

RAJPIPLA NAGARPALIKA

DIST: - NARMADA

**BID DOCUMENTS FOR MAN-MADE LAKE (BESIDE RASHI
NAKSHATRA GARDEN) DEVELOPMENT FOR RAJPIPLA**

ITEM WISE SPECIFICATIONS – CIVIL WORKS

RAJPIPLA NAGARPALIKA

RAJPIPLA

ITEM WISE TECHNICAL SPECIFICATIONS

Item No.1:

Excavation for foundation up to 1.5 m depth including sorting out and stacking of useful materials and disposing off the excavated stuff up to 50 Meter lead. (B) Dense or Hard soil

General:

Any soil which generally yields to the application of pickaxes and shovels, phawaras, rakes or any such ordinary excavation implement or organic soil, gravel, silt, sand turf loam this category.

Clearing the site:

The site on which the structure is to be built shall be cleared and all obstructions, loose stone, materials and rubbish of all kind, bush; wood and trees shall be removed as directed. The materials so obtained shall be property of the Government and be conveyed and stacked as directed within 50 M. lead. The roots of the trees coming in the sides shall be cut and coated with hot asphalt.

The rate of site clearance is deemed to be including in the arte of earthwork for which no extra will be paid.

Setting out:

After clearing the site, the center lines will be given by the Engineer-in-charge. The contractor shall assume full responsibility alignment, elevation, and dimension of each and all part of the tractor shall assume full responsibility for alignment elevation of each and all parts of the work. Contractor shall supply laborers, materials, etc. required for setting out the reference marks and shall maintain them as long as required and directed.

Excavation:

The excavation in foundation shall be carried out in thru line and level and shall have the width and depth as shown in the drawing or as directed. The contractor shall do the necessary shoring and shutting or providing necessary slopes to a safe angle, at his own cost. The payment for such precautionary measures shall be paid separately if not specified. The bottom of the Excavated area shall be levelled both longitudinally and transversely as directed by removing and watering as required. No earth filling will be allowed for bringing it to level, if by mistake or any other reason excavation is made deeper or wider that shown on the plan or directed. The extra depth or width shall be made up with contractor of same proportion as specified for the foundation concrete at the cost of the contractor. The excavation up to 1.5 m. depth shall be measured under this item.

Disposal of the excavation stud:

The excavated stuff of the selected type shall be used in filling the trenches and plinth or leveling the ground in layers including ramming and watering etc.

The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed with lade up to 50 m. and all lift.

Mode of measurement of payment:

The measurement of excavation in trenches for "foundation" shall be made according to the section of trenches shown on the drawing as per section given by the Engineer-in-charge. No payment shall be made for surplus excavation made in excess of above requirements or due to slopping and slopping back as found necessary on account of condition of soil and requirement of safety.

The rate shall be for a unit of one cubic meter.

Item No.2 :**Providing and laying rubble for apron (each stone weighting not less than 40Kg.) including and packing and filling in the interstices with quarry-spalls.**

Stone subject to marked deterioration by water or weather will not be accepted, the stone shall be sound, hard, durable and fairly regular in shape and its thickness in any one direction shall not be less than 15cm. The largest stones procurable shall be supplied on site, the size of spalls shall be minimum 25mm. and shall be suitable to fill voids.

Stones shall be filled in layers of 20cms. to 30cms. thickness and all interstices between adjacent stones shall be filled with 20 per cent spalls of proper size and wedged in with hammers to ensure tight packing.

Stones shall be first stacked in rectangular chattas on fairly level ground and measured. Artificial voids should not be left in side the chattas.

The measurement for payment shall be made on cmt. basis of chatta of rubbles only. No. deduction shall be made for voids. Chattas for spalls shall be made separately and shall be measured for record purpose only and shall not be paid for.

The unit rate in cu.m basis includes the cost of materials, labour & tools to complete the work.

Item No.3:**Providing and laying cement concrete 1:4:8 (1- Cement : 4- coarse sand : 8- hand broken stone aggregates 40 mm nominal size) and curing complete excluding cost of formwork in (A) Foundation and Plinth****Materials:**

Water shall conform to M-1. Sand shall conform to M-6 cement shall conform to M-3 stone aggregate 40 mm. nominal size shall conform to M- 12.

Workmanship:**General:**

Before starting concrete bed of foundation stretches shall be cleared of all loss materials, leveled, watered and rammed as directed.

Proportion of mix:

The proportion of cement sand and coarse aggregate shall be 1 part of cement; 4 parts of sand 8 parts of stone aggregates and shall so measured by volume.

Mixing:

The concrete shall be mixed in mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of breakdown of machineries and the interest of the work. It shall be carried out on a watertight platform and care shall be taken to ensure that mixing is continued until the mass is uniform of colour and consistency. However in such case 10 % more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer shall be done for a period 1 to 2 minutes. The quantity of water shall be sufficient to produce a dense concrete of required workability for the purpose.

Transporting & placing the concrete:

The concrete shall be handled from the place of mixing to the final position in not more than 15 minutes by the methods as directed and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.

The concrete shall be laid in layers of 15cms to 20cms.

Compacting:

The concrete shall be rammed with heavy iron rammers and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

Curing:

After the final set, the concrete shall be kept continuously wet, if required by pending for a period of less than the 7 days from the date of placement.

Mode of measurement of payment

The concrete shall be measured for its length breadth and depth, limiting dimensions to those specified on plan or directed. The rate shall be for a unit of one cubic meter.

Item No.4:

Providing formwork of ordinary timber planking so as to give a rough finish including centering shuttering strutting and propping etc. Height of propping and centering below supporting floor to ceiling not exceeding 4 M. and removal of the same for in situ reinforced concrete and plain concrete work in. (A) Foundations Footings Bases of Columns etc. and Mass concrete. Workmanship:

Before the concrete is placed the shuttering shall be trued-up and any water accumulated therein shall be removed. All saw dust, chips.

Nails and other debris shall be washed out or otherwise removed from within the shuttering. The reinforcement shall then be inspected for accuracy of fixing. Immediately before placing the concrete the shuttering shall except in frosty weather be well wetted and inspection shall be closed.

Item No.5:

Providing and laying controlled cement concrete M.250 and curing complete excluding the cost of formwork and reinforcement for reinforced concrete work in (A) Foundations, footings, Base of columns and Mass concrete..

Item No.7:

Providing and laying controlled cement concrete M.250 and curing complete excluding the cost of formwork and reinforcement for reinforced concrete work in (B) Walls, from top of foundation level upto floor two level.

Item No.10:

Providing and laying controlled cement concrete M.200 and curing complete including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in (E) Staircases excluding landing upto floor two level

GRADES OF CONCRETE:

The compressive strength of various grades of designation concrete shall be given below:

Grades	Compressive strength specified for
Designation	15 cm cubes min at
	28 days (N/mm²)

M 7.5	7.5
M 10	10
M 15	15
M 20	20
M 25	25
M 30	30

NOTE: In the designation of a concrete mix letter M refer to the mix and the number to the specified characteristic compressive strength of 15 cm-cube at 28 days expressed in N/mm²

Minimum cement content required in reinforced cement concrete to ensure durability under specified condition of exposure, will be in accordance with IS : 456-2000. However it shall not be less than 300 Kg/m³ of concrete for all grade cement.

BATCHING:

In proportioning concrete, the quantity of both cement and aggregate should be determined by mass. Cement shall be used on the basis of mass and should be weighed separately from the aggregate. Water should be either measured by volume in calibrated tanks or weighed. Any solid admixture that may be added may be measured by mass liquid and paste admixture by volume or mass. Batching plant where used should conform to IS: 4925 – 1968. All measuring equipment should be maintained in a clean serviceable condition and their accuracy periodically checked.

Except where it can be shown to the satisfaction of Engineer that supply of properly graded aggregate of uniform quality can be maintained over the period of work, the grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions when required, the different sizes being stocked in separate stock piles. The material should be stocked in separate stock piles. The material should be stock piles for several hours preferably a day before use. The grading of coarse and fine aggregate should be checked as frequently as possible, the frequency for a given job being determined by Engineer to ensure that the specified grading is maintained.

It is important to maintain the water-cement ratio constant at its correct value. To this end, determination of moisture contents in both fine and coarse aggregate shall be made as frequently as possible, the frequency for a given job being determined by the Engineer in charge according to weather conditions. The amount of the water to be added shall be adjusted to compensate for any observed variations in the moisture content in the aggregates, IS – 2386 (Part-3) – 1963 may be referred to. To allow for the variation in mass of aggregate due to variation in their moisture content, suitable adjustments in the masses of aggregates shall also be made. In the absence of exact data only in the case nominal mixes, the amount of surface water may be estimated from the values given in the table.

STRENGTH REQUIREMENT OF CONCRETE

At least 4 week before commencing any concreting in the work the contractor shall make trial mixes using samples of coarse aggregates, sand, water and cement typical of those to be used in the works. A clean dry mixer shall be used and the first batch discarded.

CONTROL OF CONCRETE:

(I) PRELIMINARY TESTS: The contractor may be called upon to submit representative samples of materials to be used for concrete in order that they may be tested at a recognized laboratory and the suitability of materials established. These tests are to be carried out in accordance with IS 456-2000. All expenses in connection with the above mentioned tests shall be borne by the contractor.

(ii) WORKS CUBE TESTS: during the progress of the work, 15 cm. Cubes shall be made and tested in accordance with IS: 456 – 2000 and IS: 516 amended up to date.

TEST SAMPLES AND ACCEPTABILITY CRITERIA:

For both preliminary testing as well as day to day works cube testing, the number of test specimens required, the frequency of sampling and criteria for acceptance of a concrete as conforming to the specified grade shall be in accordance with IS 456-2000, except that the minimum compressive strength for each grade or concrete shall be as provided in the above table.

The cubes shall be made, cured, stored, transported and tested in accordance with IS 516 – 1959 and IS

1199-1959. The test shall be carried out in the laboratory approved by the engineer. Whenever there is a significant change in the quantity of any of the ingredients for concrete, the engineer may at his discretion order the carrying out of fresh preliminary trial mixes. All cost for trial mixes and tests shall be paid by the contractor.

CONSISTENCY OF CONCRETE:

Only sufficient water shall be added to the cement and aggregate during mixing to produce a mixture of sufficient workability to enable it to be well consolidated, to be worked into the corners of the shuttering and around the reinforcement, to give the specified surface finish, and to have specified strength.

If difficulty be experienced in placing the concrete of specified mix and approved consistency between and below the reinforcement bars in the bottom of beams and similar units, the bars shall be embedded in a concrete of improved workability by increasing the proportion of cement by an approved amount and using aggregate of approved smaller maximum size than specified for which nothing extra shall be paid.

Whenever it is not possible to concrete the full height of the columns in one operation, at least 1st, ft. depth of the upper height of the column when concreted at a later state shall be concreted with a richer mix next higher to the mix specified for the member. This also applied to the top part of the column to be concreted along with the roof beam or slab. However, nothing extra shall be admissible for this and the contractor is deemed to have taken into account the excess cost involved in complying to this at the time of quoting his/there rates for the item.

MEASUREMENT OF CONSISTENCY:

The consistency shall be determined by making trial mixers with dried aggregates, or when so instructed by laboratory made test cubes as herein after shall be specified. The consistency of the trial mixer of the approved consistency shall be measured as instructed.

The slump of the approved trial mixture shall be measured and this slump shall not be exceeded throughout all batches of concrete made from the same materials mixed in the same proportions as the trial mixtures and used in those parts of the works as instructed. In no case, however, shall the slump exceed 50 mm for concrete in slab or exceed 25 mm for concrete consolidated by mechanical vibration.

The slump test shall be made on concrete actually being placed in the works at the commencement of each period of concrete placing and at such other times as instructed.

The apparatus used for the slump test shall be a standard cone. When the cone is filled, it shall be raised vertically clear of the concrete and the measurement of the slump shall be 30 mm minus the height of the slumped cone of concrete. Care shall be taken to prevent vibration of the sample being tested.

If the engineer requires the use of other means for testing the consistency of the concrete this clause must be rewritten.

a. The maximum slump for concrete used in various parts of the buildings shall be as given below unless specified otherwise.

<u>Sr. No.</u>	<u>Item</u>	<u>Max. Slump</u>
1.	Foundations	3 Cm
2.	Retaining Walls	8 Cm
3.	Concrete Walls	5 Cm

4.	Columns with smaller dimension	
a.	12" or less	5 Cm
b.	More than 12"	5 Cm
5.	Slabs, beams, parapets, ribs & stairs	5 Cm

DISTRIBUTION OF CONCRETE:

The concrete shall be distributed from the mixers to the position of placing in the works by approved means that do not cause separation or otherwise impair the quality of the concrete.

PREPARATIONS FOR PLACING CONCRETE:

Before the concrete is placed the shuttering shall be trued-up and any water accumulated therein shall be removed. All saw dust, chips.

Nails and other debris shall be washed out or otherwise removed from within the shuttering. The reinforcement shall then be inspected for accuracy of fixing. Immediately before placing the concrete the shuttering shall except in frosty weather be well wetted and inspection shall be closed.

CURING AND PROTECTION OF CONCRETE:

Newly placed concrete shall be protected from rain and during hot, dry or windy weather approved coverings shall be used to prevent premature drying out. The concrete shall also be protected from frost as hereinbefore specified. All exposed faces of concrete shall be kept moist by approved means for fifteen days after placing or for three days if Rapid Hardening Portland Cement be used, except when there be danger of the curing water getting frozen. Concrete in foundations and other underground work shall be protected from admixture with falling earth during and after placing. Concrete placed in ground containing deleterious salts shall be kept free from contact with such waters during placing and for a period of three days thereafter. The ground water around basements, underground tanks, and similar constructions shall be kept down to an approved level by pumping, or the works shall be flooded or other approved means taken to prevent floatation.

Approved means shall be taken to protect immature concrete from damage by floating debris, ice and similar material in works in water. Arrangements shall be made to restrict traffic loads and speeds in the vicinity of bridge work for an approved period.

Slabs, stairs, and other work shall be protected from damage from workmen, equipment, over load, or any other cause.

FINISHES:

Honeycombed surfaces shall be made good immediately upon removal of the shuttering and superficial water and air holes shall be filled. Unless instructed to the contrary, the face of exposed concrete placed against shuttering shall, after removal of the shuttering, be rubbed with carborandum stone with cement grout lubricant or similar to remove fins and other irregularities. This however, is not substitution for plaster, which may be required to be carried out for purpose of finishing.

The surface of non-shuttered faces of concrete work other than slabs shall be smoothed with a wooden float (or if approved with a steel trowel) to give a finish equal to that of the rubbed down shuttered faces. Concealed concrete faces shall be left as from the shuttering except that honey combed surfaces shall be made good.

The top faces of slabs not intended to be surfaces shall be leveled and floated to a smooth finish at the levels or falls shown on the drawings or elsewhere. The floating's shall not be executed to the extent of bringing excess fine material to the surface.

Ribbed surface of slabs shall where instructed be formed at the time of tamping and leveling. Indentations in slab or stair surfaces shall be formed by approved implements giving the depth and patterns instructed.

The top faces of slabs intended to be covered with screened granolithic or similar surfacing shall be left with a speed finish.

The soffits of slabs and faces of walls intended to be rendered shall be roughened by approved means to form a key.

Concrete surfaces to take finishes other than those specifically referred to herein shall be prepared in an approved manner to suit the finish as instructed.

VIBRATION:

i) **APPEARANCE:** The concrete that is to be compacted by vibration should appear anything from earth dry to slightly glistening. The mix should have the appearance of lacking in fines.

ii) **PLACING:** Segregation is likely to take place when the concrete is tipped into the form work and this should be avoided.

The concrete mix should not contain surplus water and sand which will develop segregation under influence of vibratory compaction. The distribution of new concrete should be uniform for the whole section and the surface kept horizontal the whole time, thus ensuring that the movement of concrete is downward only. Vibrators should not be used as a spreading or distributing agent.

iii) The vibrators shall be of rotary out of balance immersion type or the electromagnetic type and operate at a frequency of not less than 4,000 cycles per minutes. The vibration shall be of such a power input as to produce an accelerating of $4g$ to $10f/sec^2$ in the mass of the compacted concrete. The vibrators shall be designed for continuous operation.

iv) **DISPOSITION OF VIBRATORS:** Internal vibrators shall be disposed within the mix when placed, so as to maintain the whole of the concrete under treatment in an adequate state of agitation such that de-aeration and effective compaction attained at a rate commensurate with the supply of concrete from the mixers. Insertion of the vibrators at about 45 cm center is considered sufficient.

v) **PERIOD OF VIBRATION:** Vibration shall continue during the whole period occupied by placing the concrete, the vibrators being adjusted so that the center of vibration approximates to center of the mass being compacted at the time of placing. The concrete should not be over-vibrated and the period of insertion of internal vibrator should be about 15 second at any one point.

vi) **COMPACTNESS:** The concrete shall be judged to be compacted when the mortar fills the spaces between the coarse aggregate so as to form a glistening and even surface except for slight irregularities where the coarse aggregate breaks this smooth surface. When this condition has been attained the vibrators shall be withdrawn slowly.

vii) The vibrator must not be placed against the steel or the shuttering, the minimum distance being 75 mm. The compressor must be placed in such a position that shuttering, reinforcement and recently laid concrete are subjected to the minimum amount of vibration.

MEASUREMENT AND PAYMENT

The Concrete work shall be measured in length, breadth and depth as specified on drawing or as directed, correct up to nearest centimeter content shall be worked out nearest up to two place or decimal.

The rate shall be for a unit of cubic meters.

Item No.6:

Providing formwork of ordinary timber planking so as to give a rough finish including centering shuttering strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 M. and removal of the same for in situ reinforced concrete and plain concrete work in. (C) Vertical surface such as walls (any thickness) partitions and the like including attached buttresses & string course & the like. Materials:

Before the concrete is placed the shuttering shall be trued-up and any water accumulated therein shall be removed. All saw dust, chips.

Nails and other debris shall be washed out or otherwise removed from within the shuttering. The reinforcement shall then be inspected for accuracy of fixing. Immediately before placing the concrete the shuttering shall except in frosty weather be well wetted and inspection shall be closed.

Item No.8:

Filling in foundation and plinth with murrum or selected soil in layers of 20cm. thickness including watering, ramming and consolidating etc. complete.

All fill material will be subject to the Engineer's approval. If any material is rejected by the Engineer, the Contractor shall remove the same forth with from the site at no extra cost to the Owner. Surplus fill material shall be deposited / disposed off as directed by the Engineer after the fill work is completed.

No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with as directed by the Engineer.

The Contractor shall not commence the placement of any fill or backfill at any location without the approval of the Engineer.

MATERIAL

If any selected fill material is required to be borrowed, the Contractor shall make arrangements for bringing such material from outside borrow pits. The material and source shall be subject to prior approval of the Engineer. The approved borrow pit area shall be cleared of all bushes, roots of trees, plants, rubbish etc. top soil containing salts / sulphate and other foreign material shall be removed. The materials so removed shall be burnt or disposed off as directed by the Engineer. The Contractor shall make necessary access roads to borrow areas and maintain the same, if such access road does not exist, at his cost.

Filling in pits and trenches around foundations of structures, walls etc.

As soon as the work in foundations has been accepted and measured, the spaces around the foundations, structures, pits, trenches etc. shall be cleared of all debris, and filled with earth in layers not exceeding 15 cm., each layer being watered, rammed and properly consolidated, before the succeeding one is laid. Each layer shall be consolidated to the satisfaction of the Engineer. Earth shall be rammed with approved mechanical compaction machines. Usually no manual compaction shall be allowed unless the Engineer is satisfied that in some cases manual compaction by tampers cannot be avoided. The final backfill surface shall be trimmed and leveled to proper profile as directed by the Engineer.

The compacted surface shall be properly shaped, trimmed and consolidated to an even and uniform gradient. All soft spots shall be excavated and filled and consolidated.

MEASUREMENT AND PAYMENT

The earth work in filling shall be measured in length, breadth and depth as specified on drawing or as directed, correct up to nearest centimeter content shall be worked out nearest up to two place or decimal.

The rate shall be for a unit of cubic meters.

Item No.9:

Providing and laying in position FE 500D TMT bar reinforcement including cutting, bending, hooking and tying complete as per detailed drawings for the following. (A) Piers (B) Abutments (C) R.C.C. Returns

GENERAL

This work shall consist of furnishing and placing coated, T.M.T. or high strength deformed reinforcement, bars (intentioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge. The T.M.T. FE-500D bar shall be TATA, SAIL, RINL, Barnala, SSR or equivalent brand as directed by Engineer-in-charge.

MATERIAL

TMT Bars Reinforcements may be either TMT/medium tensile steel or high strength deformed bars. They may be coated with epoxy or with approved protective coatings.

TMT bars reinforcement for RCC work shall conform to IS 1786 FE-500D and shall be of tested quality. It shall also comply with relevant part of IS 456-1966.

All reinforcement shall be clean and free from dirt, paint, grease or oil, oil scale or loose or thick rust at the time of placing. All steel shall be procured from original producers no re-rolled steel shall be incorporated in the work. Only new steel shall be delivered to the site. Every bar shall be inspected before placing to its position and defective brittle or burnt bar shall be discarded. Cracked ends of bars shall be discarded.

Pitch

Distance between bars shall be as specified in drawings and as directed by the Engineer in Charge. All bars shall be placed at an accurate distance from each other and shall be bound tightly to maintain the desired pitch. Suitable means shall be provided for holding bars securely in position.

Binding wire

Mild steel binding wire shall be of 1.63 mm or 1.22 mm (16 to 18 gauge diameter) and shall conform IS 280-1972.

The use of black wire will be permitted for binding reinforcement bars. It shall be free from dirt, paint, grease or oil, oil scale or loose or thick rust and any other undesirable coating which may prevent adhesion of cement mortar at the time of binding.

Only new binding wire shall be delivered to the site. All binding wire shall be inspected before binding to its position and defective brittle, rusted, used wire, shall be discarded.

PROTECTION OF REINFORCEMENT

Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or thoroughly cleaning all reinforcement to remove rust using any suitable method such as sand blasting, mechanical wire brushing, etc. as directed by the Engineer. Reinforcements shall be stored on bricks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.

Portions of uncoated reinforcing steel and dowels projecting from concrete shall be protected within one week after initial placing of concrete with a brush coat of neat cement mixed with water to a consistency of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

Workmanship

The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed by The Engineer in charge.

Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawing

BENDING OF REINFORCEMENT

Bar bending schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.

Reinforcing steel shall conform to the dimensions and shapes given in the approved bar bending Schedules.

Bars shall be bent cold to the specified shape and dimensions or directed by the Engineer using a proper bar bender operated by hand power to obtain the correct radius of bends and shape. Bars, shall not be bent or straightened in a manner that will damage parent material or the coating bars bent during transport or handling shall, be straightened before being used on work and shall not be heated to facilitate straightening.

PLACING OF REINFORCEMENT

The reinforcement cage should generally be fabricated in the yard at ground level, and then shifted and placed in position. The reinforcement shall be placed strictly, in accordance with the drawings and shall be assembled in position, only when structure is otherwise ready for placing of concrete. Prolonged time gap, between assembling of reinforcements and casting of concrete, which may result in rust formation on the surface, shall not be permitted.

Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS: 280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.

Bars shall be kept in position usually by the following methods:

In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover shall be placed between the bars and formwork subject to satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.

In case of dowels for Columns and walls the vertical reinforcement shall be kept in position by means of timber templates with slots in them accurately, or with cover blocks tied to the Reinforcement Timber templates shall be removed after the concreting has progressed up to a level just below their location.

Layers of reinforcements shall be separated by spacer bars at approximately One meter intervals. The minimum diameter of spacer bars shall be 12 mm or: equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be, allowed to sag between supports.

Necessary stays, blocks, metal chairs, spacers, metal hangers supporting wires etc., or other subsidiary, reinforcement shall be provided to fix the reinforcements firmly in its correct position.

Use of pebbles, broken stone, metal pipe, brick, mortar or wooden blocks etc. as devices for positioning reinforcement shall not be permitted.

Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concrete is deposited.

Lapping

All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing; will be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25mm or $1:1.1^{1/4}$ times the maximum size of coarse aggregate, whichever is greater; if this is not feasible, overlapping bars shall be bound with annealed steel binding wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.

Welding

Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

While welding may be permitted for TMT reinforcing bars conforming to IS: 432, welding of deformed bars conforming to IS: 1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special. Welding grade of S 415 grade bars conforming to IS: 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula: $CE = C + Mn + Cr + Mg + V + Ni + Cu$ 6 5 15 are 0.4 or less.

The method of welding shall conform to IS: 2751 and IS: 9417 and to any supplemental specifications to the satisfaction of the Engineer

Bars shall be bent cold to the specified shape and dimensions or as directed by Engineer in charge using the proper bender tool, operated by hand or power to attain proper radius of bends. Bars shall not be bending or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used in the work. Bars shall not be heated to facilitate bending.

Unless otherwise specified a „U“ type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bane shall not be less then twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times of the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area the hooks shall be suitably encased to prevent any spiting of the concrete.

All reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and by using say blocks or metal chairs spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports not displaced during concreting or any other operations of the work All devices used for positioning shall be of not corrodible material wooden and metal supports shall not extended to the surface of the concrete, except where shown in drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocs shall not be used Layers of bars shall be separated by spacer bars pre-cast mortar blocks or other approved devices. Reinforcement after bending placed in position shall be maintained in a clean condition until completely embedded in concrete, Special care shall

be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement form corrosion, concrete cover shall be provided as indicated on drawings. All bars protruding from concrete and to which other bars are to be sliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout. Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than 1 mm in such a manner that they do not slip over at the time of fixing and concreting.

As far possible bars of full length shall be used. In case this is not possible, overlapping of bars shall be done as directed by the Engineer in charge. When practicable overlapping bars shall not touch each other, but be kept apart by 25 mm. Where no feasible overlapping bars shall be bound with annealed wires not less than 1 mm thick twisted tight. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending moments is maximum. Whenever indicated on drawing or desired the Engineer in charge bars shall be jointed by coupling which shall have a cross section sufficient to transmit the full stresses of bars. The end of the bars that are jointed by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross section of the bar. Threads shall be standard threads. Steel for coupling shall conform to IS 226.

10.8. When permitted or specified on the drawings joints of reinforcement bars shall butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section not more than 20 percent of the rods are welded. Only electric arc welding using a process which excludes air from the molten metal and conforms to any or other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages previous surface shall be cleaned properly. Ends of bars shall be cleaned of all loose scale, rust, stains, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M S electrodes used for welding shall conform IS 814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency to test shall be as directed by the Engineer in charge.

11.0 MODE OF MEASUREMENTS & PAYMENT

For the purpose of payment the bar shall be measured correct up to 10 mm length and weight payable works out at the rate specified below.

1.	6 mm.	0.22 Kg. /Rmt.	8.	20 mm	2.47 Kg. /Rmt.
2.	8 mm	0.39 Kg. /Rmt.	9.	22 mm	2.98 Kg. /Rmt.
3.	10 mm	0.62 Kg. /Rmt.	10.	25 mm	3.85 Kg. /Rmt.
4.	12 mm	0.89 Kg. /Rmt.	11.	28 mm	4.83 Kg. /Rmt.
5.	14 mm	1.21 Kg. /Rmt.	12.	32 mm	6.31 Kg. /Rmt.
6.	16 mm	1.58 Kg. /Rmt.	13.	36 mm	7.99 Kg. /Rmt.
7.	18 mm	2.00 Kg. /Rmt.	14.	40 mm	9.86 Kg. /Rmt.

Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to, in place lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in Kg. on the same basis as per table given above. Length shall include hooks at the ends. Wastage and annealed steel wire for

binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.

The rate for reinforcement includes cost of steel binding wires, cutting, bending, placing in position, binding and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars.

The contract rate shall be for a unit of one kilogram for all floor.

Item No.11:

Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.).

Materials:

The structural steel conforms to M-22.

Workmanship:

The M.S. **Railing** shall be prepared as per the drawings or as directed for fixing to RCC/Brick wall of periphery of Talav in true line and level with binding at site as per actual curve of pipe where necessary for Railing work.

The M.S. **Railing** shall be fabricated to the designs and pattern shown in the drawings and the weight shall be welded as shown in the drawing plan or is directed by Engineer in charge. The M.S. **Railing** so formed shall be fixed in to the wall of talav etc. before they are erected in position. The MS pipe shall be shape of curve as per talav alignment and MS plate/flat at interval of 1.50mt. With MS pipe passing through their Plate/flat as per detail drawing. M.S. **Railing** shall be fixed to the wall with require vera/pipes fixed with cement concrete with all the length of outer periphery of talav to a minimum of 1.50mt distance fixed with wall for safety purpose and as indicated in the drawing or as directed. After fixing of railing one coat of applying priming coat and painting two coats on Railing as per colour selected by Engineer in charge etc. complete

Mode of measurements & payment:

The rate shall be for unit of one Kg

Item No.12:

Excavation for foundation for depth from 3.0 m to 5.0 m including sorting out and stacking of useful materials and disposing off the excavated stuff up to 50 Meter lead.(B) Dense or Hard soil.

General:

Any soil which generally yields to the application of pickaxes and shovels, phawaras, rakes or any such ordinary excavation implement or organic soil, gravel, silt, sand turf loam this category.

Clearing the site:

The site on which the structure is to be built shall be cleared and all obstructions, loose stone, materials and rubbish of all kind, bush; wood and trees shall be removed as directed. The materials so obtained shall be property of the Government and be conveyed and stacked as directed within 50 M. lead. The roots of the trees coming in the sides shall be cut and coated with hot asphalt.

The rate of site clearance is deemed to be including in the rate of earthwork for which no extra will be paid.

Setting out:

After clearing the site, the center lines will be given by the Engineer-in-charge. The contractor shall assume full responsibility alignment, elevation, and dimension of each and all part of the work. Contractor shall assume full responsibility for alignment elevation of each and all parts of the work. Contractor shall supply laborers, materials, etc. required for setting out the reference marks and shall maintain them as long as required and directed.

Trench Excavation:

A trench is dug to the required depth and width to accommodate the NP3 pipe.

The trench needs to be appropriately sized to allow for proper pipe placement and backfilling.

The bottom of the trench should be level and stable to support the pipe.

Disposal of the excavation stuff:

The excavated stuff of the selected type shall be used in filling the trenches and plinth or leveling the ground in layers including ramming and watering etc.

The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed with lade up to 50 m. and all lift.

Mode of measurement of payment:

The measurement of excavation in trenches for "foundation" shall be made according to the section of trenches shown on the drawing as per section given by the Engineer-in-charge. No payment shall be made for surplus excavation made in excess of above requirements or due to slopping and slopping back as found necessary on account of condition of soil and requirement of safety.

The rate shall be for a unit of one cubic meter.

Item No.13:

Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts carrying heavy traffic as per IS 458-1991 specifications including setting the pipes in C.M. 1:2 watering and laying (to level or slopes) of class NP3 of following internal diameters. (iii) 600mm dia.

The end of joints/collars and specials to be closed and water tight including satisfactory flow testing after laying etc. complete. Item includes conveyance of pipes and rubber ring from any Store to site of work. (The pipes diameter details as per Schedule-B)

Note: One Collar shall be supplied with each full length plain ended R.C.C. pipe. One rubber ring should be supplied with each full length socketed pipe, cost including the rate.

The tenderer shall note that both vertical & horizontal casting process RCC pipes are allowed for the work conforming to relevant I.S. code. Pipes shall qualify the testing criteria as per I.S. code. The rates for both horizontal/vertical casting process pipes shall be as per price bid of the tender. In case of supply of vertical casting pipes, the outer and inner surfaces of the pipes shall be as smooth as horizontal casting pipes.

All the RCC NP3/NP4 Class pipes shall have ISI mark on it. At the time of Supply Contractor has to produce ISI license of manufacture from where pipe are supposed to be purchase.

MATERIALS:

R.C.C. NP3 Class spun pipes of various diameters of required length with collars shall be supplied by the contractor as per terms and condition attached herewith at end of this item.

Water shall conform to M-1, Cement shall conform to M-3, Sand shall conform to M-6, and Cement mortar of required proportion shall conform to M-11 all the required materials for completing the items shall conform to relevant Indian Standard specification requirements.

Rubber Ring shall confirm to IS: 5382-1985.

118.2.0 STACKING OF MATERIALS:

Reasonable care shall be exercised in loading, transporting and unloading of the pipes and specials. Gradual unloading shall be done by inclined plane or by chain block. Handling shall be done such as to avoid impact.

Before, the actual laying of pipe line started, the pipes and fittings in required quantity shall be arranged lengthwise, by the site of the excavated trench without causing any obstacles to the traffic. If necessary, the pipe shall be got cut by the contractor at his own cost to accommodate specials or fittings or for any other reason.

The contractor shall be fully responsible for safety of materials at site.

118.3.0 LAYING (FOR COLLAR JOINTS):

Before laying, the trench section shall be got checked for its level and uniform grade as per L-section and plan and finished with proper bedding if required as directed, with the help of sight rails and boning rods and shall be got approved from the Engineer-in-charge.

Drainage pipes are always laid with the socket at the higher and consequently, it is necessary to beginning at the lower end of drains and to work upwards laying pipes shall confirm to I.S. 783-1967 or its latest version.

The contractor shall provide and maintain leveling instruments. The pipes shall be laid in a complete straight line with centre lines ranged accordingly by means of string stretched between sight centers of cross rails and no deviation will be permissible between the manholes. The pipe shall be laid from manhole started from the lower end. The bottom concrete of the manhole must be finished simultaneously with laying joints of pipes in that section.

Temporary Bench mark shall be provided by the contractor at a minimum distance of every 150 meters without any extra claim. These B.Ms. shall be either of stone masonry or mass concrete not less than 0.14 Cu.mt. The site of B.M. kept will be directed by the Engineer-in- charge.

The pipe shall be laid in reasonably dry condition and under no circumstances they shall be rest on slushy bedding.

The pipe shall be lowered by means of wooden bull and rope in case of light pipe up to 225 mm dia. while tripped and chain pulley block of sufficient capacity shall be used for heavy pipes above 250 mm dia.

No brick bats or hard stone or kapachi bigger than 20 mm size shall be allowed beneath the pipe line directly in touch with the pipe. Murrum bedding shall be provided if only directed by the Engineer-in-charge.

The pipe shall be laid in such a way that their longitudinal joints shall always come on the top and quite centre. The long collar than shall first slipped over after cleaning the ends of pipes. The wedge shape groove at the end of the pipe shall be slipped with required quantity of jute dipped in hot tar or bitumen. The bitumen for this shall be heated till it is sufficiently plastic.

The next pipe shall than be brought forward and pressed till the jute ring in recess of first pipes sets in to the recess of the second pipe. The process shall be repeated for two three pipes, which shall than the packed up in usual manner by jack and in doing so, care shall be taken to see that there shall be no deflection from the alignment.

The collar than shall be brought systematically over the ends of pipes and kept equal-distance from the pipe with help of ends necessary wedge placed along periphery of collar. The space between the inside of collar and outside of the pipe shall be sprinkled with just sufficient water to make in to damp condition.

118.4.0 PREPARATION OF MORTAR:

Cement mortar of cement and sand shall be prepared in workman like manner in proportion of one (1.0) part of cement with one (1.0) part of sand in volume. First dry mixing shall be carried out and then added sufficient quantity of water to have consistencies of a semi-dry condition, suitable for caulking by caulking tools.

The mortar shall be prepared on clean and water tight platform and in required quantity only and shall be taken in to use before it starts setting. Only fresh mortar shall be used.

118.5.0 CAULKING:

The mortar so prepared shall be rammed and well packed and pressed with a caulking tool in to the annular space, the caulking shall be so firm that it shall be difficult to drive penknife into. The joint shall be finished off with a fillet sloping 45 degree along with the length of pipe. It shall be finished smooth with cement slurry.

If sub-soil or surface water meet with, the caulking shall be done with near quick setting cement mixed with water proofing compound, the whole caulking job shall be carried out in dry condition till cement joint set No extra payment shall be made on account of such job.

The joints shall be protected until final set, from sub-drying winds, rain and frost.

In no case sub-soil water shall be allowed to rise in or above the pipe line before the cement mortar of joint has set up. Every precaution shall be taken to avoid floating of pipe line due to accumulation of water in the trench while pipe line is empty. No working or walking over the pipe after they are laid shall be allowed. After pipe line is jointed, earth shall be refilled on the sides of the pipe line up to the top of the pipe keeping at least 90 cm length of pipe line open at the joints. The refilling shall be done strictly as per specification of item of refilling of trenches. Care shall be taken to see that after such refilling, joints remain completely opened around till final set and hydraulic/flow test is given and joints are inspected for leakage under pressure.

CURING OF JOINTS:

Every joints shall be kept wet for about 10 day for maturing. The section of pipe line jointed shall be covered with wet gunny bags and kept moist continuously for above said curing period.

Item No.14:

Earthwork for embankment including breaking clods, dressing with all lead and lift (excluding watering and consolidation)(A) From Borrow pits within land width.

Note:

- **Before Starting of Earthwork for embankment work original levels shall be taken in presence of the contractor or his representative who shall sign in the field book in token of acceptance of the same. When the work is completed as per specifications the final levels shall be taken on the same cross-sections 'on which levels were taken before starting the work entered in the field book, and the contractor shall sign in the field book in token of the acceptance of final levels and Quantity of Earth work of embankment paid as per that Quantity.**

1. The land width on which the earthwork is to be done shall be cleared of all trees having a girth of 30 cm and less, loose stones, vegetation, bushes, stumps and all other objectionable materials. All the materials cleared will be property of Government. Useful material shall be arranged in convenient stacks along the roads boundary or as directed at places within 50 meters lead, and handed over to the Authority in convenient sections. Unsuitable material shall be burnt or otherwise disposed off by the contractor at his own cost without causing any nuisance, inconvenience or damage to the works, property or people in the neighborhood. In all cases, the materials shall be disposed off in a neat manner.

2. After clearing the site, the alignment of the road shall be properly set out true to line, curves, slopes grades and sections as shown in the plan or directed by the Engineer-in-charge, The contractor shall provide all labours and materials such as lime, string, pegs, nails, bamboos, stones, mortar, concrete etc.

required for setting out, establishing Bench Marks and giving profiles. The contractor shall be responsible for maintaining the B.MS. Profiles alignments and other marks as long as they are required for the work in the opinion of the Engineer-in-charge. If the contractor defaults in this respect the authority at the cost of the contractor.

3. When an existing embankment is to be widened, continuous, horizontal benches, each at least 0.3 meter wide, shall be cut into existing slope for ensuring adequate bond with the fresh embankment material to be added The material obtained from the cutting of benches can be utilised in the widening of the embankment. Where the width of the widened portions is insufficient to permit the use of usual rollers, compactions shall be carried out with the help of tandem/sheep foot rollers, mechanical tampers or other approved plant. The dumping of material from trucks for widening operations shall be avoided except in difficult circumstances when the extra width is too narrow to permit the movement of any other type of hauling equipment.

4. The soil to be used for embankment shall be free from trees, stumps, roots, rubbish or any other objectionable materials. Only materials considered suitable by the Engineer-in-charge shall be used for the construction and that considered unsuitable other disposed off as directed by him. The selection of the materials to be used in the construction of embankment shall be made after soil surveys and investigations carried out by the Department. The embankment shall consist of earth available from roadside borrow pits on either side with all lead and all lifts.

5. Department will extend all necessary co-operation in helping contractor to get borrow area from nearby Government or Panchayat land, if available. However, department is not responsible if not such area is made available to the contractor and in the case, contractor will have to make his own arrangement to get borrow area for borrowing earth of the quantity even by making temporary arrangement with the private land owners.

6. The embankment shall be constructed in uniform layers not exceeding 250mm in loose thickness. The soil shall be spread uniformly over the entire width of the embankment. Unless otherwise directed by the

Engineer-in-charge. All clods of hard lumps of earth shall be broken to have maximum size of 15cm when being placed in the embankment and a maximum of size 5cm when being placed in the top 45cm of the embankment. The work of next layer shall be allowed only after the first layer below it has been thoroughly compacted.

7. Where an embankment is to be placed on sloping ground, the surface of the ground shall be benched in the steps of trenches or broken up in such a manner that the new material shall have perfect bond with the existing surface. Where the embankment is to be placed over an existing surface. When the embankment is to be placed over an existing road surface, the surface shall be scarified to minimum depth of a 5cm so as to provide ample bond between the old and new material. However when the embankment. If the existing road surface is of granular or bituminous type and lies within 1 Mt. of the new sub grade level, the same shall be scarified to a depth of minimum 50mm so as to provide ample bond between the old and the new material.

To avoid interference with the construction of abutment, wing walls or return walls of culverts/bridge structures, the contractor shall, at point to be determined by the Engineer-in-charge, suspend work on embankments forming approaches to such structures, until such time as the construction of the latter is sufficiently advanced to permit the completion of approaches without the risk of interference of damage to the bridge work. Unless directed otherwise the filling ground culverts, bridges and other structures up to a distance of twice the height of embankment. The fill materials shall not be placed against any abutment or wing wall unless permission has been given 14 days, the embankment shall be brought up simultaneously in equal layers on each side of the structure to avoid displacement and unequal pressure. The sequence of work in this regard shall be got approved from the Engineer-in-charge. Where the provision of any filter medium is specified behind the abutment, the same shall be laid in layers simultaneously with the laying of fill material. The material used for the filter shall conform to the requirements for filter medium and will be paid extra in the relevant item.

8. The embankment shall be finished in conformity with the alignment, level, cross section and dimensions shown on the plans or as directed by the Engineer-in-charge. Where the alignment of the road is in a curve, the top of the embankment shall be formed with the super elevation and the increased width shown on the drawings or as the Engineer-in-charge may direct. Finishing operations shall include the work of shaping and dressing the shoulder, roadbed and the slopes to conform to the cross section.

9. The earthwork measurement shall be paid on cross sectional measurements and computing the volumes of earthwork in cubic meters by average area method. The contractor shall sign day to day levelling work and also original cross sections in token of his acceptance etc. the working sections both longitudinal and cross of the ground shall be taken by the Engineer-in-charge before the actual earthwork is started. The contractor or his authorised representative shall attend day-to-day levelling work. And sign with date the field book daily, in token of this acceptance. If there is any disagreement the contractor shall inform of it in writing to the officer concerned of any complaint shall be taken. Merely not signing of the level book shall not be deemed as disagreement. The Executive Engineer shall also verify levelling work to the extent of 5% before commencement of earthwork and on finalisation. The contractor shall maintain the embankment by filling in ruts, rain cuts depression due to shrinkage etc. to proper formation and grade till this item is finally measured and accepted by the authority. Measurement shall be taken on compacted earthwork; no deduction for shrinkage shall be made from gross measured quantity of compacted earthwork. However the contractor shall have to bear loss of quantity due to all settlement as well as other types of deformations etc. if any that might have taken place at the time of taking the final measurement of this item. If the authority does not do the Compaction as stipulated in para-10 in that case shrinkage from such earthwork quantity shall be deducted as per norms i.e. 10% after monsoon and 15% before monsoon. However the contractor shall have to bear loss of quantity due to all settlements as well as other types of deformations etc. if any, that might have taken place at the time of taking the final measurements of the item.

If usable approved material is available within the land width of road, the same shall be permitted for use in the road embankment subject to the following conditions: -

(i) The borrow pits will be so excavated as to form a road side longitudinal gutter to drain the water, interrupted by such gutter.

(ii) The width of the drain shall be restricted to 1.5 mts, only. The depth will be restricted to such grade so as to drain the water efficiently. All balance quantity of earth shall be brought from distant borrow areas only.

(iii) If there is top layer of black cotton or other objectionable soils, the same shall be removed and disposed off elsewhere and usable material found at the lower level will only be used in the earthen embankment, if the contractor chooses to utilize this material.

(iv) The drain should be aligned along the boundary of the land width of the road. Not pit, other than this drain, shall be dug within 5 metres of the toe to the final section of the road embankment.

(v) No borrow pits shall be allowed in the length in which earth obtained for cutting from cutting is specified to be used in embankment.

10. The rate of earthwork includes clearing jungles, dog belling, fixing profiles, erecting necessary pillars or stones for bench mark for levelling purpose, excavating earth from borrow pits, breaking clods, conveying and spreading earth in layers with all lead and lift, finishing the entire embankment to the proper profile camber, grade and slopes. The rate also includes all labour, material, tools, equipment and incidentals necessary to complete the work according to the specification. Cutting stuff of cutting in ordinary soil, soft murrum, soft rock, hard murrum and hard rock shall be utilised in embankment construction under this item within the lead specified in that particular item. No payment shall be made under this item for the cutting stuff used in the embankment but labour for cutting will be paid as per specifications in the particular item and only balance quantity brought from borrow pits will be paid in this item.

Mode of measurement & payment.-

Measurement shall be on cross-sectional basis as per the cross-sectional levels taken before starting and after completion of the work & payment made on **Cubic meter** for the work actually done.

Item No.15:

Providing and laying cement concrete 1:4:8 (1- Cement : 4- coarse sand : 8- hand broken stone aggregates 40 mm nominal size) and curing complete excluding cost of formwork in (A) Foundation and Plinth

Materials:

Water shall conform to M-1. Sand shall conform to M-6 cement shall conform to M-3 stone aggregate 40 mm. nominal size shall conform to M- 12.

Workmanship:

General:

Before starting concrete bed of foundation stretches shall be cleared of all loss materials, leveled, watered and rammed as directed.

Proportion of mix:

The proportion of cement sand and coarse aggregate shall be 1 part of cement; 4 parts of sand 8 parts of stone aggregates and shall so measured by volume.

Mixing:

The concrete shall be mixed in mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of breakdown of machineries and the interest of the work. It shall be carried out on a watertight platform and care shall be taken to ensure that mixing is continued until the mass is uniform of colour and consistency. However in such case 10 % more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer shall be

done for a period 1 to 2 minutes. The counted of water shall be sufficient to produce a dense concrete of required workability for the purpose.

Transporting & placing the concrete:

The concrete shall be handled from the place of mixing to the final position in not more than 15 minutes by the methods as directed and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.

The concrete shall be laid in layers of 15cms to 20cms.

Compacting:

The concrete shall be rammed with heavy iron rammers and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

Curing:

After the final set, the concrete shall be kept continuously wet, if required by pending for a period of less than the 7 days from the date of placement.

Mode of measurement of payment

The concrete shall be measured for its length breadth and depth, limiting dimensions to those specified on plan or directed. The rate shall be for a unit of one cubic meter.

Signature of Contractor

Rajpipla Nagarpalika