture. The Contractor's method of handling and storing cement shall be subject to the approval of the Engineer.

Concrete Aggregate

B.03 All concrete aggregates are to be obtained from sources approved by the Engineer. They shall be free from earth, clay, chalk, lime, loam, soft clayey shaley or decomposed stone, vegetable and organic matter and other impurities. The stone shall be hard and dense.

Coarse Aggregates

B.04 The nominal sizes of the coarse aggregate in structural concrete shall be 38 millimeters, except where otherwise specified. The coarse aggregate, as far as practicable, shall conform to the following grading requirements:

Percentage by Weight Passing B.S. Sieves

B.S. 410 Test Sieve	Nominal Size of Graded Aggregate
	38 mm to 5 mm
76.20 mm	100
63.50 mm	-
38.10 mm	95 - 100
19.05 mm	30 - 70
12.70 mm	-
9.52 mm	10 - 35
4.76 mm	0 - 5

Fine
Aggregate

B.05 Grading of the fine aggregate as delivered to the mixer, as far as practicable, shall conform to the following requirements.

Percentage by Weight Passing B.S. Sieves

B.S. 410 Test Sieve	Grading Zone 2
9.52 mm	100
4.76 mm	90 - 100
2.40 mm	75 - 100
1.20 mm	55 - 90
0.60 mm	35 - 59
0.30 mm	8 - 30
0.15 mm	0 - 10

Storage of
Aggregates

B.06 Provision shall be made on the site for the separate storage of fine and coarse aggregates, as well as of each size of coarse aggregate, in such a manner as to avoid the contamination of the concrete by foreign material and to prevent segregation and excessive breakage; stockpiles shall be provided with suitable drainage facilities to ensure, as far as practicable, that the aggregates delivered to the batching equipment shall have the uniform and stable moisture content directed by the Engineer. Aggregates shall, during not weather, be covered to protect them from the direct rays of the sun.

Mixing
Water

B.07 Water for mixing concrete, mortar, and rendering shall be subject to the approval of the Engineer. It shall be clean, fresh and free from oil, acid, alkali, sugar and vegetable substances, and it shall, be free of organic or inorganic matter in solution or suspension in such amount that it may impair their strength, appearance of durability.

Concrete
Mixer

B.08 Concrete shall consist of cement, graded aggregates and water thoroughly mixed and compacted to provide strengths as detailed below.

Type of Concrete Mix	Maximum Size of Aggregate	Specified Compressive Strength at 28 Days
1 : 2 : 4	38 mm	180 kg/cm ²
1 : 3 : 6	38 mm	120 kg/cm ²

Type of concrete mix is indicated by the volumetric proportions of cement, fine aggregate and coarse aggregate. The mix proportions shown in the table above are given as a guide to the mixes ordinarily needed to achieve the specified strengths and shall not relieve the Contractor of the responsibility to obtain the specified strengths.

Batching	B.09 The aggregates and cement may be proportioned by volume in accurately calibrated gauge boxes unless otherwise directed by the Engineer.
Mixing Concrete by Machine	<p>B.10 The materials for concrete shall be mixed in an approved mechanical mixer. The mixing time for each batch shall not be less than the minimum mixing time, shall not exceed three (3) times the minimum time, and shall be constant for a series of batches of concrete for a particular structure.</p> <p>The mixer shall not be loaded beyond their rated capacity, nor shall they be operated at a speed in excess of that recommended by the manufacturer. They shall produce a concrete of uniform consistency and appearance, at a continuous rate approved by the Engineer.</p> <p>All mixing equipment shall be clean before commencing mixing, and shall be kept free from set concrete.</p>
Mixing Concrete by Hand	B.11 Where it is not possible to employ machine mixing and approval has been obtained from the Engineer, concrete shall be mixed by hand, as near as practicable to the site where it is to be deposited. Clean mixing bankers or platforms of sufficient areas for the proper execution of the Work shall be provided. These platforms if constructed of timber shall consist of planks closely jointed so as to avoid the loss of any grout or liquid from the wet concrete. The whole of the aggregate and cement shall be turned over on the banker in a dry state at least twice. The water shall then be added gradually through a rose head, after which the materials shall again be entirely turned over in a wet state at least three (3) times before leaving the banker.
Protected Concreting in Unfavorable Weather	B.12 No concreting will be allowed in the open during storms or heavy rains. All concreting materials and plant are to be adequately protected against the effects of heavy storms and strong winds.
No Partially Set Material to be Used	B.13 All concrete and mortar must be placed and compacted within 30-minutes of its being mixed: no partially set material shall be used in the Work.
Depositing Concrete	B.14 The arrangements for placing concrete are to be such that in all cases the material may be conveniently handled and placed in the required position as directed by the Engineer without re-handling or segregation. Wherever possible the concrete is to be deposited from bottom opening skips and in all cases shall be deposited in layers of such depth that each layer can be easily incorporated with the layer below with the use of internal vibrators or by spading, slicing, and ramming. Concrete shall not be delivered by chute or dropped from barrows or otherwise handled through a height greater than 1.5 meters except with the approval of the Engineer who may order the concrete to be dropped on to a banker to be turned over by hand before being placed.

The area on which any concrete is to be deposited must be made and maintained free from standing water during concreting operations unless otherwise approved. Running water crossing or entering such areas must be brought under control before concreting proceeds.

Concrete in reinforced concrete work shall be deposited in small quantities in a plastic state with a water cement ratio to give the specified strength. The depositing of concrete in individual member shall be continued without stoppage up to an approved pre-arranged construction joint or until the member is completed and shall be finished off in such manner that the junction of members shall be monolithic unless otherwise specified.

Compaction
of Concrete

B.15 Concrete shall, during placing, be compacted by vibrators or any other compaction tool of approved type. Compaction shall continue until the concrete being placed shall be judged to be compacted by the appearance of a blistering and even surface except for slight irregularities where the coarse aggregate break through. All air shall this time be expelled.

Curing and
Protection

B.16 The Contractor shall take adequate measures to ensure that the concrete is cured. These shall include covering the concrete with burlap matting or other effective means which shall be kept damp continuously for a minimum period of three (3) days after casting or for such other time as the Engineer may direct. After removal of this covering, the concrete shall then be sprayed with water for a minimum period of a further seven (7) days. Other methods of preventing the water of hydration in the concrete from evaporating may be used with the approval of the Engineer.

All concrete liable to be affected by running water or wave action shall be adequately protected from damage during the setting period and all temporary protective works shall be erected to the satisfaction of the Engineer.

Embedded
Items

B.17 Before placing concrete, care shall be taken to determine that all embedded items are securely fastened in place as shown on the Drawings or as otherwise directed. All embedded items shall be thoroughly clean and free from oil and other foreign matter, such as loose coatings of rust, paint, scale, mortar, etc. The embedding of wood in concrete shall be prohibited unless specifically authorized.

Any pipelines or other materials embedded in structures under the Contract, as construction expedients, shall conform to the above requirements and upon completion of their use, shall be backfilled with concrete at no extra cost to the Employer.

Formwork

B.18 Forms shall be used, wherever necessary, to confine the concrete and shape it to the required lines. All exposed concrete surface having slopes steeper than 1:1 shall be formed, unless otherwise directed or approved by the Engineer.

Forms shall be simple; they shall be rigidly constructed of approved materials and shall be braced and struttred to withstand the pressure resulting from placing and vibrating the concrete, constructional loads, wind and other forces without appreciable deformation.

Surfaces of the forms to be in contact with concrete shall be free from adhering foreign matter, projecting nails and the like, grooves, splits or other defects. Shutting boards shall be carefully jointed and so arranged as to be able to swell under the influence of humidity of the concrete, without causing any deformation to the forms. Interstices shall be properly filled with glazier's putty and the water-proofing of the forms shall be sufficient to prevent escape of cement resulting from excess of water in the concrete. However, paper tamping shall not be used unless otherwise approved by the Engineer.

A non-staining commercial mineral oil or other approved material shall be applied to the faces of the forms before concreting to prevent adherence to the concrete. Care must be exercised to prevent the material applied to the faces of the forms from coming in contact with the reinforcement, but if this should inadvertently occur, the reinforcement must be cleaned.

When forms have been built and have been prepared ready for concreting, they will be inspected by the Engineer and no concrete shall be placed until the forms have been approved by him. In order to avoid delays in obtaining approval, the Contractor shall inform the Engineer, at least 24 hours in advance, of his intention to have the forms ready for inspection.

The Contractor shall take full responsibility that the proper time has elapsed for the concrete to attain sufficient strength before forms are removed. Nevertheless, the forms shall not be struck without the prior approval of the Engineer, and in any case at least three (3) days shall elapse before forms are struck.

Connections shall be so formed as to permit the easy removal of the forms without hammering, etc., and without the necessity of levering against the surface of the concrete.

Reinforcing
Bar

B.19 Reinforcing bar for concrete shall be deformed not-rolled milled steel bars complying with B.S. 4449 Part 1., or its equivalent, and shall be supplied to the Contractor by the Employer as required.

The Contractor's method of handling and storing reinforcing bars shall be subject to the approval of the Engineer.

Placing of
Reinforcing
Bar

B.20 The number, size, form and position of all reinforcing steel bars, fabric, ties, links, stirrups and other parts of the reinforcement are to be placed in exact accordance with the Drawings and kept in the correct position in the forms without displacement during the process of vibrating, tamping and ramming the concrete in place. The Contractor shall provide all necessary distance pieces and space bars at his own cost to maintain the reinforcement in the correct position. Any ties, links or stirrups connecting the bars shall be taunt so that the bars are properly braced, the inside of their curved parts shall be in actual contact with the bars around which they are intended to fit. Bars shall be bound together with the best black annealed mild steel wire which is subject to the Engineer's approval, and the binding shall be twisted tight with proper pliers. The free ends of the binding wire shall be bent inwards.

The Contractor shall provide, at his own cost and to the approval of the Engineer, working drawings of all reinforcement accompanied by bending schedules and copies of the orders placed for bars.

Before any steel reinforcement is embedded in the concrete any scale, loose rust, oil, grease or other deleterious matter shall be removed. Partially set concrete which may be adhering to the exposed bars during concreting operations shall likewise be removed.

When reinforcement bar has been placed and is ready for concreting, it will be inspected by the Engineer and no concrete shall be placed until the reinforcement has been approved by him. The Contractor shall inform the Engineer at least 24 hours in advance of his intention to have the reinforcement ready for inspection.

The minimum concrete cover of reinforcement bar measured from the outside of the bar shall be 3 centimeters.

Precast
Concrete
Pipes

B.21 Concrete pipes to be used for the construction of culverts, etc. shall be reinforced concrete pipes and shall be of type shown on the Drawings. The pipes shall be substantially free from fractures, large or deep cracks and blisters, laminations and surface roughness. The planes of the ends of the pipe shall be perpendicular to the longitudinal axes. The ends of the pipe shall be so formed that when the pipes are laid together and joined, they will make a continuous uniform line of pipe with a smooth and regular interior surface. The joints shall be of such design as will permit effective jointing to reduce leakage and infiltration to a satisfactory minimum and to permit placement without appreciable irregularities in the flow line.

Laying and
Jointing
Concrete
Pipes

B.22 The trench for laying concrete pipes shall be carefully excavated to the required lines and levels shown on the Drawings or to such other lines and levels as the Engineer may direct. The sides of excavations shall be supported where necessary, to ensure their stability; if, for any reasons, portions of a trench whether supported or unsupported should give way, the Contractor shall excavate and remove, at no extra cost to the Employer, all such disturbed ground until the trench is to the satisfaction of the Engineer.

In laying concrete pipes, the pipes of the sizes and dimensions specified shall be placed carefully so that they will contact firmly to the foundation, and shall be jointed smoothly with other pipes; pipes shall be placed so that the sockets or collars face up grade. Joint sections of pipes shall be caulked with cement mortar consisting of one part of cement and three parts of sand by volume so that water will not leak.

Unless specified otherwise, backfilling shall be carried out with excavated material; the initial backfilling around pipes and to a height of 30 centimeters above the crown of the pipes shall be rammed by hand and shall contain no rock or other hard material likely to damage the pipes or joints; subsequent backfilling shall be mechanically or by hand rammed up to the original ground surface.

Plastering

B.23 Plastering shall be made by using the cement mortar which is specified in Clause C.02 as shown on the Drawings or as the Engineer may direct.

The surfaces which are to receive plastering shall be free from all laitance, scum, loose carbonate scale, loose aggregate, dirt and other foreign matters. Concrete block or brick surfaces shall be sufficiently and uniformly dampened immediately before the application of mortar. Concrete surfaces shall be kept thoroughly wet for 24 hours prior to the application of mortar. Cement mortar shall be used within 30 minutes from the time of mixing. Retempering shall not be permitted.

Where expansion and control joints exist in the base structure, provision shall be made to prevent cracking of the cement mortar by inserting metal expansion beads within the coating thickness in a manner approved by the Engineer.

The finished surface shall be perfectly plumb or level as the case may be except where otherwise specified without any bulging, runs, bruises or stains.

After application of the finishing coat, the surfaces shall be kept continuously damp for not less than 48 hours, and then allowed to become thoroughly dry. Moistening shall be started as soon as the surface has hardened sufficiently not to cause displacement or damage.

SECTION C BRICK WORKS

Bricks

C.01 All bricks shall be of the best quality of their respective kinds; they shall be hard, square, sound, thoroughly well burnt, true to shape, uniform in size, shape and texture, free from lime and hair cracks with well defined arises, uniform in colour, and clean. They shall be obtained from manufacturers approved by the Engineer. The porosity shall in no case exceed 20% by weight but in the case of engineering bricks not more than 5% will be allowed. Facing bricks shall, except where otherwise directed, be approved red engineering bricks of the best quality; they shall be of slightly larger dimensions than the brick used for internal work in order to allow neat joints to be formed on the face. Before any order for bricks is placed by the Contractor samples must be submitted to the Engineer for his approval, together with the name of the manufacturer. Any consignment of bricks delivered on the Works must be equal in every respect to the approved samples submitted. Hand labour shall be employed in discharging and stacking bricks on delivery. No broken, chipped or bats shall be brought on to the Site.

Cement Mortar

C.02 Cement mortar for brick works shall be, unless otherwise specified, Portland cement and sand mixed in the volumetric proportion of 1:3. The size of sand shall be less than 2.5 millimeters. The constituent materials shall be accurately gauged and mixed in an approved manner.

The cement mortar shall be made in small quantities only as and when required, and any mortar which has begun to set or which has been mixed for a period of more than one hour shall be rejected.

Wet Brick Masonry

C.03 Wet brick masonry work shall be built in level courses with bricks of the quality or description specified and to the dimensions shown on the Drawings. Walls are to be carried up in a uniform manner and no one portion raised more than one (1) meter above another at one time, the open end being racked up and no toothed. All perpends are to be kept strictly plumb and square and the whole properly bonded together so that there are no continuous vertical joints through any two courses of brick work. No broken bricks will be allowed except where necessary to form proper bond. The net brick masonry, where one brick thick or over, shall, unless otherwise directed, or approved, be laid in English bond. All arching, inverting and circular lining is to be built in rings 10-centimeters thick.

Immediately before use bricks are to be immersed in fresh water and thoroughly wetted to the satisfaction of the Engineer; before continuing partly completed work, the exposed bed shall likewise be wetted. All beds and joints are to be completely filled with cement mortar notwithstanding any local or common custom to the contrary. All brick works are specified to be pointed unless otherwise specified. The face joints shall be raked out to a depth of two (2) centimeters and later refilled with the mortar specified by the Engineer for each individual case and ironed in to give a neat finished surface. Faces of brick work due to be plastered shall have joints raked out and left open to form a key for plastering. All face works shall be built from scaffolding on the outside and in no case shall face work be built overhand unless specially authorized by the Engineer. The brick faces of all arches are to be cleaned off after the centres have been struck and the joints left flush with the face.

The laying of brick work is not to be carried out during storms or heavy rain.

Dry Brick
Masonry

C.04 Dry brick masonry shall be performed at the location, with thickness and in a manner as shown on the Drawings or as directed by the Engineer. Bricks used for dry brick masonry shall be of the quality for wet brick masonry specified in Clause C.01 or as directed by the Engineer.

Bricks shall be placed so that firm foundation is achieved to the satisfaction of the Engineer.

No broken bricks shall be allowed except where necessary to form proper bond. The manners and methods of placing bricks shall be those directed by the Engineer.

SECTION D PIPE WORKS FOR IRRIGATION PIPELINE

General D.01 Rigid polyvinyl chloride (PVC) pipes as well as necessary equipment and fittings to be installed for irrigation pipelines such as Main Irrigation Pipeline, Branch Irrigation Pipelines shall be supplied to the Contractor by the Employer free of charge. These equipment and materials are listed in the General Specifications.

PVC pipe will comply with VP (10 kg/cm²) of JIS K 6742 (Rigid Polyvinyl Chloride Pipe) and with VU (5 kg/cm²) of JIS K 6742 as shown on the Drawings. The fitting of pipe will comply with JIS K 6743 (Rigid Polyvinyl Chloride Pipe Fitting for Water Works) as solvent welding socket (TS joint).

The installation of irrigation pipelines shall be carried out in accordance with the details shown on the Drawings and the instruction given by the Engineer.

Pipe Bedding D.02 The Contractor shall lay pipes not less than 100 centimeters below the ground surface as shown on the Drawings or as directed by the Engineer. The bedding material of sand below the pipes shall be placed in accordance with the Drawings and shall be well compacted to the satisfaction of the Engineer.

Pipe Jointing D.03 Before the pipes are jointed together, the Contractor shall inspect for any damage to the pipes and clean the inside and outside parts of the pipe ends and the joints as directed by the Engineer. If a TS joint is used, adhesive shall be applied to the pipe to be carefully inserted into the TS joint and held for 30 to 50 seconds.

Excavation and Back-filling for Trenches D.04 Excavation and backfill of trenches shall be carried out in accordance with Clauses A.05 and A.09, respectively.

Installation of Appurtenance D.05 The Contractor shall install appurtenance such as air valves, sluice valves and hydrants under the instruction of the Engineer.

Field Testing D.06 Before backfilling trenches, all pipelines and their appurtenance shall be tested at the Site to ensure proper water tightness. Field tests shall be performed by the Contractor under the direction of the Engineer. The Contractor shall prepare all necessary instrument required by the Engineer for the proper testing of pipelines.

The maximum allowable quantity of leakage per one (1) centimeter of diameter and one (1) kilometer of length shall be 100 liter/day in the pipeline.

Defects found from the above-mentioned tests shall be investigated and shall be repaired immediately at the expense of the Contractor.

After the water conduction tests, the pipelines shall be drained completely and carefully to a safe place such as drainage canal by the Contractor with the approval of the Engineer.

SECTION E CARPENTRY AND JOINERY WORKS

Materials

E.01 Timber shall be of suitable kinds for the purposes and the best grade of each kind which are available locally. Selection of timber shall be subject to the approval of the Engineer.

All timber shall be well-seasoned and shall be free from large knots, flows, shakes or blemishes of any kind. Timber with loose, rotten or deek knots will not be accepted. Sawn timber shall have the shape and size shown on the Drawings; twisted or warped materials shall not be used.

Timber that splits, shrinks or warps after construction from want of seasoning, unsoundness or bad workmanship shall be removed and replaced at Contractor's expense.

The whole of the timber stored on the Site must be protected from the weather and properly stickered and stacked to afford free circulation of air around all faces.

Workmanship

E.02 All work, whether factory made or job made, shall be executed by qualified workmen, well skilled in the trade, and shall be strongly, neatly and accurately fitted, framed and finished throughout, in keeping with the best trade practice.

All work shall be accurately spiked, nailed, anchored, strapped or bolted, using hardware of ample gauge and length. All finishing lumber shall be secured with approved quality finishing nails, well and truly set.

Running members shall be in the longest lengths attainable, aligned and carefully matched for grain and colour.

Mechanical and electrical work shall be checked so that important framing timbers shall not be cut. The wood members shall be properly framed together so that pipe shall run between them.

Wood members not to be painted and having direct contact with concrete or cement mortar shall receive a coat of approved wood preservative.

Joinery Works

E.03 Fabrication of all joinery work shall comply with the best practice of the trade in the region and the joiner shall ensure that all weatherings and throatings are properly executed.

Framed work shall not be wedged or pinned until immediately prior to fixing.

Mortise and tenon joints shall be wedged up solid and projecting pins not flushed off until ready for fixing.

Nails shall be punched and puttied, and skirtings, door frames and all other joinery accurately scribed to fit the contours against which they abut. Dimensions for built-in work shall be checked on the building structure, and tolerances shall be provided at connections to compensate for irregularities. The Contractor shall provide and maintain temporary covers as necessary and protect finished work liable to damage.

Wood Doors,
Windows and
Frames

E.04 Before fabricating wood doors, windows and frames, the Contractor shall prepare and submit shop drawings in large scales showing necessary details for approval of the Engineer.

All wood faces exposed to view shall be planed, sanded and putty filled to a smooth surface to receive painting.

Frames shall be fixed to the opening in brick, concrete block or concrete walls using wood wedges, synthetic adhesive, nails and clamps as required. Doors shall be panel door as shown on the Drawings.

SECTION F MISCELLANEOUS WORKS

Electrical Works

F.01 The electrical works shall include the installation of a distribution panels, general lighting and wiring for lighting of interior and exterior of the farm house and the pump house, installation of control facilities for the submargible pumping unit and wiring connecting the distribution panel with the generator.

The Contractor shall, when directed by the Engineer, submit shop drawings, catalogs and specifications showing the all necessary details of the equipment not supplied by the Engineer and installation for the approval of the Engineer.

All electrical equipment fixtures and fittings shall substantially be grounded. Adequate size of annealed copper conductor based on the maximum fault grounding current in the circuit shall be used.

The distribution panels shall be mounted on the wall so that the height from the floor to the top of panels will not exceed 180 centimeters.

The necessary equipment and materials for the controlling facilities for the submargible pumping unit shall be provided by the Employer as stipulated in the General Specifications, and the Contractor shall install these equipment and materials in accordance with the Drawings and the Engineer's instruction.

Installation of Pumping Unit

F.02 The irrigation water will be supplied from an existing tubewell, and will be lifted up with a submargible pumping unit to be installed adjacent to the pump house. The lifted water will be once stored and regulated in the farm pond, and will be conveyed to the horticultural farm through pipelines with a delivery pumping unit to be installed in the pump house, in which a generator will also be installed for providing against emergency. Necessary equipment and materials for the pumping unit including generator listed in the General Specifications shall be supplied to the Contractor by the Employer free of charge.

The installation of pumping unit and generator shall be carried out in accordance with the details shown on the Drawings and the instructions given by the Engineer.

The works for the pump house shall include the installation of pumping unit, generator, their accessories and a discharge pipes.

After the installation of the pumping equipment as above, the Contractor shall operate and check for proper operation in the presence and to the satisfaction of the Engineer.

Sub-surface
Drain

F.03 The works for sub-surface drain shall include the processing of perforation on the PVC pipes to be provided by the Employer and laying the processed perforated pipes.

As stipulated in the General Specification, PVC pipes for sub-surface drain shall be supplied to the Contractor by the Employer.

The perforation shall be drilled carefully in accordance with the Drawings or as directed by the Engineer. The processed pipes shall be checked by the Engineer, and if any defects or damages are found, the Contractor shall remove such defective or damaged pipes and shall recover them at his own expense.

The drain trench shall be excavated to the depth, true lines and gradient specified in the Drawings as directed by the Engineer, and the trench bottom shall be shaped to bed, fit and secure drain pipes.

The perforated pipes are to be laid to a true line and gradient on a firm bed free from loose soil. Pipes are not to be laid on soil backfill, and are to be securely positioned to avoid displacement before and during filling filter materials and back-filling the trench.

The sub-surface drains shall be aligned generally perpendicular to collector drains at an average depth of 0.85 meter below ground surface.

The filter materials shall be well graded natural gravel or broken stones conforming to the direction of the Engineer, and shall be free from clay or other deleterious material which will lead to clogging and reduce the permeability of the filter. Care shall be taken to avoid mixing earth, etc. with the filter material which are to be carefully placed immediately around the perforated drain pipes to the specified depth, and in such a way that the pipes are not damaged or displaced.

After the pipes have been laid and filter materials fixed, pipe trenches shall be carefully backfilled with excavated material placed in such a way that the pipes are not damaged and displaced. The material shall be compacted to such an extent as to prevent the passage of water from the ground surface to the pipe and gravel filter in irrigation practice. The fill material shall be placed in two (2) layers and shall be compacted in each layer to produce a dense backfill. All trenches are to be filled to a level slightly above the surface of the ground to allow the settlement.

Surplus material, not of an injurious nature, is to be spread over the surrounding field or to be placed in embankments upon the approval of the Engineer. In exceptional cases, injurious material such as large stones, roots, etc., likely to damage implements or stock, or of a size and character abnormal to material found on the surface of the field, is to be removed to site approved by the Engineer.

The end pipe shall be unperforated smooth pipe, and its length shall be about three (3) meters. Backfilling for the outlet shall be made with clay or other selected materials. The fill shall be firmly compacted in layers not exceeding 30-centimeters compacted thickness to produce a dense fill and high resistance to piping of fill material for the whole length of an end pipe.

All pipes, joints and fittings shall not be exposed to direct sunlight either by covering them with approved sheet or by storing in a weatherproof building.

Timberwork F.04 Timber used in the permanent works shall be thoroughly seasoned and matured, sound, straight, free from warps, sap, signs of rot, shakes, large and loose knots, worm holes, waness, cracks and other defects and shall be sawn or wrought die square and true on all four sides, or circular, to the scantlings and shapes on the Drawings.

All timber used in the permanent works shall be approved by the Engineer and shall be treated or painted where required as specified.

Timber for use in Temporary Works shall be of sound quality and of adequate dimensions for the work on which it is to be used.

Painting F.05 All paints are to be obtained from a manufacturer or manufacturers approved by the Engineer, and are of a quality that has proved successful in similar situations. Samples of paint are to be submitted to the Engineer for his approval before the paint is ordered, and no paint other than that approved shall be used. All paints and materials for painting shall be used in accordance with the manufacturer's recommendation and as directed by the Engineer.

Installation of Vine Trellis F.06 Vine trellis shall be installed in about 2.7 ha of the horticultural farm as shown in the Drawings or as directed by the Engineer. The necessary materials such as wooden and steel poles, wires, anchors and grips and ties shall be supplied to the Contractor by the Employer.

The Contractor shall install and assemble such supplied materials carefully in accordance with the Drawings and the instruction given by the Engineer, and, if during such installation and assembling any damages or defects are given to the supplied materials or parts due to the Contractor's default or misoperation, he shall replace, recover and make them good at his own expense immediately to the satisfaction of the Engineer.

Before the installation of vine trellis, the Contractor shall provide the proper anti-decay preservation using creosote to the supplied wooden poles. The manners and methods of processing the supplied wooden poles shall be directed and instructed by the Engineer. Cutting and shaping of the wooden poles shall also be made by the Contractor in accordance with the Drawings or as directed by the Engineer.

The vine trellis shall be installed in accordance with the Drawings or as directed by the Engineer. Care shall be taken of erection of the wooden poles. Cobble stone foundation shall be provided in order to prevent the erected poles from sinking by grape load. Manners and procedures of the installation shall strictly conform to the Engineer's instruction and direction.

Fencing
Works

F.07 The works covered by the fencing works shall be the shaping of the supplied timber wood, the provision of anti-decay preservation, the erection of the fence poles, and the fixing of verbed wire. The Contractor shall furnish all labourers, carpenters, materials and tools necessary for carrying out the above works in accordance with Drawings or as directed by the Engineer except the timber wood which shall be supplied to the Contractor by the Employer in the Clause 4 of the General Specifications. The Contractor shall, in advance, submit to the Engineer, for his approval, samples and catalogues of the materials, except those to be supplied by the Employer, which the Contractor intends to incorporate into the works under this item. The excavation and lockfill for this work shall conform to the Clause in Section A of the Technical Specifications.

BILL OF QUANTITIES

CONTRACT
FOR
THE CONSTRUCTION OF DEMONSTRATION FARM
IN
THE NEPALGUNJ SUB-CENTER

BILL OF QUANTITIES

PREAMBLE

- (1) This Bill of Quantities shall be read in conjunction with the Instructions to Tenderers, the General Conditions, the General Specifications, the Technical Specifications and the attached Drawings. The Tenderer shall be deemed to have acquainted himself with the detailed description of the Works to be done and the way in which they shall be carried out and the requirements and standards of the finished works.
- (2) The quantities set down against the items in the Bill of Quantities are an estimate of the quantity of each kind of work included in the Contract and are given solely for the convenience of forming a common basis for Tenders. They shall not be taken as the actual and the correct quantities of the Works to be executed under the Contract.
- (3) The quantities shall therefore not be considered as representing the final measurements, it being the intention of the Contract (except where otherwise specifically stated) that all works embraced therein shall be measured upon completion by the Engineer or the Engineer's Assistant and paid for at the Prices and Rates quoted in the Bill of Quantities by the Contractor.
- (4) Payment against all Lump Sum items will be made at the time of progress payment, except where otherwise specified, by the equal installment spread over the period during which the relevant works shall be executed and completed under the Contract.
- (5) The whole cost of complying with the provisions of the Contract shall be included in the items provided in the Bill of Quantities, and where no items are provided shall be deemed to be distributed amongst the Rates and Prices for the related items of the Works.
- (6) The Contract Rates and Lump Sum Prices in the Bill of Quantities shall be expressed in Nepalese Rupees, and shall, except insofar as it is otherwise provided include all labor, constructional plant, materials, erection, maintenance, supervision, insurance, profit, together with all general risks, liabilities and obligations set forth or implied in the Contract.
- (7) If there is any discrepancy between the Rate and the Amount entered for any item in the Bill of Quantities, the Rate shall be taken as correct.

- (8) Except where clearly indicated to the contrary in an item in the Bill of Quantities or in the Specifications, all measurements shall be net in accordance with the Drawings with no allowance for waste.
- (9) Any additional labor, transport or materials required to make good defective work or used in repair or maintenance shall be at the expense of the Contractor and shall not be taken into account when determining the sum to be paid for each item or section of the Works.
- (10) If during the execution of the Works any item of the Constructional Plant in the opinion of the Engineer shall be unsuitable for the execution of the Works, the Contractor shall replace such plant with other suitable plant at his own cost, and until the replacement has been satisfactorily made the Employer may withhold from subsequent payments a sum representing such portion of the monies as the Engineer shall certify to be reasonable.
- (11) The following abbreviations have been used in the Bill of Quantities.

m ³	.....	Cubic meter
m ²	.....	Square meter
m	.....	Linear meter
kg	.....	Kilogram
%	.....	Per cent
Dia.	.....	Diameter
ha	.....	Hectare
L.S.	.....	Lump Sum

BILL OF QUANTITIES

SUMMARY

Section	Total for Local Currency (Rs)
SECTION I : GENERAL ITEMS	
SECTION II : PUMPING FACILITIES	
SECTION III : FARM POND	
SECTION IV : PIPELINE IRRIGATION SYSTEM	
SECTION V : DRAINAGE FACILITIES	
SECTION VI : ROADS	
SECTION VII : LAND GRADING	
SECTION VIII : VINE TRELLIS	
SECTION IX : FARM HOUSE	
Grand Total	

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
	SECTION I: GENERAL ITEMS				
I.1	Maintenance of access road during the period of the works	L.S.			
I.2	Construction, maintenance and subsequent removal of Contractor's staff quarters, offices, stores, workshops and temporary fencing	L.S.			
I.3	Installation, operation, maintenance and subsequent removal of water and power supply systems for Contractor's staff quarters, office, workshops and work site	L.S.			
I.4	Land clearing	L.S.			
I.5	Assistance of Engineer's staff	L.S.			
Total SECTION I (Carried to Summary)					

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
	SECTION II: <u>PUMPING FACILITIES</u>				
A.	<u>Installation of Equipment</u>				
II.1	Cleaning of existing deep tubewell	L.S.			
II.2	Installation of sub-mergible pump	L.S.			
II.3	Installation of delivery pump	L.S.			
II.4	Installation of generator	L.S.			
II.5	Installation of control panel and electric wiring	L.S.			
	(Sub-total II-A)				()
B.	<u>Pump House</u>				
II.6	Excavation	m ³	7.3		
II.7	Backfilling	m ³	5.3		
II.8	Wet brick masonry	m ³	32.2		
II.9	Dry brick masonry	m ³	4.2		
II.10	Concrete, Type-B	m ³	7.0		
II.11	Cement mortar	m ³	1.4		
II.12	Roofing works	L.S.			
II.13	Window and door	L.S.			
II.14	Electrical works	L.S.			
	(Sub-total II-B)				()
Total SECTION II (Carried to Summary)					

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
	SECTION III: <u>FARM POND</u>				
III.1	Excavation	m ³	616.0		
III.2	Embankment	m ³	420.0		
III.3	Embankment with borrowed material	m ³	1,064.0		
III.4	Backfilling	m ³	40.6		
III.5	Wet brick masonry	m ³	313.6		
III.6	Dry brick masonry	m ³	44.8		
III.7	Concrete, Type-B	m ³	5.6		
III.8	Pipe lying				
	Dia. 100 mm	m	52.5		
	Dia. 80 mm	m	15.2		
III.9	Fencing works	m	91.0		
Total SECTION III (Carried to Summary)					

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
	SECTION IV: <u>PIPELINE IRRIGATION</u> <u>SYSTEM</u>				
IV.1	Excavation	m ³	929.6		
IV.2	Backfilling	m ³	868.0		
IV.3	Wet brick masonry	m ³	9.8		
IV.4	Dry brick masonry	m ³	4.2		
IV.5	Concrete, Type-B	m ³	2.8		
IV.6	Pipe laying				
	Dia. 150 mm	m	258.0		
	Dia. 100 mm	m	324.0		
	Dia. 75 mm	m	127.0		
Total SECTION IV (Carried to Summary)					

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
	SECTION V: <u>DRAINAGE FACILITIES</u>				
A.	<u>Improvement of Belhaniya Stream</u>				
V.1	Excavation	m ³	796.6		
	(Sub-total V-A)				()
B.	<u>Main Drain</u>				
V.2	Excavation	m ³	645.5		
V.3	Embankment	m ³	630.0		
V.4	Embankment with borrowed material	m ³	3,570.0		
V.5	Backfilling	m ³	42.0		
V.6	Wet brick masonry	m ³	19.3		
V.7	Dry brick masonry	m ³	8.3		
V.8	Concrete, Type-B	m ³	13.6		
V.9	Concrete pipe laying Dia. 1,000 mm	m	6.0		
	(Sub-total IV-B)				()
C.	<u>Collector Drain</u>				
V.10	Excavation	m ³	1,778.0		
V.11	Backfilling	m ³	298.0		
V.12	Wet Brick masonry	m ³	14.1		
V.13	Dry brick masonry	m ³	14.0		
V.14	Concrete, Type-B	m ³	21.7		
V.15	Concrete pipe laying Dia. 400 mm	m	32.0		
	Dia. 300 mm	m	42.0		
	(Sub-total V-C)				()
	- to be continued -				

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
D.	<u>Field Ditch</u>				
V.16	Excavation	m ³	214.2		
	(Sub-total VI-D)				()
E.	<u>Sub-surface Drain</u>				
V.17	Excavation	m ³	2,628.0		
V.18	Backfilling	m ³	2,127.0		
V.19	PVC pipe laying				
	Dia. 100 mm	m	2,700.0		
	(Sub-total V-E)				()
Total SECTION V (Carried to Summary)					

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
	SECTION VI: <u>ROADS</u>				
A.	<u>Access Road</u>				
VI.1	Embankment with borrowed material	m ³	1,134.0		
VI.2	Gravel pavement	m ³	378.0		
	(Sub-total VI-A)				()
B.	<u>Main Road</u>				
VI.3	Excavation	m ³	490.0		
VI.4	Embankment with borrowed material	m ³	490.0		
VI.5	Gravel pavement	m ³	441.0		
	(Sub-total VI-B)				()
C.	<u>Secondary Road</u>				
VI.6	Excavation	m ³	210.0		
VI.7	Embankment with borrowed material	m ³	252.0		
	(Sub-total VI-C)				()
Total SECTION VI (Carried to Summary)					

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
VII.L	SECTION VII: <u>LAND GRADING</u> Land grading	ha	4.3		
Total SECTION VII (Carried to Summary)					

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
VIII.1	SECTION VIII: <u>VINE TRELLIS</u> Installation of vine trellis	ha	2.7		
Total SECTION VIII (Carried to Summary)					

No.	Work	Unit	Q'ty	Unit Price (Rs)	Amount (Rs)
	SECTION IX: <u>FARM HOUSE</u>				
IX.1	Excavation	m ³	16.9		
IX.2	Backfilling	m ³	8.8		
IX.3	Wet brick masonry	m ³	54.6		
IX.4	Dry brick masonry	m ³	5.6		
IX.5	Concrete, Type-B	m ³	19.6		
IX.6	Cement mortar	m ³	8.4		
IX.7	Painting works	L.S.			
IX.8	Roofing works	L.S.			
IX.9	Window and door	L.S.			
IX.10	Electrical works	L.S.			
Total SECTION IX (Carried to Summary)					

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