**2.2 Construction of Cofferdaml Ring Bundh**

**2.2.1 General**

The term ‘Cofferdam/ Ring Bundh’ denotes any temporary or removable structure, constructed to hold the surrounding earth, water or both, out of the foundation pit whether such structure is constructed by earth, timber, steel, concrete or any combination of these, Notwithstanding any other provision made anywhere in the bidding document, the Cofferdam/ Ring Bundh under this Clause shall be constructed with the suitable earth obtained from the excavation of foundation trench of structure or borrowed earth or with combination of both as the case be in the field. The Contractor shall be fully responsible for arranging land, borrowing & carrying earth to Cofferdam I Ring bundh area with the aid of equipment labours or any other means.

Cofferdam/Ring Bundhs shall be constructed so as to control water to preclude sliding and caving-in of the walls of the excavation. The interior dimension of cofferdam/ring bundhs shall be such as to give sufficient clearance for the construction and removal of any required forms and the inspection of the interior and to permit pumping.   
Palisade works to protect the Cofferdam/ / Ring Bundh from being damaged by the wave actions! thrusts as will be required shall be provided by the Contractor.   
Unless otherwise provided, cofferdam/ring bundhs shall be removed on completion of the structure without disturbing or marring the finished work. The Engineer may order the Contractor to leave any part or the whole of the cofferdam/ring bundh in place and this shall not entitle the Contractor to claim for any additional payment.

The Contractor shall submit Drawings showing his proposed method of cofferdam/ring bundh at least ten days prior to the commencement of construction. However, the Contractor shall remain fully responsible the adequacy of the design strength and stability and the safety of the people working therein.

**2.2.2 Construction Procedures**

i) The earth borrowed from the foundation pit of structure or land shall be placed along the alignment of Cofferdam I Ring Bundh in horizontal layers parallel to the finished grade not exceeding a loose thickness of 150 mm. The earth of each bucket/basket is to be placed near to the earth placed before it and spread systematically. Throwing/dumping of earth in heaps will not be allowed.

ii) The clods of earth shall be broken down to a maximum size of 100 mm by striking the clods with the back of a spade or by other suitable method before the next bucket/basket of earth IS thrown close to it. The earth shall be compacted manually using rammers made of wood, iron or concrete weighing =>7 kg, fitted with shafts of about 1.5 m long. Ramming shall reduce the voids and to be continued until no further shrinkage of earth is possible by ramming.

iii) Before commencing ramming, the moisture content of the soil shall be increased or decreased as necessary by sprinkling the soil with water or by allowing natural drying of the soil as necessary so that the ramming can achieve the compaction as specified. Both wetting and drying may be aided by furrowing the fill and then re-spreading when the moisture content IS suitable.

viii) The preceding operations shall continue layer after layer until the top of the cofferdam/ring bundh attain the desired level.

ix) Where the Cofferdam/Ring Bundh crosses a flowing channel, a bypass /diversion channel has to be constructed to keep the flow unobstructed as per approval of the Engineer. The land required for such bypass /diversion shall have to be arranged by the contractor at his own cost.

**2.2.3 Removal of Cofferdam! Ring Bundh**

The Contractor shall remove the Cofferdam/Ring Bundh after satisfactory completion of the intended structure. The contractor shall not remove the Cofferdam/Ring Bundh without written permission of the Engineer, following his satisfactory inspection of the works. Prior to the commencement of the works, the Engineer shall confirm in writing the length of cofferdam/ring bundh that are to be removed. Removed earth shall not be stockpiled within the area of drainage channel which obstruct the flow. It can be used for construction of approach embankment. The contractor shall ensure that the cofferdam ring bundh and its associated elements are carefully and completely removed without causing any harm to the permanent works.

**2.2.4 Measurement**

The cofferdam ring bundh will be measured in unit number constructed and completed for each structure in accordance with the Specifications, to the lines, levels and grades required or as directed• by the Engineer.

**2.2.5 Payment**

Payment of Cofferdam/Ring Bundh shall be made in unit number at the rates included in the BOQ. T1ie price includes full compensation of labour, construction equipment, hauling of earth including arrangement of land as necessary etc.

**2.3 Excavation I Re-excavation of Drainage Channels**

2.3.1   
Excavation/Re-excavation shall mean the removal of materials to the lines, grades and specification shown on the Drawings so that channels can be re-excavated to drain out excess water unobstructed.

**2.3.2 Spoil management**

The Contractor shall be fully responsible to explore, identify and arrange disposal area for the spoil earth and get approved by the Engineer. Dumped earth shall be leveled, dressed and compacted in a manner not to disturb the natural drainage pattern and the environment. Spoil earth shall not be dumped within a distance of 5 m from the top edge of cutting slope of drainage channel. When disposed off along the drainage channel outside 5 meter of the top edge of cut slope, it should be dressed to match the natural drainage in such a way that draining of surface runoff/waste water flow is not obstructed and water logging /congestion does take place and also earth does not go down into the excavated channel during rain. The local people may be encouraged to take earth from the spoil banks if they need it. If the excavated materials are found suitable for construction of embankment,, the contractor can use those materials on obtaining prior approval from the Engineer.   
Water hyacinth and other aquatic plants coming out from the drainage channel during excavation are to be collected at some selected places and dumped in to ditches to be dug at the direction of Engineer.

**2.3.3 Over excavation**

Any or all excess excavation for the convenience of the Contractor or over excavation performed by the Contractor for any purpose or reasons, except as may be explicitly approved by the Engineer shall be at the expense of the Contractor.

**2.3.4 Surface drainage**

Whenever a spoil bank passes across any depression or drainage channel, sufficient openings as approved by the Engineer are to be left in it to ensure unobstructed flow of surface run-off in the drainage channel. The spoil bank should be trimmed to a gentle slope across access roads to facilitate easy traffic movement and its top should be graded to a smooth surface to facilitate access.

**2.3.5 Cross dam!bundh**

Cross dams/bundhS are to be constructed across the drainage channels at suitable locations for surfce dewatering purpose to facilitate excavation, The Contractor shall submit his proposals for location and dimensions of cross dams/bundhs to the Engineer for approval before work is permitted to commence. The Contractor shall arrange to obtain earth for the construction of cross bundhs. The bundhs shalt not be removed until the bed has been dewatered, excavated and the measurement o the excavated earth completed.

**2.3.6 Bailing out of water**

The Contractor shall arrange installation and operation of surface pumps for bailing out accumulated water from the channel to facilitate the excavation work unhindered. Bailing out of water shall be continued until excavation or re-excavation to the design bed level and section is completed.

**2.3.7 Measurement**

The quantity measured for payment shall be in cubic meters basçd on the Pre-work and Post-work cross sections of accepted channel section not exceeding 50 m apart constructed and completed In accordance with the Specifications, to the depth, levels and grades required or as approved or directed by the Engineer.

**2.3.8 Payment**

Measurements for payment of drainage channel shall be made for the material excavated to the prescribed depth, slope, grades and dimensions shown on the Drawings or as approved or directed by the Engineer under BoQ Bill No.03; Item No.3.01. The unit rate shall include all costs of excavation, arranging disposal area, hauling and dumping of spoil soil at any distance, dressing and leveling of earth, putting cross dam, disposal of aquatic plants, bailing out of water, where necessary etc., including all costs of labour, materials and construction equipment.

**2.4 Closure Dam**

**2.4.1 Description**

The “Closure Dam” constructed across a flowing river/channel to stop the flow of a Channel I River completely is commonly an earthen structure with a hard material core inside (Sand filled Geo-Bags C.C Block/Boulders! sand filled synthetic bags etc.). It requires special technique and treatment while, final closing of the Channel/River takes place.

**2.4.2 Design**

i) A complete set of design and drawings duly approved by the competent authority shall be made available to the Contractor which shall act as a guide for the construction of the Closure Dam and the work is to be executed in accordance with this specification.

ii) The contractor may prepare a design and drawing for the river/channel closing on his own and submit the same to the Engineer for approval and the work is to be executed in accordance with the specifications.

iii) In either case, the design and drawings shall not relieve the contractor from his obligatiofl5 under this contract to close the flowing channel in full design section to meet the project needs.

together in a staggered pattern with 100% coverage. The turfs shall be set firrrly into the top dressing and watered immediately after planting, then daily until the grass is well established and new growth is clearly visible.

ii) Siding or turfing shall be planted with their root system substantially undamaged well buried in firm material, and packed around the moist earth in which they have grown.   
iii) Grass planting shall be started well in advance of the monsoon season to ensure establishment of growth before the rain sets in and shall not be performed when ground is muddy or when the soil or weather condition would otherwise prevent proper soil preparation and subseq1ent operations.

iv) The contractor shall be responsible for satisfactory growth and shall water, fertilize, and mow the grass to ensure 100% ground coverage of live grass all through the defect liability period.

v) Fertilizer shall be approved lime or mixture of plant nutrients or both. Fertilizer shall consist of standard commercial material such as Nitrogen — Phosphate- Potassium shared in ratio 16:5:12 or in other suitable ratio. The application rate shall be determined through soil analysis of soil sample taken from the area to be grassed.

vi) All sodden areas shall be watered until the grass grows fully. Areas that do not grow or wash out shall be repaired and returned with fresh sods at the Contractor’s expense.

**2.6.4 Measurement**

The quantity measured for payment shall be in square meters of finished and accepted well grown grass only.

**2.6.5 Payment**

Payment of the item shall be made at the. unit rate per square metre as included in the Bill of Quantities. The unit rate shall includes all cost of furnishing labour, material, incidentals for carrying out the work including preparation of grass-bed, and planting of grass as specified, fertilizing, watering, maintenance and all other procedures specified herein.

**2.7 Foundation Excavation**

**2.7.1 Description**

The work consists excavation in any type of soil/material for foundation of structures, construction of Cofferdam/Ring Bundh with excavated earth and it removal, disposal of excavated unsuitable earth sheeting and other temporary work in protecting the stability arid safety of excavated foundations. The Contractor shall construct and maintain accurate bench marks so that levels can be easily checked by the Engineer

**2.7.2 Excavation plan**

Excavation shall mean the removal of materials so that structures can be constructed to the lines grades and dimensions shown on the Drawings. Excavation area shall be such adequate so that it provides necessary working space for placing forms, installation of any other Temporary Works etc required during construction. The Contractor shall prepare, submit and obtain approval from tile Engineer for excavation plans including details of any surface and/or sub-surface dewatering prior to the start of any excavation.

**2.7.3 Clearing of Site**

The site shall be cleared as required to remove all stumps, roots, vegetable and other objectionabiS materials specifically within areas for structure excavation, structures, appurtenance and any other

facilities indicated on the Drawings or designated by the Engineer. The cleared material shall be

deposited in approved areas off site or burnt as directed by the Engineer. Cleaning of site includes cutting jungles, uprooting stumps and demolition of existing minor structures.

**2.7.4 Excavated Spoil Earth**

Excavated earth if found suitable shall be used for construction of Cofferdam/Ring Bundh as per specification specified in Article No.2.2.1. Unsuitable/surplus earth shall be removed from the site by hauling to any distance at approved locations.

**2.7.5 Over Excavation**

Except as may be directed by the Engineer, excess excavation for the convenience of the Contractor or over excavation performed by the Contractor for any purpose or reasons, shall be at the expense of the Contractor. If the excavation for foundations exceeds the depths specified, back filling shall be undertaken as fill works at the expense of the Contractor. If back filling is to be undertaken it shall be done by sand and shall have a fineness modulus.(FM) between 1.0 and 1.50 or as approved or directed by the Engineer.

**2.7.6 Final Finishing of Excavation**

When excavating to specified foundation levels, the Contractor shall not excavate the last 150 mm until immediately before commencing the construction work, except that the Engineer shall permit otherwise. Any damage to the work due to the Contractors operations shall be repaired at the expense of the Contractor.

**2.7.7 Removal of Unsuitable Materials**

When the specified levels or limits of excavation are reached, the Engineer will inspect the ground exposed. If the Engineer considers that any part of the ground is by its nature unsuitable, he may direct that the unsuitable material be further excavated to a depth from the lowest excavation level shown on the Drawings or as approved or directed by the Engineer and be replaced by a suitable backfill approved by the Engineer.

If the materials forming the bottom of any excavations, which is acceptable to the Engineer at the time of his inspection, subsequently become unacceptable to him due to exposure to weather condition or due to flooding or have become puddle, soft or loose during the process of the works, the Contractor shall remove such damaged softened, or loosened material and excavate further manually. Such further excavation shall be held to be excess excavation and the cost of the excess excavation and subsequent replacement with a suitable backfill shall be at the expense of the Contractor.

**2.7.8 Measurement**

The quantity of foundation excavation of earth for structures to be measured in CubIc MetOr for payment shall include excavation for all structures. The measured volume shall be the plan outline bounded by the bottom plane of the blinding concrete under the reinforced concrete footing, and on top by the surface of the existing ground and on the side by vertical planes of the foundation.

**2.7.9 Payment**

The work measured shall be paid as per unit prices per Cubic Meter as shown in the Bill of Quantities. The payment shall be the full compensation for all excavation and construction & removal of Cofferdam/Ring Bundh for structures including arranging land and borrowing earth from elsewhere (while excavated earth are not sufficient to construct the entire Cofferdam/Ring Bundh), supply of all materials, labour, equipment, tools and incidentals etc. necessary to the successful completion of the work. The payment shall also be the full compensation for providing working space around the