

## TECHNICAL SPECIFICATIONS

Technical Specification for the **Maintenance & Repair Work of Radhanpur Branch Canal from Ch.16.370 km to 24.608 km (Slice-2) for Damaged Lining remedial measures for facilitate RBC to Flow at FSL.(Package-3)**

### Item Wise Detail Specification

#### **Item No:-1**

**Dismantling the C.C. lining including disposing off the dismantled materials as directed etc. complete.**

**(A) 10 cm thick lining**

**(B) 7.5 cm Thick lining**

#### **General**

The damaged canal lining shall be dismantled properly or as directed by the Engineer-in-charge. Utmost care shall be taken while dismantling so that only demarcated portion of lining will be broken and no damage shall occurs to adjoining lining work. Suitable breaking tools shall be used as directed by the Engineer-in-charge. The contractor shall first carry out cleaning of the site by removing the silt or loose materials deposited on or near the damaged portion and the removed silt or loose materials shall be disposed off with all leads and lifts outside the canal banks as directed by the Engineer-in-charge. No extra payments will be made for removal of silt / loose material.

#### **Conveyance & Disposal of Dismantled Material**

The dismantled material from the damaged CC / RCC lining from bed, slide slopes and curvature of canal shall be disposed off at the specified place outside the canal bank with all lifts and lead up to 200 m as directed by Engineer-in-charge. The dismantled material shall be disposed off as per instruction of Engineer-in-charge.

#### **Special Care**

The contractor shall take special care to avoid damage to adjoining good lining already completed. The contractor shall not adopt any blasting for dismantling of damaged CC / RCC lining, which is to be removed from the canal.

If during the dismantling of damaged lining, the damage will occur to good lining work, the same shall have to be made good by the contractor at his cost and no extra payment will be made for such work.

#### **Measurement and payment**

Measurement of dismantling work will be made on square meter basis of area of lining to be dismantled and the payment for the same shall be made at the quoted tendered rate in Schedule-B (**for item 1**) on square meter basis.

The payment shall be made on cubic meter basis. (**For Item No.3**)

The rate shall include the cost of demolishing lining, removing dismantled material and disposing off the same at the specified place outside the canal banks with all lifts & lead up to 200 m as directed by the Engineer-in-charge. The rate shall also include cost of all labors, materials, tools & plants, equipment and all other incidental operations for carrying out the work in accordance with the specifications.

#### **Item No – 2**

**Trimming of the canal section manually for preparing sub grade for laying cement concrete (C.C.) lining in all sorts of soil and murrum including watering and compacting bed etc. complete.**

The provision of this item applies for trimming and preparation of sub-grade upon which concrete lining is to be placed.

The work of trimming the canal section up to the underside of concrete lining and preparing sub-grade for concrete lining includes removal of proud equivalent to thickness of the lining. The excavation for trimming for preparing the base of lining shall be carried out immediately prior to laying of the lining but in no case the time interval should exceed 3 days in normal weather and 2 days in adverse weather conditions. All along the canal alignment the rain cuts on the banks shall be filled up with approved excavated material and shall be compacted adequately to require line and level. The bed and side slopes shall be trimmed to the required section manually. The canal bed / side slopes shall be dressed, watered and compacted by manually hand rammer. Excavated profile provides the final base for lining and any tolerances of quantities shall not be paid to the contractor. If at any point the material has been excavated beyond the pay line required to receive C.C. lining, the excess excavation shall be refilled in layers not exceeding 100 mm in thickness with selected material moisture, if required and compacted.

#### **Measurement and payment**

Measurement for payment for the trimming and preparing of sub-grade shall be made on the basis of square meter of the surface of the canal prism trimmed over which cement concrete lining is to be placed. The rate includes cost of labour, equipment, watering, compaction of bed and side making good of over cuts, under cuts and all incidental works to complete the work as per specifications. The unit rate of trimming also includes the cost of bringing existing canal section to design canal section by back filling with suitable earth wherever required with watering and due compaction and desilting if required.

#### **Item No:-3**

**Providing and laying plain/reinforced cement concrete lining of M 15 (MSA 20 mm) in bed, side slopes and curvature including batching, mixing, transporting, placing, vibrating, smooth finishing, curing including dewatering where required. (MACHINERY BASED by "FLORI" - WITHOUT PAVER MEMBRANE CURING)**

**(A) 15 cm thick lining in Bed / Slope**

**(B) 7.5 cm thick lining in Bed / Slope**

#### **Item No:-3(A)**

**Providing and laying plain / reinforced cement concrete lining with concrete of cement, sand and metal in nominal mix 1:2:4(M-15) in bed, side slopes and curvature including batching, mixing, transporting, placing, vibrating, smooth finishing, curing including dewatering where required for maintenance of canal Patches. 5 cm thick lining in bed, side slopes - with water curing.**

**( MACHINERY BASED ,WITH OUT PAVER )**

**(A) 5 cm thick lining in Bed / Slope**

### **5.1 CONCRETE**

- 5.1.1 Concrete shall be composed of cement sand, coarse aggregate and water, all well mixed in proper proportions as specified in the item, by volume and brought to the proper consistency. One full bag of cement shall be considered 0.034 m<sup>3</sup>. Other materials shall be measured by suitable measuring boxes. If the sand is wet at the time of mixing, due allowance as determined by test from time to time shall be made for bulking of sand due to moisture. The proportion of sand and coarse aggregate shall be varied lightly if required on

the basis of laboratory tests to get dense workable concrete of design strength. No extra payment shall be made for such variation that may have to be made. The quantity of water to be used shall be as decided by the Engineer so as to get concrete of required quality.

- 5.1.2 The concrete shall be mixed in mechanical mixers of approved type which will ensure a uniform distribution of the material through out the mass. The mixer shall not be loaded in excess of its rated capacity and each batch shall be for whole bags of cement. Mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency but in no case shall the mixing be done for less than two minutes. The first batch of concrete at the commencement of work with any mixer shall be made richer by adding 10 percent of cement extra over and above that required for the particular mix. The mixer drum shall be completely empty before receiving while in use and shall be thoroughly washed when mixing operations cases for any period longer than 30 minutes.
- 5.1.3 All ingredients shall be fill in to the mixer simultaneously. A portion of water from 5 to 10 percent shall proceed and the like quantity shall floe follow the introduction of other materials. The remainder shall be added uniformly and simultaneously with the other materials.
- 5.1.4 No hand mixing shall be permitted except in the event of break down of the machine during concreting of a panel. Whenever such hand mixing is resorted to 5 percent extra cement shall be used. Hand mixing shall be done in the manner as directed by the Engineer on a water tight platform and care shall be taken to ensure and mixing is continued until the mass is uniform in colour and consistency. No batch of hand mixing shall be of more than two bags of cement.
- 5.1.5 Concrete shall be handled from the place of mixing to the place of final deposit and placed in position as rapidly as practicable but always within a period of 30 minutes after mixing, by methods which will prevent the segregation and/or less of any ingredients or reduction in slump. If segregation does occur during transport, the concrete shall be placed and compacted before setting commences and should not be subsequently disturbed.
- 5.1.6 In order to test the consistency of concrete, slump tests shall be made by the contractor as and when required. The slump test shall be carried out as per IS: 456-1964. The allowable slump for concrete shall be as decided by the Engineer-in-charge.
- 5.1.7 One set of test cubes, 15 cm x 15 cm x 15 cm shall be taken for every 30 m<sup>3</sup> as per of concrete subject to a minimum of one set for a day's work. From each set of cubes shall be tested at 7 days and 3 cubes at 28 days ( and also 3 cubes at 90 days when pozolona cement used. Sample of concrete for test cubes shall be taken at the mixer and it shall be representative of the entire batch. The location in the work of the batch of concrete thus sampled shall be noted for future reference when tested at 28 days ( at 90 days when Pozolona cement used in concrete ) at specified strength and no test cube shall give compressive strength less than 80 percent of the specified strength.
- 5.1.8 For concrete made for one part of cement, three parts of sand and six parts of coarse aggregate, the specified strength shall be 66 Kg/cm<sup>2</sup> at 7 days and 100 Kg/cm<sup>2</sup> at 28 days. (if pozolona cement used)

- 5.1.9 In case the results fails to fulfill the above strength requirements, the respective portion of the work shall be removed and redone by the contractor at his cost. At the discretion of the Engineer the work may be accepted and paid at a reduced rate as may be decided by him.
- 5.2 Concrete Lining
- 5.2.1 The concrete lining shall consist of cement concrete panels laid to specified thickness, insitu or precast sloopers under the joints, and the mastic filler in the grooves of these joints. The slope shall be 15 cm. wide and 7.5 cm. deep in case of canals with capacity less than 15 m<sup>3</sup>/Sec. and wide and 20 cm. wide and 10 cm. deep in case of canals with larger capacity. Capacity of canal is mentioned in work and site conditions.
- 5.3 Measurement and payment
- 5.3.1 The measurement of lining shall be of the areas of the exposed and shall be obtained by measuring the perimeter of the section and of the canal lined. When separate item is provided for steps in lining, the area covered by them shall be deducted from the measurements of lining. Area of drainage concrete boxes at the surface of lining shall not be deducted from the area otherwise qualifying for payment of lining.
- 5.3.2 The payment shall be on S.M. basis at the tendered rates.
- 5.3.3 The work of concrete lining shall include the work of joints as per para 36 and no separate payment shall be made for the work of joints.

**Item No:-4**

**proving & fixing MS welded mesh jali of 2.8 mm dia 65mm x 65mm including cutting in required sizes, fixing in canal prism etc. completed by Engineer in charge. beyond 300 Cusec) ( By Machinery )**

**6.2 General**

- (a) The Item includes Providing and Laying in position Mild Steel Welded Mesh jail of 2.8 mm Dia., 65 mm x 65 mm C/C Both Directions. The Welding must have been done in Factory with BIS Specified Welding Rods and **Shop Welding Method**. The Engineer-In-Charge shall inspect the Welded Wire Mesh on Site and before Supply in Factory and confirm as to whether the manufacturing is as per **BIS Approved Material and Method**. On his satisfaction he shall approve the Welded Wire Mesh and it shall be allowed to be used on Site.
- (b) The Length of Welded Wire Mesh shall be 8m as the Panel of Concrete Lining is to be made of 8m Length approximately and its width shall be equivalent to Periphery of the Canal Cross Section plus necessary embedding for the Dowel.
- (c) The Item includes Laying and Placing the Welded Wire Mess with 25 mm Clear cover from the bottom and cost of cover shall be included in the Item.
- (d) The Item also includes fixing the Wire Mesh in position as per Drawing and as directed.

### 6.3 Cutting, Bending and Binding

The Contractor shall be responsible for the accuracy of the Cutting, Bending and Placing of the Welded Wire Mesh shall be inspected for compliance with the Requirements as to grade, size, shape, length, splicing and locations after it has been placed. No concreting shall start unless the reinforcement as placed if the Work is finally checked, recorded and certified by the Engineer-In-Charge. Before the Welded Wire Mesh is placed, the surface of the Wire Mesh shall be cleaned of the rust, scale dirt, grease and other objectionable foreign substances. After being placed, the Welded Wire Mesh shall be maintained in a clean condition until they are completely embedded in the Concrete.

The Wire Mesh shall not be displaced during the placing of Concrete. The Contractor shall ensure that there is no disturbance of the reinforcing bars in Concrete during placement in Concrete and correct location shall be maintained in the Cast Concrete. Wire for Binding Wire Mesh shall be of soft and **Annealed Mild Steel** and shall conform to IS:280-1978. Binding Wire shall have a Tensile Strength of not less than 56 kg/mm<sup>2</sup>. The Wire shall have minimum diameter of 3.80 mm. Chairs, hangers, spacers and other approved arrangement shall be provided to support the Wire Mesh. Wire used for binding reinforcement shall not be measured for Payment.

#### 6.3.1 Care of Placed Reinforcement and Concrete.

Where Wire Mesh are bent aside at Construction Joints and afterwards bent into their Original Position.

### 6.4 Overlapping of Wire Mesh

Sufficient Overlap i.e. Square Size of Wire Mesh should be provided. For jointing the Wire Mesh, G.I. Binding Wire should be used. No Extra Payment will be made for the overlapping area of Wire Mesh, jointing Work and Material used for jointing.

### 6.5 Measurement and Payment.

Payment shall be made at Unit Tendered Rate on **Square Meter** Basis of completed Item. The Rates includes Tools & Plants required for carrying out Work.

#### Item No:-5

**Providing & Placing in position reinforcement bars including cutting, bending, welding joints where necessary, hooking etc. complete as per drawing for all lead and lifts.**

**(A) TMT-Fe 500 D**

### 11.3 APPLICABLE PUBLICATIONS:

1. IS: 226-1975 Structural steel (Standard Qualification) (Fifth revision)
2. IS: 432 - 1982 Hard drawn steel wires  
(Part-II) (Third revision)  
(Reaffirmed-1989)
3. IS:814-1986 Covered electrodes for metal are Welding of structural steels.
4. IS:814 - 1974 For welding products other (Part-I)  
than sheets.  
(Fourth revision)  
(With Amendment No. 1 to 3)
5. IS: 814 - 1974 For welding sheets.  
(Part-II)(Fourth revision)
6. IS: 1139-1966 Specification for Hot rolled mild  
Steel medium tensile steel and high yield strength  
steel deformed bars for concrete reinforcement.  
(Revised) (Superseded by IS:1786).
7. IS: 1278-1972 Filler rod and wires for gas (Reaffirmed-  
1987) welding. (Second revision)  
(With Amendment No.1)
8. IS: 1481-1970 Metric steel scales for engineers  
(First revision)  
(With 2 Amendments)
9. IS: 1521-1972 Method of tensile of steel wires.  
(First revision)
10. IS: 1566-1982 Specification for Hard drawn steel  
(Reaffirmed-1989) wire Fabric for concrete reinforcement. (Second  
revision)  
(Amendment No.1)

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| 11. | IS: 1608-1972<br>(Reaffitmed-1991)    | Method for tensile resting of steel products. (First revision)                            |
| 12. | IS: 280-1978<br>(Reaffitmed-1989)     | Method for tensile resting of steel engineering purpose.                                  |
| 13. | IS: 1786-1985<br><br>(Third revision) | Specification for high strength Deformed steel bars and wires for concrete reinforcement. |
| 14. | IS: 2502-1963<br>(Reaffitmed-1990)    | Code of practice for bending and fixing of bars for concrete reinforcements.              |
| 15. | IS: 5525-1969<br>(Reaffitmed-1990)    | Recommendation for detailing of Reinforcement in reinforced concrete works.               |
| 16. | IS: 2602-1984<br>(Reaffitmed-1990)    | Weldable structural steel third revision (Amendment – 3)                                  |
| 17. | IS: 9417-1979                         | Recommendations for welding cold worked bars for reinforced concrete construction.        |

In addition to the above the relevant Indian standard Codes referred to Section- 4 shall also apply or its latest edition.

#### **11.4 STEEL REINFORCING BARS:**

##### **11.4.1 General:**

- (a) TMT bars/MS bars/HYSD bars, rods and structural steel, corrosion resistance steel etc shall be procured by the contractor from the steel manufacturing plants approved by Nigam and bearing relevant Bureau of Indian Standards (BIS) as specified in clause 17.1.2 (B) of VOLUME –ONE-B. Minimum consignment of 3.0 MT steel shall be procured by the contractor at a time. In case the required steel is less 3 MT, such less quantity shall be procured at a time.

Steel reinforcing bars shall be placed in concrete as shown on the drawings or as directed by the Engineer-In-Charge. The drawings issued with these specifications are typical ones. Further working drawings shall be issued by the Engineer-In-Charge for each structure during the course of the contract.

- (b) Not less than 30 days prior to placement of reinforcement, the contractor shall submit to the Engineer-In-Charge three prints and a reproducible prints of each of reinforcement detail working drawings for approval. The drawing for approval shall be prepared in accordance with IS: 456-2000. (Code of practice for plain and Reinforced Concrete) IS: 2502-1963. (Code of practice for Bending and fixing of Bars for Concrete reinforcement) And IS: 5525-1969.(Recommendation for detailing of reinforcement in reinforced concrete work) or unless otherwise shown on the reinforcement detail drawings. The drawings shall show necessary details for checking the bars during placement and for use in establishing payment quantities. The reinforcement bars shall conform to requirements shown in the drawings or as directed by the Engineer-In-Charge. The approval of the Engineer-In-Charge to the Contractor's reinforcement detailed drawings shall not absolve the contractor of his responsibility for the correctness of details or for conformance with the requirements for these specifications.
- (c) As far as possible TMT. bars, conforming to IS-1786-1985 shall be used as reinforcement as shown on the drawings. Certified copies of the manufacturing company's test results shall be produced before using the steel along with a certificate of satisfactory test results shall conform in accordance with the latest IS Code. However, in case of non-availability of such bars, other steel bars conforming to IS: 432-1982 and or IS: 1139-1966 shall be allowed by the Engineer-In-Charge. The Contractor shall have to produce necessary relevant certificates, conforming to test results as per IS requirement to the Engineer-In-Charge. However, Engineer-In-Charge may ask for additional tests if required. The charges for carrying out necessary tests shall have to borne by contractor.

#### **11.4.2 Cutting, Bending and Binding:**

The Contractor shall be responsible for the accuracy for the cutting, bending and placing of the reinforcement. Reinforcement shall be inspected for compliance with the requirements as to grade, size, shape, length, placing and locations after it has been placed. No concreting shall be started unless the reinforcement as placed in the work is finally checked, recorded and certified by the Engineer-In-Charge. All bending shall be as per the IS:456-2000 IS : 2502 : 1963 & only cold bending shall be allowed.

Before the reinforcement is placed, the surface of the bars and the surfaces of the metal bar supports shall be cleaned of the rust, scale, dirt, grease and other



objectionable foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete.

Reinforcing bars shall be accurately placed and secured in positions so that the clear distance between two main bars shall not be less than the greatest of the following:

- (i) The Diameter of the bar if the diameters are equal.
- (ii) Diameter of larger bar if diameter are unequal
- (iii) 5 mm more than the specified maximum size of coarse aggregate.

The bars and fabric shall not be displaced during the placing of concrete. The contractor shall also ensure that there is no disturbance of the reinforcing bars in concrete that has already been placed.

**(d)** Wire for binding reinforcement shall be of soft and annealed a mild steel and shall conform to IS:280-1978. Binding wire shall have a tensile strength of not less 56 kg/mm<sup>2</sup>. The wire shall have a minimum diameter of 1 mm. Chairs, hangers spacers and other supports for reinforcement may be of concrete, metal or other approved material. The minimum allowable clearance between parallel round bars shall not be less than 1.5 times the diameter of the largest bars and for square bars shall not be less than twice the side dimensions of the larger bars or 1.5 times the maximum size of aggregate whichever is greater. Bars crossing each other, where required shall be secured by binding wire in such a manner that they do not slip over each other during the fixing and concreting. Wire used for binding reinforcement shall not be measured for payments.

#### **11.4.3 Splicing.**

Where it is necessary to splice reinforcement the splices shall be made by lapping, by welding or by mechanical means.

Joints or splices in reinforcing bars shall generally be made at the locations where neither shear nor bending moment is maximum, but the contractor would be permitted to make joints splices at other positions provided that such positions are approved by the Engineer-In-Charge. The splices shall be in staggered fashion so that in the adjacent bars it shall not be closer than 8

m in horizontal bars or 6 m in vertical measured between mid points of laps. Splicing of bars shall not be permitted for length of bar less than 8 m in case of horizontal bars and 6m in vertical bars.

If the contractor proposes to use welded splices in reinforcing bars, the equipment, the material and all welding and testing procedures shall be subject to the approval of the Engineer-In-Charge. The contractor shall also carry out test welds as required by the Engineer-In-Charge.

In case of welded splices for reinforcing bars conforming to IS: 1786 welding shall be done in accordance with IS: 9417. For reinforcing bars conforming to IS: 432-(Part-I)welding shall be done in accordance with IS:2751. Electrodes for manual metal are welding shall conform to IS:814 (Part-I)-1974 and IS:814(Part-II)-1974. Mild steel filler rods for Oxy-acetylene welding shall conform to IS: 1278-1972 provided they are capable of giving a minimum butt weld tensile strength of 41 kg/mm.<sup>2</sup>.

Reinforcing bars 25 mm in diameter and less may be either lapped or butt welded, whichever is the most practicable.

Reinforcing bars 28 mm in diameter and large may be connected by butt welding provided that lapped splices are permitted when found to be more practicable than butt welding and the lapping does not encroach on cover limitation or hinder the concrete of reinforcement placing.

Butt welding of reinforcing bars shall be performed under cover from weather and may be performed either by the gas pressure or flash pressure welding process or by the electric arc methods. Following requirements shall apply to all welding of reinforcing bars including butt welding and the preparation of welded reinforcement mats.

Welded pieces of reinforcement shall be tested at the rate of 0.5 % of total number of joints welded. Specimens shall be taken from the actual site of work. Strength of the weld provided shall be at least 25% higher than the strength of bar.

If the contractor proposes to use mechanical couplings for reinforcing bars, he shall submit samples of the proposed coupling to the Engineer-In-Charge for approval not less than 60 days prior to their proposed use.

### **Cover and cover block:**

The clear cover and cover to the reinforcement shall be provided as shown in the drawing. In case it is not shown, the clear cover and cover block to be ascertained from the Engineer-In-Charge.

To maintain the correct clear cover, cement mortar block of size 5 cm x 5 cm and thickness according to the clear cover as of the strength of the concrete shall be fasted. The cover block shall have binding wires rigidly inserted in them to tie it with the reinforcement. The cover block shall be sufficiently cured to attain the required strength. No extra cost to the contractor shall be paid for providing concrete blocks.

All protruding bars from concrete to which the other bars are to be spliced and that will remain exposed to action of weather for indefinite period shall be protected from rusting by thin coat of neat cement grout. Accurate records shall be kept at all time numbers, sizes, lengths and weight of bars placed in position for different parts of the work.

#### **11.4.4 Care of placed reinforcement and concrete**

Where reinforcement bars are bent a side at construction joints and after wards bent back into their original position care shall be taken to ensure that at no time the radius of the bend is less than 6 times the diameter for deformed bars. Care shall also be taken when bending such bars to ensure that the concrete around the bars is not damaged. Care shall also be taken to remove the silted materials around the bars.

#### **11.4.5 MEASUREMENT AND PAYMENT [ Item No. 12 ] :**

- (a) Measurement for payment for furnishing and placing reinforcing bars shall be based on the calculated **weight of the bars** placed in concrete.
- (i) The weight of reinforcing bars shall be based on following table:

**Table : Cross Sectional Area and Mass**

**(IS:1786-1985)**

Nominal size in mm (dia)	Cross section area in mm <sup>2</sup>	Mass per metre run in kg.
<b>1</b>	<b>2</b>	<b>3</b>
6	28.3	0.22
8	50.3	0.395
10	78.6	0.617
12	113.10	0.888
16	201.20	1.579
18	254.60	1.999
20	314.3	2.467
22	380.30	2.985
25	491.10	3.855
28	616.00	4.836
32	804.60	6.316
36	1018.30	7.994
40	1257.20	9.869
45	1591.10	12.49
50	1964.30	15.424

(ii) The joints or splices shown on the drawing or as directed by the Engineer-In-Charge shall be measured as laps. Mechanical coupling and welded joints approved by the Engineer-In-Charge, shall be measured for payment in terms of length of equivalent lap joints. Payment for placing reinforcement bars shall be made at the rate tendered there of in the Schedule-B. The rate shall include the cost of preparing workshop drawings for reinforcement based on the construction drawings, issued by the Engineer-In-Charge.

(iii) Supporting chairs/separators prepared from MS or HYSD reinforcement preferably of equal dia or as directed by the Engineer-In-Charge shall be measured and paid for as per standard weights on the lines of payment for reinforcing bars.

- (iv) The measurement and payment shall be made per **metric tonne** of steel used in the work.

**Item No:-6**

**Providing and laying vertical non metallic pressure release valves including excavation of pits and refilling the same with filter materials as per design and drawing at required intervals etc. complete as directed**

**(b) 150 mm dia**

**8.1 PRESSURE RELEASE VALVES**

**8.1.1 General**

(a) Vertical PVC (poly vinyl chloride) pressure release valves of 150 mm outer dia as shown on the drawing shall be provided and fixed in position. The item includes excavating pits and refilling the same with filter materials, where necessary, as per drawing or as directed by the Engineer-In-Charge.

(b) The vertical PVC pressure release valves shall be procured by the contractor at his own cost as per requirements and after the make is got approved by the Engineer-In Charge These valves shall be fixed in bed as well as in slopes as per the drawings supplied by the SSNNL or as per the instructions of the Engineer-In-Charge. Filter material to be used shall be of approved quality of sand and gravel in required gradation. Graded filter as shown on the relevant drawings, shall be carefully placed with help of GI Box as approved by Engineer-In-Charge and compacted to form an even bedding upto the elevation of bottom of canal lining. Tar paper or any other suitable material, approved by the Engineer-In-Charge shall be placed over the entire surface of the gravel fill to prevent water from concrete entering the fill. The under drainage arrangements shall be in conformity with IS: 4558-1983 in general. When placed in the positions, the individual lid of required depth & diameter of PVC shall be placed on top of PRV without any extra cost to SSNNL. Before handing over of the entire work, the contractor shall remove this lid & replace with the lid as specified in the drawing. 145

(c) As an alternative to graded filter around PRV, geofabric of approved quality and design shall be used without any extra cost to the SSNNL.

**8.1.2 Measurement and Payment**

Measurement and payment for the PVC pressure relief valves shall be made on the basis of numbers at the unit rate quoted in BOQ. The rate shall include the cost of providing and fixing pressure relief valves, excavating and refilling, with filter material inclusive of materials, placing of lid removing & replacing the lid as per drawing and labour required thereof and all incidental operations necessary to execute the work as per the specifications.

**8.1.3 MONSOON DAMAGES**

Damages due to rain or flood either in cutting or in banks or in foundation of structure shall have to be made good by the contractor till the final section is handed over to the SSNNL. The responsibility of desilting and making good the damages due to rain or flood rests with the contractor, throughout the defect liability period of work and not only limited to earthwork. No extra cost is payable for such operations to protect the work done during the construction and the contractor shall therefore have to take all necessary precautions to protect the work done during the construction period. The provision made in this Para shall be applicable to all the components of the work under this contract up to defect liability period of the entire work.

The contractor shall take all precautionary measures well prior to onset of monsoon to prevent entry of flood waters of drains, nallas and other area. However any damage done to the work or silting or slush caused shall have to be attended by the contractor without any extra cost to SSNNL and no time limit sanction shall be entertained for the work. During monsoon the contractor shall make available the machinery such as pumps, excavators, dozers, rollers etc. and skilled and unskilled manpower to attend the emergency conditions of flood inundation caused due to construction of canal in surrounding fields, roads etc. so that the public traffic can be maintained with least possible damage to public and natural drain / nallas / Nigam's property. The cost for such operations shall not be paid separately and deemed to be included in the rates quoted in respective Items of Bill of Quantity.

**Item No:-7**

**Earth work in embankment using selected soil, soft & hard murrum excavated from approved borrow area / village tanks etc. Including conveying, spreading in uniform layers, breaking clods and dressing to the designed canal section etc. with lead upto 7 KM m and all lift. (For canals having capacity beyond 300 Cusec) ( By Machinery )**

**GENERAL :**

Specifications and requirement laid down in general technical specification for EARTH WORK shall apply.

**SCOPE OF WORK :**

The scope of this item of work includes quarrying, transporting the suitable excavated stuff materials with a lead of 500 m and all lift 0 to 1.50 m depth. Up to 50 cusec and laying, spreading in specified layer with necessary dressing, finishing, as and where directed.

**WORKMANSHIP :**

Specifications laid down in general technical specification for EARTH WORK shall apply. Suitable materials shall be stacked in piles and same shall only be spread after approval of department. Spreading in specified layer can be performed by suitable machinery or by manually. The work shall have to carry out with best workmanship manner with the use of modern earth work machines.

**MEASUREMENT AND PAYMENT :**

The payment of this item shall be made on cubic metre basis of the

**Item No:-8**

**Compaction of selected soil/hard murrum/soft murrum in even thickness of 15 to 20 cms including watering, tamping with suitable hand rammer etc. complete as directed**

Compaction shall be done by manually for Branch, Distributaries and Minors. Each layer of materials has to be prepared so as to have the proper moisture content uniformly distributed throughout the materials. It shall be compacted in strips overlapping not less than 0.30 mt. roller shall travel in direction parallel to the axis of the canal. Density test shall be made after rolling & dry density attained shall be at least 95 % of the maximum dry density obtained in the laboratory for the type of materials used.

**Measurement and payment**

Measurement shall be taken in cubic meter (Cum). The payment shall be made on cubic meter basis.

**Measurement and payment**

Measurement shall be taken in cubic meter (Cum). The payment shall be made on cubic meter basis.

**Item No:-9**

**Providing and filling the polysulphide joint sealant of the approved make in the expansion and contraction joints in the c.c. lining including clearing the joints with air water jet.**

**1.17.1 General**

(i) The work includes providing and fixing pre moulded asphalt filler joint as per drawing and finishing smooth as directed. The material required for the work shall be approved first before bringing to site.

(ii) Open joints shall be constructed at locations as directed by the Engineer-In-Charge using a wood strip metal plate or other suitable material which is subsequently removed. While removing the material care shall be exercised to avoid chipping or breaking the corners of the concrete. The edge of the concrete at the joints shall be edge finished. Reinforcement shall not extend across as open joint.

(iii) When performed filler is to be provide as show on the drawing the filler shall be placed in the correct position before concrete is placed against the filler. The filler material shall from part of the joint and while concreting the slab care shall be taken to prevent the filler from being displaced. After the work is completed the exposed face of the joint shall be cleaned of all loose material sticking to it.

(iv) The material used for filling expansion joints shall be bitumen impregnated felt. Impregnated felt shall conform to the requirements of relevant portions of IS : 1838-1961 performed filler for expansion joint in concrete non extruding and resilient type; or its latest edition where they do not conflict with specific provisions made in this document; and shall be got approved from the Engineer-In-Charge. The joint shall consist of large piece and assembly of small pieces to make up the required size shall be avoided.

The thickness of the expansion joint will be 12 mm and width of the expansion joint shall be full depth of the slab.

(v) The rate shall include the cost of all materials, labour, equipments and other incidental charges for fixing the joints complete in all respects as per these specifications and as shown on the drawings.

### 1.17.2 Measurement and Payment

The measurement and payment shall be made on metre basis of the completed item of work.

#### Item No:-10

**Clearing silt from canal /drain bed by digging the same to the required bed level and gradient incl. depositing the excavated earth regularly in spoil bank for utilising the same for preparing the bund after breaking clods as and where directed for lead up to 200 m & lift up to 3 m as under (excluding weed cutting). (d) For canal above 500 Cusecs**

### 10.1 Scope of work.

- (a) The section covers specifications for item No.10
- (b) The work covers clearing silt from Radhanpur Branch Canal Ch 11.469 Km To 16.370 Km and their distributories & its Minors.
- (c) The work to be done under these specifications shall consist of furnishing all tools, plants, labours and material required for carrying out the work of clearing of silt as directed by Engineer-in-charge.

### 10.2

#### Item No. 5 (a)

Clearing silt from the canal / drain bed by digging the same to the required bed level and gradient including depositing the excavated earth regularly in spoil bank for utilizing the same for repairing the banks after breaking clods as and where directed for lead up to 45 m. and lift 4.5 m.(Manually) (A) For canal above 500 cusecs(14.17 cumecs)

#### Item No. 5 (b )

Clearing silt from the canal / drain bed by digging the same to the required bed level and gradient including depositing the excavated earth regularly in spoil bank for utilising the same for repairing the banks after breaking clods as and where directed for lead up to 45 m. and lift 1.5 m.(Manually) (C) For canals 20 to 250 cusecs (0.56 to 7.00 cumecs)

#### Item No. 5 (c)

Clearing silt from the canal / drain bed by digging the same to the required bed level and gradient including depositing the excavated earth regularly in spoil bank for utilising the same for repairing the banks after breaking clods as and where



directed for lead up to 45 m. and lift 1.5 m.(Manually) (D) For canals below 20 cusecs(below 0.56 cumecs)

The item provides for desilting from canal and structures. The item also provides for removing slush from the canal bed, slope, AC-TC of syphon under water pool.

### **10.3 Recording of Cross Section of Canal Bed**

- a) After clearing the site and vegetation, undesirable foreign material etc. as per site condition & initial cross section of silt deposited shall be taken at every 30m interval or closer interval depending upon nature of silt deposited. Cross sectional levels at these locations shall be taken at 3.0 m interval or closer intervals as directed by the Engineer-in-charge and these levels shall be recorded in the field book in presence of the contractor or his authorized representative and shall be binding to both the parties. This cross section shall form the basis of all further measurement and payment. The original cross sections duly signed by the Contractor and representative of Engineer-in-charge shall be preserved in safe custody of Engineer-in-charge.
- b) After taking the initial levels the contractor shall clear the silt deposited from canal bed and slope in dry or wet condition what so ever case may be and dispose-off the same for 1.50 mt lifts & lead up to 45 m. as directed by the Engineer-in-charge. No time for drying of silt shall be permitted to the contractor.
- c) During removal of silt operation, the contractor shall take extra care and precaution to protect the canal lining work. If during removal of silt operation, any damaged occurs to the existing canal lining, the same shall be made good by the contractor at his cost. No extra payment shall be made on this account.
- d) During desilting operation, contractor may have to carry out dewatering; the same shall be resorted to by the contractor. The rate for the item is deemed to have been included in the cost towards dewatering. No extra claim for dewatering will be entertained.

### **10.4 Conveyance and disposal of excavated materials.**

The excavated silt materials shall be used to strengthen the embankment on either side of the canal or deposited in low areas on either side of the canal, to fill up local depression or otherwise stacked in spoil banks in regular shape with suitable slopes

or spread on other approved location and manner as directed by the Engineer-in-charge for 1.50 mt lifts & lead up to 45 m.

## **10.5 Photography**

The photography before the commencement of work and after the completion of work shall be taken by the contractor at his cost. The said photographs shall be provided with bill.

## **10.6 Measurement and payment (Item No.10)**

- a) The payment for the item shall be made for the item at unit tendered rate on **volumetric basis (Cum)**. The rate includes removal of silt / debris in dry or wet condition, conveyance & disposal of all such materials for all leads and lifts as directed. The rate shall also include all labours, tools, plants, equipment etc incidental operations & other charges.
- b) The rate is also deemed to have been included of the cost of dewatering, if any required to be done for removal of silt. No claim on account of drying of silt etc. will be entertained.

It shall be well understood that during the irrigation, the silt / debris, vegetation like bushes, stumps, roots of trees etc. may get accumulated in the canal structures, the same shall have to be cleared without any extra cost and maintained the canal throughout the contract period. No damage shall occur to canal due to accumulation of such silt / debris / vegetation like bushes, stumps, roots of trees etc. No extra payment shall be made on this account.

### **Item No:-11**

**Cleaning the slope lining by removing all dirt, dust, soil etc. deposited on slope lining by providing labours with necessary equipment including disposing the stuff outside the canal with all lead and lift as directed by engineer-in-charge**

## **2.1 SCOPE OF WORK:**

- (a) The section covers specifications for Item No. 8 of Bill of Quantity of the tender
- (b) The work covers clearing silt from Kachchh Branch Canal side slope.
- (c) The work to be done under these specifications shall consist of furnishing all tools, plants, labours and material required for carrying out the work of clearing of silt as directed by Engineer-in-charge.

## **2.1 Clearing Canal Slope**

The contractor should remove the dirt, dust, soil deposited in canal side slope as directed by Engineer-in-Charge.

The contractor shall clear the silt deposited from canal side slope in form of slushy / muddy condition what so ever case may be and dispose off such materials as directed by the Engineer-in-Charge for lead and lift as mentioned. During removing of silt deposited, the contractor shall take extra care and precaution for maintaining concrete work to its original shape. No extra payment shall be made on this account. Any damage occurred to the existing concrete work during the removal of silt from canal side slope then it shall be rectified by the agency for which no claim or no extra payment shall be made.

## **2.2 Conveyance and disposal of materials.**

The excavated materials shall be disposed of on either side on canal or deposited in low areas on either side of the canal to eliminate tripped drainage or otherwise stacked in spoil banks in regular shape with suitable slopes or spread in other approved location and manner as directed by the Engineer-in-Charge within a leads and lifts as specified in the items. In any case it is not permitted to dispose of silt in canal water. Necessary care shall be taken by the contractor in this regard. The canal is in running water condition hence contractor has to take necessary precaution for safety of labors. All necessary safety equipment shall be provided to the labors and no extra payment shall be made in this regard.

## **2.3 Measurement and payment (Item No. 8)**

The payment will be made on square meter basis. The quantity of silt in slushy and muddy condition shall be computed by measuring area on which silt accumulated on canal slope lining. The rate of cleaning the canal lining includes providing all tools, equipment, labors all conveyance and disposal of removed material with all lead and all lift.