

- d. Supply and works of steel frame truss and all other related materials including welding, riveting, painting, etc.
 - e. Roofing works including supply of all related materials.
 - f. All finishing works including supply and works of cement mortar, and all other related materials.
 - g. Door and window works including hanging door.
 - h. All electric works in the building.
 - i. All water supply works in the building.
 - j. All kinds of necessary works outside of the building including earth works, paving stone works, construction of closets, etc., and any other works related to Garage and Warehouse at Dok Krai.
- (3) Payment for water supply system for Garage and Warehouse at Dok Krai will be made in lump sum under Pay Item 7111 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor water supply system for Garage and Warehouse at Dok Krai including supply and installation of pipes and valves.
- (4) Payment for power supply system for Garage and Warehouse at Dok Krai will be made in lump sum under Pay Item 7112 of the Bill of Quantities, and shall cover all kinds of necessary works to complete out-door power supply system for Garage and Warehouse at Dok Krai including supply and installation of power line cables, conduit pipe, wires, etc., and any other works related.

7109. DOK KRAI COMPRESSOR ROOM

(1) General

- a. The main body of the Dok Krai Compressor Room shall be of the reinforced concrete rahmen structure with steel frame construction of roof truss. Wall of the building shall be of concrete hollow block with sprayed cement mortar, and roofings shall be of the asbestos corrugated cement board.

(2) Concrete Works

- a. All concrete works and hollow concrete block works of this building shall be the same as described in (2) of Clause 7105 "Dok Krai Administration Office" in the Particular Specifications.

(3) Steel Frame Works

- a. All steel works for purline shall conform to the Contract Drawing No. 7404 and "Metal Works" of Division 6 of the General Specifications.
- b. The Contractor shall submit to the Engineer for approval the details of material and manner for painting.

(4) Roofings

- a. Roofings of the building shall be constructed to conform to the Contract Drawing No. 7404, and the item (4) of Clause 9201 "Roofing" of the General Specifications. Materials of the roofing shall be the asbestos corrugated cement board conforming to the item (3) of Clause 9201 "Roofing" the General Specifications.

(5) Finishings

- a. All finishing works inside and outside of the building shall be the same as described in the item (5) of Clause 7103 "Dok Krai Substation" in the Particular Specifications.

(6) Doors

- a. Entrance door of the building shall be of the family ties type with steel structure. The Contractor shall submit to the Engineer for approval the Shop Drawing and manner of painting.

(7) Electric Facilities

- a. Power supply of the building shall be made from the switch board of the Air Chamber Facilities which shall be constructed nearby this building.
- b. All lighting works in the building shall be performed based on the Contract Drawing No. 7405 and Division 8 "Electric Facilities" of the General Specifications.

7110. MEASUREMENT AND PAYMENT FOR DOK KRAI COMPRESSOR ROOM

- (1) Measurement for payment for the building works of Dok Krai Compressor Room shall be the area, measured in square meters.
- (2) Payment for the building works of Dok Krai Compressor Room will be made under Pay Item 7113 of the Bill of Quantities, and shall cover the following items:
 - a. All kinds of foundation works including excavation, fill and backfill, gravel foundation works, etc. for the building.
 - b. All concrete works including supply and works of reinforcing bars, formworks, and all other related materials.
 - c. Hollow concrete block works including supply and works of reinforcing bars, sprayed mortar, plaster paint, and all other related materials.
 - d. Supply and works of steel frame truss and all other related materials including welding, riveting, painting, etc.
 - e. Roofing works including supply of all related materials.
 - f. All finishing works including supply and works of cement mortar, and all other related materials.
 - g. Door and window works.
 - h. All electric works in the building.
 - i. All kinds of necessary works outside of the building including earth works, entrance paving stone works, etc. and any other works related to Dok Krai Compressor Room.
- (3) Payment for power supply system for Dok Krai Compressor Room will be made in lump sum under Pay Item 7114 of the Bill of Quantities, and shall cover all kinds of necessary works to complete out-door power supply system for Dok Krai Compressor Room including supply and installation of powerline cables, conduit pipe, wires, and any other materials.

7111. DOK KRAI CAMP

(1) General

- a. Scope of the Dok Krai Camp construction works shall include construction of nine (9) units of residential houses for operation and maintenance staff and site preparation works around the residential units.
- b. The major construction works consist of construction of residential houses in several grades, access road, parking apron, water supply and sewerage facilities, power supply system and other miscellaneous works.
- c. Supply and installation of furniture for the residential units shall be also within the scope of works of the Dok Krai Camp works.
- d. The descriptions of Clause 7004 of the Particular Specifications shall apply to this Clause.

(2) Building Works

The residential houses to be constructed are listed as follows:

- | | |
|---------------------------|---------------------------------|
| - Deputy Director's house | : Grade 2, 93.03 sq.m, 1 unit |
| - O.M Engineers' house | : Grade 2, 93.03 sq.m, 1 unit |
| - Technicians' house | : Grade 3, 85.50 sq.m, 2 units |
| - Skilled labor's house | : Grade 4, 126.87 sq.m, 3 units |
| - Common labor's house | : Grade 5, 218.40 sq.m, 1 unit |

(3) Land Preparation

The Contractor shall perform land grading and other land preparation works required for preparation of the camp land ready to build the camp facilities.

(4) Road with Drain Ditch and Uncovered Parking Area

- a. Road construction and pavement shall be made based on Section 2300 "Paving" of the General Specifications. The road works consist of the main roads with 6.0 m in effective width and the access roads with 3.0 m in effective width.
- b. The Contractor shall conduct paving works for the road and uncovered parking area in accordance with the Contract Drawings.

(5) Drainage Ditch

- a. The drainage ditches in and around the compound and feeder ditches to the existing river shall be constructed.
- b. The Contractor shall submit to the Engineer for approval the Shop Drawings on the feeder drainage ditches prior to commencement of the works.

(6) Water Supply Works

- a. Water supply to the residential houses shall be made from the branch point of water pipeline to the Dok Krai Administration Office.
- b. The elevated water tank with capacity of approx. 8 cubic meters shall be constructed. The tank shall be connected, with pipe and valves, to water supply pipeline network for camp facilities as well as Dok Krai Administration Office.
- c. The Contractor shall submit to the Engineer for approval the Shop Drawings on the water supply pipelines and necessary appurtenances based on the Contract Drawing No. 7406 "General Plan of Dok Krai Camp".

(7) Sewerage Facilities

Septic tanks and connecting pipes shall be provided and installed in accordance with the Contract Drawings by the Contractor. The Contractor shall submit to the Engineer for approval the Shop Drawings on the sewerage facilities prior to commencement of the works.

(8) Electric Supply

- a. Power supply of the camp facilities will be made from the public power line. Power supply system for the camp shall be separately constructed from other facilities in Dok Krai and shall include transformer, electrical cable networks, switches, and electric meters, etc.
- b. The scope of work of electric facilities for the camp compound includes feeder line from the distribution point mentioned above to the respective facilities including street lamp line, all necessary instruments and materials, their cables and wires, and their installation.
- c. Power-meter (KWH meter) shall be installed in each residence and shall be the acceptable type by the Provincial Electric Authority.

- d. The Contractor shall submit to the Engineer for approval the Shop Drawings on all the electric facilities related prior to commencement of the works.

7112. MEASUREMENT AND PAYMENT FOR DOK KRAI CAMP

- (1) Measurement for payment for the respective residential houses of the Dok Krai Camp shall be the unit of each grade of residence.
- (2) Payment for each grade of residence of Dok Krai Camp will be made under Pay Items 7115, 7116, 7117 and 7118 of the Bill of Quantities, and shall cover all kinds of necessary works for completion of each grade of residence, unless otherwise separately itemized in the Bill of Quantities, including foundation works, earth works, concrete works, construction of building structure, all finishing works, plumbing and electrical works inside of building, external finishing works, supply and installation of furniture, etc. and any other works related.
- (3) Measurement for payment for land grading of the Dok Krai Camp shall be on the lump-sum basis.
- (4) Payment for land grading of the Dok Krai Camp will be made under Pay Item 7119 of the Bill of Quantities.
- (5) Measurement for payment for road paving of Dok Krai Camp shall be the area, measured in square meters.
- (6) Payment for road paving of Dok Krai Camp will be made under Pay Items 7120 and 7121 of the Bill of Quantities, and shall cover the excavation, fill, sub-base fill and compaction works, and pavement of the road surface and uncovered parking area.
- (7) Payment for sewerage and drainage system for Dok Krai Camp will be made in lump sum under Pay Item 7122 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor sewerage and drainage system for Dok Krai Camp including construction of drainage ditches, feeder ditches, supply and installation of sewerage pipeline, and any other works related.
- (8) Payment for water supply system for Dok Krai Camp will be made in lump sum under Pay Item 7123 of the Bill of Quantities, and shall cover all kinds of necessary works to complete out-door water supply system for Dok Krai Camp including supply and installation of pipes and valves.

- (9) Payment for power supply system for Dok Krai Camp will be made in lump sum under Pay Item 7124 of the Bill of Quantities, and shall cover all kinds of out-door power supply system for Dok Krai Camp including supply and installation of transformer, electrical cable networks, switches, power-meters, etc. and also including out-door illumination system such as installation of lighting posts, cablings, etc. and any other works related.
- (10) Payment for elevated water tank for buildings at Dok Krai will be made in lump sum under Pay Item 7125 of the Bill of Quantities, and shall cover all kinds of necessary works to complete the water tank including supply and erection of the tower, supply and installation of water tanks, pipes and valves, etc. and any other works related.

SECTION 7200. HEAD TANK BUILDING WORKS

7201. HEAD TANK MAINTENANCE HUT

(1) General

- a. The main body of the Head Tank Maintenance Hut shall be of the reinforced concrete rahmen structure with steel frame construction of roof truss. Wall of the building shall be of concrete hollow block and wooden board, and of the asbestos corrugated cement board for roofings.
- b. Building consists of office room, storage and toilet. The building construction works shall include main body concrete with reinforcing bars, steel roof purline, roofings, walls, doors, windows, water supply and sewerage facilities, power supply with lightings, etc.

(2) Concrete Works

- a. All concrete works and hollow concrete block works of this building shall be the same as specified in (2) of Clause 7105 "Dok Krai Administration Office" of the Particular Specifications.

(3) Steel Frame Works

- a. All steel works for purline shall conform to the Contract Drawing No. 7501 and 7502 and "Metal Works" of Division 6 of the General Specifications.
- b. The Contractor shall submit to the Engineer for approval in detail of the materials and manner for painting.

(4) Roofings

- a. Roofings of the building shall be constructed to conform to the Contract Drawing No. 7501, and item (4) of Clause 9201 "Roofing" in the General Specifications. Materials of the roofing shall be of the asbestos corrugated cement board conforming to the item (3) of Clause 9201 "Roofing" of the General Specifications.

(5) Finishings

- a. Finishing of concrete works of the beam which concrete surface will be exposed shall conform to "Finish F3" of Clause 3018 "Finishing" of the General Specifications. Finishings of concrete surface for concrete column shall be of the cement mortar placing.

- b. Finishings of outside wall for the building shall be of hard wood board as shown on the Contract Drawing No. 7501.
 - c. Finishing of inside wall shall conform to the following schedules:
 - i) Office room
 - Floor: Vinyl tiles
 - Skirt: Cement mortar up to 10 cm height from the top of floor level
 - Wall: Asbestos cement board with painting finish
 - Ceiling: Gypseous acoustic board
 - ii) Toilet
 - Floor: Mosaic tiles
 - Skirt: Ceramic tiles, 100 x 100, h = 1,200
 - Wall: Plaster paint finish
 - Ceiling: Asbestos cement board with painting finish
 - iii) Storage
 - Floor: Cement mortar
 - Skirt: -do-
 - Wall: -do-
 - Ceiling: No ceiling
 - iv) The manner and color of plaster and asbestos cement board are to be proposed by the Contractor for the Engineer's approval.
 - v) Color and design of vinyl tiles, gypseous acoustic board, mosaic tiles and ceramic tiles to be used in the building works shall be proposed by the Contractor for the Engineer's approval.
- (6) Doors and Windows
- a. All door and window works shall be made based on the Contract Drawing No. 7501 and frame materials of all the doors and windows shall be hard wood.
 - b. The thickness of glass shall be 3.0 mm.
 - c. The painting color of all doors and window frames will be instructed by the Engineer.

(7) Electric Facilities

- a. Power supply of the lighting for Head Tank Maintenance Hut and Head Tank Camps shall be made from public power line. Supply and installation works of transformer, power cable networks, switches and kWh-meters, etc. for power supply system to Head Tank Maintenance Hut as well as Head Tank Camp shall be performed by the Contractor.
- b. All lighting works in the building shall be performed based on the Contract Drawing No. 7503 and Division 8 "Electric Facilities" of the General Specifications. The works shall include supply of all necessary materials, such as lights, lighting fixtures, tumbler switch receptacles, switch board, cables and wires, and their installation. The quantity of the spare parts to be provided for the lighting exclusive cables and wires shall be 20 percent of the proposed quantity.

(8) Water Supply Works

- a. Water supply to the toilet room shall be made from the main pipeline through galvanized pipeline of 40 mm in diameter and approximately 30 m in length.
- b. The Contractor shall submit to the Engineer for approval the Shop Drawing on detail of the water supply system and installation method and distribution pipelines to the inlet of the building.

(9) Sewerage Facilities

- a. Sewerage facilities consist of septic tank with capacity of about 1.9 cu.m, and drainage pipes between toilet and septic tank and toilet to drainage ditch. The pipe works of drainage shall be made based on the Contract Drawing No. 7504. The Contractor shall submit to the Engineer for approval the Shop Drawing on the septic tank and necessary appurtenances.

7202. MEASUREMENT AND PAYMENT FOR HEAD TANK MAINTENANCE HUT

- (1) Measurement for payment for the building works of Head Tank Maintenance Hut shall be the area, measured in square meters.
- (2) Payment for the building works of Head Tank Maintenance Hut will be made under Pay Item 7201 of the Bill of Quantities, and shall cover the following items:
 - a. All kinds of foundation works including excavation, fill and backfill, gravel foundation works, etc. for the building.

- b. All concrete works including supply and works of reinforcing bars, formworks and all other related materials.
 - c. Hollow concrete block works including supply and works of reinforcing bars, sprayed mortar, plaster paint, and all other related materials.
 - d. Supply and works of steel frame truss and all other related materials including welding, riveting, painting, etc.
 - e. Roofing works including supply of all related materials.
 - f. All finishing works including supply and works of cement mortar, plaster paint, asbestos cement board, mosaic tiles, ceramic tiles and all other related materials.
 - g. Door and window works.
 - h. Partition wall works.
 - i. All electric works in the building.
 - j. All water supply works in the building.
 - k. All kinds of necessary works at outside of the building including earth works, paving stone works, entrance stair, etc., and any other works related to Head Tank Maintenance Hut.
- (3) Payment for water supply system for Head Tank Maintenance Hut will be made in lump sum under Pay Item 7202 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor water supply system for Head Tank Maintenance Hut including supply and installation of pipes and valves.
- (4) Payment for sewerage and drainage system for Head Tank Maintenance Hut will be made under Pay Item 7203 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor sewerage and drainage system for Head Tank Maintenance Hut including supply and installation of pipelines.
- (5) Payment for power supply system for Head Tank Maintenance Hut will be made under Pay Item 7204 of the Bill of Quantities, and shall cover all kinds of outdoor power supply system for Head Tank Maintenance Hut including supply and installation of electric cable networks, switches, etc.

Payment for supply and installation of transformer and outdoor illumination system shall be made under Pay Item 7214 of the Bill of Quantities.

7203. HEAD TANK CAMP

(1) General

- a. Scope of the Head Tank Camp construction works shall include construction of five (5) units of residential houses for operation and maintenance staff and site preparation works around the houses.
- b. The major construction works consist of construction of residential houses in two kinds of grades, access road, water supply and sewerage facilities, power supply system and other miscellaneous works.
- c. Supply and installation of furniture for the residential units shall be also within the scope of works of the Head Tank Camp works.
- d. The descriptions of Clause 7004 of the Particular Specifications shall apply to this Clause.

(2) Building Works

- a. The residential houses to be constructed are listed as follows:
 - Skilled labor's house: Grade 4, 126.87 sq.m, 4 units
 - Common labor's house: Grade 5, 163.80 sq.m, 1 unit

(3) Land Preparation

The Contractor shall perform land grading and other land preparation works required for preparation of the camp land as well as the area for Head Tank Maintenance Hut ready to build the camp facilities.

(4) Road with Drain Ditch and Uncovered Parking Area

- a. Road construction and pavement shall be made based on Section 2300 "Paving" of the General Specifications. The road works consist of main roads with 5.0 m in effective width and the access roads with 1.5 m in effective width.

(5) Drainage Ditch

- a. The drainage ditches in and around the compound and feeder ditches to the drain ditch along the Route 3191 shall be constructed.
- b. The Contractor shall submit to the Engineer for his approval the Shop Drawings on the feeder drainage ditches prior to the commencement of the works.

(6) Water Supply Works

- a. Water supply to the residential houses shall be made from the branch point of water supply pipeline to the Head Tank Maintenance Hut.
- b. Elevated water tank with capacity of approx. 8 cubic meters shall be constructed.

Pipeline with valves shall be supplied and installed at between the elevated water tank and water supply pipeline network for Head Tank Camp.

- c. The Contractor shall submit to the Engineer for his approval the Shop Drawings on the water supply pipelines and necessary appurtenances based on the Contract Drawing No. 7505 "General Plan of Head Tank Camp".

(7) Sewerage Facilities

- a. Septic tanks and connecting pipes shall be provided and installed in accordance with the Contract Drawings by the Contractor. The Contractor shall submit to the Engineer for his approval the Shop Drawings on the sewerage facilities prior to commencement of the works.

(8) Electric Supply

- a. Power supply of the camp facilities will be made from the public power line. Supply and installation works of transformer, power cable networks, switches and KWH-meters, etc. for power supply system to Head Tank Camp as well as Head Tank Maintenance Hut shall be performed by the Contractor.
- b. The scope of work of electric facilities for the camp compound includes feeder line from the distribution point mentioned above to the respective facilities including street lamp line, all necessary instruments and materials, their cables and wires, and their installations.
- c. KWH-meter shall be installed in each residence and shall be the standard type of the Provincial Electric Authority.
- d. The Contractor shall submit to the Engineer for his approval the Shop Drawings on the electric facilities related prior to commencement of the works.

(9) Gate and Fence

The Contractor shall construct the entrance gates and fences around the compound based on the Contract Drawings.

7204. MEASUREMENT AND PAYMENT FOR HEAD TANK CAMP

- (1) Measurement for payment for the respective residential houses of the Head Tank Camp shall be the unit of each grade of residence.
- (2) Payment for each grade of residence of Head Tank Camp will be made under Pay Items 7205 and 7206 of the Bill of Quantities, and shall cover all kinds of necessary works for completion of each grade of residence, unless otherwise separately itemized in the Bill of Quantities, including foundation works, earth works, concrete works, construction of building structure, all finishing works, plumbing and electrical works inside of building, external finishing works, supply and installation of furniture, etc. and any other works related.
- (3) Payment for land grading for Head Tank Camp will be made in lump sum under Pay Item 7207 of the Bill of Quantities, and shall cover all kinds of land grading and land preparation works for Head Tank Camp, Head Tank Maintenance Hut and other buildings and appurtenance facilities at Head Tank.
- (4) Payment for guard hut and gateway of Head Tank Camp will be made in lump sum under Pay Item 7208 of the Bill of Quantities, and shall cover all kinds of necessary works to complete guard hut and gateway of Head Tank.
- (5) Measurement for payment for fence around Head Tank Camp shall be the length in meters of fence installed, and shall include manufacturing, supply and installation of the fence and any other works related.
- (6) Payment for fence around Head Tank Camp will be made under Pay Item 7209 of the Bill of Quantities.
- (7) Payment for water supply system for Head Tank Camp will be made in lump sum under Pay Item 7210 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor water supply system for Head Tank Camp including supply and installation of pipes and valves.
- (8) Measurement for payment for road paving of Head Tank Camp shall be the area, measured in square meters.
- (9) Payment for road paving of Head Tank Camp will be made under Pay Items 7211 and 7212 of the Bill of Quantities, and shall cover the excavation, fill, sub-base fill and compaction works, and pavement of the road surface and uncovered parking area.

- (10) Payment for sewerage and drainage system for Head Tank Camp will be made in lump sum under Pay Item 7213 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor sewerage and drainage system for Head Tank Camp including construction of drainage ditches, feeder ditches, supply and installation of sewerage pipeline, and any other works related.
- (11) Payment for power supply system for Head Tank Camp will be made in lump sum under Pay Item 7214 of the Bill of Quantities, and shall cover all kinds of outdoor power supply system for Head Tank Camp including supply and installation of transformer, electrical cable networks, switches, power-meters, etc. and also including outdoor illumination system such as installation of lighting posts, cablings, etc. and any other works related.
- (12) Payment for elevated water tank for buildings at Head Tank will be made in lump sum under Pay Item 7215 of the Bill of Quantities, and shall cover all kinds of necessary works to complete the water tank including supply and erection of the tower, supply and installation of water tanks, pipes and valves, etc., and any other works related.

SECTION 7300. MAB TA PUD BUILDING WORKS

7301. MAB TA PUD ADMINISTRATION OFFICE

(1) General

- a. The buildings consist of director's room, staff room, meeting and spare room, and toilet. The building construction works shall include main body of concrete with reinforcing bars, roof truss, roofings, wall with doors and windows, water supply and sewerage facilities, air conditioning facilities and power supply with lighting and preparation works around the building.
- b. The main body of the building shall be of the reinforced concrete rahmen structure with steel frame construction of roof truss. Wall of the building shall be of concrete hollow block with sprayed cement mortar, and roofings shall be of the asbestos corrugated cement board.

(2) Concrete Works

- a. The classes of concrete of the building works are as follows:
 - Structural concrete of building: F-concrete
 - Foundation concrete : D-concrete
- b. Materials of hollow concrete block to be used in these works shall be the same as specified in (2) of Clause 7101 "Dok Krai Control House" of the Particular Specifications.

(3) Steel Frame Works

- a. All steel works for purline shall conform to the Contract Drawing Nos. 7602 and 7603, and "Metal Work" of Division 6 of the General Specifications.
- b. The Contractor shall submit to the Engineer for approval the Shop Drawing of steel structural work, and materials and manner for painting shall comply with Section 9400 "Painting" of the General Specifications.

(4) Roofings

- a. Roofings of the building shall be constructed to conform to the Contract Drawing Nos. 7602 and 7603, and the item (4) of Clause 9201 "Roofing" of the General Specifications. Materials of the roofing shall be the asbestos corrugated cement board conforming to the item (3) of Clause 9201 "Roofing" of the General Specifications.

(5) Finishings

- a. Finishing of concrete works of the beam of which concrete surface will be exposed shall conform to "Finish F3" of Clause 3018 "Finishing" of the General Specifications. Finishings of concrete surface for concrete column shall be the pea gravel wash finished.
- b. Finishing of outside wall for the building shall be made by sprayed cement mortar placing. Manner of finishing is to be proposed by the Contractor for the Engineer's approval.
- c. Finishing of the inside of the building shall be specified as follows:
 - i) Office room, entrance hall and spare room
 - Floor: Vinyl tiles
 - Skirt: Cement mortar up to 20 cm height from top of the floor level.
 - Wall: Plaster paint finish
 - Ceiling: Gypseous acoustic board
 - ii) Toilet room
 - Floor: Mosaic tiles
 - Skirt: Ceramic tiles, 100 mm x 100 mm
 - Wall: Ceramic tiles, 100 mm x 100 mm
 - Ceiling: Gypseous acoustic board
 - iii) The manner and color of plaster paint are to be proposed by the Contractor for the Engineer's approval.
 - iv) The color and design of mosaic tiles, ceramic tiles, and gypseous acoustic board to be used in the building shall be proposed by the Contractor for the Engineer's approval.

(6) Doors and Windows

- a. All door and window works shall be made based on the Contract Drawing Nos. 7601, 7602, and 7603 and the frame materials of all the doors and windows shall be steel.
- b. The thickness of glass shall be 3.0 mm.
- c. The painting color of all doors and window frames will be instructed by the Engineer.

(7) Partition Wall

- a. All partition wall works in the building shall be the same as specified in the (7) of Clause 7101 "Dok Krai Control House" of the Particular Specifications.

(8) Electric Facilities

- a. All power supply to the electric facilities relating to the building, such as to air conditioner facilities and lighting, shall be made from the terminal of the 380/220V Distribution and Valve Control Cubicle (E-21) which is described in Section 5400 "Electric Facilities" of the Particular Specifications.
- b. All lighting works in the building shall be constructed based on the Contract Drawing No. 7606 and Division 8 "Electric Facilities" of the General Specifications. The works shall include supply of all necessary materials such as lights, lighting fixtures, tumbler switch, receptacles, switch board, wires and cables, and their installation. Twenty (20%) percent of the proposed quantities of the lighting facilities, exclusive of cables and wires, shall be provided as the spare parts.
- c. The Contractor shall supply and install five (5) units of air conditioner facilities (one (1) unit of 3.0 HP capacity and four (4) units of 4.0 HP capacity.) These air conditioners shall be of floor stand type with packaged necessary appurtenances equipped. The Contractor shall submit to the Engineer for approval the detail of design data, Shop Drawings, shop tested data, instruction book and any other necessary information prior to commencement of the works.
- d. The Contractor shall supply and install the power-meter (KWH-meter) which shall be an acceptable type by the Provincial Electric Authority.

(9) Water Supply Works

- a. Water supply to the spare room and toilet shall be made from water supply pipeline. The detailed network of the water supply pipeline around the compound is as shown on the Contract Drawing No. 7607.
- b. The Contractor shall submit to the Engineer for approval the Shop Drawing, and shall submit in parallel with above the proposal on wash stand, wall hanging lavatory, flush toilet and their accessories prior to commencement of the works.

(10) Sewerage Facilities

- a. Sewerage facilities consist of septic tank with capacity of 4.7 cu.m and drainage pipes between toilet and septic tank with 100 mm cast iron pipe, and drainage pipe of diameter of 150 mm concrete pipes from toilet to the existing drain ditch along Route 3. Location of the septic tank to be installed and drainage pipeline networks are shown on the Contract Drawing No. 7607.
- b. The Contractor shall submit to the Engineer for approval the Shop Drawing on the septic tank and necessary appurtenances.

7302. MEASUREMENT AND PAYMENT FOR MAB TA PUD ADMINISTRATION OFFICE

- (1) Measurement for payment for the building works of Mab Ta Pud Administration Office shall be the area, measured in square meters.
- (2) Payment for the building works of Mab Ta Pud Administration Office will be made under the Pay Item 7301 of the Bill of Quantities, and shall cover the following items:
 - a. All kinds of foundation works including excavation, fill and backfill, gravel foundation works, sodding, etc. for the building.
 - b. All concrete works including supply and works of reinforcing bars, formworks, and all other related materials.
 - c. Hollow concrete block works including supply and works of reinforcing bars, sprayed mortar, plaster paint, and all other related materials.
 - d. Supply and works of steel frame and all other related materials including welding, riveting, painting, etc.
 - e. Roofing works including supply of all related materials.
 - f. All finishing works including supply and works of cement mortar, plaster paint, gypseous acoustic board, mosaic tiles, ceramic tiles and all other related materials.
 - g. Door and window works.
 - h. Partition wall works.
 - i. Cable trench works with hard wood cover.

- j. All electric works in the building.
 - k. All water supply works in the building.
 - l. All sewerage works including septic tank and the delivery piping from the building to the septic tank, and supply and installation of other related materials.
 - m. Supply and installation of four (4) units of floor stand type air conditioners, (one (1) unit of 3.0 HP capacity and four (4) units of 4.0 HP capacity) and necessary accessories.
 - n. All kinds of works at outside of the building including earth works, paving stone works, fairface concrete works, stair works, etc., and any other works related to Mab Ta Pud Administration Office.
- (3) Payment for water supply system for Mab Ta Pud Administration Office will be made in lump sum under Pay Item 7302 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor water supply system for Mab Ta Pud Administration Office including supply and installation of pipes and valves.
- (4) Payment for sewerage and drainage system for Mab Ta Pud Administration Office will be made in lump sum under Pay Item 7303 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor sewerage and drainage system for Mab Ta Pud Administration Office including supply and installation works of pipeline.

7303. REPAIRING SHOP, WAREHOUSE AND GARAGE AT MAB TA PUD

- (1) General
- a. The building consists of repairing shop, warehouse and garage with space of two (2) units car parking. The building construction works shall include main body concrete with reinforcing bars, roof truss, roofings, wall with doors and windows and water and power supply works.
 - b. The main body of the building shall be of the reinforced concrete rahmen structure with steel frame construction of roof truss. Wall of the building shall be of concrete hollow block with sprayed cement mortar, and roofings shall be of the asbestos corrugated cement board.

(2) Concrete Works

- a. All concrete works and hollow concrete block works of this building shall be the same as specified in (2) of Clause 7103 "Dok Krai Administrative Office" of the Particular Specifications.

(3) Steel Frame Works

- a. All steel works for purline shall conform to the Contract Drawing Nos. 7701 and 7702 and "Metal Work" of Division 6 of the General Specifications.
- b. The Contractor shall submit to the Engineer for approval the Shop Drawing, and materials and manner for painting shall be performed based on the Contract Drawings and Section 9400 "Painting" of the General Specifications.

(4) Roofings

- a. Roofings of the building shall be constructed to conform to the Contract Drawing Nos. 7701 and 7702, and item (4) of Section 9201 "Roofing" of the General Specifications. Materials of the roofing shall be the asbestos corrugated cement board conforming to item (3) of Section 9201 "Roofing" of the General Specifications.

(5) Finishings

- a. All finishing works inside and outside of the building shall be the same as specified in (5) of Clause 7103 "Dok Krai Substation".

(6) Doors and Windows

- a. Entrance door of the warehouse and repairing shop shall be of hanging steel door. The Contractor shall submit to the Engineer for approval the Shop Drawings on hanging door and closet door.

(7) Electric Facilities

- a. Electric power supply of the building shall be made from distribution board terminal at the Mab Ta Pud Administration Office.
- b. All electric works in the building shall be constructed based on the Contract Drawing No. 7704 and Division 8 "Electric Facilities" of the General Specifications. The work shall include supply of all necessary materials and installation.

(8) Water Supply Works

- a. Water supply of the building shall be made from the branch pipe to the Mab Ta Pud Administration Office.

7304. MEASUREMENT AND PAYMENT FOR REPAIRING SHOP, WAREHOUSE AND GARAGE AT MAB TA PUD

- (1) Measurement for payment for the building works of Repairing Shop, Warehouse and Garage at Mab Ta Pud shall be the area, measured in square meters.
- (2) Payment for the building works of Repairing Shop, Warehouse and Garage at Mab Ta Pud will be made under Pay Item 7304 of the Bill of Quantities, and shall cover the following items:
- a. All kinds of foundation works including excavation, fill and backfill, gravel foundation works, etc., for the building works.
 - b. All concrete works including supply and works of reinforcing bars, formworks, and all other related materials.
 - c. Hollow concrete block works including reinforcing bars, sprayed mortar, plaster paint, and all other related materials.
 - d. Supply and works of steel and all other related materials including welding, riveting, painting, etc.
 - e. Roofing works including supply of all other related materials.
 - f. All finishing works including supply and works of cement mortar, plaster paint, and all other related materials.
 - g. Door and window works.
 - h. All electric works in the building.
 - i. All kinds of necessary works at outside of the building including earth works, paving stone works, etc., and any other works related to Repairing Shop, Warehouse and Garage at Mab Ta Pud.

- (3) Payment for water supply system for Repairing Shop, Warehouse and Garage at Mab Ta Pud will be made in lump sum under Pay Item 7305 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor water supply system for Repairing Shop, Warehouse and Garage at Mab Ta Pud including supply and installation of pipes and valves.
- (4) Payment for power supply system for Repairing Shop, Warehouse and Garage at Mab Ta Pud will be made in lump sum under Pay Item 7306 of the Bill of Quantities, and shall cover all kinds of outdoor power supply system for Repairing Shop, Warehouse and Garage at Mab Ta Pud including supply and installation of electrical cable networks, switches, etc.

7305. MAB TA PUD DIESEL ENGINE GENERATOR ROOM

(1) General

- a. The Mab Ta Pud Diesel Engine Generator building is of the same structure and size as Dok Krai Compressor Room.
- b. All construction work items and requirements of the building shall be the same as Clause 7109 "Dok Krai Compressor Room" in the Particular Specifications.

(2) Construction Works

All construction works, such as concrete, steel frame, roofings, finishings, door and window works, except power supply work, shall be referred to the respective sub-clauses in Clause 7109 of the Particular Specifications.

(3) Electric Facilities

- a. Power supply of the building shall be made from the terminal in the Mab Ta Pud Administration Office.
- b. All electric works in the building shall be constructed based on the Contract Drawing 7405 and Division 8 "Electric Facilities" of the General Specifications.

7306. MEASUREMENT AND PAYMENT FOR MAB TA PUD DIESEL ENGINE GENERATOR ROOM

- (1) Measurement for payment for the building works of Mab Ta Pud Diesel Engine Generator Room shall be the area, measured in square meters.

- (2) Payment for the building works of Mab Ta Pud Diesel Engine Generator Room will be made under the Pay Item 7307 of the Bill of Quantities, and shall cover the following items:
- a. All kinds of foundation works including excavation, fill and backfill, gravel foundation works, etc. for the building.
 - b. All concrete works including supply and works of reinforcing bars, formworks, and all other related materials.
 - c. Hollow concrete block works including supply and works of reinforcing bars, sprayed mortar, plaster paint, and all other related materials.
 - d. Supply and works of steel and all other related materials including welding, riveting, painting, etc.
 - e. Roofing works including supply of related materials.
 - f. All finishing works including supply and works of cement mortars, and all other related materials.
 - g. Door and window works.
 - h. All electric works in the building.
 - i. All kinds of necessary works at outside of the building including earth works, paving stone works, etc., and any other works related to Mab Ta Pud Diesel Engine Generator Room.

7307. MAB TA PUD CAMP

(1) General

- a. Scope of the Mab Ta Pud Camp construction works shall include construction of twenty-eight (28) units of residential houses for operation and maintenance staff and site preparation works around the houses.
- b. The major construction works consist of construction of residential houses in several grades, water supply and sewerage facilities, power supply system and other miscellaneous works.
- c. Supply and installation of furniture for the residential units shall also be within the scope of works of the Mab Ta Pud Camp works.
- d. The descriptions of Clause 7004 of the Particular Specifications shall be supplementary to this Clause.

(2) Building Works

- a. The residential houses to be constructed are listed as follows:

- Director's house : Grade 1, 187.10 sq.m, 1 unit
- Deputy Director's house: Grade 2, 93.03 sq.m, 1 unit
- O.M Engineers' house : Grade 2, 93.03 sq.m, 4 units
- Technicians' house : Grade 3, 85.50 sq.m, 9 units
- Skilled labor's house : Grade 4, 126.87 sq.m, 11 units
- Common labor's house : Grade 5, 218.40 sq.m, 2 units

(3) Land Preparation

- a. The Contractor shall perform land grading and other land preparation works required for preparation of the camp land ready to build the camp facilities.

(4) Road with Drain Ditch

- a. All road construction works shall not be included in this Clause.

(5) Drainage Ditch

- a. All drainage ditch and related facilities shall not be included in this Clause.

(6) Water Supply Works

- a. Water supply to the camp facilities shall be made from the Receiving Well.
- b. Elevated water tank with capacity of approx. 8 cu.m shall be constructed. The booster pumps shall be supplied and installed. Pipeline with valves shall be supplied and installed at between the elevated water tank and water supply pipeline networks for Receiving Facilities.
- c. The Contractor shall submit to the Engineer for approval the Shop Drawings on the water supply pipelines and necessary appurtenances.

(7) Sewerage Facilities

- a. Septic tanks and connecting pipes shall be provided and installed in accordance with the Contract Drawings by the Contractor. The Contractor shall submit to the Engineer for approval Shop Drawings on the sewerage facilities prior to commencement of the works.

(8) Electric Supply

- a. Power supply of the camp facilities will be made from the terminal of the Mab Ta Pud Administration Office.
- b. The scope of work of electric facilities for the camp compound includes feeder line from the distribution point mentioned above to the respective facilities including street lamp line, all necessary instruments and materials, their cables and wires, and their installation.
- c. Power-meter (KWH-meter) shall be installed in each residence and shall be the standard type of the Provincial Electric Authority.
- d. The Contractor shall submit to the Engineer for approval the Shop Drawings on all the electric facilities related prior to commencement of the works.

7308. MEASUREMENT AND PAYMENT FOR MAB TA PUD CAMP

- (1) Measurement for payment for the respective residential houses of the Mab Ta Pud Camp shall be the unit of each grade of residence.
- (2) Payment for each grade of residence of Mab Ta Pud Camp will be made under Pay Items 7308, 7309, 7310, 7311 and 7312 of the Bill of Quantities, and shall cover all kinds of necessary works for completion of each grade of residence, unless otherwise separately itemized in the Bill of Quantities, including foundation works, earth works, concrete works, construction of building structure, all finishing works, plumbing and electrical works inside of building, external finishing works, supply and installation of furniture, etc. and any other works related.
- (3) Payment for land grading of the Mab Ta Pud Camp will be made in lump sum under Pay Item 7313 of the Bill of Quantities.
- (4) Payment for guard hut and gateway of Mab Ta Pud Camp will be made in lump sum under Pay Item 7314 of the Bill of Quantities, and shall cover all kinds of necessary works to complete guard hut and gateway of Mab Ta Pud.
- (5) Measurement for payment for fence around Mab Ta Pud Camp shall be the length in meters of fence installed, and shall include manufacturing, supply and installation of the fence and any other works related.
- (6) Payment for fence around Mab Ta Pud Camp will be made under Pay Item 7315 of the Bill of Quantities.

- (7) Payment for water supply system for Mab Ta Pud Camp will be made in lump sum under Pay Item 7316 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor water supply system for Mab Ta Pud Camp including supply and installation of pipes and valves.
- (8) Payment for power supply system for Mab Ta Pud Camp will be made in lump sum under Pay Item 7317 of the Bill of Quantities, and shall cover all kinds of outdoor power supply system for Mab Ta Pud Camp including electrical cable networks, switches, power-meters, etc. and also including outdoor illumination system such as installation of lighting posts, cablings, etc. and any other works related.
- (9) Payment for sewerage system for Mab Ta Pud Camp will be made in lump sum under Pay Item 7318 of the Bill of Quantities, and shall cover all kinds of necessary works to complete outdoor sewerage system for Mab Ta Pud Camp including supply and installation of sewerage pipeline, and any other works related.
- (10) Payment for flag pole for Mab Ta Pud Camp will be made in lump sum under Pay Item 7319 of the Bill of Quantities, and shall cover all kinds of necessary works for foundation of the poles, supply and installation of flag poles, and any other works related.
- (11) Payment for elevated water tank for buildings at Mab Ta Pud will be made in lump sum under Pay Item 7320 of the Bill of Quantities, and shall cover all kinds of necessary works to complete the elevated water tank facilities including foundation works, supply and erection of the tower, supply and installation of water tanks, supply and installation of boosting pumps and electric cablings, supply and installation of pipes and valves, etc., and any other works related.

DIVISION 8. TEST OPERATION AND COMMISSIONING

SECTION 8000. GENERAL

8001. SCOPE OF WORKS

The scope of Works of Test Operation and Commissioning consist of:

- a) Test Operation: The test operation works shall contain "Test Operation" and "Staff Training".
- b) Commissioning: The commissioning works shall contain "Commissioning" and "Maintenance and Guarantee Performance".

8002. SCHEDULE OF WORKS

(1) The schedule for test operation and commissioning shall be as follows:

- a) Test Operation: Two (2) months' period commencing from the 17th month counted from the date of signing the Contract.
- b) Staff training: Four (4) months' period. Two (2) months overseas training commencing from the 15th month counted from the date of signing the Contract.

Two (2) months' training at Site, concurrent with test operation, commencing from the 17th month counted from the date of signing the Contract.
- c) Commissioning: Six (6) months' period commencing from the date of Stage Two Provisional Take-over.
- d) Maintenance and Guarantee Performance: Twelve (12) months' period commencing from the date of Stage Two Provisional Take-over.

(2) The Contractor shall submit to the Engineer for his approval detail program of test operation and commissioning.

SECTION 8100, TEST OPERATION

8101. DRY TESTS

The Contractor shall perform at least the following tests and test operations under the supervision of the Engineer:

<u>Test Item</u>	<u>Station</u>
a. Power supply system test including residence	Dok Krai, Head Tank, Mab Ta Pud
b. Communication system test	-do-
c. Intake gates and all valves on-off	Dok Krai, Head Tank, Mab Ta Pud and all pipelines
d. Air chamber-compressor system	Dok Krai
e. Pipeline inside clearance	Pipeline (patrol all length)
f. Conductivity of instrumentation system	Dok Krai, Dok Krai - Head Tank, Mab Ta Pud

8102. FILLING TEST BETWEEN PUMP STATION AND HEAD TANK

Following tests and test operations shall be executed by the Contractor under the supervision of the Engineer:

<u>Test Item</u>	<u>Station</u>
a. Pump's shut-off test	Dok Krai
b. Air chamber's water level control	Dok Krai
c. Air valve, air exhaust	Pipeline
d. Outlet main valve (closed)	Head Tank
e. Water level meter	Dok Krai

<u>Test Item</u>	<u>Station</u>
f. Head Tank leakage	Head Tank
g. Drain valves and stop valves	Pipeline
h. Head Tank drain valve and Spillway flow, energy dissipation	Head Tank
i. Water level meter	Head Tank

8103. FILLING TEST BETWEEN HEAD TANK AND RECEIVING RESERVOIR

Following tests and test operations shall be performed by the Contractor under the supervision of the Engineer.

<u>Test Item</u>	<u>Station</u>
a. Air valve, air exhaust	Pipeline
b. Inlet main valve (closed)	Receiving Well
c. Flow meter	Dok Krai, Mab Ta Pud
d. Level meter	Mab Ta Pud
e. Control valve	Mab Ta Pud
f. Drain valves and stop valves	Pipeline

8104. FLOW TEST AND TEST OPERATION

Following tests and test operations shall be performed by the Contractor under the supervision of the Engineer:

<u>Test Item</u>	<u>Station</u>
a. Pump's characteristics, flow rate vs. delivery pressure	Dok Krai
b. Pump unit number control (normal operation)	System
c. Overflow and spillway flow, energy dissipation	Head Tank, Receiving Well, Receiving Reservoir
d. Emergency operation	Mab Ta Pud, PTT
e. Control valve opening	Mab Ta Pud
f. Test operation	Whole system

8105. REPORT OF TEST RESULTS

The Contractor shall submit to the Engineer the report of results of each test executed.

The results of each test shall be signed by the representative of both the Contractor and the Engineer.

Photographic records shall be also contained.

8106. OVERSEAS TRAINING

- (1) The Contractor shall assist the Employer in performing overseas training of the operation and maintenance staff. The overseas training shall be mainly performed at the shop of supplier of pumping plant and/or electrical equipment and/or control system.
- (2) The number of trainees sent overseas will be fifteen (15), and duration of overseas training shall be forty-five (45) days.
- (3) The contents of training to be performed by the Contractor shall be at least the following:
 - a. Classroom training
 - * Text book Engineering Report, Manufacture's Manuals and Instructions
 - * Subject Hydraulics, electrical, instrumental & mechanical (pump) engineering
 - * Inspection Manufacturer's plant
 - b. Inspection tour
 - * Visit to facilities Long distance and large diameter water conveyance pipeline
 - * Discussion Acquiring practical operation experience
- (4) All kinds of necessary arrangements for overseas training tour including arrangements of air flights (economy class), hotels (second class), transportation at the time of necessity, and any other arrangements necessary for trainings and tours, etc. shall be made by the Contractor.

8107. TRAINING AT SITE

- (1) The Contractor shall assist the Employer for training of operation and maintenance staff of the Project during the period of test operation.
- (2) The training at site shall at least contain the following items:
- * Lecturers Trainees trained overseas, and Contractors' engineers engaged in the test operation
 - * Textbooks Operation manuals (to be prepared by the Contractor)
 - * Subject Working knowledge of operation
 - * Job-site training Working together with the Contractor's engineers and operators

8108. MEASUREMENT AND PAYMENT

- (1) Payment for all kinds of necessary preparations and performances of the test operations as well as staff training will be made in lump sum under Pay Item 8001 of the Bill of Quantities, and shall cover depreciation costs for equipment and instruments required for tests, wages for operators and labourers, costs for fuel and power, and any other expenses required for test operations, and shall also cover all necessary expenses for staff training including air fares, hotel and transportation charges, per diem of trainees (average Thai grade C-6), expenses for insurance, textbooks, and any other necessary training fees and expenses.

The lump sum under Pay Item 8001 of the Bill of Quantities will be payable when the Engineer signs the certificate for performance of test operation including staff training.

SECTION 8200. COMMISSIONING

8201. COMMISSIONING

- (1) The Contractor shall assist the Employer in operating the projected facilities during six (6) months after Stage Two Provisional Take-over.
- (2) An electrical engineer with two assistant electricians and a mechanical engineer with two assistant mechanics shall be at least provided and be kept at Site by the Contractor during the period of commissioning.

The engineers and technicians shall have enough capability for operating, maintaining and repairing of control system, pumping plant, electric facilities and any other mechanical and electrical works.

8202. MAINTENANCE AND GUARANTEE PERFORMANCE

The Contractor shall have the obligation to execute the maintenance work of the projected facilities and shall guarantee satisfactory performance up to the date of Final Take-over.

8203. MEASUREMENT AND PAYMENT

- (1) Payment for commissioning will be made in lump sum under Pay Item 8002 of the Bill of Quantities, and shall cover commissioning works specified in Clause 8201 of the Particular Specifications and shall not cover the expenses for maintenance and performance guarantee.

The lump sum will be paid in equal monthly payments such that the total sum shall be fully disbursed at the end of 6th month after date of Stage Two Provisional Take-over.

- (2) No separate payment will be made for complying with the provisions for maintenance and performance guarantee and all costs for maintenance and performance guarantee shall be deemed to be included in the rates for various items of the Works in the Bill of Quantities.

APPENDIX

CONSTRUCTION SCHEDULE

OF

DOK KRAI-MAB TA PUD WATER PIPELINE PROJECT

