

Road Works

First: Specifications of Constructing the Base Course

From graded natural gravelly materials or the outcome of crushing.

- 1- Thickness of layer after compaction must not be more than fifteen (15 cm).

Construction shall be made on two layers according to the required total thickness. It must be of approved stone quarries or from the materials whose properties shall be improved by adding other materials to it. They must contain the required binding materials in such a manner that all these materials after mixing them thoroughly and spreading them on the surface of the sub base course or foundation layer, and adding the required water to them, compacting them while they are homogenous, graded and forming a tenacious body, and corresponding to the inclinations, longitudinal and cross section shown on the drawings.

- 2- The materials constituting it, which are the thick, thin, and binding of siliceous pebbles, or natural stones, or the outcome of crushing, or graded furnace slag, and natural graded sands or mixture of them – shall constitute in its whole a graded mixture corresponding to the Standard Specifications for Roads and Bridges.
- 3- They shall be from approved stone quarries accepted by the NSDO.
- 4- The materials shall be homogenous, clean and free from impurities or align materials, while taking into account not to lose any of its components during transport operation.
- 5- All materials shall be free from organic materials, balls, or muddy accumulations.
- 6- The layer density must not be less than 95% of the laboratory density resulting from the revised compaction.
- 7- Before carrying out works of supplying this layer, the Contractor is bound to make an accurate leveling on the sub base course surface, or foundation layer, and prepare the surface of this layer by leveling, mashing, and compacting it at the levels by distention, and the determined inclinations in both longitudinal and traversal directions.
- 8- It shall be supplied on the road surface in the form of stows with uniform sections which facilitate measuring them.
- 9- Mixing, Stirring and thoroughly spread by motor grader. Water shall be added to the mixture by means of tanks with sufficient and suitable quantities to reach the maximum density after crushing. Spreading shall be carried out in such a manner that the thickness shall not be more than 15 cm after crushing, and shall not be made on two layers.
- 10- Humidity percentage must be verified before carrying out crushing operation. If water percentage is little, it can be increased, and if it was large it can be aerated.
- 11- The crushing operation shall be carried out by means of using the suitable type of mashers that are appropriate for the kinds of used materials.
- 12- Surface uniformity and levels must be verified. The Contractor should fully maintain cleanliness of the base course from dust and mud. He must remove them and make sure of the thickness after removal and to handing over.
- 13- The Contractor must take into account that each damage or harm occurs to base course layer, he will be alone responsible to repair it with full care and on his own cost. In case of making the initial prime coat, this will be after the elapse of a period of not less than two weeks on the base

course layer. The Contractor must assign a complete group of equipment for this purpose, while continuing the operation of spraying with water, leveling and crushing, and adding new quantities in the falling distances in such a manner that the surface is always in the required straightness degree, and to be compacted and tenacious continuously. It will not be left without maintenance for any period that leads to looseness of its surface. In case the Contractor neglects all that or some of it, all procedures required for this maintenance shall be carried out, and to be deducted from the Contractor account.

14-Payment shall be made per square meter including supplying, works of workmanship, leveling base course layer, stowing, spreading and mixing materials, and adding water to them, as well as re-mixing, leveling, and spreading, continual maintenance till initial handing over or till the prime coat operation. The rate also includes manpower, and required equipment, and operating them, and all what is required to complete the work according to the specifications, drawings and instructions.

Second: Specifications of Establishing and Executing Initial Prime Coat (M.C.O.)

- 1- Preparation of the base surface is included in the rates of this work.
- 2- The liquid asphalt must be of the medium volatile kind (M.C.O) corresponding to the Standard Specifications for Roads and Bridges.
- 3- The Contractor must provide the equipment for preparing the road surface and spraying the asphalt. They are motor grader – water tanks – rubber mashers – mechanical brushes – instruments for heating the asphalt and asphalt distributors.
- 4- The Contractor performance of leveling the surface of the base course with its full width by the suitable motor, and in case of necessity slight plowing for the surface of this layer and asphalt distributors are included in the rate of the item.
- 5- Before spreading surface painting, it must be thoroughly cleaned from dissolved materials and dusts by using mechanical and hand brushes.
- 6- After the completion of the road surface preparation, asphalt will be sprayed after heating it to the temperature degree indicated in the Standard specifications for Roads and Bridges Department. The surface must be dry to the degree which allows for the leakage of the asphalt in the surface. This will be done by using mechanical asphalt sprayers at a rate of 1.5 (One and Half) kg per square meter on one time or two times in such a manner that the road surface is thoroughly saturated by asphalt. Hand sprayers may also be used for the surfaces where mechanical spraying is impossible and pursuant to the approval of the NSDO.
- 7- Asphalt layer shall be left without passing over it for a period not less than 24 hours. After this period there must be a continuous maintenance for this layer by water for a period of at least two days till placing the surface asphalt layer on it, together with treating asphalt leakage process by sand.
- 8- Payment shall be made per square meter for the surface to be sprayed with asphalt. The rate includes and is charged with supplying the required asphalt, as well as all works of workmanship including leveling of base course, the whole layer, and spraying asphalt after heating it to the determined width and with the appropriate average. The rate also includes and is charged with cleaning the base surface.

With respect to the used sand, it shall be either natural or the outcome of crushing in the stone quarries, free from organic, muddy, align, and harmful materials. After grading it and mixing it with the stone and powder it must fulfill the general grading stated in the Standard Specifications of The Roads and Bridges Department.

As for the powder the outcome of crushing lime stones or any other solid stones, it must be free from the muddy materials.

With respect to the solid asphalt, it must be with a degree of insertion 60/70, and its specifications agree with the Standard Specifications of the Roads and Bridges Department.

The rate includes and is charged with supplying of materials, machines and instruments required for mixing, spreading, leveling, compacting, preparing materials, mixing, transporting, spreading and crushing them, and finishing the surface.

The rate also includes crushing cross and longitudinal joints and edges, making joints, and testing straightness of the layer surface, its density which should not be less than 95% of the laboratory density. It shall not be allowed to pass over the paved layer before the decrease of layer temperature to weather temperature, and this must be for a period not less than at least 8 hours. The rate is given per square meter including everything, as well as operating all machines, equipment, boilers, distributors, and all what is required to complete the work according to the specifications, drawings and instructions.

Third: Specifications of Surface Course of Asphalt

- 1- The used materials must be clean, strong and tight, and do not dissolve in water. They should not contain flat or rectangular gravel and free from surface dust and undesired materials.
- 2- The missing in Los Angeles instrument according to the standard tests should not be more than 40%.
- 3- Gradation of pre-mixed materials shall be according to the Standard Specifications of the Road and Bridges Department.
- 4- The materials shall be either stone resulting from crushing process or natural materials with sharp angles and thoroughly sticking to asphalt.
- 5- Using solid asphalt (60/70) shall be either from the production Suez Company or Alexandria Petroleum Company. It should be corresponding to the Standard Specifications of the Roads and Bridges Department.
- 6- Mixing shall be done by the mechanical mixers for stones with asphalt in the appropriate temperature degree, together with the availability of homogeneity, and guaranteeing easy transport, spreading, and compaction without splitting up of the asphalt cover from gravel surface.
- 7- Paving surface shall be thoroughly cleaned before spreading the pre-mixed layer.
- 8- In case the mixture being spread is exposed to the act of rains it must be excluded and replaced by another one.
- 9- Mashers from 8 – 12 tons will be used. Crushing must be done at the rate of spreading. The crushing process shall be carried out till reaching the maximum density exactly. This will be evidenced by the non appearance of the marks of the masher wheels, together with the necessity of protecting the edges during compaction operation.
- 10- The rate will be given by one square meter.

Fourth: Rapid Volatile Liquid Asphalt (R.C.)

The used asphalt must be homogenous free from water, and corresponding the Standard Specifications of the Roads and Bridges Department. It will be sprayed immediately before the process of spreading the asphalt mixture, after cleaning the base course surface from dusts, loose and align materials and the like by using mechanical or manual brushes, or mechanical blowing machines.

Fifth: Hot Surface Asphalt Concrete

It is a hot mixture of stones or natural or crushed gravel, or natural stones, sand, powder and solid asphalt. It will be spread and crushed to the determined thickness over the road surface prepared with the binding asphalt layer.

All used stones must be clean with acceptable homogeneity. The missing rate shall not be more than 40% in Los Angeles Test.

Technical Specifications for Tree Planting (Windbreak)
(BQ Pay Item Nos. 37, 38, 39, 40 and 41)

First: Tree Planting Plan

- 1- Both sides of the canal (right and left) will be tree planted with two rows of Casuarina and Acacia alternately in the right side and left side of the water course at a distance of one meter between the trees, and according to the instructions.
- 2- Distance between trees in the one row is 1.00 meter.
- 3- Distance between each row and the other is 0.5 (One Half) meter.
- 4- The inner row shall be planted at a distance of 0.5 meter of the end of embankment.
- 5- Planting shall be in two rows alternately (Crow foot).

Second: Technical Specifications for Casuarina Transplants

- 1- The age of transplant shall not be less than one year and not more than one and half years.
- 2- The transplant shall have a sound end but, not branched, with a height not less than 70 (Seventy) cm from ground surface, and not more than 90 (Ninety) cm.
- 3- The transplant shall have a suitable firmness (muddy soil) inside clayey flowerpots No. 8 or No. 10, or in Polyethylene bags, sound and free from weeds and in particular the long age (grass – esparto).
- 4- Required hardening process shall be made to the transplants from the breeding house to propagator for a sufficient period in order to have stiff transplant stem that can bear weather conditions. Also, the transplant would have been weaned in the propagator within an appropriate time before its being conveyed to the permanent ground.
- 5- Transplants must be of the quick growing kinds, and which are defined in sandy grounds of the upright branching kinds and not of lying down or hanging loosely kinds.

Third: Execution Works On Site

- 1- Trees shall be prepared by excavating with a ditcher to a suitable depth. The distance between diameter of the trees shall be (1.00) meter. Irrigation test shall be made to make sure of its being easy. A-----shall be made between each 7 – 10 trees according to ground surface straightness for the accuracy of irrigating the groups.
- 2- The pits shall be excavated with a diameter of 50 cm, and a depth of 50 cm, and irrigation will be made at the same day of planting, together with serving it by adding clay at a rate suitable for growing not less than two baskets for the pit.
- 3- It should be taken into account that the distances between trees in the row shall be (one) meter, and between one row and the other (one half) meter. It shall be planted in the shape of crow foot.
- 4- Fertilizing by chemical fertilizers shall be after the elapse of the first six months after planting.

Fourth: Executive Steps

- 1- Irrigation will be made by means of movable units in the first years of the trees age.
- 2- The required transplants shall be supplied to the site, to which a rate of patching transplants is added (10%).
- 3- The ground shall be prepared and leveled.
- 4- The ground shall be lined, and pits places will be defined.
- 5- Excavation of tree lines will be made by ditcher in case of need.
- 6- Irrigation before planting to make sure of irrigation accuracy.
- 7- Excavation of planting ditches will be with a diameter of 50 cm and a depth of 50 cm.
- 8- Manure must be added with the supplied clayey soil, according to the standard and suitable rates in each ditch.
- 9- After that, transplants will be planted.
- 10- Irrigation will be carried out after planting.
- 11- The Contractor is responsible for the works of guarding the transplants, and the works of care and maintenance required to them for a period of one year of handing over.

Fifth: Plantation

The transplants shall be implanted at any time of the year with the exception of strong hot months (June, July and August), together with giving care and attention to irrigation. Planting will be made by placing the transplant vertically and straight at the middle of the ditch. It shall be with a depth of 50 cm than the previous position in the supporting place.

The outcome of soil excavation will be mixed with the silt and manure mixture at a rate of one quarter basket per ditch. It will be pressed round the transplant. Irrigation will be carried out directly, while taking into account the uniformity of planting lines in a longitudinal line. All this will be done under the supervision of the NSDO and according to the instructions.

Sixth: Care After Plantation

These works are confined by the regularity of irrigation works on close periods in the first stages of plantation, and the continual cleaning of irrigation channel, plantation ditches, and non-trimming of trees during the first year, together with maintaining the growing buds of the trees. In case of their being lost or broken or dried the trees shall be replaced, those trees which loses its buds shall be replaced without claiming a return for that.

Seventh: Patching

This can be done during the first year, after making sure of the success of transplants by the appearance of new grows on the transplants during the maintenance and care period, together with the exclusion of the extremely hot months (June, July and August).

Eighth: Guarding in Seasons of Activity

The Contractor is responsible for all what is necessary for guarding the trees and in particular during care period.

Technical Specification of Mechanical Works

Part One : Stop-logs and Safety Rack

First : General

(1) Scope of work

The Contractor shall undertake the designing, manufacturing, testing, transportation to the site, erection and tests at the site of the following complete equipment and devices in accordance with this specification :

- 1 Four (4) complete set of the stoplog consist of 3 leaves and a lifting beam
- 2 Sixteen (16) complete sets of the embedded stoplog guide frame for the inlet and outlet of the box culvert conduit
- 3 One hundred twenty eight (128) complete sets of the embedded stoplog guide frame for opening of the box culvert conduit
- 4 Four (4) complete sets of the safety rack for the inlet of the box culvert conduit

(2) Cooperation with other suppliers

The Contractor shall have full responsibility for coordination and adequate design of all equipment and shall exchange with other suppliers furnishing associated equipment or the installation contractor, all necessary drawings and other information required to ensure the satisfactory completion of the equipment as a whole.

Second : Material and workmanship

All materials furnished by the Contractor shall be new and of the most suitable grade for the purpose intended considering strength, ductility, durability, and best engineering practice.

Furnished materials and manufacturing procedures shall be in accordance with pertinent provisions of the applicable standards herein specified unless otherwise specified.

Material	Applicable Standard	Equivalents
Structural steel for general use	ISO 630 E 235 A, E 275 A	JIS G 3101 SS 400 ASTM A 36
Steel plate for pressure vessels and principal stress carrying member of welded structure	ISO 630 E 275 A to C	JIS G 3106 SM 400 ASTM A 516 Gr. 60
Steel plate for other than principal carrying member	ISO 630 E 235 A E 275 A to C	JIS G 3106 SM 400 or JIS G 3101 SS 400 ASTM A 516 Gr. 60
Steel piping for pressure service	ISO 2604-2 ISO 2604-3	JIS G 3454 STPG 370, 410 ASTM A 53 (A, B) S (A, B)
Steel piping for ordinary piping	ISO 559 ST 320	JIS G 3452 SGP ASTM A 53 Type F
Forging	ISO 2604-1	JIS G 3201 SF 440 A min. ASTM A 668 class C min.
Steel casting	ISO 3755 200 – 400 min.	JIS G 5101 SC 410 min. ASTM A 27 U-60-30 min.
Iron casting	ISO 185	JIS G 5501 FC 250 ASTM A 48 No. 25
Spherical graphite iron casting	ISO 1083 400 – 18 min.	JIS G 5502 FCD 400 min. ASTM A 536 60-40-18 min.
Stainless steel (martensitic)	ISO TR 15510 L-No.48	JIS G 4303 ~ 4305 SUS 403 AISI 403, 410
Stainless steel (austenitic)	ISO TR 15510 L-No.6	JIS G 4303 ~ 4305 SUS 304 AISI 304

All work shall be performed and completed in a thorough workmanlike manner and shall follow the best modern practice in the manufacture of high-grade machinery, notwithstanding any omissions from these specifications. All works shall be performed by mechanics skilled in their various trades.

Third : Applicable Codes, Standards and Specification

All bolts, nuts, screws, rivets, threads, pipe, gauges, gears, and measurements or dimensions shown on the drawings shall conform to Egyptian standards. For internal connections only, the Contractor will be permitted to deviate from the Egyptian standards.

Fourth : Execution

(1) Safety Factors and working stresses

Liberal factors of safety shall be used throughout the design and especially in the design of parts subject to alternating stresses or shock. Upon request from the Engineer, the Contractor shall furnish complete information as to the maximum unit stresses used in the design.

- (a) The allowable stresses for normal loading of structural steel members as to the gate and Guide frame shall be as shown in the following table:

Steel material	Materials having the yield point of 2400 kgf /cm ² min.	
	Thickness \leq 40mm	> 40mm
1. Axial compressive stress(per gross sectional area)	1,200 kgf /cm ²	The stress should be multiplied by 0.92
2. Axial compressive stress (per gross sectional area)	$\frac{L}{r} \leq 20 : 1,200 \text{ kgf /cm}^2$	
① Compressive members <i>L</i> : buckling length of member (cm) <i>r</i> : radius of gyration of gross sectional area of members(cm)	$20 \leq \frac{L}{r} < 93 : 1,200 - 7.5 \times \left(\frac{L}{r} - 20\right)$	
② splice plates	$93 < \frac{L}{r} : \frac{10 \times 10^6}{6,700 + \left(\frac{L}{r}\right)^2}$	
1. Bending stress	1,200 kgf /cm ²	
① Bending tensile stress (per gross sectional area)	$\frac{L}{b} \leq \frac{9}{k} : 1,200 \text{ kgf /cm}^2$	
② Bending compressive stress (per gross sectional area) <i>L</i> : flange supporting length (cm) <i>b</i> : flange width (cm) <i>A_w</i> : gross area of web (cm ²) <i>A_c</i> : gross area of flange (cm ²) $k = (3 + A_w/2A_c)^{0.5}$	$\frac{9}{k} < \frac{L}{b} \leq 30 : 1,200 - 11 \times \left(k \frac{L}{b} - 9\right)$	
③ When compressive flanges are directly welded as in skin plates	In case of $\frac{A_w}{A_c} < 2 : k = 2$	
Shearing stress (per gross sectional area)	700 kgf /cm ²	

The allowable stresses for overloading condition such as earthquake may be 50% percent higher than these for normal loading.

(b) All mechanical machine parts of the gate and hoist subjected to normal loading condition or rated capacity loading condition shall be designed as below :

Material	Factor of safety based on ultimate strength		
	For tensile force	For compressive force	For shearing force
Rolled steel plate	5	5	8.7
Forged steel	5	5	8.7
Rolled steel bar	5	5	8.7
Stainless steel bar	5	5	8.7
Cast steel	5	5	8.7
Cast iron	10	3.5	17
Ductile iron	7	2.5	12
Bronze casting	8	8	10
Wire rope	8 (For static load under lowering or raising gate)		

(c) The allowable concrete bearing and shearing stresses shall not exceed 50 and 7 kgf/cm² respectively.

(2) Welding

The Contractor shall prepare a complete schedule of welding procedure which shall consist of detailed procedure specifications for each structure to be welded and tables or diagrams showing the procedure to be used for each required joint, and which shall include filler metal requirements preheat, and inter-pass temperature requirements, and stress relief heat treatment. The schedule shall be submitted for approval to the Engineer.

Welding will be subjected to inspection to determine conformance with approved welding procedures. Welds will be judged unacceptable if shown to possess any degree of incomplete fusion, inadequate penetration, or undercutting.

(3) Protective coating

(a) Coating Schedule

Coatings, minimum thickness, minimum number of coats, and surface preparation for the various items shall conform to the following schedule.

- 1) All machined and finished surfaces of ferrous metals to be exposed to the atmosphere during shipment shall be solvent cleaned and coated with one heavy coat of rust preventive compound.
- 2) All surfaces of the gate equipment such as gate leaf, gate guide, lifting beam, and screen normally in contact with water, except stainless steel, shall be applied epoxy resin paint system. (receive a coating of epoxy zinc-rich primer of 20 microns, epoxy resin paint of 60 microns as under coat, epoxy resin MIO paint of 60 microns as intermediate coat respectively at the shop. And 2 coat of epoxy resin paint of 40 microns as intermediate and top coat at the field) with a total minimum dry film thickness of 200 microns. (MIO means micaceous iron oxide)

All surfaces of the gate equipment such as Hoisting device and Gantry normally in expose under sunlight at the outdoor, except stainless steel, shall be applied epoxy

polyurethane resin paint system.(receive a coating of organic zinc-rich primer of 20 microns, epoxy resin paint of 60 microns as under coat, epoxy resin MIO paint of 60 microns as intermediate coat respectively at the shop. And polyurethane resin intermediate paint of 40 microns, and polyurethane resin top paint of 30 microns at the field) with a total minimum dry film thickness of 190 microns. The color of paints applied in the painting and coating shall be from those offered as coating schedule of the plant by the Contractor and approved by the Engineer.

- 3) The Contractor's standard painting system will be acceptable for practical and economical reason for standardized motors, instruments, cranes and equipment used in all station as far as possible.

Fifth : Equipment Requirements

(1) General

The arrangement of the gates shall be as shown on the following drawings :

DWG. No. CCL-171	Box Culvert	Inlet	Safety Rack
DWG. No. CCL-172	Box Culvert	Inlet and Outlet	Stoplogs
DWG. No. CCL-179	Box Culvert	Opening	Stoplogs

(2) Performance

The stoplogs and safety racks shall be designed for the following water load and condition .

(a) Stoplog

Design head	:	3.35 m
Height of stoplog leaf	:	1.20 m (Tenderer may change dimensions)
Total height of Stoplogs	:	3.60 m
Numbers of Stoplog leaf	:	3 (Tenderer may change number)
Clear span of gate	:	3.70 m
Type of hoist	:	by the track crane

The stoplog leafs shall lift under a water load correspond to the leaf height and be lowered under no flow condition.

(b) Safety rack

Clear span	:	3.70 m
Height of screen	:	4.00 m
Installation angle	:	Vertical
Water load	:	Differential head of 0.1 m
Bar pitch	:	300 mm
Bar element	:	50 mm nom. diameter Steel pipe

Sixth : Design and Construction

(1) General

The basic materials and methods shall be in accordance with Section 8004 (2). However, the materials chosen for the different parts of the Equipment shall be suitable for quality of water as shown in the chemical analysis given or obtained by tenderer himself.

Equivalent materials according to other specifications or better can be accepted if the contractor shows clearly its chemical analysis and mechanical properties.

(2) Stoplogs

(a) General

The stoplog shall be designed for water load specified and for loads such as reaction due to its own weight, loads imposed during starting, raising or lowering the stoplog due to the overload hoist or the gate jammed conditions.

The guide frames and anchors shall be capable of transferring the all loads acting on the stoplog to the concrete structure. The loading on the guide frames shall be the seal loads and other loads due to the most adverse operation of the stoplog and hoisting by the track crane.

The lifting beam shall be designed to lift the dead-weight of the stoplog, plus all frictional load due to the stoplog. The lifting beam shall withstand all loads imparted to the beam under the condition that it is carrying becomes jammed in the guides. The lifting beam shall be designed as the strongest item in the lifting assembly.

(b) Stoplog leafs

The stoplog leaf shall consist of skin plate, main beams, sub beams, bearing plates, seal, front and side shoes, lifting attachments and all other necessary components. The stoplog shall be slide type and of all welded steel construction. Each stoplog leaf shall completely be interchangeable within one another. The thickness of skin plate including a corrosion allowance of 0.5 mm shall not be less than 9.0mm.

The main beams shall be of channel shape steel or built-up steel plate girder construction. The deflection of the main horizontal beams shall be less than 1/800 of the supporting span of the stoplog under full load condition.

The bearing plates shall be of stainless steel shape and shall be attached to the gate. The minimum thickness of the bearing plate shall be 6 mm.

The stoplog seal shall be of the molded rubber shapes and clamped to the main beam of the stoplog by means of stainless steel bars and corrosion resisting steel bolts, nuts and washers. The seals shall be spliced at the corners and be vulcanizing to provide a single continuous seal at the shop. The tensile strength of all shop splices shall not be less than 50 per cent of the tensile strength of the unspoiled material.

The side seal shall be music note or other shape to be activated by the water pressure. The bottom seal shall be plain bar or other shape of rubber which shall bear on the sill beam. The weight of the stoplog shall be transmitted to the sill beam through the skin plate. The seals shall be arranged to provide a complete water tightness when they are positioned in place.

Two steel side shoes shall be provided on each side of the stoplog to limit the lateral movement of the stoplog. And two steel front shoes shall also be provided on each side faced to guide frames to limit forward and backward movement of the stoplog.

The stoplog shall be fitted with two lifting attachments on the top of the stoplog. The attachments shall be designed to ensure that the linkage mechanism of lifting beam can catch and release the pins of lifting attachments.

(c) Guide Frames

The guide frame shall consist of seal frames, guide frames, side plates, sill beam, and all other necessary components. The seal frame shall be of channel shape stainless steel and steel reinforcement bars. When the seal frames have been assembled, the sealing surfaces shall be straight, true and in the same plane. The seal frames shall be capable of transmitting the water load from the bearing plates of the stoplog to the concrete structures. The bearing surface of seal frames shall be true and flat in the same direction to maintain parallel paths. The variation from the theoretical true plane shall not be greater than plus or minus 2.0 mm throughout the total length in order to guide the stoplog properly during operation. No offset shall exist at each joint.

The guide frames shall consist of channel shape stainless steel and steel reinforcement bars and shall have ample strength to guide the stoplog.

The side plate shall be of stainless steel plate and weld to the seal frame and guide frame respectively.

The sill beam shall consist of stainless steel seal plate and I or H shape steel. And the sill beam shall be straight and true to provide a close fit with the bottom seal of the stoplog and to carry the weight of the stoplog. The sill beam shall be designed to be able to transfer all loads applied on it to the concrete structures without any deflection.

(d) Lifting Beam

The lifting beam made of all welded steel construction shall be provided with two flanged side rollers on each side of it so as to ride on the side guide frames.

The lifting beam shall be provided with the attachment for connection of the hoisting hook of the track crane and be provide with two lifting hooks jointly connected through a linkage mechanism to engage the stoplog lifting attachments by a manually operated counter weight lever.

(3) Safety Rack

The arrangement of the safety rack shall be as shown on drawing CCL-171. The safety rack shall consist of the racks split into three pieces, rack sills, supports, and stainless steel anchor bolts. The rack shall be of 50 mm nominal diameter steel pipes and channel shape steel construction suitable braced with reinforcements.

The rack sill shall consist of stainless steel angle shape and steel anchors. and the rack sill shall provide screwed holes to fix lower portion of the racks. The rack supports shall be of welded steel plates and have flanges to fix upper portion of the rack and fix the rack to the concrete structure by the stainless steel anchor bolts. The anchor bolts shall have sufficient strength to resist water load specified and shall be embedded in secondary concrete after the safety rack have been assembled correctly and secured by the temporary fasteners..

Seventh : Factory tests

(1) Stoplog

The stoplog including seals shall be assembled as possible as completion. While assembled, the stoplog shall be checked on dimensions, tolerance and accuracy of alignment. Any errors and misalignment discovered shall be promptly corrected.

Seal frames, guide frames, side plates and sill beam for the guide frames shall be checked whether satisfactorily manufactured or not. All dimensions of the guide frames reflect to the stoplog dimensions shall be checked and any errors and misalignment shall be corrected.

(2) Safety rack

The safety rack shall be assembled and be checked whether satisfactorily manufactured or not and any errors and misalignment shall be corrected.

Eighth : Site tests

(1) Stoplogs

The Contractor shall confirm following requirements :

The guide frames shall be assembled in their blockouts in accordance with the final approved drawings and check dimensions within the tolerance specified. During the placement of the concrete, alignment tolerance shall be checked and remedial action taken if readings indicate that displacement has occurred.

The stoplog complete with seals shall be assembled and provided in their slot for the purpose of checking the water tightness. After checking, the Contractor shall store the stoplog in accordance with the Engineer's decision.

(2) Safety Rack

The safety rack shall be completely assembled and assure all function are satisfied with specification requirement.

Ninth : Spare parts

The Tenderer shall state the necessary spare parts to be kept in stock valid for two years from the point of view of the Tenderer, and submit in such a detail to enable the Engineer to place additional order whenever necessary.

Tenth : Data, Descriptive Documents and Drawings

(1) Drawings prepared by NSDO

DWG. No. CCL-171 Box Culvert Inlet Safety Rack
DWG. No. CCL-172 Box Culvert Inlet and Outlet Stoplogs
DWG. No. CCL-179 Box Culvert Opening Stoplogs

(2) Drawings and Data to be submitted by the Tenderer

The Tenderer shall submit with his bid the drawings and data as following. Regardless of any statement by the Tenderer with respect to his intention or ability to comply with the requirements of these specifications, failure on his part to include the drawings and data specified below with his bid or failure of such drawings and data to conform to the requirements of these specifications may cause rejection of this bid.

- (a) General drawings and descriptive data of their proposals together with complete detailed specifications ,technical schedules, catalogues, etc., if necessary.
- (b) General information as to method of assembling, installation and other information as may be needed to show that the materials proposed meets requirements of these specifications

Eleventh: Measurement and payment

Separate measurement or payment shall not be made for the work required under this specifications. When all devices have been installed, connected and completed, it is accepted to pay the cost by the Engineer.

Part Two : Radial Gates and Gantry Crane for spillway

First : General

(1) Scope of work

The Contractor shall undertake the designing, manufacturing, testing, transportation to the site, erection and tests at the site of the following complete in accordance with this specification :

- 1) Two (2) complete sets of the radial gates with the embedded guide frames and hoisting equipment
- 2) One (1) complete sets of the gantry with a gear trolley type chain block
- 3) Two (2) complete sets of the stoplog consist of 3 leaves with a lifting beam
- 4) Four (4) complete sets of the embedded guide frames for the stoplogs

(2) Cooperation with other suppliers

The Contractor shall have full responsibility for coordination and adequate design of all equipment and shall exchange with other suppliers furnishing associated equipment or the installation contractor, all necessary drawings and other information required to ensure the satisfactory completion of the equipment as a whole.

Second : Material and workmanship

Refer to Second: Material and workmanship of Part One of this specification.

Third : Applicable Codes, Standards and Specification

Refer to Third : Applicable Codes, Standards and Specification of Part One of this specification..

Fourth : Execution

(1) Safety Factors and working stresses

Refer to Fourth : Execution of Part One of this specification

(2) Material

Refer to Fourth : Execution of Part One of this specification

(3) Welding

Refer to Fourth : Execution of Part One of this specification

(4) Protective coating

Refer to Fourth : Execution of Part One of this specification

Fifth : Equipment Requirements

(1) General

The arrangement of the gates shall be as shown on the following drawings :

DWG. No. SPW-110 Radial Gate and Gantry General arrangement

DWG. No. SPW-111 Stoplogs

(2) Performance

The radial gates shall be provided to close outlet of the spillway and be constructed so that the closing member can be completely removed from the water passageway when the gate is full opened. The stoplogs are provided at upstream side of the radial gate for maintenance of the radial gates. The gates shall be designed for the following water load and condition .

(a) Radial Gate

Head water max.	:	At elevation	11.94 m
Sill beam	:	At elevation	7.60 m
Gate deck	:	At elevation	13.80 m
Height of gate	:		4.50 m
Clear span of gate	:		4.00 m
Type of hoist	:	Lifting and lowering by the manual head stock	

The gate shall lift under pressure difference specified between up and downstream sides of the gate. And the gate will be lowered under flow condition.

(b) Stoplog

Head water max.	:	At elevation	10.91 m
Sill beam	:	At elevation	7.60 m
Gate deck	:	At elevation	13.80 m
Height of gate leaf	:		1.20 m (Tenderer may change dimensions)
Total height of Stoplogs	:		3.60 m
Numbers of Stoplog leaf	:		3 (Tenderer may change number)
Clear span of gate	:		4.00 m
Type of hoist	:		by the gear trolley type chain block

The stoplog leafs shall be lift under balanced water level condition between up and down stream sides of the gate, and be lowered under no flow condition.

(3) Design and Construction

(a) General

The basic materials and methods shall be in accordance with Section 8004 (2). However, the materials chosen for the different parts of the Equipment shall be suitable for quality of water as shown in the chemical analysis given or obtained by tenderer himself.

Equivalent materials according to other specifications or better can be accepted if the

contractor shows clearly its chemical analysis and mechanical properties.

(b) Radial Gates

1) General

The general arrangement of the radial gate shall be as shown on the drawing SPW-110. The water load shall be applied to the convex side and carried by the vertical beam, which are supported by two horizontal beams. The horizontal beams are supported by radial arms emanating from the pin bearings located at the anchors. The gate members shall be consisted as below:

- Leaf including faceplate, horizontal beams, and vertical beams
- Two radial arms
- Guide rollers
- Two pin bearings consisting of pin, fork end support, and bolts
- Rubber seals consisting of sides, bottom, and corner with clamp bars
- Wall plates, one each side, with anchor bolts
- Gate sill with anchor bolts
- Gate hoist
- Embedded anchors

2) Gate Leaf

The gate leaf shall consist of faceplate, horizontal and vertical beams, seals, guide rollers, and all other necessary components. The gate leaf shall be of all welded construction, except that the high-tensile bearing bolts and reamer bolts shall be used for all field connections with the radial arms.

All cuttings, chamfering and other necessary preparations of each segment for field connections shall be done at the shop, if required. Adequate temporary bolts and nuts shall be provided to hold sub-assemblies rigidly and in proper alignment during field erection. The openings for the gate shall be 4.00 meters wide by 4.50 meters high. The details of construction of the gate, not specified herein, shall be made by the contractor upon approval of the Engineer.

The thickness of faceplate shall include a corrosion allowance of 0.5 millimeters and shall be not less than 9.0 millimeters.

The beams shall be of H-shape steel or built-up steel plate girder construction. The deflection of the horizontal beams shall be less than 1/800 of the supporting span of the gate under full load condition.

The gate seals shall be of the molded rubber shapes clamped to the upstream face of the gate by means of stainless steel bars and corrosion resisting steel bolts, nuts and washers. The seals shall be spliced at the corners and be vulcanizing to provide a single continuous seal at the shop. The tensile strength of all shop splices shall be not less than 50 per cent of the tensile strength of the unspoiled material. The side seals shall be of music

note or other shape activated by the upstream water pressure. The bottom seal shall be a plain bar of rubber which shall bear on the gate sill. The weight of the gate shall be transmitted to the gate sill through the faceplate.

The radial arm shall be of H-shape steel or built-up steel plate girder construction and have flanges to connect the gate leaf. And a pin bearing boss with non lubricating bushing shall be provided on other end of the radial arm.

Two guide rollers shall be provided on each side of the gate to limit the lateral movement of the gate. The guide rollers shall be provided with self lubricating metal bushing and washers. Each guide roller and pin shall be designed to resist the imposed load due to the gate becoming jammed in the wall plates.

The gate shall be fitted with two lifting lugs centered on the bottom of the gate. The attachment shall be designed for connection of the hoisting wire.

Tolerances for the alignment of guide roller and for guide roller paths and sealing surfaces shall be selected to prevent over-stressing of the gate parts and to effect watertight seal. All tolerances and means of adjustment shall be defined on the Contractor's drawings and subject to the Engineer' approval.

3) Wall Plate

The wall plate, placed on each side of concrete structure, shall consist of the seal plate reinforced by ribs such as shape and anchor bolts, and be embedded to the concrete structure. The details of construction of the wall plate, not specified herein, shall be made by the Contractor upon approval of the Engineer' approval.

The wall plates shall be of corrosion-resisting steel plates and be true to form and free from twist and warps to provide a watertight seal with the gate. The minimum thickness of the sealing plates shall be 9 millimeters. When the wall plates and gate sill have been assembled, the sealing surfaces shall be straight, true and in the same plane. within a tolerance of plus or minus 1.0 millimeter per 4.0 meters.

4) Gate Sill

The gate sill shall consist of stainless steel seal plate, I or H shape steel, and anchors. The gate sill shall be straight and true providing a close fit with the bottom of the gate faceplate and to carry the weight of the gate. The gate sill shall be conservatively designed to be able to transfer all loads applied on it to the concrete structures, without any deflection.

5) Anchorage Assembly

The anchorage assembly shall be consist of the embedded anchors, bearing support base, and fork end bearing supports with a pin. The embedded anchors shall be fabricated plate steel and /or shape steels and have enough strength to resist whole water load acting on the gate through the fork end bearing supports. The bearing support base with adjustable thickness shall be attached by welding in place to the anchors embedded in the structural

concrete. The fork end bearing supports shall be of the fabricated steel plates and have a stainless steel pin which shall bear whole water load specified.

6) Hoist

Each gate shall be provided with a stationary hoist. The hoist shall be of the cable lift type suitably mounted on the hoist deck. The hoist shall consist of steel framework, mechanical equipment including torque shafts, bearings, gear reducers, couplings, hoist drums, wire ropes, mechanical position indicator, manual operating device, etc., and all other necessary components for its proper and efficient operation. Drum assemblies and gear assemblies shall be provided with the steel plate covers to protect from danger.

The hoist shall be designed to withstand the rated hoisting loads at the specified allowable unit stresses and factors of safety and to operate the gate safely and smoothly under all conditions of operation and loads specified. The framework shall be of all welded steel construction using steel plates and /or shape steels. No deflection shall be such as to cause misalignment or over-stress of machinery parts.

The torque shafts shall be of carbon steel or alloy steel. The bearings shall be of self-aligning regrettable ball or roller type.

All gears except worm wheels in the gear reducer shall be of cast or forged steel with machine cut teeth and worm wheels shall be of phosphor bronze casting. If worm gears are used, they are their supports shall be sufficiently rigid to prevent undue movements. Gears shall have removable housing with easily accessible provision for lubrication. High-speed gears shall be encased and oil bathed, if provided. Adequate inspection openings shall be provided together with an oil filler plug, drain cock and oil level indicator.

Couplings shall be provided for field adjustment and permanently attached to torque shafts after field adjustment.

The hoist drums shall be of cast and/or welded steel construction and be grooved to receive the full length of rope corresponding to the required lift plus two dead wraps on each drum at fully opened position, in addition to the length required for attachment to the drum. When the gate is at the fully closed position, at least three dead wraps of the rope shall remain unwound.

The minimum pitch circle diameter of drums shall be 20 times the diameter of the stranded wire rope. The rope grooves shall be in accordance with the recommendation of the rope manufacturer. All surfaces which are to come into contact with the ropes shall be machined true to approved tolerance and finished to minimize rope wear and to prevent permanent deformation of the rope.

A mechanical gate position indicator shall be mounted on each hoist base. The indicator shall be an easily readable dial type having pointer to rotate approximately 300 degrees for full travel. The dial plate shall be of stainless steel or brass with engraved markings.

The dial and pointer shall be mounted in a dust-tight and weather-proof enclosure.

The hoist shall be provided with a manual operating device which can hoist under the full load condition. The operating force on the handle of the device shall be less than 12 kgf.

The wire ropes shall be of galvanized steel, grease impregnated during manufacture, and shall be supplied by a reputable manufacturer of hoisting ropes. Wire ropes shall be selected with lay suitable for preventing kicking.

The rope shall be designed so that the normal working load does not exceed one-eighths (1/8) of the breaking strength of the rope.

(c) Stoplogs

1) General

The stoplog shall be designed for water load specified and for loads such as reaction due to its own weight, loads imposed during starting, raising or lowering the stoplog due to jammed conditions.

The guide frames and anchors shall be capable of transferring the all loads acting on the stoplog to the concrete structure. The loading on the guide frames shall be the seal loads and other loads due to the most adverse operation of the stoplog and chain block

The lifting beam shall be designed to lift the dead-weight of the stoplog, plus all frictional load due to the stoplog. The lifting beam shall withstand all loads imparted to the beam under the condition that it is carrying becomes jammed in the guides. The lifting beam shall be designed as the strongest item in the lifting assembly.

2) Stoplog Leafs

The construction of the stoplog leaf shall be as same as one specified in Section X006-3 (2) (b) except the following:

To reduce capacity of the chain block, the each stoplog shall be provided a 100 mm diameter stoplog penetration pipe with the blind flange on downstream side. This flange shall be unbolted, but not taken off, to pass water into downstream side when the stoplog is lifted from waterway. The bolt stem shall have enough length to make above work.

3) Guide Frames

The construction of the guide frames shall be as same as one specified in Section X006-3 (2) (c) .

4) Lifting Beam

The construction of the guide frames shall be as same as one specified in Section X006-3 (2) (d) .

(d) Gantry

The arrangement of the gantry shall be as shown on drawing PSW-110. The gantry shall be consist of steel structure and monorails which suspend a trolley geared type chain block. The gantry shall be of H or suitable shape steel construction braced with reinforcements. The gantry shall have ample strength to form and free from twist and wraps during a stoplog is carrying from the track board to a place where the stoplogs are installed.

The Contractor shall provide a hand operating trolley geared type chain block. The trolley geared type chain block shall have a capacity enough to lift the stoplog from waterway.

Sixth :Factory Tests

(1) Radial Gate

The gate including seals, guide rollers, arms, forked end bearing supports and anchors shall be assembled in the shop. While assembled, the gate shall be checked for dimensions, tolerances and accuracy of alignment, any error and misalignment discovered shall be promptly corrected. The seals shall be fitted to their supports during the shop assembly. Parts shall be clearly match marked before disassembly for transportation. Wall plates, and gate sill shall be checked by means of straight edge and feeler gauges. All dimensions of wall plate and gate sill that reflect to the gate dimensions shall be checked and any errors and misalignments shall be corrected.

The hoist shall be completely shop assembled and tested for smooth and proper performance. All units shall be tested at normal operating speed and at no load and closely checked to ensure that all necessary clearances and tolerance have been provided and that no binding occurs in any moving parts. All bearings shall be carefully checked. All lubrication grease and oil required for the performance of the tests shall be furnished. An operation test shall be made to the hoist at no load condition to prove specified functions. If any defect or improper operations are discovered, they shall be corrected and the entire test shall be repeated.

(2) Stoplog

The stoplog including seals shall be assembled at the manufacturer's shop. While assembled, the stoplog shall be checked on dimensions, tolerance and accuracy of alignment. Any errors and misalignment discovered shall be promptly corrected. Seal frames, guide frames, side plates and sill beam for the guide frames shall be checked whether satisfactorily manufactured or not. All dimensions of the guide frames that reflect to the stoplog dimensions shall be checked and any errors and misalignment shall be corrected.

Seventh : Site Tests

(1) Radial Gates

The Contractor shall confirm following requirements:

The wall plates and gate sill shall be assembled in their blockouts in accordance with the final approved drawings and in dimensions within the tolerance specified and firmly secured in place. During the placement of the concrete, alignment tolerance shall be checked and remedial action taken if readings indicate that displacement has occurred.

The gate leaf complete with seals, guide rollers and arms shall be assembled and erected to fork end supports in accordance with the details shown on the final approved drawings. The bottom of the gate, when erected, shall be checked that its are in true alignment to ensure a tight and even bearing of the faceplate and rubber seal on the embedded gate sill. The sides of the gate shall be in true alignment so that the rubber seals, when installed, shall have a tight on the wall plate embedded in the concrete. The gate shall be assembled and erected within the specified tolerance.

Before assembly of the Hoist, all bearing surfaces, journals, grease and oil grooves shall be carefully cleaned and lubricated with an approved oil or grease. After assembly, each lubricating system shall be filled with an approved lubricant furnished by the contractor. No solvents shall be used for cleaning self-lubricating bearings.

The hoist complete with all accessory shall be assembled and installed in accordance with the final approved drawings. The hoist drums shall be located and adjusted so that they are in true alignment with the wire rope attachments of the gate. After installation of the hoists and prior to placing the wire ropes, the hoists shall be operated and checked for proper operation. After completion of the above tests, the wire ropes shall be connected to the gates and the gates shall locally and remotely be tested, at which time all controls such as limit switches, electromagnetic brakes and position indicators, etc., shall be adjusted and tested for proper operation. Any defect or improper operations discovered during the tests shall be corrected and the entire test repeated.

(2) Stoplogs

The Contractor shall confirm following requirements:

The guide frames shall be assembled in their blockouts in accordance with the final approved drawings and check dimensions within the tolerance specified. During the placement of the concrete, alignment tolerance shall be checked and remedial action taken if readings indicate that displacement has occurred.

The stoplog complete with seals shall be assembled and provided in their slot for the purpose of checking the water tightness. After checking, the contractor shall store the stoplog in accordance with the Engineer's decision.

(3) Gantry

The gantry shall be completely assembled and assure all function are satisfied to specification requirement.

Eighth : Spare Parts

The Tenderer shall state the necessary spare parts to be kept in stock valid for two years from the point of view of the Tenderer, and submit in such a detail to enable the Engineer to place additional order whenever necessary.

Ninth : Data, Descriptive Documents and Drawings

(1) Drawing list prepared by the Engineer

Drawing No.SPW-110 Radial Gate and Gantry General Arrangement

Drawing No. SPW-111 Stop Logs

(2) Drawings and Data to be submitted by the Tenderer

The Tenderer shall submit with his bid the drawings and data as following. Regardless of any statement by the Tenderer with respect to his intention or ability to comply with the requirements of these specifications, failure on his part to include the drawings and data specified below with his bid or failure of such drawings and data to conform to the requirements of these specifications may cause rejection of this bid.

- (a) General drawings and descriptive data of their proposals together with complete detailed specifications ,technical schedules, catalogues, etc., if necessary.
- (b) General information as to method of assembling, installation and other information as may be needed to show that the materials proposed meets requirements of these specifications.

Tenth : Measurement and Payment

Separate measurement or payment shall not be made for the work required under this specifications. When all devices have been installed, connected and completed, it is accepted to pay the cost by the Engineer.

"GENERAL CONDITIONS"

- 1- The Contractor will investigate by himself about the nature of land * the subject of this Contract, by making the required tests and the complete study. This will be through inspecting the site to be acquainted with soil properties in the different necessary levels; also, to be fully aware of the precautions that should be taken to construct a sound work.

- 2- **Quantities**

Before starting of supply or execution, the Contractor must be sure of the correctness of the quantities estimated in the Bill of Quantities and the required Specifications, and that the materials rejected or ordered to be excluded no price shall be paid for them, while observing that the quantities mentioned in the main bill of rates are approximate. What is important are the final quantities.

- 3- **Rejection and Removal of Works not Complying with Specifications**

All works that are carried out and the NSDO found out that they are not in conformity with the technical specifications, whether this was a result of bad workmanship, or using low quality materials, or damages occurred in the work due to the Contractor negligence, they shall be repaired by a method to be approved by the NSDO.

In case of delay incurred by the Contractor to do that, the NSDO shall after advising him of that remove them and deduct the cost from his account without the Contractor having the right of objection with respect to the costs.

- 4- **Control of Materials**

The NSDO must approve the sources that will supply the materials entering in the works. This is before start of supply. The approval will be granted after making tests on the taken samples to determine the extent of its conformity with the specifications. Taking into account that the conformity of results of tests on these samples shall not relieve the Contractor responsibility of the materials supplied on site, and from which samples will be taken at any time before and during operation. If it is evident that the sources of materials previously approved had become not conforming to the specifications, he must provide fit materials from other approved sources. It will not be allowed to use materials which are not corresponding to specifications. All used materials are subject to inspection and tests at any time.

- 5 - **Rates**

Rates shall be according to those stated in the Bills of Quantities including the rates for supply, distribution, stowing, measuring, workmanship, and maintenance works throughout the operation period. These rates also include all what is required for work of supply of materials and requirements whether what is mentioned in the special conditions for the operation or what is required for work and not mentioned in these conditions.

- 6 - **Program of Works Execution:**

Immediately upon concluding the contract with the Contractor, he must submit to the NSDO within fifteen days a detailed program for works execution, in which times and periods of executing each part will be indicated. The NSDO shall have the right to amend this program according to what it regards appropriate to carry out the required works.

After the approval of this program by the NSDO, it shall be considered as one of the Contract Conditions. The Contractor must abide by it with full accuracy. If the Contractor neglected to start carrying out the work defined in the Program, or if he failed or neglected to comply with carrying out the NSDO instructions regarding this Contract or to take into consideration the Contract conditions by the method which satisfy the NSDO, it shall have the right to request from the Contractor through a registered letter with acknowledgment or receipt to carry out his obligations according to the Contract conditions. In case the Contractor failed after that to carry out his obligations with full accuracy whether this was in repairing a previous default or a default following the notification, the NSDO shall have the absolute freedom to use all rights entitled to it pursuant to the Contract conditions. In case the Contractor violates the conditions of this Contract or neglects in executing one of them the NSDO shall have the right to suspend executing any new works in the part or parts which are affected by this negligence or default or till he repairs its effect. The Contractor shall have no right to claim in this case for any indemnity or extension to the time fixed for completing and handing over the required work.

7 - Organization of Traffic Movement During Work Progress

The Contractor is bound to erect barriers and signs indicative of closing the road with respect to traffic. He must put sufficient number of red lights at night, as well as guides, instructors and guards day and night by him and at his own cost. The Contractor will be responsible for what may happen due to shortage of these precautions according to the instructions of the Roads and Bridges NSDO.

8 - Equipment:

All machines and instruments which shall be brought by the Contractor to use them in the execution of works * the subject matter of this Contract * must be in good state approved and accepted by the NSDO before starting execution. The Contractor must maintain its state throughout the execution period; also he must bring the sufficient number of them to the work site to guarantee quick execution according the approved time schedule.

Furthermore, the Contractor must appoint the sufficient number of workers and technicians trained to operate this equipment with high efficiency.

9 - Optional Items:

In the cases where there are optional items the NSDO shall have the right to entrust the Contractor whether to carry out all or part of the work shown in these items or not, without the Contractor having the right to object or claim with indemnity due to that.

10 - Amendment of Works:

The NSDO shall have the right at any time either before or after starting work to make amendment in works by increase or decrease or deleting certain items stated in the bill of quantities and rates in such a manner that the value of amendment will not exceed one quarter of the total Contract whole value. The Contractor must abide by and carry out these amendments immediately upon notifying him by means of a registered letter with acknowledgment of receipt from the NSDO. These amendments shall be considered as if they are stated in the original contract, and at the same rates the same period specified therein. In case the value of amendments exceeded 25 % of the total Contract value whether by increase or decrease, the Contractor shall have the right to object against that, and to reach an agreement with the NSDO concerning the prices and execution period.

If the works required to be executed have no prices in the Contract or in the annex of bill of

rates, a suitable price for them will be agreed upon with the Contractor before the start of work execution, provided that work execution shall not be delayed because of any disagreement or dispute that may arise regarding this agreement.

The amendments and additional works shall not result in any delay in carrying out the operation within the fixed time, and the Contractor shall be responsible for the delay that occurs if he was not able to hand over the whole works in the fixed time.

11 - Regulations and Laws

The Contractor must abide by the laws and general regulations currently in force. He must obligate his agents and workers to abide by them. The Contractor shall bear alone all fees, and insurance due on him in application of the provisions of the law. The Contractor shall also bear tax stamp of the Engineering and Applied Professions Association, and he alone shall be responsible for that.

12 - Lining and Levels

The Contractor must make the required lining for each part of the work by his engineer and the presence of the NSDO Engineer. The Contractor is alone responsible for carrying out the works required for lining with full accuracy, for its correctness, checking the dimensions shown on the drawings, and the correct recording of all information on them to the real nature. The approval of the NSDO Engineer or his participation in execution and making the lining will not relieve the Contractor from the absolute responsibility for the correctness of this lining. The NSDO will specify a constant level (Roper) for executing the required works.

The Contractor must carry out all these works according to the levels shown on the drawings, or requested from him. He must verify the correctness of heights from the fixed level by making fixed marks, and recording these fixed marks for their revision and approval by the NSDO. All costs required for executing this work are charged on the Contract rates and nothing for them shall be paid to the Contractor.

13 - Maintaining the Existing Structures

The Contractor must maintain the existing structures located in the work area and adjacent to the structures required to be made. Any damage or harm occurs to these structures by reason of the work must be repaired by the Contractor and at his own cost, without the need to take any other measures. The Contractor shall have no right to object or discuss what is determined by the NSDO with respect to costs spent by it on repairs and rebuilding what was damaged to its original state.

14 - Water

The Contractor must obtain by himself and at his own cost the water required for carrying out the works * the subject matter of this Contract. The water must be pure to the required degree. Water determined by the NSDO as unfit must not be used. In this case, the NSDO resolution is final and binding the Contractor.

15 - Obtaining Construction Materials

The Contractor is solely responsible for procuring the materials required for all constructions

(reinforcement steel * cement * woods .. etc.) by himself. The role of the NSDO is confined to handing letters to facilitate receiving these materials from the concerned bodies without its being liable to the least responsibility. The Contractor must pay all what is requested from him of costs or fees to the competent bodies by himself and on his own account.

- 16 -** The Contractor is solely bound to take all steps required for leveling the existing roads or to make replacement roads or footpaths for entering work site * the subject matter of this Contract, and to convey the required equipment, instruments, raw materials, and machines to all locations of execution, by himself and at his own cost, and without paying anything to him in return of that.
- 17 -** The Contractor is bound to procure all and various equipment, engineering and survey instruments required for the works of lining, executing and measuring in a good state to work site to be used by the supervision staff assigned by the NSDO.
- 18 -** The Contractor must take into account that the work area is located east of Suez Canal in Sinai Peninsula, and which was a stage of numerous military battles, and which usually results in the existence of mines, explosives, dynamites and wars leftovers that are always liable to explosion.

Since all these hazards may exist in this area, the NSDO from its side reached an agreement with the Armed Forces to inspect and clean the area * the subject matter of this Contract, and determined to be reclaimed and planted, and which is shown on the Project maps from all these leftovers. The Armed Forces from its side issues a certificate purporting the completion of cleaning and inspection together with placing the required warning signs to define the limits of these areas.

The Contractor must take all this into his account, and that the performance of the Armed Forces of this matter by instructions from the NSDO will not relieve him from the responsibility of the safety of his workers and equipment. He solely will assume the responsibility, and he must take all measures which he regards as appropriate for the sake of protecting his work and workers without the least responsibility on the NSDO.

- 19 -** The Contractor must also be well aware that the Contract area is a military area, and he must abide by all rules and regulations organizing work in such areas, together with full safeguarding the contact lines for the Armed Forces and Security. Also, he must abide by any military instructions issued before and during work progress. Contract rates include the costs of repairing any military facilities exposed to damage as a result of work and according to the estimations of the Armed Forces.
- 20 -** The Contractor must take all precautions to protect the safety of what may be found of roads, electric and telephone cables, potable water pipelines and the like. He must notify the NSDO whenever these utilities are found to obstruct the required operation in order to enable moving them or operating beside them or avoiding them. This will be done by a written approval. If it will be necessary to remove or amend any of these utilities, the costs involved shall be charged to the NSDO account, and the Contractor shall be responsible for protecting any equipment till handing them to the body owning it, or to the NSDO stores.
- 21 -** The Contractor is bound to hand to the NSDO and the concerned bodies defined by the NSDO all what is found out during work progress of antiquities, coins and the like of the valuable things. He shall take all precautions to guarantee keeping off hazards from them. The Contractor immediately upon finding out any antiquities or statues or tombs or inscriptions, or

remains of ancient buildings or any other ancient monuments shall advise the NSDO. In this case the Contractor shall suspend work within the limits of the place where the discovery is found till he receives instruction from the NSDO in this concern.

- 22 - The Contractor undertakes * for the sake of realizing the goals of the Contract documents, and without prejudice of the stipulations of Article (27) of the General Contract * to put at the disposal of the staff starting from the date of issuing operation order from the NSDO to the Contractor, and throughout the execution period and till the actual completion of the work (6) six passenger vehicles in a good state and serviceable, and acceptable to the NSDO, and (2) two vehicles equipped with auxiliary gearbox of a type acceptable to the NSDO also. The Contractor shall bear all costs concerning operation and maintenance of these vehicles, fuel and oils, as well as expenses and wages of drivers. In case the Contractor falls behind putting these vehicles at the disposal of the supervisory staff or putting them in a serviceable state, the NSDO shall have the right to hire these vehicles at the Contractor cost.
- 23 - If during the validity of this Contract decrees were issued from the competent bodies of the State, it is of their nature that they increase or decrease of the prices of supply materials (reinforcement steel and cement) the Contractor shall be compensated for the increase and the decrease shall be deducted from his dues.
- 24 - Any increase to be deducted from the operation final account will affect the Contractor priority.
- 25 - The NSDO is not bound to pay anything to the Contractor for the material, equipment, and works rejected by it according to the provisions of this Contract. Also, it will not allow an extension of the period of work execution due to any delay resulting from the rejection of materials, equipment and works by the NSDO.
- 26 - Without prejudice of the stipulation of Article (21) of the General Contract concerning the Contractor Engineer, the contractor must employ for him during the execution of the Contract, and from the date of issuing operation order to him * two of the engineers graduates of Faculty of Engineering * Civil Division, one of them having experience more than ten years and the other having experience not less than five years, and both having full efficiency. Both of them shall have a general delegation from the Contractor to act on his behalf for receiving and for quick execution of the instructions and orders issued to him from the NSDO, and to perform all work particulars. The Contractor shall submit their names to the NSDO before employment for approval and authorization.

If the Contractor failed to employ the engineers continuously, or in replacing them during a period of fifteen days from the date of his receiving a written request by that effect, he shall be bound to pay a fine amounting to fifty pounds for each engineer per each day of the days elapsed without employing this engineer or replacing him according to the case. This will be without the need of a warning or taking a certain procedure.

- 27 - All works will continue to be * to the date of final handing over * under the care of the Contractor and at his responsibility. He must repair all defects that may rise or harms that may result from any reason in general. Supervision of the NSDO on work progress will not prejudice by any way the Contractor responsibility, but the responsibility will remain fully to the Contractor up till the final handing over of the works. The report indicative of that will be written.
- 28 - The Contractor must complete and carry out all works * the subject matter of the Contract

during a period of thirty months starting from the date of issuing the written order to him, and his receiving the operation site including any increase or amendments issued pursuant to written orders pursuant to the right entitled to the NSDO in accordance with the provisions of this Contract, and till the work becomes serviceable from all aspects for provisional Handing Over.

29 - The Contractor must take into account that all his dues in the operation including the advance payments shall be paid in local currency, and he solely responsible for procuring all his requirements of the foreign currency. The role of the NSDO shall be confined to handing him letters of facilitation to the concerned bodies without the least responsibility on it.

30 - The Contract Rates include and apply to the Contractor carrying out, and at his own cost and throughout the period of operation, procurement, preparation and maintenance of a housing unit to be designated as a rest house for the staff supervising the Contract execution from the Project Executive Agency. Also, to make available, prepare and maintain an office to facilitate the works of this agency, and with them his working staff by acceptable form, and in the location to be approved by the NSDO, and to the extent which guarantees convenience for the supervising staff, and qualifies him for work without any obstacles.

The area of the housing unit designated as a rest house shall not be less than one hundred square meters, and the area of the office not less than forty square meters. They shall be provided with drinking water, electricity and all sanitary sewerage services. It should be taken into consideration that work in the Project is daily and throughout the twenty four hours. The Contractor shall be responsible for all maintenance works, as well as all costs required for work in the office and residence in the rest house. These housing units can be of buildings or pre-cast units which are approved by the NSDO. These units (the office and the residence house) shall be furnished with complete sets of suitable furniture which shall be approved by the NSDO.

31 - The Rest House and Office must be completely separated from the rest houses and offices of the Contractor. The Contractor is bound to prepare a suitable road to them, and to make adjacent to it a suitable place * vehicles parking area. The Contractor must take into account that he is bound throughout the operation period to provide means of complete accommodation for the supervisory staff, and procure the manpower required for the works of service, guarding and maintenance.

32 - The Contractor must take into consideration the necessity of completing, preparation, furnishing and providing both the Rest House and the Office with all their contents during two months from the date of issuing the written order to him to work. All costs of construction, service and maintenance throughout the period of operation are charged on the Contract rates, and nothing for them will be paid to the Contractor. In case the Contractor falls behind or slackens in carrying out all above-mentioned or some of it concerning the Office and the Rest House, the NSDO shall have the absolute right to carry it out and to deduct the value thereof from his account, together with obliging him with all resulting obligations according to the Contract.

33 - The Contract Rates include the Contractor paying the local fees and taxes according to the approved decrees in this concern.

34 - On submitting his Tender, the Contractor must take into account that the Agency will deduct 0.5 % (One Half percent) from the total value of his tender, after awarding. It will be paid through the Agency to the Ministry Training Center in 6 October City with the aim of training the engineers or technicians nominated by the Agency in proportion to the volume and value of the Operation, to develop their human skills and experiences in the field of work. This value

is charged to the Contract rates, and nothing for it shall be paid to the Contractor.

35 - This Tender together with all conditions thereof is governed by the Egyptian Law No. 89 for 1998 (and its Executive Regulations) concerning Bidding.

36 - Advance Payment

The NSDO will consider payment of the Advance Payment when so requested by the Tenderer in his Tender Documents. However, the Tenderer shall take into consideration that the actual payment of the Advance Payment cannot be the prerequisite for the commencement of the construction works. The Contractor shall be bound to start the Contract works within the period specified in the Order of Commencement issued by the NSDO and after the handover of the construction site to the Contractor by NSDO, irrespective of the actual payment of the Advance Payment.

37 - After conclusion of the Contract, it is subject to the revision of the State Council. The two parties agree in advance to execute the resolution of the State Council.

The Employer

The Contractor

(name)
(title)
North Sinai Development Organization

(name)
(title)
(Name of Contractor)

ARAB REPUBLIC OF EGYPT

**MINISTRY OF WATER RESOURCES AND IRRIGATION
MECHANICAL AND ELECTRICAL DEPARTMENT
ON BEHALF OF
NORTH SINAI DEVELOPMENT ORGANIZATION**

NORTH SINAI DEVELOPMENT PROJECT

**CONVEYANCE SYSTEM OF
EL SHEIKH GABER EL SABBAAH CANAL
BETWEEN KM 86.500 AND KM 108.466**

TENDER DOCUMENTS

VOLUME I (3)

PARTICULAR CONDITIONS OF CONTRACT

(month) 200x

Volume I (3) Particular Conditions of Contract

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Volume I (3) Particular Conditions of Contract

(Clauses in this Volume I (3) shall be read in conjunction with the Clauses with the same number of Volume I (1). The contents of the Clauses of this Volume I (3) are additions or replacement to those Clauses in Volume I (1). In case of any contradiction between the two the present Volume I (3) shall have the precedence.)

Article 6 Tender Bond, which is Submitted with the Tender

Each Tenderer shall enclose with his Tender, a Bank certified cheque or a Banker's guarantee as a Tender Bond (Bid Bond) issued by a first class Egyptian Bank acceptable to the NSDO for an amount of 2 % of the Tender Price.

The period of validity of the Tender Bond shall be at least 180 days.

In the event of the Tenderer withdrawing his Tender before the expiration of the period of validity previously stated, or failing to execute a formal Contract, the amount of the Tender Bond in respect of the Tender shall be confiscated in favour of the NSDO.

The successful Tenderer shall present a similar letter of guarantee as a Performance Bond as a guarantee for his proper performance of the Contract, amounting to 10% (ten percent) of the Initial Contract Price. Said Performance Bond has to be presented within 28 days of receipt by the Contractor of the Letter of Acceptance of his Tender, but not later than the date of expiration of the period of validity of the Tender Bond, or any agreed extension hereto.

The NSDO will return the Tender Bond to the Successful Tender on receipt of the Performance Bond.

The Tender Bonds of unsuccessful Tenderers will be returned as soon as the successful Tenderer has provided the Performance Bond, however not later than the date of expiration of the period of validity of the Tender Bond or of any agreed extension hereto.

Article 13 Opening the Tender Envelopes

(1) Two Envelope System of Tender

The evaluation of the Tenders and selection of the successful Tenderer shall be conducted in two steps using the Two Envelope System. Each Tender is submitted in two envelope, i.e., Technical Envelope and Financial Envelope, as described below. First, only the Technical Envelope will be opened and evaluated by the Technical Committee of the NSDO. The result of the evaluation for each Tender shall be either "passed" or "failed". Then, the Financial Envelope of only the "passed" Tenderers will be opened and the lowest price Tenderer shall be the successful Tenderer.

(2) The Bills of Quantities will be checked arithmetically and in the event of there being any mistakes in the extension of unit rates, the summation of any pages or Bill totals or the carrying forward of any sum, then the Tender shall be amended and the Tender Sum revised accordingly.

- (3) All tender prices will be valued in terms of Egyptian Pounds (L.E.)
- (4) All reservation shall be evaluated in terms of cost and added to the total Tender prices, for the purpose of comparison only. If the successful Tenderer has submitted reservations in his Tender, the details shall be negotiated with him during the Contract negotiations.
- (5) Technical Envelope

Technical Envelope shall comprise the following 2 groups of documents:

Group A

The documents of this group shall become part of the Contract Documents.

- A1) Cover letter (free style, but do not mention the Tender Price.)
- A2) Tender Bond (on Bank's Letterhead)
- A3) Power of Attorney
- A4) Schedule of Technical Data
- A5) Alternative Proposals, if any, together with detailed design documents, drawings and technical specifications.
- A6) Financial Statement of the Tenderer for the last 5 Years
- A6) Experience in Similar Works for the last 10 Years

Group B

The following documents shall be prepared using the Tenderer's own formats. These are required for the purposes of assessing the Contractor's Tender and comparing the various Tenders received. It is not intended that these documents will form part of the Contract between the NSDO and the successful Tenderer.

- B1) An organization chart showing clear definition of powers and duties of each staff in the organization.
- B2) A preliminary but comprehensive network showing the Tenderer's proposed procedure and the programme for constructing the Works in accordance with the Contract, together with such additional information the Tenderer wishes to submit in support thereof.
- B3) A histogram showing staff (managers, engineers and specialized technicians) and labour whom the Tenderer anticipates employing to construct the Works. The histogram shall differentiate direct employees and those employed by the Tenderer's sub-contractors.
- B4) Curriculum Vitae of all staff anticipated to be employed on the Contract.
- B5) A list of the major Construction Plant to be used.
- B6) A list of the works which are anticipated to be sub-contracted.
- B7) A list of all permanent materials showing the proposed sources and suppliers.

(6) Financial Envelope

Financial Envelope shall comprise the following documents, which shall become part of the Contract Documents.

- 1) Tender Form together with the Appendices
- 2) Bill of Quantities
- 3) Detailed Supplementary Schedules (Breakdown of all Tender Rates and Lump Sums)
- 4) Alternative Proposal, if any: The Cost comparative tables compared to the original specifications

Article 30 Fixed Time to Accomplish the Work

Penalties and Delay

Penalties for Shortage in the Earth Works

If the Contractor shall fail to achieve completion of the Works within the time prescribed in these Contract Documents, then the NSDO may allow the Contractor to complete the execution of Works, but then the Contractor shall pay to the NSDO the sums stated below as penalties for such default for any and every week or part of a week which shall elapse between the time prescribed in these Contract Documents and the date certified for completion of the Works. The NSDO may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies in his hands, due or which may become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligations to complete the Works, or from any other of his obligations and liabilities under the Contract.

The penalties shall be applied on the basis of one percent (1%) for every week or any part thereof such that the total levy shall not exceed ten percent (10%).

The periods of stopping the works which are covered by granted extensions of time from the NSDO as per the provision of the Contract are not included in the aforementioned delay.

The penalties for delay shall be calculated as percent of the final Contract Price if the NSDO sees that the delayed part of the Work shall prevent making use in the stipulated time of the already executed part of the Work. In case the NSDO sees that the delayed part of the Work shall not prevent making use of the completed part of the Works, then the penalties percentage shall be applied only to the value of the delayed part and at the rate and rules specified above.

The penalties for delay should be promptly imposed on the Contractor as delay happens although no damages occur and without notice or warning. The NSDO will deduct the delay penalties from any payments which are due or may become due to the Contractor.

Article 36 Quantities and Prices

- (1) Valuation Of Variations

All extra or additional work done or work omitted by order of the NSDO shall be valued at the rates and prices set out in the Contract if, in the opinion of the NSDO, the same shall be applicable. If the Contract does not contain any rates or prices applicable to the extra or additional work, then suitable rates or prices paid as far as possible on the same basis as the Contract rates and prices shall be agreed upon between the NSDO and the Contractor.

(2) Power Of NSDO To Fix Rates

Provided that no increase or decrease under Article (1) of this Clause, shall be made unless, as soon after the date of the order as is practicable and, in the case of extra work, before the commencement of the work or within fourteen days thereafter notice shall have been given in writing:

- a. by the Contractor to the NSDO of his intention to claim extra payment or a varied rate or price, or
- b. by the NSDO to the Contractor of his intention to vary a rate or price.

(3) Variations Exceeding 25 Per Cent

If, on certified completion of the Works, it shall be found that a reduction or increase greater than 25% of the sum named in the Letter of Acceptance, excluding all fixed sums, provisional sums and allowance for dayworks, if any, results from:

- a. the aggregate effect of all Variation Orders, and
- b. all adjustment upon measurement of the estimated quantities set out in the Bill of Quantities, excluding all provisional sums, dayworks and adjustments of price, if any.

but not from any other cause, the amount of the Contract Price, shall be adjusted by such sums as may be agreed between the NSDO and the Contractor, or failing agreement, fixed by the NSDO having regard to all material and relevant factors including the general overhead costs of the Contract.

Article 42 Power of Amendment of Works

(1) Variations

The NSDO may order any variation of the form, quality or quantity of the Works or any part thereof or any specified sequence, method or timing of construction provided that the NSDO may give any order, of whatsoever nature, if, in his opinion, a necessity, a circumstance or an emergency has arisen and such order is necessary in the best interest of the Project.

The NSDO shall have the power to order the Contractor to do and the Contractor shall do any of the following:

- a. increase or decrease the quantity of any work included in the Contract,
- b. omit any such work,

- c. change the character or quality or kind of such work.
- d. change the levels, lines, positions and dimensions of any part of the Works,
- e. execute additional work of any kind necessary for the completion of the Works, and
- f. change any specified sequence, method or timing of construction of any part of the Works,

and no such variation shall in any way vitiate or invalidate the Contract but the value, if any, of all such variations shall be taken into account in ascertaining the amount of the Contract Price.

(2) Orders For Variations To Be In Writing

No such variations shall be made by the Contractor without an order in writing of the NSDO. Provided that no order in writing shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this Clause, but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities. Provided also that if for any reason the NSDO shall consider it desirable to give any such order verbally, the Contractor shall comply with such order and any confirmation in writing of such verbal order given by the NSDO, whether before or after the carrying out of the order, shall be deemed to be an order in writing within the meaning of this Clause. Provided further that if the Contractor shall within seven days confirm in writing to the NSDO, and such confirmation shall not be contradicted in writing within fourteen days by the NSDO, it shall be deemed to be an order in writing by the NSDO.