

Consultancy Services for Carrying out Feasibility Study, Preparation of Detailed Project Report and providing pre-construction services in respect of 2 laning with paved shoulder of *Imphal-Jiribam section of NH-37 (NH-53)* (length- 220 Km) in the State of Manipur (PKG NO. NHIDCL/DPR/CT-II-TP/Manipur/2017)

PACKAGE – V

DESIGN CH:

66+110 KM TO 101+280 KM

SURVEY CH:

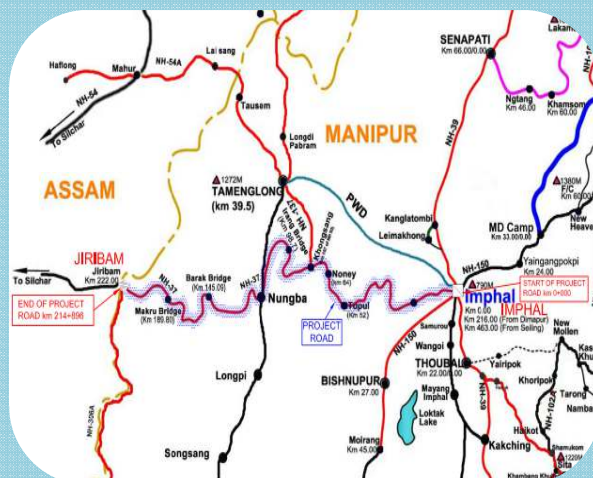
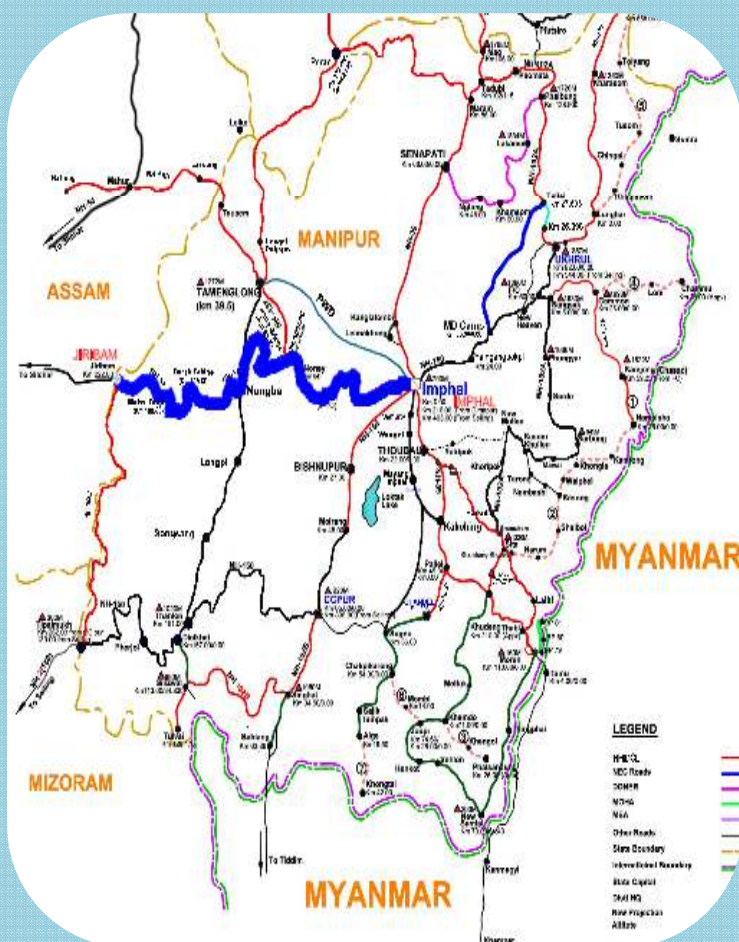
67+496 KM TO 103+557 KM

**DRAFT DETAILED PROJECT REPORT
VOLUME – V: TECHNICAL SPECIFICATION
VOLUME – VI: RATE ANALYSIS
VOLUME – VII: COST ESTIMATE
VOLUME – VIII: BILL OF QUANTITY**



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CET/4047/NHIDCL/NH-37/DDPR

Rev: R0

Mar, 2021

Road name- IMPHAL-JIRIBAM ROAD SECTION OF NH-53 (OLD NH-37)
PKG-V
(FROM DESIGN CH KM 66+110 TO KM 101+280)
GENERAL ABSTRACT OF COST

Length of Road (KM) : 35.170

DESCRIPTION OF WORKS		TOTAL COST (IN Cr.)	COST PER KM. OF TOTAL ROAD LENGTH (IN Cr.)	% of Cost of Civil Works (% of C)
A.	ROAD WORKS			
1	Site Clearance and Dismantling	2.73	0.08	0.83%
2	Earth work ,Subgrade and Erosion control	81.63	2.32	24.78%
3	Sub-Base & Base	68.81	1.96	20.89%
4	Bituminous Courses	56.53	1.61	17.16%
5	Junction Improvement	1.55	0.04	0.47%
6	Traffic signs, Road marking & other road appurtenances	4.74	0.13	1.44%
7	Passenger Shelter	0.21	0.01	0.06%
8	Busbay	1.38	0.04	0.42%
	Drainage and Protective Works			
9	Longitudinal Drains	21.14	0.60	6.42%
11	Retaining wall	4.63	0.13	1.41%
12	Breast wall	22.50	0.64	6.83%
B.	BRIDGES & CULVERTS			
12	Culvert	43.93	1.25	13.34%
14	Minor Bridge	10.02	0.28	3.04%
C.	COST OF CIVIL WORKS IN LAKHS (AS PER SOR 2018)	319.80	9.09	
D.	Escalation @ 3% WPI	9.59		
E.	Total Civil Cost including Escalation@3%	329.39	9.37	
F.	Maintenance for 5 years, i.e 2.5% on civil cost (E)	8.23		
G.	GST @ 12% of (E)	39.53		
H.	Contingencies @ 2.8% over Civil Cost (E)	9.22		
I.	Supervision Charges @ 3% of (E)	9.88		
J.	Agency Charges @3% of (E)	9.88		
K	Escalation Cost @ 2.5% during Construction Period(For 1.5 Yrs of construction period, No escalation in 1st Year and 2.5% for 0.5 Years)	8.23		
L.	TOTAL CONSTRUCTION COST (C+D+E+F+G+H+I)=J	414.36	11.78	
M.	DEPARTMENTAL COST			
a.	LA Cost & Structure Cost	99.34		
c.	Utility Shifting(Electrical+PHE)	12.98		
d.	Environmental Budget	9.88		
e.	Muck Disposal	32.94		
f.	Forest Clearance	3.61		
N	Sub Total (L)	158.75		
O	TOTAL PROJECT COST (N+M)=O	573.11	16.30	



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VOLUME - V

TECHNICAL SPECIFICATION



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Technical Specification

1.1 General

The Technical specifications covering the materials and the workmanship aspects as well as method of measurements and payments are included in this section. These specifications cover the items of civil and non-civil works coming under scope of this document. All work shall be carried out in conformity with the same. The works shall be executed in accordance with good practices followed for achieving high standards of workmanship, thus ensuring safety and durability of the construction. All codes and standards referred to in these specifications shall be the latest thereof unless otherwise stated.

1.1.1. Inclusive Documents

The provisions of special conditions of contract, those specified elsewhere in the tender document, as well as execution drawings and notes, or other specifications issued in writing by the Engineer shall form part of the technical specifications of this project.

The attention of the contractor is drawn to those clauses of codes which require supporting specification either by the Engineer or by 'Mutual agreement between the supplier and purchaser'. In such cases, it is the responsibility of the tenderer /contractor to seek clarification on any uncertainty and obtain prior approval of the Engineer before taking up the supply/construction. In absence of such prior clarification, the Engineer's choice/design will be final and binding on the contractor without involving separately any additional payment.

1.1.2. Defective Works

All defective works are liable to be demolished, rebuilt and defective materials replaced by the contractor at his own cost. In the event of such works being accepted by carrying out repairs etc. as specified by the Engineer the cost of repairs will be borne by the contractor.

1.2 Site Information

The information given hereunder and provided elsewhere in these documents is given in good faith by the Employer but the Contractor shall satisfy himself regarding all aspects of site conditions and no claim will be entertained on the plea that the information supplied by the Employer is erroneous or insufficient.

1.2.1 Location

The area in which the works are located is in Plain and Mountainous terrain.

Package -IA (Km 0+000 to Km 13+747) of Churachandpur - Tuivai (NH-102B) road is situated in the district of Churachandpur, Manipur.

1.2.2 General Climatic Conditions

Churachandpur District is one of the 16 districts of Manipur state in north-eastern India. The district is bounded by Senapati district in the north, Bishnupur and Chandel districts in the east, Assam and Mizoram in the west and Myanmar on the south. The total population of the district as per 2011 census is 2,71,274. This district with its headquarters at Churachandpur has been divided into five blocks, i.e. Churachandpur, Thanlon, Henglep, Singhat and Parbung.



1.2.3 Seismic Zone

The works are located in Seismic Zone V as defined in IRC: 6-2000.

2. GENERAL REQUIREMENTS

The Technical Specifications in accordance with which the entire work described hereinafter shall be constructed and completed by the Contractor shall comprise of the following:

2.1 PART-I: General Technical Specifications

The General Technical Specifications shall be the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FIFTH REVISION, April 2013)", issued by the Ministry of Road Transport & Highways, Government of India and published by the Indian Roads Congress (IRC), with a cross reference to relevant Bureau of Indian Standards (BIS) for materials or other aspects not covered by the IRC.

2.2 PART-II: Supplementary Technical Specifications

The Supplementary Technical Specifications shall comprise of various Amendments/ Modifications/ Additions to the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" referred to in PART - I above and Additional Specifications for particular item of works not already covered in PART-I.

- 2.2.1. A particular clause or a part thereof in "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FIFTH REVISION, April 2013)" as corrected in the original referred in PART-I above, where Amended/ Modified/Added upon, and incorporated in PART-II, referred to above, such Amendment/Modification /Addition supersedes the relevant Clause or part of the Clause.
- 2.2.2. When an Amended/Modified/Added Clause supersedes a Clause or part thereof in the said Specifications, then any reference to the superseded Clause shall be deemed to refer to the Amended/Modified/Added Clause or part thereof.
- 2.2.3. In so far as Amended/Modified/Added Clause may come in conflict or be inconsistent with any of the provisions of the said Specifications under reference, the Amended/Modified/ Added Clause shall always prevail.
- 2.2.4. The following Clauses in the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FIFTH REVISION, April 2013) have been Amended/ Modified/ Added upon;

Sr. No.	Section No.	Section Title	Clause No.
1.	100	General	100,105,106,107,108,109,110,111, 112,114 and 120
2.	200	Site Clearance	200,201 and 202
3.	300	Earthwork, Erosion Control and Drainage	300,301,304,305,307 and 309
4.	400	Sub-base, Bases (Non-Bituminous) and Shoulder	400,401,404 and 406
5.	500	Bases and Surface Courses	500, 501, 502, 503, 505, 507, 509,

Sr. No.	Section No.	Section Title	Clause No.
		(Bituminous)	and 516
6.	800	Traffic signs, Markings and other Road Appurtenances	801, 802, 803, 804, 805, 807 and 811
7.	900	Quality Control for Road works	901 and 903
8.	1000	Materials for Structures	1007, 1008, 1010, 1012, 1014 and 1015
9.	1500	Form Work	1501,1502,1503,1504,1506, 1507 1508,1509, 1510 and 1513
10.	1600	Steel Reinforcement (Untensioned)	1602,1604,1605, and 1606
11.	1700	Structural Concrete	1705, 1707, 1711, 1716 and 1718
12.	2100	Open Foundations	2106
13.	2200	Substructures	2204 and 2210
14.	2500	River Training Work and Protection Work	2504, 2507 and 2509
15.	2600	Expansion Joints	2602, 2607, 2608, 2609, 2013, 2014, and 2615
16.	2700	Wearing Coat and Appurtenances	2702, 2703, 2704, 2705, 2706, 2708 and 2709

In the absence of any definite provisions on any particular issue in the aforesaid Specifications, reference may be made to the latest codes and specifications of IRC, BIS, BS, ASTM, AASHTO and CAN/CSA in that order. Where even these are silent, the construction and completion of the works shall conform to sound engineering practice as approved by the Engineer.

2.3 The latest edition till 28 days before the final date of submission of the bid of all specifications / standard shall be applicable.




PART II

SUPPLEMENTARY TECHNICAL SPECIFICATION

AMENDMENTS/MODIFICATIONS/ADDITIONS TO EXISTING CLAUSES OF GENERAL TECHNICAL SPECIFICATIONS

SECTION 100 GENERAL

CLAUSE 102 DEFINITIONS

The following abbreviations shall be added in this Clause:

"MORT&H"	:	Ministry of Road Transport & Highways (Previously known as 'MOST', Ministry of Surface Transport)
"NHIDCL"	:	National Highway Infrastructure Development Corporation Limited.
"BIS"	:	Bureau of Indian Standards
"WBM"	:	Water Bound Macadam
"WMM"	:	Wet Mix Macadam
"BOQ"	:	Bill of Quantities

CLAUSE 105 SCOPE OF WORK

Sub-Clause 105.3 Delete the text of Clause 105.3 and substitute the following:

"The Contractor shall institute and operate a quality management system complying with SP-47 (Quality systems for road bridges) and SP-57 (Quality system for roads). The quality management system shall be described in a Quality Assurance Plan that shall be submitted to the Engineer for acceptance not later than 28 days after the Letter of Acceptance. The costs associated with preparing, implementing and monitoring the quality management system shall be deemed to be covered in the scope of the work. The Quality Assurance Plan shall cover the following items:

- i) The Contractor's organization and management including:
 - The organization of the Contract, including the line of command and communication links between parties involved in the Contract;
 - Names, roles, responsibilities and authority of principles and key personnel;
 - Control of liaison and meetings with third parties;
 - Identification of the Contractor's staff responsible for overseeing each major activity;
 - Contractor's control of sub-contracts;

- Document control;
 - provide a safe, clear and informative system of road signs
 - Program for submission of method statements;
 - Procedures for the preparation, review and adjustment of programmes for the effective progression of the Works;
 - Procedures for the regular review and recording by the Contractor of the quality of the Works;
 - Control of personal selection based on skill and experience;
 - Management review and audit to monitor and exercise adequate control over the implementation of the quality plan.
- ii) The Contractor's detailed method statements and construction procedures for each major activity whether directly controlled or subcontracted including:
- Plant and materials to be used, safety measures, the requirement for skilled labour and/or special supervision and working space;
 - Delivering, handling and storage of materials;
 - Environmental control in respect of pollution, noise, dust, temperature, working hours, traffic control etc.
 - Hold points i.e. the stages at which checks are necessary before continuing;
 - Enable standards of reliability, durability, accessibility, maintainability, quality control and assurance, and fitness for purpose appropriate to a highway of the character of the Project Highway to be achieved throughout the Contract Period
 - Achieve a high standard in the appearance and aesthetic quality of the Project Highway and achieve integration of the Project Highway with the character of the surrounding landscape through both sensitive design and sensitive management of all visible elements including those on the existing road
 - Ensure adequate safety of the Project Workers on the work site.
 - Work instructions, quality control procedures, compliance testing, inspection procedures and work acceptance procedures.
- iii) The Contractor's construction quality control including;
- A statement of the Contractor's organization for quality control;
 - Control of test laboratories;
 - Control of test, measuring and inspection equipment;
 - Document control;

- Procedure for monitoring and recording the inspection, test and approval status of the Works;
- Procedures for the collation of quality records and provision of copies to the Engineer;
- Procedures for the receipt, examination and verification of certificates of conformity and test results for purchased products.”

Sub-Clause 105.5 Contractor shall take steps to minimize the negative impact of construction operations on environment.

Hot Mix Plants should be located at least 1-2 Km from the nearest habitation unless otherwise required by statutory requirements. Vehicles and machinery used for road construction are to be regularly maintained to conform to SPCB (State Pollution Control Board) norms. Blasting as per Indian Explosive Act will be adopted. People living such blasting site should have prior information of operation hours. Workers at blasting site will be provided with ear plugs. Vehicle transporting earth materials will be covered. Water shall be spread to control the dust.

Degraded materials and waste water shall be disposed into the Septic Tank and soak pits etc. The contractor will make arrangement to clean up the spoil as soon as the work finishes in a stretch. If such sites are located outside the ROW, restoration of the site to a level acceptable to the land owner will be done with in time period agreed between land owner and the contractor. Spilling of oil and bituminous products during construction phase will be avoided to reduce the chances of contamination of surface as well as ground water. The construction camps shall be situated at places involving least risks of the nature considering the factors like ground slopes, underground water table and shall confirm to local building regulations, as applicable.

Construction camps shall be properly located to avoid contamination of water through waste water drainage into river and canals. Seasonal pollution issues may arise when flow of river is slow. To prevent such contamination, waste water generated at camp site will be discharged in soak pits. For human excreta, proper disposal through Septic Tanks or deep trenches will be done.

CLAUSE 106 CONSTRUCTION EQUIPMENT

Add the following sub Para (l) and (m) after sub Para (k)

- Adequate standby equipment including spare parts shall be available.
- All measuring devices and gauges shall be in good working condition. Measuring devices that can affect product quality shall be calibrated prior to use and at prescribed intervals against certified equipment. Calibration procedures shall be established, maintained and documented and corrective actions taken when results are unsatisfactory. Accuracy and fitness of measuring devices shall be ensured by proper maintenance.

CLAUSE 107 CONTRACT DRAWINGS

Sub-Clause 107.1 *Add the following after the end of Para*

After careful study of the drawings issued by the employer, the contractor shall where details are not provided or where changes are required due to site conditions, prepare all supplementary and/or additional working drawings based on field/construction information and shall submit the same to the Engineer for approval prior to construction.

CLAUSE 108 SITE INFORMATION

Sub-Clause 108.4 *Add this Sub-clause after the Sub-clause 108.3:*

"Identification of quarry sites and borrow areas shall be the responsibility of the Contractor. Materials procured from quarry sites and borrow areas identified by Contractor and to be used in Works must comply with the requirements of quality as stipulated in the Technical Specification for particular items of work."

Clause 109 SETTING OUT

Sub-Clause 109.9 *Delete the 2nd and 3rd sentences in Clause 109.8 and substitute the following:*

"Setting out of the road alignment and measurement of angles shall be done by using Total Station. Levels shall be taken by Automatic levels with precision micrometer staff having least count of 1mm."

Clause 110 PUBLIC UTILITIES

Replace whole of this Clause 110 with the following:

Clause 110 ENCUMBRANCES IN CONSTRUCTION AREA, INCLUDING TREES AND UTILITIES

Sub- Clause 110.1 The contractor shall be responsible to coordinate with service provider/concerned authorities for cutting of trees, shifting of utilities and removal of encroachments, etc. and making the site unencumbered from the project construction area required for completion of work. This will include initial and frequent follow-up meetings/actions/ discussions, with each involved service provider/concerned authorities. Payment for cutting of trees and shifting of utilities as required by the concerned department shall be made by the Employer.

Sub-Clause 110.2 Drawings scheduling the affected encumbrance such as trees and services like water pipes, sewers, oil pipelines, cables, gas ducts, electricity lines, accessories, telephone poles and OFC cables, etc. including in the contract document shall be verified by the contractor for accuracy of scope.

Sub-Clause 110.3 The Employer will make payments to the respective service provider/authorities for cutting trees and shifting of utilities, wherever required. The contractor shall obtain necessary approval from such Authorities after payments by the Employer and also in cases where payments are not required to be made for such shifting. The Employer will also write to all concerned department/service provider organization for expedite and facilitating cutting of trees, shifting of utilities and removal of encroachments, etc.

Sub-Clause 110.4 Any services and properties affected by the works must be temporarily supported by the Contractor who must also take all measures reasonably required by the various authorities/ persons to protect their services and properties during the execution of the works. It shall be deemed to be part of the Contract and no extra payment shall be made for the same.

Sub-Clause 110.5 The Contractor may be required to carry out certain works for and on behalf of various bodies and he shall also provide, with the prior approval of the Engineer, such assistance to the various bodies as may be authorized by the Engineer.

Sub-Clause 110.6 Payment

For coordinating the work of cutting of trees, shifting of utilities and removal of encroachments, etc. no separate payment will be made and these will be incidental to the work.

Clause 111 PRECAUTIONS FOR SAFEGUARDING THE ENVIRONMENT

Sub-Clause 111.1 General

Delete the text of Clause 111.1 in its entirety and substitute the following:

“The Contractor shall take all necessary measures and precautions and otherwise ensure that the execution of the Works and all associated operations on site or off-site are carried out in conformity with statutory and regulatory requirements including those prescribed elsewhere in this document. The provisions specified in the Environment Management Plan Report shall be followed as guidelines.

The Contractor shall take all measures and precautions to avoid any nuisance or disturbance arising for the execution of the Works. This shall wherever possible be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated. All vehicles deployed for material haulage shall be spillage proof.

Haul roads shall be inspected at least once daily to clear any accidental spillage. In the event of any spoil, debris, wastes or any deleterious substance from the Site being deposited on any adjacent land, the Contractor shall immediately remove all such material at no cost to the Contract and restore the affected area to its original state to the satisfaction of the Engineer.”

The Contractor shall be required to carry out all Environmental mitigation measures and monitoring required during execution of works as directed by the Engineer in Charge. It is pointed out that all costs incurred on such measures/ monitoring shall be treated as incidental to the work and shall be deemed to have been included in the cost of item of works covered under the BOQ

Sub-Clause 111.2 Borrow Pits for Embankment Construction

Delete the text of Clause 111.2 and substitute the following:

“Prior approval shall be sought from the concerned State Authorities, and the Contractor shall comply with all local environmental regulations. For all borrow areas, the actual extent of area/zones to be excavated shall be demarcated with the signboards and the operational areas shall be access controlled.

In the case of borrow from tank beds, a regarded/improvement of the inlet channels (at least up to 100m stretch) shall be undertaken in consultation with the concerned state government departments (the Minor Irrigation department and the State RCD) and local bodies. The Contractor shall ensure that excavation of tank beds is uniform over the entire area and that the finished profile of the bed is smooth.

In the case of borrow from the dry highlands, all borrow areas shall be reinstated by the formation gentle side slopes, re-vegetated and connected to the nearest drainage channel to avoid the formation of pools during/after the rainy seasons.

Plant and machinery used in the borrow areas shall conform to State noise emission regulations. All operation areas shall be water sprinkled to contain dust levels to the National Ambient Air Quality Standards.”

Sub-Clause 111.3 Quarry Operations

Delete the text of Clause 111.3 and substitute the following:

“Aggregates shall be sourced only from quarry sites that comply with the local/state environmental and other applicable regulations. Occupational safety procedures/practices for the work force in all quarries shall be in accordance with applicable laws. Quarry and crushing units shall have adequate dust suppression measures, such as sprinklers, in work areas and along all approach roads to the quarry sites. These shall preferable be located on the upwind side.”

Sub-Clause 111.5 Pollution from Hot-Mix Plant and Batching Plants

Delete the 1st sentence of Clause 111.5 and substitute the following:

“Bituminous hot mix plant and concrete batching plants shall be located at least one 1 km away from the sensitive receptors (schools, hospitals, etc.) and at least 500m from urban settlements, unless otherwise required by the statutory requirements.”

Sub-Clause 111.8.2 Air Quality

Add the following text after the end of 1st Para

Construction camps shall have facilities for LPG fuel. The use of firewood shall not be permitted.

Add the following text after the end of last Para

The Contractor shall monitor air-quality once weekly in all operational areas under the project and take the necessary steps to comply with the specified requirements.



Air quality parameters will include SPM, RPM, SO₂, NO_x, HC and CO. operational areas include work sites, haulage roads, hot mix plants, quarries, crushing plants, stockpiles, borrow sites and spoil disposal sites.

Sub-Clause 111.8.3 Water Sources and Water Quality

Add the following text after the end of 1st Para

Bore wells installed and used for the project shall be left in good operating condition for the use local communities. The Contractor shall prevent any interference with the supply to or abstraction from, and prevent any pollution of water resources (including underground percolating water) as a result of the execution of the Works.

Add the following text after the end of last Para

Areas where water is regularly or repetitively used for dust suppression purposes shall be laid to fall to specially constructed settlement tanks to permit sedimentation of particulate matter. After settlement, the water may be re-used for dust suppression and rinsing. The Contractor shall protect all watercourses, waterways, ditches, canals, drains, lakes and the likes from pollution as a result of the execution of the Works. All water and other liquid waste products arising on the Site shall be collected and disposed of at a location on or off the Site and in a manner that shall not cause either nuisance or pollution.

The Contractor shall at all times ensure that all existing stream courses and drains within, and adjacent to, the Site are kept safe and free from any debris and any materials arising from the Works. The Contractor shall not discharge or deposit any matter arising from the execution of the Works into any water except with the permission of the Engineer and the regulatory authority concerned.

Work force camps shall have septic tank and soak away pits. Operational areas like POL storage areas/hot mix plant areas shall comply with local/state environmental regulations and safety procedures. Storage and handling areas shall be impervious and surrounded by an impervious lined drain to catch any accidental spills. Storm water shall be stored in lined holding tanks with oil, grease-tapping facility prior to disposal in to nearby watercourses. The trappings and sludge of holding tanks shall be disposed of in accordance with the procedures approved by the local regulatory authority.

Sub-Clause 111.10 Control and Disposal of Wastes

Add the following text after the end of last Para

Spilling of oil and bituminous products during construction and transport shall be avoided to reduce the chances of contamination of surface as well as ground water.

Degraded materials shall be disposed of in a manner as approved by the Engineer and wastewater shall be disposed into septic tanks and soak pits etc. The Contractor shall make arrangements to cleanup spoil as soon as the work finishes in a stretch. If such sites are located outside the ROW, restoration of the site to a level acceptable

to the land owner(s) will be carried out within a time period agreed between landowner(s) and the Contractor. Separators shall be used to separate POL materials from wastewater prior to discharging to the watercourses or as approved by the Engineer in conformance with directives and guidelines.

Disposal of solid waste materials shall be outlined in a plan for which environmental clearances shall be obtained from State environmental regulatory authorities. Potential locations for solid waste disposal are the natural depressions and borrow areas. The areas used for dumping of uncontaminated debris shall be covered with 300mm soil and shall be planted. Contaminated debris shall be dumped in depressions whose bed must be impervious e.g., stone quarry sites or depressions made impervious with 450mm thick impervious floor apron as per MORT&H Technical Specifications. Each successive 1.0m layers shall be covered with 500mm thick soil layer, and the area will be covered with 300mm thick layer and planted.

After Clause 111.13 Add the following new Clauses 111.14 to 111.17

Sub-Clause 111.14 Haulage Roads

Existing roads used for hauling shall be strengthened and/ or widened by the Contractor in accordance with the requirements for normal and construction traffic. Where such roads do not exist, the Contractor shall construct project specific single lane paved roads in settlement areas and gravel roads in open areas conforming to the Ministry of Road Transport and Highways (MORTH) specifications.

The alignment of the haulage roads shall be fixed to avoid agricultural land to the extent possible. In unavoidable circumstances, suitable compensation shall be paid to the people whose land will be temporarily acquired for the duration of the operations. The compensation shall cover for loss of income for the duration of temporary acquisition and land restoration. Prior to the construction of the haul roads, topsoil shall be stripped and stockpiled for re-use. Material dumping sites shall be access controlled to prevent the unauthorized entry of the people, grazing cattle and stray animals. Haulage roads shall be reinstated upon completion of hauling for the use of local communities.”

Sub-Clause 111.15 Equipment and Vehicles used for the Works

Equipments and vehicles deployed for the construction activities shall not be older than 5 years. Equipments used for road and bridge works shall be based on new technology and shall generate noise and pollutants not exceeding the limits specified by the relevant State Authorities. Vehicles and machineries used for road and bridge works are to be regularly maintained to conform to the National Air Quality Standards.

Sub-Clause 111.16 Noise Control

The Contractor shall consider noise as an environmental constrain in the planning and execution of the Works.

The Contractor shall take all necessary measures so that the operation of all mechanical equipment and construction processes on and off the site shall not cause any unnecessary or excessive noise, taking in to account applicable environmental

requirements. The Contractor shall use all necessary measures and shall maintain all plant and silencing equipment in good conditions so as to minimize the noise emission during construction works.

Any member of the work force likely to be exposed to beyond their threshold noise levels shall be provided with protective equipment, such as earplugs, and shall be rotated every four hours.

Construction operations shall be limited to daytime hours only, particularly in the settlement areas.

Sub-Clause 111.17 Vibration Control

The Contractor shall take measures during construction activities to control the movement of the work force and construction machinery/equipment, and to avoid/minimize activities, which produce vibrations.

CLAUSE 112 ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION

Sub-Clause 112.2 Passage of Traffic along a part of the Existing Carriageway under Improvement

This clause shall read as under:

For widening and strengthening of the existing carriageway where part width of the existing carriageway is proposed to be used for passage of traffic, paved shoulder in a width of at least 1.5m shall be provided on one side of the existing road with the following minimum requirements to be provided by the contractor:

- i) At least one 5.5m lane to remain open to traffic at all times
- ii) The surface used by the through traffic shall at all times be a firm all weather compacted surface free of pot holes and other defects
- iii) The maximum continuous length over which construction under traffic may take place shall be limited to 750m. However, for longer stretches, passing places shall be provided at every 0.75 km interval with at least 50m length.
- iv) The treatment to paved shoulders shall consist of providing 200 mm thick granular base course grading-I Table 400-1 as per Clause 401 covered by 225 mm thick wet mix macadam layer as per Clause 406 and treated with mix seal surfacing (MSS) type B as per Clause 512.
- v) Construction activity shall be restricted to only one side of the existing road.

Sub-Clause 112.3 Passage of Traffic along a Temporary Diversion

Add the following at the end of this Clause.

Where the new highway crosses or joins with an existing state highway, or an established road or cart track, the highway, road or cart track shall be kept open at

all times. In case the Engineer specifically orders to construct and maintain diversion as described below, the same will be paid for.

Sr. No.	Type of Road	Carriageway Width	Unpaved Shoulders Width on each side (m)	Pavement Elements (Compacted)
1.	National Highways & State Highways	7.0 m	2.5	• Earthwork • 200 mm granular sub base (Grading-I of Table 400-1) • 225 mm W.B.M. • Prime coat & Tack Coat • Mix seal surfacing Type B.

Drainage should be provided as directed by the Engineer.

The alignment and longitudinal section of diversion including junctions and temporary cross drainage provision shall be as approved by the Engineer.

Sub-Clause 112.4 Traffic Safety and Control

Add the following Para in the end of Clause 112.4

The Contractor shall be fully responsible for the adequate safety of all site operations and methods of construction.

Persistent breaches of the safety provisions by the Contractor and his employees shall constitute a sufficient cause for action.

The Contractor shall also observe the following additional safety provisions. Before taking up, an agreed phased programmed for providing barricades of the approved design as per drawings and other safety measures shall be drawn in consultation with the Engineer.

- The barricading shall be erected on the side of the carriageway portion/ portion of the carriageway where any construction activity is taken up on or alongside of the existing carriageway.
- Flagmen in adequate numbers shall be provided to marshal the traffic on diversion wherever diversion of traffic is resorted to.
- Proper traffic signage in required numbers shall be provided for the information of road users.
- A safety officer shall be nominated to prepare safety programmed and oversee the safety arrangements at site.



Sub-Clause 112.6 Measurements for payment and rate

Replace this clause by following:

All arrangement for traffic during construction except temporary safety barricade as mentioned hereafter, dismantling and clearing debris, where necessary and providing traffic safety and control devices where necessary shall be considered incidental to the works and shall be contractor's responsibility.

Payment for construction of temporary diversion including temporary cross drainage structures, if required, construction of treated shoulder for traffic during construction shall be measured and paid separately as per relevant item in the BOQ. The temporary diversion shall be dismantled and credit for dismantled material shall be taken as per BOQ.

During construction activity for widening of road on hill side, the contractors shall provide rock fall fencing and deepen and widen the existing hill side drain to arrest the falling materials from coming to road surface. The fencing shall be of type as shown in the drawing or as decided by the engineer for safety of road users and workers. After the completion of the work the temporary fencing shall be shifted or removed according to necessity. All works towards providing fencing shifting of fencing clearing accumulated debris arrested by fencing regularly deepening and widening of existing drain etc. shall be considered incidental to the work.

Temporary safety barricade shall be measured in linear meter. All works in excess of quantitative provisions made in BOQ towards providing temporary safety barricade shall be considered as incidental to work and no extra payment shall be admissible for the excess quantity. The contract unit rate for the temporary safety barricade shall be payment in full for the cost all labour, materials, installation, maintenance or replacement, shifting of temporary units from one location to other and refilling the temporary holes made in the ground. Removing debris and all other incidentals to complete the work in all respect, The contractor shall take back these temporary barricades in full quantities after the completion of the project or earlier as per direction of the Engineer by paying at the rate of 50 % of his quoted rate or Rs. 1000 per meter whichever is more as salvage value to the Employer. Recovery for the salvage value shall be made in the third last interim payment certificate. These temporary units shall not be used in any permanent work in the project.

CLAUSE 114 SCOPE OF RATES FOR DIFFERENT ITEMS OF WORK

Sub-Clause 114.2 *Item (ii) of Clause 114.2 shall read as follows:*

A detailed resource based construction programme including resources planning using computerized critical path network method/PERT in a form, which facilitates control of the progress of the works and consequences of any changes in terms of time. The programme shall also include detailed network, activities for the submission and approval of materials, procurement of critical materials and equipment, fabrication of special products/ equipment and their installation and testing and for all activities of the Contractor that are likely to affect the progress of work etc. including updating all such activities on the basis of decisions taken at the periodic site review meetings or as directed by the Engineer. The Contractor shall submit data via electronic media to the Engineer in a form readily compatible with

Engineer's planning system.

Add the following as item (xix) to sub-clause 114.2:

The Contractor shall prepare detailed construction drawings for each culvert on the basis of the drawings given in Bid Documents and get them approved by the Engineer. The drawings shall be submitted to the Engineer at least 8 weeks before commencement of construction of culverts.

Add the following as item (xx) to sub-clause 114.2

Monthly progress report will be submitted in a format acceptable to the Engineer. The report shall state the progress which has been achieved compared with the planned progress, illustrate delays in proportion to the progress planned, analyses the consequences and state planned corrective measures. Intermediate progress reports may also be required.

The first issue of the detailed construction programme including the detailed description of the system and the procedures shall be submitted to the Engineer for acceptance not later than 28 days after the date of receipt of the letter of acceptance.

The contractor shall submit to the Engineer for approval & consent, the updated & revised programme at every three months interval or as such as directed by the Engineer. The updated & revised programme shall be submitted showing the actual progress achieved (physical & financial) and the effects of the progress achieved on the timing of the remaining work including any change to the sequence of the activities.

Sub-Clause 114.4 Add the following as Clause 114.4

If any 'work' executed by the Contractor does not meet the specifications, it shall be deemed as rejected. The Engineer, in his sole discretion, may consider a proposal by the Contractor to retain, the element or part of the 'work'. The Contractor's proposal shall be supported by calculations, drawings and other data to prove the soundness of the proposal and shall clearly describe the additional measures required to ensure the intended performance of the 'work'.

Such corrective measure shall be carried out at the contractor's cost and risk.

CLAUSE 120 FIELD LABORATORY

Sub-Clause 120.1 Scope

Add the following at the end of the clause.

This facility will be provided and maintained by the Contractor, as incidental to work and no separate payment shall be made for this item.

Sub-Clause 120.2 Description

Replace “electric supply etc.” to the second sentence of first paragraph by “including uninterrupted power supply etc.”

Add the following at the end of this Clause:

“There shall also be provided a concrete paved area, for storing samples adjacent to the laboratory, of about 300 sqm and another 200 sqm shall be suitably roofed with open sides giving protection against sun and rain.

Within 14 (fourteen) days of the commencement date, the Contractor shall prepare and submit a layout plan and details of the laboratory building and make/supplier of the equipment to the Engineer for his approval.

The field laboratory to be provided under the Contract shall be handed over to the Engineer in finished and fully equipped condition not later than 2 months after the receipt of Notice to Commence Work, and the field laboratory with all equipment/instrument shall be to the entire satisfaction of the Engineer. During the 2 months period starting from the Notice to Commence work, the laboratory tests shall be performed in another laboratory proposed by the Contractor and approved by the Engineer.

Sub-Clause 120.3 This clause stands deleted.

Sub-Clause 120.4 This clause stands deleted.

Table 100-2 Laboratory Equipment

S. No.	Sub No.	Item, Specifications	Nos. required
A: General			
i)		Balance	
	(a)	5 kg to 20 kg capacity semi -self-indicating Electronic Type –Accuracy 1 gm.	1
	(b)	500 gm. capacity semi self indicating Electronic Type – Accuracy 0.01 gm.	1
	(c)	Chemical balance 100gm capacity - Accuracy 0.0001gm	1
	(d)	Pan balance 5 kg capacity - Accuracy 0.5 gm.	1
	(e)	Platform Scale – 300 kg capacity	1
ii)		Ovens – Electrically operated, thermostatically controlled	
	(a)	From 0°C to 220°C – Sensitivity	1

[Signature]



S. No.	Sub No.	Item, Specifications	Nos. required
iii)		Sieves, as per IS 460-1962	
	(a)	IS Sieves 450 mm internal dia. of sieve sets as per BIS of required sieve sizes complete with lid and pan	1 set
	(b)	IS sieve 200 mm internal dia. (brass frame and steel or brass wire cloth mesh) consisting of sieve sets of required sieve sizes complete with lid and pan	2 set
iv)		Sieve shaker capable of taking 200 mm and 450 mm dia. Sieves electrically operated with time switch assembly (As per BIS)	1
v)		200 tones compression testing machine	1
vi)		Stop watches 1/5 sec. Accuracy	2
vii)		Glassware comprising of Beakers, Pipettes, dishes, measuring cylinders (100 to 1000 cc capacity) glass rods and funnels, glass thermometers range 0oC to 100oC and metallic thermometers range 300oC	2 Nos. each
viii)		Hot plates 200 mm dia (1500 watt.)	6
ix)		Enamel trays	
	(a)	600 mm x 450 mm x 50 mm	2
	(b)	450 mm x 300 mm x 40 mm	2
	(c)	300 mm x 250 mm x 40 mm	2
	(d)	Circular plates of 250 mm dia.	2
x)		Water Testing Kit	1

Sub-Clause 121.3.2 for Soils and Aggregates

B: For Soils and Aggregates			
i)		Water still, 3 liter/hr. with fittings and accessories	-
ii)		Liquid limit device with Casagrande and ASTM grooving tools as per IS: 2720	1
iii)		Sampling pipettes fitted with pressure and suction inlets, 10 ml Capacity	1 set
iv)		Compaction apparatus (Proctor) as per IS: 2720 (Part 8) complete with collar, base plate and hammer	1 set
v)		Modified AASHTO compaction apparatus as per IS. 2720 (Part 7) 1980 or Heavy Compaction Apparatus as per IS complete with collar, base plate and hammer	1 set

B: For Soils and Aggregates			
vi)		Sand pouring cylinder with conical funnel and tap and complete as per IS 2720 (Part 28) 1980 including modified equipment	2
vii)		Sampling tins with lids 100 mm dia x 75 mm ht ½ kg capacity and miscellaneous items like moisture, tins with lid (50 grams) etc.	4
viii)		Lab CBR testing equipment for conducting CBR testing, load frame with 5 Ton capacity, electrically operated with speed control as per IS: 2720 (Part 16), and consisting of following:	1 set
	(a)	CBR moulds 150-mm dia – 175-mm ht complete with collar, base plate etc.	6
	(b)	Tripod stands for holding dial gauge holder	4
	(c)	CBR plunger with settlement dial gauge holder	1
	(d)	Surcharge weight 147-mm dia 2.5 kg weight with central hole	6
	(e)	Spacer disc 148-mm dia, 47.7-mm ht. With handle	2
	(f)	Perforated plate (Brass)	2
	(g)	Soaking tank for accommodating 24 CBR moulds	2
	(h)	Proving rings of 1000 kg, 2500 kg and 5000 kg capacity	1 each
	(i)	Dial gauges, 25 mm travel- 0.01 mm/division	2
ix)		Standard Penetration test equipment	1
x)		Nuclear Moisture Density Meter or equivalent	1
xi)		Speedy moisture meter complete with chemicals	1
xii)		Unconfined compression test apparatus	1 set
xiii)		Aggregate Impact Test Apparatus as per IS 2386 (Part 4) 1963	1
xiv)		Los Angeles abrasion Test Apparatus as per IS 2386 (Part 4) 1963	1
xv)		Riffle Box of Slot size of 50mm as per ASTM C-136	1
xvi)		Dynamic Cone Penetrometer	1
xvii)		Hydrometer with high speed stirrer and jars	2 sets
xviii)		Post-hole augur (to BS-812)	3



Sub-Clause 121.3.3 For Bitumen and Bitumen Mixes

C: For Bitumen and Bituminous Mixes			
i)		Constant temperature bath for accommodating bitumen test specimen, electrically operated and thermostatically controlled, 50 liter capacity temp. range ambient 80° C	1
ii)		Penetrometer automatic type, adjustable weight arrangement and needles as per IS. 1203 – 1978	1
iii)		Solvent extraction or centrifuge type apparatus complete (AASHTO, T-164) with extraction thimbles with stocks of solvent and filter paper	1
iv)		Laboratory mixer including required accessories about .02 cum capacity electrically operated fitted with heating jacket	1
v)		Marshall compaction apparatus automatically operated as per ASTM 1559-62 T and complete with electrically operated loading unit, compaction pedestal heating head assembly, dial micrometer and bracket for flow measurement, load transfer bar, specimen mould 100 mm dia. (4 in) with base plate, collars, specimen extractor, compaction hammer 4.53 kg (10 lb.) x457 mm (18 in) fall	1 set
vi)		Distant Reading Digital Thermometer for Measuring Temperatures in Asphaltic Mixes	As required
vii)		Riffle Box	1
viii)		Automatic Asphalt Content Gauge [Nuclear or equivalent]	1
ix)		Thin film Oven test apparatus to the requirement of AASHTO T 179, including accessories	1
x)		Ring Ball Apparatus as per IS 1205- 1978	1
xi)		Asphalt Institute Vacuum Viscometer as per IS 1206(part II) – 1978	1
xii)		BS U- Tube Modified Reverse Floro Viscometer IS 1206(Part III) – 1978	1
xiii)		Apparatus for Determination of Ductility Test as per IS 1208 – 1978	1
xiv)		Pen Sky – Martars closed Tester for testing flash and fire point as per IS 1209 – 1978.	1
xv)		Apparatus for Float Test – IS – 1210 – 1978	1
xvi)		Apparatus for Determination of water content (Dean and Stark Method) IS – 1211 – 1978	1

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C: For Bitumen and Bituminous Mixes			
xvii)		Apparatus for Determination of Loss on Heating IS – 1212-1978.	1
xviii)		Apparatus of Determination of specified Gravity IS-1202-1978	1
xix)		Core cutting machine with 100mm dia. Diamond cutting Edge	1
xx)		Apparatus for Elastic Recovery test for Modified Bitumen	1
xxi)		Apparatus for Storage Stability test for Modified Bitumen	1
xxii)		Apparatus for Separation test for modified bitumen	1

Sub-Clause 121.3.4 for Cement, Cement Concrete and Materials

D: For Cement, Cement Concrete and Materials			
i)		Water still	1
ii)		Vicat needle apparatus for setting time with plungers, as per IS. 269-1967	1
iii)		Moulds	
	(a)	150 mm x 300 mm ht cylinder with capping component	As required
	(b)	150mmx150 mm x150mm cubical for compressive strength	As required
	(c)	150mmx100 mm x600mm beam for flexural strength	As required
iv)		Concrete permeability apparatus	1
v)		High frequency mortar cube vibrator for cement testing	1
vi)		Concrete mixer power driven, 1 cu ft capacity	1
vii)		Variable frequency and amplitude vibrating table size 1 meter x 1 meter, as per the relevant British Standard	1
viii)		Flakiness & Elongation test apparatus	2each
ix)		Aggregate impact test apparatus as per IS 2386 (Part 4) 1963	2
x)		Los Angeles abrasion apparatus as per IS. 2386 (Part 4) 1963	1
xi)		Flow table as per IS 712-1973	1
xii)	(a)	Equipment for slump test	2



D: For Cement, Cement Concrete and Materials			
	(b)	Compaction factor test equipment	1
xiii)		Equipment for determination of specific gravity for fine and coarse aggregate as per IS 2386 (Part 3) 1963	2
xiv)		Core cutting machine with 150 mm dia. Diamond cutting edge	1
xv)		Needle vibrator	1
xvi)		Vibrating hammer as per BS specification	1
xvii)		Air entrainment meter ASTM C - 231	1
xviii)		0.5 Cft, 1 Cft cylinder for checking bulk density of aggregate with tamping rod	1
ix)		Soundness testing apparatus for cement	1
xx)		Compression testing machine with the provision of flexural attachment and accessories for testing flexural beam	1
xxi)		Chemicals solutions and consumable	As reqd.
xxii)		Chloride Testing kit for chemical analysis of chloride content.	1
xxiii)		ION Exchange kit for rapid determination of sulphate content.	1
xxiv)		Electronic PH meter	1

Sub-Clause 121.3.5 For Control of Profile and Surface Evenness

E: For Control of Profile and Surface Evenness			
i)		Total Station with all accessories	1 No.
ii)		Precision Automatic Level	1 set.
iii)		Distomat or equivalent	1 set.
iv)		Theodolite – Electronically operated with computerised output attachment	1 set.
v)		Precision Staff of 1mm least count	2 Sets.
vi)		3 metre straight edge and measuring wedge	1 set.
vii)		Camber templates 2 lane	
	(a)	Crown type cross-section	1 set.



E: For Control of Profile and Surface Evenness			
	(b)	Straight run cross-section	2 sets.
viii)		Steel tape	
	(a)	5 m long	2 Nos.
	(b)	10 m long	2 Nos.
	(c)	20 m long	2 Nos.
	(d)	30 m long	2 Nos.
	(e)	50 m long	2 Nos.
ix)		Roughometer (Bump Integrator)	1 Set.

Note: The laboratory set-up must be complete including a set of reference standards, adequately staffed and operational to the satisfaction of the Engineer not later than 2 months from the date of receipt of Notice to commence the works.

The Contractor shall be responsible for the provision of adequately experienced and qualified laboratory staff, in sufficient numbers to be able to meet all testing requirements to the approval of the Engineer, and for the supply of all transportation of staff, testing equipment and samples necessary to allow the testing to be performed in a time scale compatible with the needs of the Site.

Contractor shall arrange to maintain the laboratory in satisfactory manner and will carry stocks of spare equipment and laboratory consumables until the issue of Taking over Certificate.

The contractor shall provide any other equipment required to check quality as per the requirement of specification in addition to the above.

Sub-Clause 120.5 Rate

"This Clause shall be read as under:"

The construction, supply, installation, maintenance, and operation including all consumables like chemicals & reagents etc., and all other expenses involved in connection thereto for the field laboratory shall be incidental to the work, and shall not be paid for separately.

SECTION 200 SITE CLEARANCE

CLAUSE 201 CLEARING AND GRUBBING

Sub-Clause 201.1 Scope

Replace with following Para:

This work shall consist of cutting, excavating, removing, and disposing of all materials such as trees of girth up to 300 mm, bushes, shrubs, stumps, roots, grass weeds, rubbish etc. and top soil up to 150 mm, which in the opinion of Engineer is unsuitable for incorporation in the work including draining out stagnant water if any from the area of road land, drain, cross drainage structure and other area as specified in the drawing or instructed by Engineer. It shall include necessary excavation by harrow discs or any other suitable equipment, back filling of the pits by suitable soil, resulting from uprooting of trees & stumps and making the surface in proper grade by suitable equipment and compacted by power roller to required compaction as per Clause 305.3.4. The work also includes handling, salvaging and disposal of cleared material. Clearing and grubbing shall be performed less than one month in advance of earthwork operation and in accordance with requirement of these specifications.

Sub-Clause 201.5 Measurements for Payment

Delete the 2nd sentences in first paragraph and replace as under:

Cutting of trees up to 300 mm in girth measured at 1 meter above ground including removal of stumps and roots and trimming of branches of trees extending above the roadway shall be considered incidental to the clearing and grubbing operations and no separate payment shall be made for the same.

Removal of stumps & roots of trees of girth above 300mm trees cut by other agencies and back filling to required compaction as specified in this clause shall be measured in terms of number separately on the basis of girth size of stumps of trees as given in Bill of Quantities and will be payable. For the purpose of stump removal, girth size shall be measured 150mm above ground.

CLAUSE 202 DISMANTLING CULVERTS, BRIDGES AND OTHER STRUCTURES/ PAVEMENTS

Sub-Clause 202.5 Disposal of Materials

The first paragraph of the sub clause shall read as below

All materials obtained of dismantling/milling shall be the property of the Employer and, the Contractor shall be free to use this material in work or he may sell/dispose of the material to as desired/deemed fit by him, for which he shall quote a rate for rebate against the respective items of BOQ.

Contractor may use dismantled / milled road crushed material on as is where is basis.

by suitably modifying the material, or by crushing the material, or by breaking the material, and screening the same, after effecting due rebate in the BOQ, provided it meets the specifications and is approved by the Engineer.

Sub-Clause 202.6 Measurements for Payment

This Clause shall read as:

The work of dismantling structures shall be paid for in units indicated below by taking measurements before and after, as applicable:

i)	Dismantling brick / stone masonry / plain concrete / reinforced concrete including reinforcement.	cum
ii)	Dismantling pavement structures such as Sub base / Base Course, Bituminous wearing course, Concrete wearing course	cum
iii)	Dismantling pipes, guard rails, road kerbs, gutters and fencing	..running metre
iv)	Dismantling Guard Stones/KM stones/Sign post/Hectometre Stones	Nos
v)	Dismantling RCC railing	..running metre
vi)	Dismantling of railing kerb	..running metre
vii)	Dismantling of Stone pitching/ boulder apron/ brick soling/ stone soling	cum

Sub-Clause 202.7 Rates

Add at the end of this sub clause:

The contract unit rates for various items of rebate shall be on the full quantities obtained from dismantling.

SECTION 300 EARTHWORK, EROSION CONTROL AND DRAINAGE

CLAUSE 301 EXCAVATION FOR ROADWAY AND DRAINS

Sub-Clause 301.1 Scope

Add the following as second paragraph under this clause:

“The work shall also include excavation for channel training at culverts/bridges, excavation of existing shoulders and medians for purposes of widening the pavement and excavation of existing embankment for reconstruction to specification.”

Sub-Clause 301.2.1 Classification

The Para (a) under this clause shall read as under:

“(a) Soil

This shall comprise top soil, turf, sand, silt, loam, clay, mud, black soil, soft shale or loose moorum, a mixture of these and similar material which yields to the ordinary application of pick, spade and stroke/or shovel, rake or other ordinary digging implement, including excavation of unsuitable soil (as described in Clause 305.2). Removal of gravel or any other nodular material having dimension in any one direction not exceeding 75 mm occurring in such strata shall be deemed to be covered under this category. Conglomerates and boulders not requiring blasting having maximum dimension in any direction up to 300 mm and excavation of unsuitable soils (as described in clause 305.2) shall also be covered under this category”.

Delete “and Conglomerates” from first line of Para b (i)

Delete Para b (iv)

Sub-Clause 301.3.3 Excavation – General

The following paragraph is added to the sub-clause 301.3.3

“Temporary support to the sides of the excavation, necessary to support the foundation of adjoining structures and to prevent any ground movement shall be provided by the Contractor. Where temporary supports are provided these shall be designed & removed such that no ground movement occurs on removal. The Contractor shall submit his proposal in this respect to the Engineer for approval prior to commencement of the excavation”.

Sub-Clause 301.3.7 Excavation of road shoulders/verge/medians for widening of pavement or providing treated shoulders

The title of this Clause shall read as under:

“Excavation of road shoulders/verge & medians for widening of pavement or for providing treated/paved shoulders and medians”.

The first sentence of this Clause shall be replaced as under:

“In works involving widening of existing pavements or providing paved shoulders, the existing shoulders/verge/median shall be removed to its full width and upto top of subgrade. The subgrade material within 0.5m from the lowest part of the pavement crust for widened portion or paved shoulders shall be loosened and re-compacted as per Clause 305 to a density not less than 97% of maximum dry density determined according to IS:2720 (Part 8). Any unsuitable material encountered in this portion of sub-grade shall be removed and replaced with suitable material and compacted in accordance with Clause 305”.

Clause 301.3.11 Use & Disposal of excavated materials

Delete this sub-clause and replace with:

“All the excavated materials shall be the property of the Employer. Suitable material obtained from the excavation of the roadway, shoulders, verges, drain, cross drainage works, etc. shall be used for:

- i) Filling for roadway embankments with all lifts and leads
- ii) Filling existing pits in the right of way as directed by the Engineer, including levelling and spreading with all lifts and leads
- iii) For landscaping of the road as directed by the Engineer, including levelling and spreading with all lifts and leads

Excavated rock shall be available to the contractor for using in the manner as he desires (other than the above items of work) after affording the rebate against the respective items of BOQ.

The contractor shall remove unsuitable and surplus material, which, in the opinion of the Engineer cannot be used in the works, from site and disposed of at the approved location in accordance with all statutory requirements as approved by the Engineer with all lifts and leads and no extra payment shall be made for the same. Area of dumping shall be arranged by the contractor.

Sub-Clause 301.6 Preparation of Cut Formation

Second Para shall be read as under:

“In rock formation, the rock shall be cut 100mm below the specified elevation of base WMM and the surface irregularities shall be corrected. The gap between rock cut and base of WMM shall be filled with 100mm thick granular sub-base as per grading-I of Table 400-1 of Clause 401. The unsuitable material shall be disposed of in accordance with Clause 301.3.11.”

Sub-Clause 301.8 Measurements for Payment

In first line of first Para add “and drains” after the word “roadway”

Delete the last Para from “works involved.....” and substitute:

“Works involved in excavation for roadway and drains shall be measured in unit indicated below:

- Excavation in all classes of soil including marshy soil ...cum
- Excavation in ordinary rock ...cum
- Excavation in hard rock with or without blasting ...cum
- Preparing Rocky Subgrade ...sqm
- Loosening and re-compacting of sub-grade ...cum

Sub-Clause 301.9 Rates

Sub-Clause 301.9.1

Add extra item after item (vii)

“(viii) The removal from site and disposal of all surplus or unsuitable materials obtained from excavation operations, which, in the opinion of the Engineer cannot be used in the Works, shall also be included in the Contract unit rates.”

Sub-Clause 301.9.2 This Clause shall read as under:

“The contract unit rate for loosening and re-compacting at subgrade level shall include full compensation for loosening to the specified depth, removing the loosened soil outside the roadway excavation rolling the surface below, breaking the clods, spreading the excavated soil in layers, watering where necessary and compacting to the requirements.”

Sub-Clause 301.9.3

Insert “including marshy soil” after words “unsuitable material” in the second line of this sub-clause.

Sub-Clause 301.9.6

Add new Sub Clause after 301.9.5 as under;

The Contract unit rate for rebate of materials obtained from excavation/cutting shall take into account for full compensation to be made by the Contractor who shall be responsible for arranging approval, payment of royalty and complying the requirement of mining department and other authorities of Central / State Government for reuse of materials obtained for rock cutting”.

CLAUSE 304 EXCAVATIONS FOR STRUCTURES

Sub-Clause 304.3.2 Excavation

At the end of 1st paragraph of Clause 304.3.2 insert the following additional sentences:

“The Contractor shall ensure the stability and structural integrity of adjacent existing foundations and structures and if necessary shall, at his own expense, install temporary or permanent sheet piles, coffer dams, shoring or similar as support or protection to the satisfaction of the Engineer.”

CLAUSE 305 EMBANKMENT CONSTRUCTION

Sub-Clause 305.2 Material and General Requirements

Sub-Clause Physical Requirements:

305.2.1 Add at the end of the 1st paragraph of Sub Clause 305.2.1.1 insert the following additional sentence;

“Use of flyash available from Thermal Power Station located within 100 kms of work may be required. The embankment with flyash shall be executed as per IRC: SP: 58:2001.

Sub-Clause

305.2.1.2 Add the following at the end of Sub-Clause:

“Soils having medium and high swelling potential shall be defined on the basis of Liquid Limit, Plastic Limit, Shrinkage Limit, Gradation, Free swelling Index, Field dry Density and Field Moisture Content and types of Clay minerals present in the soil and as directed by the Engineer. The location and the extent of these soils with medium to high swelling potential should be defined as directed by the Engineer.”

Sub-Clause

305.2.1.4 Delete second sentence “However, the Engineer Requirements of these Specifications”.

Sub-Clause

305.2.2.4 Compaction Requirements

Delete Table 300-2 and substitute the following:

Table 300-2

Compaction Requirements of Embankment and Subgrade

S. No.	Type of Work/Material	Relative Compaction as %age of maximum laboratory dry density as per IS 2720 (Part 8)
1	Subgrade and earthen shoulders	Not less than 97%
2	Embankment	Not less than 95%
3	High Embankment (Height >6m)	Not less than 97%
4	Expansive clays	Not allowed
5	Design CBR of Subgrade & Shoulder shall be as per Drawing, but not less than 6%	

Replace the last part of Sub-Clause 305.2.2.4 (after Table 300-2) with the following:

The contractor shall at least 7 working days before commencement of construction of embankment and the subgrade; submit the following to the Engineer for approval:

- i) The values of maximum dry density and optimum moisture content obtained in



accordance with, IS: 2720 (Part 8) for each fill material proposed to be used in the construction of embankment and subgrade.

- ii) The graphs of Density plotted against moisture content from which each of the values in (i) above of maximum dry density and optimum moisture content were determined.
- iii) The dry density-moisture content-CBR relationships, heavy compactive efforts conforming to the IS 2720 (part 8) for each of the fill material proposed to be used in the sub grade.

The above information shall form the basis for compaction only upon its approval by the Engineer."

Sub-Clause Add the following new sub-clause:

"Construction of embankment with flyash / pond ash available from coal or lignite thermal plants as waste materials.

Construction of Embankment using Fly ash / Pond ash shall be carried out complete as per IRC: SP: 58 – 2001".

Sub-Clause 305.3 Construction Operations

Sub-Clause 305.3.1 Setting Out

Add the words "with minimum 300 mm wider" after the words "sufficiently wider" in the fourth line of the clause.

Sub-Clause Compacting Ground Supporting Embankment/Subgrade

305.3.4 Para 1 of this clause shall be read as

"Where necessary the original ground shall be leveled, scarified, mixed with water and then compacted by rolling to facilitate placement of first layer of embankment so as to achieve minimum dry density as given in Table 300-2".

Add at the end of Para 2

"Backfilling layers in pits, trenches and below the original ground are to be compacted to the relative natural ground density. The natural ground density shall be determined by conducting field density tests at three widely spaced locations along the central line of the proposed additional carriageway at a depth between 0.5m to 1.0m. Samples of natural ground are collected at each location, and are tested in accordance with IS: 2720 (Part 8). The relative density (i.e. the percentage of the field dry density to the laboratory maximum dry density) is assessed for each sample, and the greatest relative density obtained is selected as the "natural ground density". If the natural ground density is less than 90% then these are to be compacted after necessary watering so as to achieve not less than 90% of relative compaction".

"Where necessary to facilitate compaction of the subgrade to 97% relative compaction as stated above, a further depth below the subgrade of maximum

thickness of 0.2m shall be loosened, watered and compacted in accordance with Sub Clause 305.3.5 and 305.3.6 to not less than 95% of dry density determined in accordance with IS: 2720(Part-8)".

Sub-Clause

305.3.6 Compaction

The second Para of this Clause shall read as under:

"Vibratory roller of not less than 80-100 KN static weight with plain or pad foot drum or pneumatic tyre roller of 300 KN weight having tyre pressure of at least 7 kg/sqcm shall be used for compaction."

Insert the following sentence before the last sentence of Paragraph 4.

"The co-relation between sand replacement densities and nuclear gauge densities shall be based on trials with minimum 30 coherent density measurements".

Sub-Clause 305.9 Rates

Sub-Clause 305.9.1

Add "including removal of topsoil after word "materials" appearing in first line of item (v).

Insert "including removal and replacement of marshy soil" after words "unsuitable material" appearing in the second line of item (iii).

Sub-Clause Add new Sub-Clause after Sub Clause 305.9.10 as under;

305.9.11 The contract unit rate for construction of embankment with suitable material obtained from roadway excavation within Right of Way (ROW) shall be payment in full for carrying out the required operation including full compensation for items under Clause 305.9.1 excluding Sub Clause (i) & (x) after the suitable material has been received as provided in Clause 301."

Clause 306 SOIL EROSION AND SEDIMENTATION CONTROL

Sub-Clause 306.4 Measurements for Payment

Substitute Clause 306.4 as follows:

"All temporary sedimentation and pollution control works shall be deemed as incidental to the earthwork and other items of work and as such no separate payment shall be made for the same."

Sub-Clause 306.5 Rates

This clause shall be deleted.

Clause 309 Surface/Sub-Surface Drains

Sub-Clause 309.2 Surface Drains

Add the following paragraphs after end of the fourth Para of this clause.

“Drains in super-elevations shall be constructed as per drawings. Geotextile membrane if specified for these drains shall conform to Sub-Clause 702 of Section 700”.

“The roadside land between toe of road embankment & drain shall be levelled & sloped towards the drain as per drawing.”

Sub-Clause 309.3 Sub-Surface Drains

Sub-Clause 309.3.1 Scope

The first sentence of this clause should read as:

“Sub-surface drains shall be close jointed perforated pipes, surrounded by granular material laid in a trench to drain the pavement courses.”

Sub-Clause 309.3.2 Materials

Grading requirements for filter material shall conform to Class I of Table 300-3.

Sub-Clause 309.3.2.1 Pipe

The first and second sentences of this clause shall read as:

“Perforated pipes for the drains are of PVC. The size and grade of the pipe to be used is as specified in the drawing.”

Sub-Clause 309.3.4 Laying of Pipe and Backfilling

Delete Para 4 of this clause.

Sub-Clause 309.4 Measurements for Payment

This Clause shall read as:

“Construction of drains shall be measured as finished work in position as below:

a) Unlined ditch drain		as per Clause 301 Cum
b) Semi-Circular median drain as shown in the drawing with PCC M20, NP2 pipe, levelling concrete M15 and filter media.		running metre
c) Open cross-drain in paved median as per drawing with PCC grade M-20 & levelling concrete M-15.		running metre
d) Paved open/Covered drain		

(i) Levelling concrete M-15		cum
(ii) Course rubble masonry		cum
(iii) Stone pitching grouting with CM 1:3		cum
(iv) PCC/ RCC grade M-20		cum
(v) Steel Reinforcement		MT
(vi) Precast perforated slab		Nos.
(vii) Catchpits/ inspection chambers		Nos.
(viii) RCC pipes		running metre
e) Sub-surface drains		running metre
f) Iron grating		Nos.

SECTION 400 SUB-BASES, BASES (NON BITUMINOUS) AND SHOULDERS

General

Sub clause (i) of clause 401.7 stands deleted and remaining sub paras (ii) to (v) are renumbered as (i) to (iv).

Sub clause (i) of clause 405.7 stands deleted and remaining sub paras (ii) to (v) are renumbered as (i) to (iv).

The provision of clause 401.8 (i) to (v) be read as "Clause 401.8 (i) to (iv)" in the sub clauses 402.8, 403.8, 404.7, 407.7 and 408.7

Clause 401 GRANULAR SUB BASE

Sub-Clause 401.2 Materials

Sub-Clause 401.2.1 Para 1 of this Clause shall be read as under:

"The material shall be free from organic or other deleterious constituents and conform to the Grading I given in Table 400-1 with the percentage passing 0.075mm size restricted to 5%. The portion of the total aggregate passing 4.75 mm sieve shall have a sand equivalent value of not less than 50 when tested in accordance with the requirement of IS: 2720 (Part – 37).

Delete the eighth sentence beginning with "where the sub-base is laid in two layers as upper sub-base and lower sub-base, the thickness of each layer shall not be less than 150mm".

Sub-Clause 401.2.2

Add at the end of this clause as under:




The Contractor shall, at least 21 working days before the commencement of the construction of the sub-base course, submit to the Engineer, the results for approval of the laboratory testing on the physical properties defined above. The construction of the sub-base course shall be taken up only upon the Engineer's approval of the material.

Sub-Clause Add new Sub-Clause after Sub Clause 401.3.3 Strength of Sub-base as under:

It shall be ensured prior to actual execution that the material to be used in the sub-base has a minimum CBR value of 30% and other physical requirements when compacted and finished.

When directed by the Engineer, this shall be verified either by performing CBR tests in the laboratory or by conducting DCP test. The CBR tests shall be conducted on specimen soaked for 4 days and compacted to 98% of the maximum dry density as per IS: 2720 (Part 8).

When decided by the Engineer – Dynamic Cone Penetration (DCP) tests shall be performed in-situ as per TRRL (UK) Road Note No. 31 and in situ CBR calculated by co-relation given by TRRL.

Clause 406 WET MIX MACADAM SUB BASE/BASE

Clause 406.2.1.1 Physical requirement

Delete the second sentence beginning with "If crushed gravel and ending with fractured faces" and add as under:

"If crushed boulders are used, not less than 90% by weight of crushed boulders retained on 4.75 mm sieve shall have at least two fractured faces.

The constituents of the aggregates shall be produced by integrated crushing and screening plant (Impact or Cone type of capacity 200T/hour) and, unless otherwise instructed by the Engineer, crushing shall be carried out in at least two stages. The fraction of material passing through 4.75mm sieve shall also be crusher run screening only."

Add the following at the end of the paragraph:

Soundness test shall be carried out in accordance with IS: 2386 (Part 5) 1963. The average loss of weight of coarse aggregate after "5 cycles shall not exceed 12% when tested with sodium sulphate and 18% when tested with magnesium sulphate as specified in IS: 383.

From Table 400 – 10 delete at the bottom of the table asterisk and modify as under:

"The aggregate should satisfy both the tests a) Los Angeles Abrasion Value
b) Aggregate Impact value"

Sub-Clause 406.3.4 Spreading of Mix

Substitute 1st sentence of Para 2 of clause 406.3.4.

"The mix shall be spread by a WMM paver".

Sub-Clause 406.3.5 Compaction

Delete second sentence of Para 1 of Clause 406.3.5.

Clause 409 CEMENT CONCRETE KERB AND KERB WITH CHANNEL

Sub-Clause 409.5 Construction Operations

Sub-Clause 409.5.1 Add at the end of the first sentence "or as shown in the drawings"

Sub-Clause 409.6 Substitute

"Cement concrete kerb/kerb with channel shall be measured in linear metre. Foundation of kerb, where separately provided, shall be measured in cubic metre."

Clause 409.7 This Clause shall read as under:

The contract unit rates for cement concrete kerb / kerb with channel shall be payment in full compensation for furnishing all materials, labour, tools equipment for construction and other incidental cost necessary to complete the work. Foundation for kerb, wherever provided, shall be paid separately as per contract.

SECTION 500 BASE AND SURFACE COURSES (BITUMINOUS)

General

Sub Para (i) of clauses 501.8.8.2 stands deleted and remaining sub pares (ii) to (x) are renumbered as (i) to (ix).

The provision "clause 401.7 (i) to (v)" be read as "Clause 401.7 (i) to (iv) in the clauses 502.8 & "clause 401.8 (i) to (v)" be read as "Clause 401.8 (i) to (iv) in the clauses 503.8.

Sub-Clause 501.2 Materials

Sub-Clause 501.2.2 Delete "Crushed gravel or other hard material" from First line of Para 1 and replace with "crushed boulders"

Replace word "crushed gravel" in Para 2 with "crushed boulders"

Sub-Clause 501.6 Compaction

Para 2, Line 11; sentence starting with "the intermediate rolling" is replaced by "Intermediate rolling shall be done with a Pneumatic roller of 150-250kN weight having a tyre pressure of at least 0.7Mpa.

Add new Para,

"Rolling shall be continued till the density achieved, satisfied the requirement of Clause 903.4.2."

Sub-Clause

501.8.8.2 Add the following at the end of Para (viii)

Payment of extra bitumen shall be made on the basis of the prevailing rate of

bitumen.

CLAUSE 502 PRIME COAT OVER GRANULAR BASE

Sub-Clause

Add the Sub-Clause 502.2.5 Choice of Primer after 502.2.4

This clause shall be read as under:

The primer shall be medium setting bitumen emulsion and shall be refinery produced. The particular grade to be used for the work shall be got approved by the Engineer."

CLAUSE 503 TACK COAT

Sub-Clause

503.2 Materials

This clause shall be read as under:

"Binder: The binder used for tack coat shall be medium setting bitumen emulsion and shall be refinery produced. The particular grade to be used for the work shall be got approved by the Engineer."

CLAUSE 505 DENSE GRADED BITUMINOUS MACADAM

Sub-Clause 505.2.1 Bitumen

This Clause shall be read as under:

The binder shall be viscosity grade VG-30 bitumen conforming to IS:73-2006.

Sub-Clause 505.2.2 Coarse Aggregates

Delete "Crushed Gravel or other hard material" from 1nd line of 1st para and replace with "crushed boulders".

Replace word "crushed gravel" in para 2 with "crushed boulders"

Add the following at the end of this clause:

"The constituents of the aggregates shall be produced by integrated crushing and screening plant (Impact or Cone type of capacity 200T/hour) and, unless otherwise instructed by the Engineer, crushing shall be carried out in at least two stages. The fraction of material passing through 4.75mm sieve shall also be crusher run screening only."

Sub-Clause 505.2.3 Delete the words “or Naturally Occurring Mineral or a Combination of the two” appearing in the first sentence of the clause.

Sub-Clause 505.2.4 the first sentence of this clause shall read as “Filler shall consist of finely divided hydrated lime or cement as approved by the Engineer”

Sub-Clause 505.2.5 Aggregate Grading and Binder Content

From the Table 500 – 8, replace at bottom of the table against Asterisk (*) with the following:

“Aggregate should satisfy both the tests Los Angeles abrasion value and aggregate impact value”

In Table 500-10, the following may be substituted:

Grading	1	2
Layer Thickness	>75mm to 100mm	50-75mm

Sub Clause 505.3 Mix Design

Sub-Clause 505.3.1 Requirement for the Mixture

Add the following requirements to the list of Table 500-11:

Water sensitivity (ASTM D1075): Retained stability (Ratio of Marshal Stability for 24 h Immersion and 30min Immersion in water at 60 degree centigrade temperature) = not less than 75 %

Filler- Bitumen ratio = 0.6 to 1.2 (Filler: passing 75 micron sieve)

Sub-Clause 505.3.3 Insert the following paragraph between the existing paragraphs 3 & 4:

“Mixed design shall be carried out in accordance with the modified Marshal method described in Asphalt Institute Manual MS-2.”

Sub-Clause 505.4.9 Rolling

Add at the end of Para 1

“The rolling shall be continued till the density achieved is at least 98% of that of laboratory Marshall Specimen compacted as detailed in Table 500-11.”

Add the following Sub-clause after Sub-clause 505.4.9

Clause 507 BITUMINOUS CONCRETE

Sub-Clause 507.1 Scope

Add the Following at the end of this clause:

“A site trial shall be performed in accordance with the direction of the Engineer”

Sub-Clause 507.2.1 Bitumen

This Clause shall be read as under:

The bitumen use for the work shall be VG-30 grade conforming to IS:73:-2006.

Sub-Clause 507.2.2 Coarse Aggregates

Add the following as second para:

“The constituents of the aggregates shall be produced by integrated crushing and screening plant (Impact or Cone type of capacity 200T/hour) and, unless otherwise instructed by the Engineer, crushing shall be carried out in at least two stages. The fraction of material passing through 4.75mm sieve shall also be crusher run screening only.”

From the Table 500 – 16, replace at bottom of the table against Asterisk (*) with the following:

“Aggregate should satisfy both the tests Los Angeles abrasion value and aggregate impact value”

Sub-Clause 507.2.4 Filler

This clause shall read as under:

“Filler shall consist of finely divided hydrated lime or cement as approved by the Engineer.”

Sub-Clause 507.3 Mixture Design

Sub-Clause 507.3.1 Requirement for the mixture

Add the following requirements to the list of Table 500-11:

Water sensitivity (ASTM D1075): Retained stability (Ratio of Marshal Stability for 24 h Immersion and 30min Immersion in water at 60 degree centigrade temperature) = not less than 75 %

Swell Test (Asphalt Institute, MS-2, No.2), maximum = 1.5%

Sub-Clause 507.4.9 Add the following additional sub-clause 507.4.9

The bitumen concrete layer shall be laid with sensor paver capable of paving in width 8 to 10 m in single operation.

Sub-Clause 507.9 Rate

Delete the existing Para and replace it with the following:

The contract unit rate shall be for all operations as specified in clause 505.9, except that the rate shall include the provision of modified bitumen at 5.40 percent by weight of total mixture. The variance in actual percentage of modified bitumen used will be assessed and payment adjusted up or down, accordingly. The modified

binder, the cost of modifier and its mixing with the bitumen for the preparation of modified bitumen shall not be paid separately and is inclusive of all costs

CLAUSE 516 MASTIC ASPHALT

Sub-Clause 516.2.2 Coarse Aggregate

Delete "Crushed gravel/Shingle or other stones" from the 1st sentence

SECTION 800 TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES

CLAUSE 801 TRAFFIC SIGNS

Sub-Clause 801.2.5 Substrate

2nd sentence of this clause shall read as under:

"The aluminum sheet used for signs shall be 2mm thick."

Sub- Clause 801.3 Traffic Signs Having Retro-reflective Sheeting

Sub-Clause 801.3.1 General Requirements

The fifth sentence of this clause should read as under:

"The reflective sheeting shall be of High Intensity grade with encapsulated lens."

Sub-clause Add following in the clause

801.3.8.3 "All the facility information and place identification signs shall have blue (Indian standard colour No. 166: French Blue) background and white letters."

Sub-Clause Warranty and Durability

801.3.11 the first and second sentences of this clause shall read as under:

"The Contractor shall obtain from the manufacturer a seven-year warranty for satisfactory field performance including stipulated retro-reflectance of the retro-reflective sheeting of high intensity grade and submit the same to the Engineer. In addition, a seven year warranty for satisfactory in-field performance of the finished sign with retro-reflective sheeting of high intensity grade, inclusive of the screen printed or cut-out letters/legends and their bonding to the retro-reflective sheeting shall be obtained from the Contractor/Supplier and passed on to the Engineer."

Sub-clause 801.4.1 the last sentence of clause shall read as follows

Posts shall be embedded in concrete (M-15) for safeguard against theft. The cost of concrete shall be deemed to be included in the rate of signboard.

Sub-clause 801.4.2 Add following at the end of this clause:

"The sign back shall be painted with two coats of grey colour epoxy paint. The sign post shall be painted in black & white alternate bands with two coats of epoxy paint."

CLAUSE 802 OVERHEAD SIGNS

Sub-Clause 802.4 Materials for Overhead Sign and Support Structures

Sub-Clause 802.4.2

The last line of this clause “they shall _____ IS specifications” shall read as

“They shall be thoroughly descaled, cleaned, primed along with all other components of signs, except reflective portion. They shall be painted with two coats of epoxy paint. The sign back side shall be painted with grey colour and post shall be painted in black & white alternate bands. The post below ground shall be painted with three coats of red lead paint”.

Sub-Clause 802.4.3 Replace “1.5mm” with 2.0mm” in the fifth line.

Sub-Clause 802.8.1 this clause shall read as under:

“The Structural steel part of the overhead signs shall be measured in tones while the sign board shall be measured in square meters. The excavation for foundation, concrete and reinforcement in foundation shall be paid separately under the respective BOQ items. All other items like painting of structural steel and sign back etc. shall be considered incidental and no separate payment shall be made. The contract unit rate for overhead sign structures shall be payment in full compensation for finishing, all labour, materials, tools, Equipment, fabrication, installation and all other incidental works necessary to complete the work to the specifications”

CLAUSE 803 ROAD MARKINGS

Sub-Clause 803.2 Materials

This clause shall read as under:

“Road markings shall be hot applied thermoplastic compound and the materials shall meet the requirements as specified in Clause 803.4.

The road markings shall be laid in one layer with appropriate road marking machine approved by the Engineer. Before the road-marking machine is used on the permanent works, the satisfactory working of the machine shall be demonstrated on a suitable site, which is not part of the permanent works. The rate of application shall be checked and adjusted as necessary before application on a large scale is commenced, and thereafter daily.”

Sub-Clause 803.3 Ordinary Road Marking Paint

This Clause shall be deleted.

Sub-Clause 803.5 Reflectorised Paint

This Clause shall be deleted.

803.6.6 Add the following para at the end of Sub-Clause 803.6.6

Line and curves, whether broken or unbroken, shall not consist of chords but shall follow the correct radius.

ii) Faulty Workmanship or Materials

If any materials not complying with the requirements is delivered at the Site or used in the Works, or if any sub-standard work is carried out, such material or work shall be removed, replaced or repaired as required by the Engineer, at the Contractor's own cost. Rejected traffic markings and paint that has been splashed or has dripped onto the surfacing, kerbs, structures or other such surfaces shall be removed by the Contractor at his own cost, in such a way that the markings of spilt paint will not show up again later."

CLAUSE 805 DISTANCE INDICATOR POSTS

Sub-Clause 805.3 The first sentence of this clause shall read as under:

"The hectometre/kilometre stones shall be made of concrete of grade as shown in the drawing."

Sub-Clause 804.3.1 New Clause 804.3 shall be added as follows:

Marker post shall be provided as shown in drawing. The posts shall be embedded in the ground as shown in drawing.

Sub-Clause 804.4 Measurement of Payment

The measurement will be in numbers of 200 meters, kilometers, 5th kilometer stone and marker posts fixed at site.

Sub-Clause 804.5 Rate

The words '/marker posts' shall be inserted after the words '5th kilometer stone' appearing in the clause.

CLAUSE 806 ROAD DELINATORS

Sub-Clause 806.2 This clause shall read as follows:

- a) Triangular Object Marker shall be 300mm side with four red reflector, made out of 2mm thick aluminum sheet, face to be fully covered by high intensity grade white retro reflective sheeting of encapsulated lens type as per clause 801. The background/ border/ symbols shall be made by screen-printing of desired colour as per sign details. The sign plate shall be fixed with 6mm dia. aluminium rivets on MS angle iron frame. The angle iron frame shall be made with angle of size 40mmx40mmx5mm. The sign shall be fixed with nut-bolts & welding on MS pipe 50mm dia (NB-MW) and 500mm high or as shown in the drawings.
- b) Rectangular hazard marker 600mm x 300mm made out of 2mm thick aluminum sheet, face to be fully covered by high intensity grade white retro reflective sheeting of encapsulated lens type. The background/ border/ symbols shall be

made by screen-printing of desired colour as per sign details. The sign plate shall be fixed with 6mm dia aluminium rivets on MS angle iron frame. The angle iron frame shall be made with angle of size 40mmx40mmx5mm. The sign shall be fixed to 80mm dia (NB-MW) MS pipe or as shown in the drawings.

- c) Roadway Indicators shall be 1000mm high made with 100 mm dia. NB medium weight MS pipe. One reflector of high intensity grade retro reflective sheeting with encapsulated lens shall be provided on top of the reflector. The white & red reflector shall be provided alternatively of 40mm width, so that total width of reflector shall be 120mm. A wire mesh cover of 150mm height shall be provided on top or as shown in the drawings.
- d) All components of signs & supports shall be thoroughly descaled, cleaned, primed and painted with two coats of epoxy paint. The sign backside shall be with grey colour and post shall be white colour/ alternate white & black bands. The post below ground shall be painted with three coats of red lead.

CLAUSE 807 BOUNDARY STONES

Sub-Clause 807.1 Scope

Add at the end of Para 1, "The boundary stones shall be of concrete as shown in drawing." The words 'RCD' should be engraved on each stones appropriately.

CLAUSE 811.2 CONCRETE CRASH BARRIER

Sub-Clause 811.2.1.2 The Clause will be read as below

"The concrete barriers shall be constructed with grade & concrete as indicated in the drawing and with high yield strength deformed reinforcement conforming to IRC-21"

Sub-Clause 809.6 Rate:

Add at the end of the clause:

"And paid as per respective BOQ items."

CLAUSE 811.3 METAL BEAM CRASH BARRIER

Sub-Clause 811.3.1 Materials

Sub-Clause 811.3.1.1 this clause shall be read as:

Metal beam is a "W" profiled corrugated beam in single or double row and single or double faced as specified in the drawing made out of cold roll forming from steel strip of 3 mm thick using steel of grade ST 42 grade conforming to IS:5986 with hot dip galvanised 550 gm per square meter.

The beam after forming shall have formed width of 312 mm and depth of 83 mm and shall have punched holes for fixing as specified in drawings.

The metal crash barrier posts & spacer shall consist 'C' channel section made out of 5 mm thick sheet by cold roll forming process of steel conforming to IS: 2062-1992 Grade 'A' with hot dip galvanised 550 gm per square meter. All bolt, nuts and washers as specified in drawings shall conform to IS: 1367 & IS: 1364 unless otherwise specified and are hot dip galvanized 550 gm per square meter.



The Guard rail reflector shall be made of material and placed in position as shown in drawings. It shall be hot dip galvanized 550 gm per square meter.

Beams to be erected on a radius of 50 m or less shall be shop curved to the appropriate curvature of the installation.

Sub-Clause Add at the end of this Clause

811.3.1.4 The size of the concrete foundation block for embeddings the guard posts and grade of concrete shall be as shown in the drawing.

Sub-Clause 811.3.3 Installation of Posts

The sub-clause 811.3.3.1, 811.3.3.2, 811.3.3.3 and 811.3.3.4 are replaced as below:

The guard posts shall be embedded in the concrete footing of size and the grade of concrete along with the depth of the embedment of post as indicated in the drawing.

Clause 811.3.3.5 Add "and end section" in first line after "posts".

Sub-Clause 811.3.7 Measurements for Payment

Sub-Clause 811.3.7.1 the 2nd sentence "Terminals/ Anchors of various types shall be paid by numbers" is deleted.

Sub-Clause 811.3.7.2 the first sentence will be substituted as below:

"No separate measurement for payment shall be made for Terminals/Anchors of various types required for the work. The cost of these elements will be deemed to be included in the rate quoted by the contractor."

Sub-Clause 811.3.7.3 the words "or backfilling" shall be substituted as "and concreting"

Sub-Clause 811.3.8 Rate

Add "and drawings" at the end of last sentence of Clause.

SECTION 900 QUALITY CONTROL FOR ROAD WORKS

Clause 901 GENERAL

Sub-Clause 901.1 This clause shall read as under:

"All materials to be used, all methods adopted and all works performed shall be strictly in accordance with the requirements of these Specifications. The Contractor shall set up a field laboratory at locations approved by the Engineer and equip the same with adequate equipment and personnel in order to carry out all required tests and Quality Control work as per Specifications and/or as per Clause 121 and/or as directed by the Engineer. The list of laboratory equipment and the facilities to be provided shall be as per Clause 121 and shall be got approved from the Engineer in advance."

Sub-Clause 901.5 This Clause shall read as under:

"The Contractor shall provide necessary cooperation and assistance in obtaining the samples for tests and carrying out the field tests as required by the 'Engineer' from

time to time. This shall include provision of laboratory, equipment, transport, consumables, personnel, including labour, attendants, assistance in packing and dispatching and any other assistance considered necessary in connection with the tests."

Clause 903 QUALITY CONTROL TESTS DURING CONSTRUCTION

Sub-Clause 903.4 Tests on Bituminous Constructions

Sub-Clause 903.4.1 Add at the end of this Clause:

"The density test shall be carried out by 100 mm diameter core cutter machine on Dense Bituminous Macadam and Bituminous Concrete as per the frequency specified".

In Table 900-4, Serial No. 5 for Dense Graded Bituminous Macadam /Bituminous Concrete, modify the 'Frequency (Minimum)' values for Item No. (vi), (viii) and (xvi) as under:

S. No.	Type of Construction	Test	Frequency (Minimum)
5	Dense Bituminous Macadam/ Bituminous Concrete	(vi) Sand Equivalent Test	Three tests on aggregates for each 400 t of mix subject to two tests per plant per day.
	Dense Bituminous Macadam/ Bituminous Concrete	(viii) Polished Stone Value (PSV)	Initially one set of three representative specimens for each source of supply. Subsequently when warranted by changes in the quality of aggregates.
	Dense Bituminous Macadam/ Bituminous Concrete	(xvi) Density of Compacted Layer	One tests per 250 m ² area subject to the condition that 10% of density tests shall be done on the edges.

Note:

Add the following note at the end

- The laboratory and field tests shall be performed on materials and works at the frequency values indicated against each. The Supervision Personnel shall ensure that there are no deviations in this regard.
- The Contractor shall prepare a detailed manual for Quality Assurance including



the methodology for the respective tests, the data formats and the methodology for the analysis and interpretation of test results based on the reference Standards and Practices indicated in the Technical Specifications and obtain the approval of the Engineer.

Add the following Sub-Clause 903.4.4 & 903.4.5

Sub-Clause 903.4.4 Characteristics to be tested on completed Bituminous Layers

The characteristics to be tested on completed bituminous layers are:

Relative compaction

Layer thickness

For testing the above characteristics, the following sampling criteria shall apply:

a) Random Sampling

When testing any lot, or an isolated section, which is obviously defective or exhibits abnormal variation of the characteristics under consideration, all samples shall be taken in a random pattern.

b) Lot Size

The lot size shall normally be a section laid and compacted in one process and for which essentially the same materials had been used. Where production is on a continuous basis, a lot shall normally mean one-day production and shall not exceed two full days production. However, the Engineer for investigating compliance with the specifications may order a lot of any smaller size, if:

- The factors affecting the characteristics under investigation exhibit abnormal variation within the normal lot size
- The area is obviously defective or of poorer quality than that of the rest;
- The rate of production is very high.

Sub-Clause 903.4.5 Add new clause

“Bituminous mix shall be spread with paver fitted with electronic sensing device and string line arrangement (supported by steel pegs @ 5m apart) on either side of paving width for automatic levelling, surface evenness and profile control. Use of string line is compulsory to provide signal to the electronic sensing device fitted with a Paver Finisher”.

Bituminous works shall be tested immediately after laying/finishing for:

- a) Thickness (compacted) measured by extracting cores and shall be dealt in accordance with Specifications Section 900.
- b) Density (compaction) test as performed on the extracted cores
- c) Workmanship test by measuring roughness of the finished layer by duly

calibrated Towed Fifth Wheel Bump Integrator

d) Workmanship Test: Roughness measured longitudinally

The finished bituminous layers (DBM and BC) shall be tested for workmanship (immediately before allowing traffic) by measuring roughness, longitudinally, separately for each lane with the Calibrated Towed Fifth Wheel Bump Integrator. Calibration of Bump Integrator device shall be carried out using the procedure recommended in the World Bank Technical Publication No. 46. The measured roughness shall **not** exceed a value of 2000 mm/km for finished DBM and BC layers.

Note: Contractor shall arrange the core extraction machine at his cost and shall take cores of the executed bituminous works jointly with Engineer without any extra cost.

Sub-Clause 903.5 Quality Control Tests for Road Constructions

Sub-Clause 903.5.2 Pavement Concrete

Sub-Clause 903.5.2.1 Sampling and testing of beam and cube specimens

Replace first para ("At least for compliance.") with:

"One each day's work, at least six pairs of beams for flexural strength and six pairs of cubes for compressive strength shall be cast of concrete delivered to the paving plant as long as the total daily production is less than 300m³. For daily productions over 300m³, two additional beams and two additional cubes shall be cast of each 100m³, (or part thereof). Each pair of beams and cubes shall be from different deliveries of concrete. All specimens shall be transported in an approved manner to prevent any damage to the specimen. From each pair of beams and cubes one specimen shall be tested at 7 days and one at 28 days. The groups of beams specimens from each day's production tested at 28 days shall be used for assessing the strength for compliance with the strength requirements. The groups of beam specimens from each day's production tested at 7 days shall be used for early indication of the 28 days strength as described in Clause 603.3.3.2. The flexural strength test results shall prevail over compressive strength tests results for compliance."

Sub-Clause 903.5.2.2 Replace 1st para with following:

"Where the 28 days strength requirements are not met; or where in the opinion of the Engineer the quality of the concrete or its compaction is suspect, the actual strength of the concrete in the slab shall be ascertained by carrying out tests on six cores cut from the concrete at such locations. The cores shall be 150 mm diameter, shall be saw cut in both ends to provide a specimen height of 300 mm $\pm$ 5mm and shall be tested for compressive strength. The concrete will be acceptable if:

- The average compressive strength of the six cores when corrected to 28 days strength using the factors given in Table 900-5 or an age-strength relationship for the actual mix determined by the Contractor and approved by the Engineer

– is at least the average compressive strength of the cores tested from the trial length, refer Clause 602.10.5.5;

- None of the cores show considerable honeycombing”.

Delete fourth para (“In order..... test beams.”).

Delete fifth para (“The standard deviation.....the requirements.”)

Delete sixth para (“An individual.....is substandard.”)

Add at the end of seventh paragraph (“Beams shall..... and cubes required.”)

“The Engineer may permit a reduction in the number of beams and cubes required when previous test results have shown satisfactory strength and when he is satisfied with the variation in quality of the mix.”

Delete ninth para (“The flexural.....they were taken.”).

Delete eleventh para (“Should the concrete.....flexural strength.”)

Delete twelfth para (“The equivalent ----- obtained from Table 900-5.”)

Sub-Clause

903.5.2.2 In-situ density

Add as Para 5 of this clause:

“This Clause is not applicable for cement concrete kerb and kerb with channel”.

Sub-Clause

903.5.2.5 Summary of Control Tests.

In Table 900-6, item 5 (i) “Strength of concrete”, change test frequency to:

“On each day’s work, at least six pairs of beams and six pairs of cubes for total daily production less than 300 m³. Two additional beams and two additional cubes for each 100 m³ (or part thereof) in excess of 300m³.”

Sub-Clause

903.5.2.5 Summary of Control Tests in Table 900-6, item 5(ii) “(core strength on hardened concrete”, change test frequency to:

“As per Clause 903.5.2.1”.

Sub-Clause 903.5.2.6 Add the following new Clause:

Temperature Measurements

“The temperature development in the concrete slab during hardening shall be recorded for each day’s production. The temperature shall be measured in the middle (vertically) of the slab at a horizontal distance of at least 1000 mm from any free edge. The temperature shall be measured using a thermometer that shows maximum temperatures. From each day’s production three thermometers

shall be installed, at commencement, in the middle of production and at completion of placing concrete. Measurements shall be recorded for 3 days after placing of the concrete."

SECTION 1000 MATERIALS FOR STRUCTURES

CLAUSE 1007 COARSE AGGREGATES

Delete "crushed gravel, natural gravel or a suitable combination thereof or other approved inert material" in the third and fourth line of first para and replace with "or crushed boulders. For this purpose, boulder greater than average dimension of 300 mm shall only be used"

Add the following at the end of Para 2.

"Costs of all tests shall be borne by the Contractor."

Add the following at the end of the Clause:

"Integrated stone crusher with Primary and Secondary (Cone or Impact Type) crushers shall be employed for getting proper size and grading of coarse aggregates."

The alkali aggregate reactivity should be measured and reported for getting approval for the source aggregates at the beginning of the work using methods given in IS: 2386. The tests may be repeated if the source or the type of rock being exploited for winning aggregates, changes.

CLAUSE 1008 SAND/FINE AGGREGATES

Delete from the 2nd line the word "crushed gravel" and from the 3th line "gravel" in Para 2.

Add the following at the end of the clause:

"The alkali aggregate reactivity shall be measured and reported for getting approval for the source."

Clause 1010 WATER

In Para (C) the permissible limit for Chlorides (Cl) shall be read as "250 mg/lit for structures having length more than or equal to 30 m."

In case of structures of lengths 30m and below, the permissible limits of chlorides may be increased up to 500mg/ltr.

Clause 1012 CONCRETE ADMIXTURES

Sub-Clause 1012.1 General

Add the following at the end

Admixtures shall not impair the durability of concrete; they shall not combine with the ingredients to form harmful compounds or endanger the protection of

reinforcement against corrosion. Only chloride free admixtures shall be used.

2. Storing

- A. Shelf life
- B. Max. & Min. allowable temperature
- C. Other instructions (e.g. requirements of stirring)

3. Dosage

Maximum and minimum to be specified as a percentage of weight of cement.

Clause 1012.3.1 Information Required From the Manufacturer

Paragraph 1 shall read as follows:

For all admixtures being used the packing shall be marked with the name of the supplier/manufacturer, brand name (name of product) and main effect. A certificate for the admixture in question shall be submitted. The certificate shall include the following information:

Add the following at the end of the para h

- i. pH value and colour.
- j. If two or more admixtures have to be used in one mix, their compatibility.
- k. Latest date of test and name of test laboratory.

Add the following at the end of the clause:

After selecting a few acceptable brands and types of admixture based on the manufacturer's data/technical literature, independent acceptance tests should be carried out for the same using the approved combination of cement/sand/aggregates intended for use in the project. After establishing the basic acceptability using strength criteria (compression and tensile strengths) a number of trial mixes be designed using different proportions of admixtures/cement/water etc. to establish the data bank on the behavior of the admixture for the project site conditions. A spectroscopic signature of accepted product should be obtained and preserved for comparison for acceptance of the production lots.

Retrial should be conducted with change in source/type of cement.

Workmanship

The dosage should be finalized on the basis of field trial and special mechanical devices should be used for dispensing the admixture in the batching/mixing plant. No addition of admixture after dosage is permitted (including addition in transit mixers).

Manufacturer's experts should be available for consultation/trouble-shooting of problems associated with their product. The conditions of storage, shelf life etc., as

specified by the manufacturer should be strictly observed. The manufacturer's Quality Assurance Plan during process of production should be obtained and filed for reference/record.

Clause 1014 STORAGE OF MATERIALS

Sub-Clause 1014.3 Aggregates

The following shall be added to this Clause:

"Aggregates shall be stored or stockpiled in such a manner that segregation of fine and coarse sizes will be avoided and also that the various sizes will not become intermixed before proportioning. They shall be stored, stockpiled and handled in such a manner that will prevent contamination by foreign materials."

CLAUSE 1015 TESTS AND STANDARDS OF ACCEPTANCE

Add the following as Para 3:

"Independent testing of pre-stressing steel shall be carried out by the Contractor for each consignment from each source at site in the laboratory approved by the Engineer before use. The tests shall be carried out for the properties as listed in clause 7.2.1 of BS- 5896:1980. These tests are in addition to the tests carried out by the Manufacturer."

CLAUSE 1104 MATERIALS

Sub-Clause 1104.2 The first sentence of this clause is amended as follows:

Concrete to be used in Cast-in-situ piles shall be of grade as per BOQ or as directed by the Engineer.

SECTION 1500 FORMWORK

CLAUSE 1501 DESCRIPTION

The Clause shall read as below.

The Contractor shall prepare a formwork mobilization and utilization plan and submit the plan for Engineer's approval at least 28 days before the commencement of construction of structures. The requirement of formwork shall be worked out considering the overall construction program of all the structures to be cast in one or more stages, as specified in the drawings. The plan shall take into account the time required for erection of formwork, retention in position, stripping, and removal and subsequent use in the next and subsequent structures.

Notwithstanding Engineer's approval of mobilization plan, if due to any reason, Contractor has to arrange additional formwork, to meet the requirements of the construction program, it shall be done by the Contractor without any extra cost to the Employer.

CLAUSE 1502 MATERIALS

This Clause shall read as under:

"All materials shall comply with the requirements of IRC-87.

Material and components used for formwork shall be examined for damage or excessive deterioration before use/reuse and shall be used only if found suitable after necessary repairs.

Only steel formwork shall be used. The steel used for forms shall be of such thickness that the forms remain true to shape. All bolts should be countersunk. The use of approved internal steel ties or plastic spacers shall be permitted. Structural steel tubes used as support for forms shall have a minimum wall thickness of 4 mm."

Clause 1503 DESIGN OF FORMWORK

Sub-Clause 1503.1 *Add at the end of this Sub-clause*

"For distribution of load and load transfer to the ground through staging, an appropriately designed base plate must be provided which shall rest on firm sub-strata".

Sub-Clause 1503.2 The following shall be added at the end of this Clause:

"The work of formwork shall not commence without approval of the Engineer"

CLAUSE 1504 WORKMANSHIP

Sub-Clause 1504.1 *Add the following at the end of Clause 1504.1*

"The loading from the formwork shall be distributed to the soil or the permanent works below (e.g. pile cap) in such a manner that any total or differential settlement is within acceptable limits. Subsoil characteristics shall be taken into account while designing the staging to avoid untoward failures. All the pipes etc. used for staging shall be free from kinks, bends etc."

CLAUSE 1506 PRECAUTIONS

Add the following as items of this clause:

Adequate support against sideways and lateral loads due to construction operations and wind shall be provided.

In case cantilevers are supported directly from the ground, the supports for cantilevers shall be removed simultaneously with main supports only after approval for the same from the Engineer.

Forms shall be rigid and of adequate section to reduce deflections. Forms shall have sufficient rigidity to resist horizontal pressures caused by flowing concrete resulting from use of superplasticisers. The formwork shall resist the lateral pressure caused due to fast rate of placement by concrete pumps.

CLAUSE 1507 PREPARATION OF FORMWORK BEFORE CONCRETING

Add at the end of last para :



“Concreting shall not commence without approval of the Engineer”

CLAUSE 1508 REMOVAL OF FORMWORK

Add the following as para 7 Clause. 1508.

For prestressed units, the side forms shall be released, as early as possible and the soffit forms shall permit without restraint deformation of the member, when prestress is applied. Form supports and forms for cast in situ members shall not be removed until sufficient prestress has been applied to carry the dead load and any formwork supported by the member and anticipated construction loads.

Clause 1509RE-USE OF FORMWORK

This Clause shall read as under:

"After forms are stripped, all materials shall be examined for any damage and damaged pieces, if any, shall be removed either as rejected or for rectification if possible. The materials found fit to be reused shall be thoroughly cleaned. Holes bored through sheathing for form ties shall be plugged by driving in common corks or foamed plastics. Patching plaster may also be used to fill small holes. After cleaning and before re-fixing, each formwork shall be got approved from the Engineer.

Formwork and staging shall be so used as to ensure quality of the exposed surface. However, if in the opinion of the Engineer, any particular panel/member has become unsatisfactory for use at any stage, the same will be rejected and removed from site.

All bent steel props shall be straightened before reuse. The maximum deviation from straightness shall not exceed 1/600 of length. However the maximum number of users shall be limited to 20 times since only steel formwork is to be used. The maximum permissible axial loads in used props shall be suitably reduced depending upon their condition.”

CLAUSE 1510 SPECIALISED FORMWORK

Replace the words ‘slip-form work’ by ‘climbing formwork’ in the first sentence of this clause.

The first sentence of Para 2 of this clause shall read as follows:

Slip forming is not permitted.

Replace the word “plywood” by “marine plywood” in the fifth paragraph of this clause.

Clause 1513 RATE

Add the following at the end of the first para:

“The unit rate shall also include all costs for preparation of erection scheme, designs of false work and formwork and their approval.”

SECTION 1600 STEEL REINFORCEMENT (UN-TENSIONED)

CLAUSE 1602 GENERAL

Paragraph 2 of Clause 1602 shall read as follows:

“Reinforcements shall be thermo mechanically treated (TMT) deformed bars of grade Fe 415/ Fe 500 conforming to IS: 1786 as Specified in the drawings. Only uncoated steel shall be used as reinforcement unless specified.”

CLAUSE 1604 BENDING OF REINFORCEMENT

Para 1 shall be read as follows:

The reinforcement shown on the drawings shall be considered merely symbolic representations of the shape and position and shall not be used by the Contractors to justify any deviation from the stipulated requirements. Bar bending schedules and any supplementary drawings as may be required shall be furnished by the Contractor and got approved by the Engineer before start of work. The bending schedules shall state the number, shape and length of bar and weight in respect of each type. System of bar referencing should be coherent and systematic. A separate bar bending schedule shall be prepared for auxiliary bars like spacers, chairs etc.

CLAUSE 1605 PLACING OF REINFORCEMENT

Paragraph (c) (i) of Clause 1605 shall be read as follows:

Cover blocks shall be made of concrete or cement mortar with the same durability properties as the surrounding concrete and with the same type of constituents. In visible surfaces, the cover blocks shall be of the same colour and texture as the surrounding concrete. The Contractor's proposal for cover blocks shall be submitted to the Engineer for acceptance.

Add the following as sub Para (f) to this Clause:

Tolerances:

1. Tolerance of cover: Deviation shall not exceed + 10 mm No negative tolerance is allowed.
2. Tolerance in position: Tolerance for deviation from the positions shown in the drawings shall not exceed the following:

Structural depth d (mm)	Tolerance (mm)
d < 1000	<10
1000 < d < 2000	< 0.01d
2000 < d	< 20

CLAUSE 1606 BAR SPLICES

Sub-Clause 1606.1 First sentence of Clause 1606.1 shall read as follows:

To the extent possible, all reinforcement shall be furnished in full lengths as indicated in drawings.

Add the following as paragraph 2 of Clause 1606.1:

The location of joints in continuous reinforcing bars, not shown in drawings, shall be submitted to the Engineer for acceptance. If nothing contrary has been specified, the number of bars to be joined in any cross-section shall not exceed one-third of the total.

Sub-Clause 1606.2 Welding

Sub-Clause Add the following at the end of the paragraph:

1606.2.1 "In prestressed concrete members, when welding of untensioned reinforcement is permitted by the Engineer, it shall be carried out before insertion of the prestressing tendons/sheathing."

SECTION 1700 STRUCTURAL CONCRETE

CLAUSE 1703 GRADES OF CONCRETE

Sub-Clause 1703.2 This Sub-Clause shall be replaced with the following:

"The lowest grades of concrete in bridges and corresponding minimum cement contents and water-cement ratios shall be maintained as indicated in Table 1700-2 and 1700-3."

TABLE 1700-2 for all major bridges (bridges with total length 60m and above, ROBs, Flyovers, Grade Separators) and minor bridges (bridges with total length less than 60 m & Underpasses)

A) Minimum cement content and maximum water cement ratio

Structural Member	Min. cement content (kg/cum)		Max. water cement ratio	
	Major Bridges	Minor Bridges	Major Bridges	Minor Bridges
PCC Members	360	310	0.45	0.45
RCC Members	400	400	0.40	0.40
PSC Members	400	400	0.40	0.40

B) Minimum strength of concrete

Member	Major Bridges	Minor Bridges
PCC Members	M30	M20

RCC Members	M35	M25
PSC Members	M40	-

TABLE 1700-3 For culverts and other incidental structures:

A) Minimum cement content and maximum water cement ratio

Structural Member	Min. cement content (kg/cum)	Max. water cement ratio
PCC Members	310	0.45
RCC Members	400	0.40

B) Minimum strength of concrete

Member	Grade
PCC Members	M20
RCC Members	M25

Notes:

1. The minimum cement content is based on 20mm aggregate (nominal max. size). For 40mm and larger size aggregates, it may be reduced suitably but the reduction shall not be more than 10 per cent.
2. For under water concreting, the cement shall be increased by 10 per cent.

The cement content shall be as low as possible but not less than the quantities specified above. In no case shall it exceed 540 kg /cum.

Clause 1704 PROPORTIONING OF CONCRETE

Add the following at the end of this Clause:

"In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Where the weight of cement is determined by accepting the manufacturer's weight per bag, a reasonable number of bags shall be weighed separately to check the net weight. Where cement is weighed from bulk stock at site and not by bag, it shall be weighed separately from the aggregates. Water shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in a clean and serviceable condition. Their accuracy shall be periodically checked.

It is most important to keep the specified water-cement ratio constant and at its correct value. To this end, moisture content in both fine and coarse aggregates shall be determined as frequently as possible; frequency for a given job being determined by the Engineer according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. The determination of moisture content in the aggregates shall be done as per IS: 2386 (Part III). Suitable adjustments shall also be made in the weight of aggregates to allow for the variation in weight of aggregates due to variation in their moisture content."

Sub-Clause 1704.4 Additional Requirements

In Para (a) substitute "0.06%" for "0.1%"; "0.06%" for "0.2%"; and "0.1%" for "0.3% for the three items respectively.




Clause 1705 ADMIXTURES

This Clause shall read as under:

"Duly tested admixtures/additives conforming to IS: 6925 and IS: 9103 (without replacement of cement) may be used subject to satisfactory proven use, with the approval of the Engineer. Admixtures generating Hydrogen or Nitrogen and containing chlorides, nitrates, sulphides, sulphates and any other material liable to affect the steel or concrete shall not be permitted.

The general requirements, physical and chemical requirements shall be as per Clause 1012."

Clause 1706 SIZE OF COARSE AGGREGATE

Table 1700-7 shall be modified as given below :

Components	Maximum nominal size of Coarse aggregate (mm)
a) RCC Well Curb.	20
b) RCC / PCC well steining, PCC below foundations and approach slab, annular filling around foundations.	40
c) Well cap or pile cap; solid wall type abutments, piers, median walls, splayed wing walls and their foundations.	40
d) RCC works in T-beam and slab / solid slab / voided slab and box girder superstructure, wearing coat, kerb, crash barrier, approach slab, dirt walls, coping on masonry wing walls, hollow abutments and piers, pier / abutment caps, pedestals, dirt walls, piles, all components of counter fort type abutments, columns, cantilever return walls etc.	20
e) All PSC works	As specified by the Engineer
f) Any other item	

Clause 1707 EQUIPMENT

Para 1 of this Clause shall read as under:

"Unless specified otherwise, equipment for production, transportation and

compaction of concrete shall be as under:

- a) For production of concrete: Batching and mixing of the concrete shall be done in a concrete batching and mixing plant fully automatic of a minimum capacity of 30 cum/hour. The plant shall be approved by the Engineer.
- b) In special cases for culverts, the Engineer may allow mixing of concrete by a diesel or electrically operated mechanical mixer with integrated weigh batching facility having a capacity of 500 litres and automatic water measuring system.

Paragraph 3 of this clause shall read as follows:

“The accuracy of measuring devices shall fall within the following limits:

Measurement of Cement $\pm$ 1% of the quantity of cement in each batch.

Measurement of Water $\pm$ 1% of the quantity of water in each batch.

Measurement of Aggregate $\pm$ 2% of the quantity of Aggregate in each batch.

Measurement of Admixture $\pm$ 1% of the quantity of Admixture in each batch.

Paragraph 3(b) & 3(c) shall remain unchanged.

CLAUSE 1711 CONCRETING IN EXTREME WEATHER

Sub-Clause 1711.2 Hot Weather Conditions

Add the following at the end of paragraph 1 of the above clause:

Where the Contractor proposes to use ice to cool the concrete or mixing water or any of the ingredients, the Contractor shall provide a refrigeration plant to avoid use of contaminated ice.

Placement of concrete shall not be permitted when day temperature exceeds 40°C.

Clause 1712 PROTECTION AND CURING

Sub-Clause 1712.2 Water Curing

Add the following at the end of Para 1:

Water sprinklers or perforated pipes shall be used for curing of concrete for all major bridges, ROB's and grade separators. Such arrangement must be in place & tested before concreting for its proper functioning and shall be maintained for a minimum period of 14 days after concreting.

Approved concrete curing compounds should be preferred where water curing cannot be done reliably.

CLAUSE 1716 TOLERANCES

Add the following at the end of Clause:



"In the absence of any information in drawings or specifications, for particular cases, the following limitations shall apply.

Dimension (mm) 'a'	Tolerances (mm) ' $\delta_a = (a_{\text{nominal}} - a_{\text{actual}})$ '
$a \leq 200$	$ \delta_a < 5$
$200 < a \leq 2000$	$ \delta_a < 3.5 + 0.0075a$
$2000 < a$	$ \delta_a < 16.5 + 0.001a$

CLAUSE 1718 MEASUREMENT FOR PAYMENT

The clause may be read as under :

Structural concrete shall be measured in cubic metres. In reinforced or prestressed concrete, the volume occupied by reinforcement or prestressing cables and sheathing shall not be deducted. The slab shall be measured as running continuously through and the beam as the portion below the slab. In the case of RCC/PSC voided slab the deduction shall be made for the volume of void.

SECTION 1800 PRE-STRESSING

CLAUSE 1801 GENERAL

Add the following as the last paragraph of this clause:

Prestressing system shall conform to FIP Recommendation "Recommendations of acceptance of post-tensioning systems", June 1993.

CLAUSE 1802 MATERIALS

Sub-Clause 1802.2 Sheathing

Sub-Clause 1802.2.1 The second and third sentences of Para 6 shall be read as follows:

"The joint between the end of coupler and the duct shall be sealed with heat shrink tape to prevent penetration of slurry during concreting. The couplers of adjacent ducts should be staggered at least 300mm apart."

Add the following at the end of Para 6:

Couplers and splices shall be larger in diameter than ducts joined.

Sub-Clause 1802.2.3 This clause may be read as under:

Pull-in or push-in of prestressing stands shall be mechanized.

Strands shall not be placed in the ducts before concreting. The ducts shall be sealed at the ends by plastic caps to prevent water from entering.

Cables shall be threaded after concreting. In such cases a temporary tendon shall be inserted in the sheathing, or the sheathing shall be stiff ended by other suitable method during concreting. The sheathing supports shall be such as to prevent

floatation of empty cable duct during concreting.

Add the following as additional Sub-clause

Sub-Clause 1802.2.4 Corrugated HDPE sheathing ducts

When high-density polyethylene (HDPE) sheathing ducts are specified, the material for the ducts shall be with more than 2 percent carbon black to provide resistance to ultraviolet degradation and shall have the following properties:

Specific Density : 0.954 g/cm³ at 23 °C

Yield Stress : 18.0 N/mm²

Tensile Strength : 21.0 N/mm²

Shore Hardness D-3 sec. Value : 60

-15 sec. Value : 58

Notch impact strength at 23 °C : 10 KJ/m²

- 40 °C : 4 KJ/m²

Coefficient of Thermal Expansion for

20 °C - 80 °C : 1.50 x 10⁻⁴ KJ/m²

The thickness of the wall shall be 2.3 ± 0.3 mm as manufactured and 1.5 mm after loss in the compression test, for duct size upto 160 mm OD.

The ducts shall be corrugated on both sides. The ducts shall transmit full tendon strength from the tendon to the surrounding concrete over a length not greater than 40 duct diameters.

These ducts shall be joined by adopting any one or more of the following methods, as convenient to suit the individual requirements of the location, subject to the satisfactory pressure tests, before adoption.

Screwed together with male and female threads.

Joining with thick walled HDPE shrink couplers with glue. This can also be used for connection with trumpet, etc.

Welding with electro fusion couplers. The joints shall be able to withstand an internal pressure of 0.5 bar for 5 minutes as per test procedure given in Appendix-1A of IRC: 18 - 2000.

Sub-Clause 1802.3 Anchorages

Heading of the clause shall be "Anchorages and Tendon couplers"

Sub-Clause 1802.3.1 The word “Anchorages” shall be replaced by the words “Anchorages and couplers” in sentence 1 of the paragraph.

Add the following after the words “furnished to the Engineer” in sentence 3 of paragraph 1 of this clause:

“Couplers which connect two tendons to form a continuous tendon, should be tested in the same way as anchorages formed by mechanical means.”

CLAUSE 1803 TESTING OF PRESTRESSING STEEL AND ANCHORAGE

Add following Paragraphs to the section.

All samples shall be representative of the lot and in the case of wire or strand shall be taken from the same master roll. At least 5.0m length shall be selected from each lot for testing. Also two anchorage assemblies, complete with distribution plates of each size or types to be used, shall be tested. Testing of anchorage - cable assemblies shall be carried out in accordance with procedures in FIP document "Recommendations for the acceptance of Post Tensioning systems", June 1993.

The frequency of such tests should be as follows:

- 1) For acceptance of the tendon at the stage of submission of tendons, the manufacturers certificate together with the data of previously conducted and most recent test results of "Acceptance Testing" is acceptable subject to further testing as given below.
- 2) Acceptance Testing for the works
 - a) Static load test for tendon-anchorage assembly

A series of three tests using the proposed combination of anchorage systems and the prestressing strand/wire/bars. All the tests should meet the following requirements.

Residual deformations of anchorage components after the test should confirm the reliability of the anchorage.

The increase in the displacements between the anchorage components as well as between the prestressing steel and anchorage components should not be disproportionate to the increase in tendon force.

The above relative displacements during the 0.8Fpk load stage should stabilize within the first thirty minutes of the load duration of 1 hour.

The mode of failure of tendon should be by the fracture of the prestressing steel. Failure of the tendon should not be induced by the failure of anchorage components.

The measured anchorage efficiency should be:

(Refer CEB/FIP Guidelines for details).

The total elongation ϵ_u in free length of the tendon under the load F_{tu} should be $\epsilon_u \geq 2\%$

b) Dynamic load test with tendon/ anchorage assembly

This test is to be carried out for every new combination of type of anchorage and tendons. A series of three successful tests shall be carried out for acceptance of the systems. This test is considered as essential for both unbonded and bonded cables as per FIP document.

Requirements:

Each test result should meet the following requirements

- Fatigue failure of anchorage components should not occur.
- The minimum fatigue strength of post-tensioning system should be $\Delta\sigma_p \min = 80 \text{ MPa}$
- The fatigue strength is defined as the stress range ($\Delta\sigma_p$), which is endured for 2 million cycles without failure of more than 5% of the initial cross-section of the tested tendon at beginning of the test.

Clause 1804 WORKMAN SHIP

Sub-Clause 1804.3.1 Post-tensioning

The following para shall be inserted between the 5th and 6th para.

“The steel sheaths or duct formers shall be suitably tied to secondary reinforcement or to properly locate withdrawable through-shutter bolts, precast concrete blocks or similar effective means, in such a manner that they do not give rise to excessive friction when the steel is being tensioned.”

Sub-Clause 1804.5 Insert following Para after Para 1

Mixture of water-soluble oil such as Dromas - B and Water is to be flushed through empty metallic ducts before threading of cables, and after threading of cable at frequency of at least once in a month. The layer of oil formed on sheathing / prestressing steel shall be fully flushed out by using clean water before final grouting by cement grout.

CLAUSE 1806 TENSIONING EQUIPMENT

Add the following at the end of Para 2:

“Jack and Pump shall be calibrated by an approved laboratory prior to use and then at intervals not exceeding three months.

A standby set of jack, pumps and pressure gauges shall always be available at site where prestressing is in progress.”

Add the following at the end:



"Before initial use & subsequently at suitable intervals the pre-stressing equipment shall be checked to determine any variation from the normal values during use.

SO far as these variations depend upon external influence (e.g. temperature in the case of oil jacks) they shall be taken into account"

CLAUSE 1807 POST TENSIONING

Add the following at the end of Para 5 of this clause:

"Parallel measurement by load cell in combination with direct reading of Pressure gauge shall be preferred. In any case such parallel measurements by load cell shall be made for at least 10% of the cables stressed during any tensioning operation."

Add the following at the end of this Clause:

"The Contractor shall submit fabrication drawings, detailing prestressing cables, anchorages, couplers, chairs and supports, templates or forms holding anchorage assemblies etc. for Engineer's approval at least one month before commencement of work in superstructure. Stressing schedules shall be prepared by the Contractor and submitted to Engineer for approval."

CLAUSE 1808 GROUTING OF PRE-STRESSED TENDONS

Add new Para at the end of Clause as under:

"Where directed by the Engineer the Contractor shall perform full-scale site test to determine the adequacy of grout mix, equipment and grouting method. The Contractor shall submit a method statement detailing the test procedure.

Special Attention is directed to Appendix 1800 / III of the Standard Specifications. Contractor shall arrange for testing of all grout components and of the mix, prior to the start of grouting and whenever the source of any component is changed, to ensure that the grout is free of anything that could promote shrinkage or cracking of the grout or corrosion in the tendons. Further samples of grout and its components shall be obtained for each day of grouting at each site where grouting is carried out and a full chemical analysis shall be performed on the samples."

CLAUSE 1815 RATE

Add at end of Para 4:

Cost of fixing anchorages / sheathing for dummy cables and future prestressing cables shall be incidental to work and shall not be measured / paid extra. No additional cost shall be payable for stressing of cables for compensation of short fall of prestress or for any other reason.

CLAUSE 1816 JOINTS IN CONSTRUCTION WITH PRE-CAST-UNIT

Add new clause:



"Joints between a series of precast concrete units which are to be prestressed together by post-tensioning shall be such as to ensure even transfer of compression from one unit to another.

Whatever be the method of jointing, the holes of the prestressing steel shall be accurately made and shall meet one another in true alignment at ends. Jigs shall always be used. Care shall be taken to ensure that the jointing material does not enter the duct or press the sheath against the prestressing steel.

Jointing by application of mortar on the face of a unit and then placing another unit against it shall not be permitted.

Suitability and effectiveness of the method should be got confirmed from a suitably designed mock-up."

SECTION 2000 BEARINGS

CLAUSE 2001 DESCRIPTION

Add the following as paragraph 2 of this clause:

"Within 90 days of award, the Contractor shall submit detailed specifications, designs and drawings including installation drawings and maintenance manual, for the approval of the Engineer. Designs shall also include review and modifications of designs and drawings of bearing pedestals and other elements required for installation. The installation of bearings shall be carried out under the supervision of the manufacturer of the bearings. The Contractor shall provide the bearings only from the manufacturers approved and enlisted by the Department. In addition to routine testing of the materials and bearings at manufactures premises, the Contractor shall arrange at his own cost testing of random samples of 1 % (Minimum 1 no. of each type) of bearings from independent agencies, other than manufactures' own facilities, duly approved by the Engineer. The bearings shall be selected by the Engineer / his authorised representative and duly sealed in his presence for dispatch to the independent agency."

CLAUSE 2004 SPECIAL BEARINGS

The clause shall read as follows:

Sub-Clause 2004.1 Spherical Bearings: Spherical Bearings shall conform to the requirements of sections 9.1 and 9.2 of BS 5400. However materials of bearing elements may conform to Indian Standards nearest to the specifications stated in the above sections of BS: 5400.

Clause 2005 ELASTOMERIC BEARINGS

Sub-Clause 2005.4 Acceptance Specifications

In Para 5, substitute the words "Engineer or his authorised representative" for the word "Inspector".

Sub-Clause 2005.3.5 Inspection Certificate

Substitute the words "Engineer or his authorised representative" for the word "Inspector".

Sub-Clause 2005.4.6 Quality Control Certificate

Delete the words "/Inspector" in the third paragraph.

CLAUSE 2006 POT BEARINGS

The clause shall read follows:

"Pot Bearings shall conform to the requirements of IRC: 83 (Part III)-2002. Mild steel to be used for components of the bearings shall comply with Grade B of IS: 2062."

Sub-Clause 2006.1 General

Sub-Clause 2006.1.2 Add after 2nd sentence "Provisions of IRC83 (Part III) shall be applicable for POT, POT cum PTFE, PIN and Metallic Guide Bearings"

ADD new Clause 2009 as under and the existing Clauses 2009 and 2010 are renumbered as 2010 and 2011 respectively :

CLAUSE 2009 "Tar Paper bearing shall be reinforced bitumen laminated Kraft paper conforming to IS-1398".

Clause 2010 MEASUREMENTS FOR PAYMENT

Add the following after Para 2:

"Tar Paper bearings shall be measured in square meters."

SECTION 2100 OPEN FOUNDATIONS

CLAUSE 2106 TOLERANCES

Reference to Tolerance shall be made to Clause 1716.

SECTION 2200 SUB-STRUCTURE

CLAUSE 2204 PIERS AND ABUTMENTS

Sub-Clause 2204.2 replaced as follows:

"Slip forming will not be allowed."

Add new Sub-Clause 2204.7 at the end of clause:

"Wherever necessary, suitable cofferdams or other means shall be provided to exclude water from the construction area. The Contractor shall provide necessary pumping equipment for dewatering areas. No payment will be made for these

operations as per Clause 304.5.1.”

Sub-Clause 2210 Rate

This Clause shall read as follows:

“The contract unit rate for masonry, concrete and reinforcement in substructure shall include all works as given in respective sections and cover the cost of incidental items like providing cofferdams, dewatering, providing special formwork, where necessary, and all other items for furnishing and providing substructure as mentioned in this section.”

The necessary material (thermocole, bituminous fibrous board or equivalent material) and labour, tools etc. required for maintaining 20 / 40 mm gap between faces of various structures (old / new) wherever required / as shown in drawing shall be incidental to work and shall not be measured / paid separately.

SECTION 2300 CONCRETE SUPER-STRUCTURE

Clause 2305 PRESTRESSED CONCRETE CONSTRUCTION

Sub-Clause 2305.2 Box Girder

Add the following at the end of paragraph 1:

“Contractor shall, in his methods statement, indicate the location of construction joints for Engineer’s approval.”

Add new sub clause 2305.5 as under:

Sub-Clause 2305.5 PSC Solid Slab

Casting of the slab shall be done in a single stage without construction joints.

The portions of deck near expansion joints shall be cast along with Reinforcements and embedments for expansion joints.

The deck slab shall be finished rough, but true to lines and levels as shown in drawings. Bearings shall be set as shown in drawings.

Sub-Clause 2504.2.2 Filter Media

Add after 1st Para:

“The material for filter media behind abutment shall conform to general guide lines given in Appendix 6 of IRC-78 (Standard Specification and Code of Practice for Road Bridges – Section-II).”

Clause 2507 CURTAIN WALL AND FLEXIBLE APRON

Replace Sub-clause 2507.1 and modify sub-clause 2507.2 as under:

Sub-Clause 2507.1 Curtain Wall

The rigid flooring shall be enclosed by curtain walls (tied to the wing walls) with a minimum depth below floor level on up-stream side and downstream side as indicated in the drawings. The curtain wall shall be in cement concrete M-20

grade. The rigid flooring shall be continued over the top width of the curtain wall.

Sub-Clause 2507.2 Flexible Apron

First sentence under this sub-clause shall read as under:

“Flexible apron of thickness indicated in the drawing, comprising loose stone boulder (weighing not less than 40 kg) shall be provided beyond curtain wall for a minimum distance of 3.0 m on upstream side and 6.0 m on downstream side”

Sub-Clause 2509 Add new Para in the end of the Clause;

“Filter media and cement concrete bedding, wherever required, shall be measured in cubic metre and paid separately as per contract.”

SECTION 2600 EXPANSION JOINTS

Clause 2602 GENERAL

Add the following at the end of the clause.

“The expansion joints shall be procured only from those manufacturers/ suppliers of expansion joints who are empanelled with MOSRT&H. The MOSRT&H (formerly, Ministry of Surface Transport) had issued modified interim specifications for expansion joints vide letter dated 31/03/97 and revised vide letter No. RW/NH-34059/1/96 - S&R dated 30th Nov, 2000 and corrigendum of same circular dated 15th Jan., 2001 which shall be adopted. These specifications are reproduced below.”

TABLE R-1 SUITABILITY CRITERIA FOR ADOPTION OF DIFFERENT TYPES OF EXPANSION JOINTS

Sl. No.	Type of Expansion	Suitability for Adoption Joint	Expected Service Life	Special Consideration
1.	Buried Joint	Simply supported spans upto 10 metres	10 Years	Only for deck with bituminous/ asphaltic wearing coat. Steel plate may need replacement, if found corroded or distorted at the time of relaying/ renewal of wearing coat.
2.	Filler Joint	Fixed end of simply supported spans with insignificant movement or simply supported spans not exceeding 10 metres.	10 Years	The sealant and joint filler would need replacement if found damaged.

3.	Asphaltic Plug Joint	Simply supported spans for right or skew (upto 20 degree), moderately curved or wide deck with maximum horizontal movement not exceeding 25 mm. Ambient temperature should be in the range of 5 degree to 50 degree Celsius.	10 Years	Only for decks with bituminous/ asphaltic wearing coat. Not suitable for bridge with longitudinal gradient more than 2 % and cross camber/ super-elevation exceeding 3%. Not suitable for curved spans and spans resting on yielding supports.
4.	Compression Seal Joint* (Chloroprene Seal & Cell Foam Seal)	Simply supported or continuous spans right or skew (upto 30 degree), moderately curved with maximum horizontal movement not exceeding 40 mm.	10 Years	Chloroprene/ Closed Foam Seal may need replacement during service.
5.	Elastomeric Slab Seal Joint*	Simply supported or continuous spans, Right or skew (less than 20 degree), moderately curved with maximum horizontal movement upto 50 mm	10 Years	Liable to excessive wear and tear under high traffic intensity. Not suitable for bridges located in heavy rainfall area and spans resting on yielding support.
6.	Single strip seal joint*	Moderate to large simply supported, cantilever/ continuous construction having right, skew or curved deck with maximum horizontal movement up to 70 mm	25 Years	Electrometric seal may need replacement during service.
7.	Modular Strip/ Box Seal Joint	Large to very large continuous/ cantilever construction with right, skew or curved deck having maximum horizontal movement in excess of 70 mm	25 Years	Electrometric seal may need replacement during service.
8.	Special Joints for	For bridges having wide decks and large	25 Years	Electrometric seal may need replacement

special conditions span length involving complex movements/ rotations in different directions/ planes, provision of special type of modular expansion joints such as Swivel joists joints may be made. during service. Provision of these joints may be made with prior approval of the Ministry.

* These are proprietary items for which 10 years warranty shall be insisted upon from the suppliers. The contractor shall submit all relevant information as per clause 115.1

Clause 2608 Add the following Sub-Clause after the end of This Clause

Sub-Clause 2608.3

Installation

- (a) The Expansion joint shall be installed by the manufacturer/ Supplier.
- (b) The block out for the joint shall be marked and constructed to the dimensions as indicated in the drawing or recommended by the manufacturer/ supplier.
- (c) The recess for the block out shall thoroughly cleaned of any loose or foreign material wire brushing and air blowing and dried with hot compressed air.
- (d) The recess in the deck slab, if required, shall be repaired with epoxy mortar and cleaned and dried again.
- (e) The foam caulking/backing rod shall be placed about 25 mm down in the joint opening.
- (f) The aggregate shall be washed, cleaned and heated to a temperature between 170°-180°C prior to placement.
- (g) The binder shall be preheated to temperature of 170 – 190° C before application.
- (h) While sealing the joint opening with preheated binder, care shall be taken that the binder does not spill on to the joint surface of the deck.
- (i) The joint shall not be installed when the ambient temperature goes below + 5 deg. C or above + 35 deg.C. or while it is raining/ snowing. (Planning for installation must taken into account the weather condition).
- (j) When clement weather resumes, the joint installation may be continued after the upper layer and/or exposed surface of the partially completed joint has been re-prepared by heating and/ or coating with binder as

necessary.

Sub-Clause 2608.4 Handling and Storage

All the aggregates and binder shall be pre-bagged and clearly marked. All the material shall; be stored on concrete platform at 150 mm above the ground in covered enclosures to avoid contamination.

Clause 2608.5 Tests and Standard of Acceptance

The material shall be tested in accordance with these specifications and shall meet prescribed criteria. The manufacture/ supplier shall furnish the requisite certificates from the recognized testing laboratory of India or abroad.

The work shall conform to these specifications and shall meet the prescribed standards of acceptance.

The clause 2609 be replaced fully as below:

Clause 2609 COMPRESSION SEAL JOINT

Clause 2609.1 Compression seal joint seal joint shall consist of steel armoured nosing at two edges of the joint gap suitably anchored to the deck concrete and a performed chloprene elastomer or closed cell foam joint sealer compressed and fixed in to the joint gap with special adhesive binder.

Clause 2609.2 Material

(a) Steel nosing

The steel nosing shall be of angle section ISA 100 x 100 conforming to weldable structural steel as per IS:2062. The thickness of legs shall not be less than 12 mm. The top face of the angle shall be provided with Bleeder holes of 12 mm diameter spaced at a maximum 100 mm centers so as to ensure that there are no voids in the concrete beneath the angle.

(b) Anchorage

The anchorage steel shall conform to IS:2062 or equivalent. The steel nosing shall be anchored to the deck by reinforcing bars, headed studs or bolts or anchor plates cast in concrete or a combination of anchor plate and reinforcing bars, headed studs or bolts. Anchor bars, studs or bolts shall engage the main structural reinforcement of the deck and in case of anchor plates o anchor loops this shall be achieved by passing transverse bars through the loops or plates.

The minimum thickness of anchor plate shall be 12 mm. Total cross sectional area of bars, studs or bolts on each side of the joint shall not be less than 1600 mm sq. per metre length of the joint and the center

to center spacing shall not exceed 250 mm. The ultimate resistance of anchorages shall not be less than 600 KN/m in any direction.

(c) Corrosion Protection

All steel section shall be protected against corrosion by hot dip galvanizing or any other approved anticorrosive coating with a minimum thickness of 100 micron.

(d) Joint Seal

- i) The sealing element shall be a performed continuous chloroprene or closed cell foam seal with high tear strength, insensitive to soil, gasoline and ozone. It shall have high resistance to aging and ensure water tightness. The seal should be vulcanised in a single operation for the full length of the joint required for carriageway, kerbs and footpaths, if any. The seal shall cater for a horizontal movement upto 40 mm and vertical movement of 3 mm.
- ii) The physical properties of chloroprene/ closed cell foam sealing element shall conform to the following:

Chloroprene Seal

Shall be performed extruded multi web cellular section of chloroprene of such a shape as to promote self-removal of foreign material during normal service operations. Chloroprene of joint seal shall conform to clause 915.1 of IRC:83 (Part – II) and satisfy the properties stipulated in Table – 2 Strip Seal Element Specification of these specifications except in respect of the working movement range of the sealing element which shall be as specified in Clause 2.4.1 above.

Closed Cell Foam Seal

Shall be of performed non extruded non cellular section made from low density closed cell, crossed linked ethylene vinyl acetate, polyethylene copolymer that is physically brown using nitrogen. The material shall possess properties as indicated in **Table. 1:**

Table – 1

	Property	Specified Value
i)	Density	41.7 – 51.3 Kg/ cum
ii)	Compression Set on 25 mm	50 percent compression samples (ASTM D3575) for 22 hours at 23 degree Celcius, 2 hour recovery; 13 percent set.
iii)	Working temperature	-70 to +70 deg C.




iv)	Water absorption (total immersion for 3 months) (ASTM D3575)	0.09766 Kg/ sqm
v)	Tensile strength	0.8 Mpa
vi)	Elongation at break (ASTM D3575)	195 +/-20 percent

(e) Lubricant cum Adhesive

The type and application of material used in bonding the performed joint seal to the steel nosing and concrete shall be as recommended by the manufacturer / supplier of the seal system.

Sub-Clause 2609.3 Handling and Storage

- (a) The expansion joint material shall be handled with care and stored under cover. All joint material and assemblies shall be protected from damage and assemblies shall be supported to maintain true shape and alignment during transportation and storage.

Sub-Clause 2609.4 Installation

- (a) The expansion joint shall be installed by the manufacturer/ supplier or their authorized representative, who will ensure compliance of installation procedure and instructions.
- (b) The dimension of the joint recess and the width of the gap shall conform to the approved drawings.
- (c) Anchoring steel shall be welded to the main reinforcement in the deck maintaining the level and alignment of the joint.
- (d) Concreting of pocket/ recess shall be done with great care using proper mix conforming to same grade as that of the deck concrete but not less than M30 grade in any case. The water cement ratio shall not be more than 0.40. If needed, suitable admixtures may be used to achieve the workability. The width of pocket shall not be less than 300 mm on either side of the joint. Care shall also be taken to ensure efficient bonding between already cast/ existing deck concrete and the concrete in the joint recess.
- (e) At the time of installation, joint shall be clean and dry and free from spalls and irregularities, which might impair a proper joint seal.
- (f) Concrete or metal surfaces shall be clean, free of rust, laitance, oils, dirt, dust or other deleterious materials.
- (g) The lubricant cum Adhesive shall be applied to both faces of the joint and joint seal prior to installation in accordance with the manufacturer's instructions. The joint seal shall be compressed to the specified thickness



for the rated joint opening and ambient temperature at the time of installation, which shall be between +5 to 35°C.

- (h) The joint seal shall be installed without damage to the seal. Loose fitting or open joints shall not be permitted.

Sub-Clause 2609.5 Acceptance Criteria

- (a) All steel elements shall be furnished with corrosion protection system.
- (b) For the joint seal the acceptance test shall conform to the requirements stipulated in Para above. The manufacturer/ supplier of this type of joint shall produce a test certificate to this effect conducted in a recognized laboratory in India or aboard.
- (c) Prior to acceptance 25 percent of the completed and installed joints, subject to a minimum of one joint, shall be subjected to water tightness test. Water shall be continuously ponded along the entire length for a minimum period of 4 hours for a depth of 25 mm above the highest point of deck. The width of ponding shall be at least 50 mm beyond the anchorage block of the joint on either side. The depth of water shall not fall below 25 mm anytime during the test. A close inspection of the underside of the joint shall not reveal any leakage.

CLAUSE 2613 TEST AND STANDARDS OF ACCEPTANCE

The clause 2613 be replaced fully as Below

“The materials shall be tested in accordance with these specifications and shall meet the prescribed criteria. The manufacturer / supplier shall furnish the requisite certificates from the recognized testing laboratory of India or abroad.

The work shall conform to these specifications and shall meet the prescribed standards of acceptance.”



CLAUSE 2614 Measurement for payment

The clause 2614 be replaced fully as below

The expansion joint shall be measured in running metres. For filled joints, the rate per running metre shall include the cost of sealant for the depth provided in this drawing. The expansion joint shall be measured along the width of the deck slab from one end to the other including length through footpaths and parapets.

CLAUSE 2615 RATE

The clause 2615 be replaced fully as below

The contract unit rate shall include the cost of all material, labour, equipment and other incidental charges for fixing the joints complete in all respects as per these specifications in the case of Bridge Contractor supplying the expansion joint. If the manufacturer supplies the expansion joint directly to the Engineer, the cost of installation, handling and fixing shall be borne by the Bridge Contractor.



SECTION 2700 WEARING COAT AND APPURTENANCES

CLAUSE 2702 WEARING COAT

Sub-Clause 2702.1 Bituminous Wearing Coat

"Asphaltic concrete wearing coat shall be constructed in thickness as shown in drawings"

CLAUSE 2703 RAILINGS AND CRASH BARRIER

Sub-Clause 2703.3 Cast-in-Situ Railings and parapets

Last sentence of paragraph 3 shall be replaced by the following.

"Location of construction joints shall be determined in advance and approved by Engineer."

Add the following additional clauses:

Sub-Clause 2703.5 Concrete crash barrier for bridges

Sub-Clause 2703.5.1 General

This work shall consist of construction, provision and installation of concrete crash barrier on the bridge deck / approach slab / approaches at locations and of dimensions as shown on the drawings or as directed by the Engineer.

Sub-Clause 2703.5.2 Materials

All materials shall conform to Section 1000-Materials for Structures as applicable, and relevant Clauses in Section 1600 shall govern the steel reinforcement. The concrete barriers shall be constructed either by the "cast-in-place with fixed forms" method or the "extrusion or slip form" method or a combination thereof at the Contractor's option with the approval of the Engineer. Where "extrusion or slip form" method is adopted, full details of the method and literature shall be furnished.

Grade of concrete for crash barrier shall be as per BOQ or as directed by Engineer.

An expansion joint with Polysulphide Joint sealants and bituminous fiberboard shall be provided in the crash barriers at the location of expansion joints/ gaps on the bridge, approaches etc.

Sub-Clause 2703.5.3 Construction Operations

The location of crash barrier shall be strictly adhered to as shown on the drawing and as directed by the Engineer. Concrete crash barriers shall present a smooth, uniform appearance in their final position, conforming to the horizontal and vertical lines shown on the plans or as ordered by the Engineer and shall be free of lumps, sags or other irregularities. The top and exposed faces of the barriers shall conform

to the specified tolerances, as defined in Clause 809.4, when tested with 3 m straight edge, laid on the surface.

The concrete crash barrier or precast shall be given two coats of cement paint or aqua based paint as directed by the Engineer of approved brand and shade."

Sub-Clause 2703.5.4 Tolerance

The overall horizontal alignment of crash barrier and rails shall not depart from the road alignment by more than ± 30 mm, nor deviate in any two successive lengths from straight by more than 6 mm and the faces shall not vary more than 12 mm from the edge of a 3 m straight edge. Barriers shall be at the specified height as shown in the plans above the edge of the nearest adjacent carriageway or shoulder, within a tolerance of ± 30 mm.

Sub-Clause 2703.5.5 Measurements for Payment

All barriers will be measured in cubic metres of concrete completed for the barriers including approach and departure ends. The sealing of opening in crash barrier at expansion joints with polysulphide rubber joint sealant and bituminous fibreboard as per sub- clause 2703.6 shall be incidental to work. The reinforcement in barriers shall be measured and paid separately in relevant item of B.O.Q. The painting over crash barrier shall be measured in square meter and paid separately.

Sub-Clause 2703.5.6 Rate

The Contract unit rate shall include full compensation for furnishing all labour, materials, tools, equipment and incidental costs necessary for doing all the work involved in constructing the concrete barrier complete in place in all respects as per these Specifications.

Sub-Clause 2703.6 Polysulphide Rubber Joint Sealant

Polysulphide Joint sealants with bituminous fiberboard shall be provided in the Expansion Joints/ gaps in Crash Barriers.

Before application it shall be ensured that the top of the bituminous fiberboard and the concrete faces are dry, sound, free from dirt, grease and other loose foreign matter. A thin coat of primer shall be applied on concrete faces with a brush to air dry before applying sealant. The components of the sealant i.e. base and hardener shall be mixed in a slow speed mixed sealant till uniform color is obtained. Placement of the mechanical mixer shall be done with either cartridge or fully enclosed gun barrels within 30 minute of mixing. Manufacturer's recommendation shall be followed.

The sealing compound shall be two packs, low modulus of elasticity Polysulphide elastomer having bituminous ingredients such as Cico T-680 or equivalent with following properties of the cured compound.

Tensile strength	-	0.4 MPa $\pm$ 10%
Modulus of elasticity	-	At 100% elongation: 0.15 MPa



Elongation	-	Elongation at break 550%	
Hardness	-	Shore 'A' hardness @ 25°C	22 ± 3
Operating temperature	-	-20°C to + 80°C	
Shrinkage	-	Less than 1%	
Permanent dynamic	-	± 25%	

Movement capability

Polysulphide material shall be approved by the Engineer prior to procurement.

Measurements for Payments

Cost for providing Polysulphide Joint sealants and bituminous fiberboard in the Expansion Joints in Crash Barriers shall be deemed to be included in the unit rate of Crash Barrier and shall not be measured separately.

Clause 2706 WEEP HOLE

This clause shall read as under:

"Weep holes shall be provided in solid plain concrete/reinforced concrete/brick masonry abutments, wing walls, return walls as shown in the drawing or as directed by the Engineer to drive moisture from the back filling. Weep holes shall be provided with 100 mm dia PVC pipe of approved thickness and shall extend through the full width of concrete with slope of about 1 vertical: 20 horizontal towards the draining face.

The spacing of weep holes shall generally be 1m in either direction or as shown in the drawing with the lowest at about 150 mm above the low water level or ground level whichever is higher or as directed by the Engineer."

CLAUSE 2708 MEASUREMENTS FOR PAYMENT

Replace in Clause 2708- sub-clause ii, "running meters" by "running meters/ cubic meters as per unit provided in BOQ".

CLAUSE 2709 RATE

The second paragraph shall be read follows:

"The contract unit rate of parapets and railings shall include the cost of all labour, materials tools and plant required for completing the unit in accordance with specifications".

Add at the end of Para 2:

The contract unit rate for approach slab shall include cost of reinforcement and providing and laying in position bitumen joint filler with joint sealing compound in the 20 mm thick gap between dirt wall and approach slab.

CLAUSE 2819

PROVIDING AND FIXING DRAINAGE SPOUT INCLUDING SEALING WITH NON-SHRINK FREE FLOW CEMENT GROUT.

For all existing bridge decks where drainage spouts are to be replaced new drainage spouts shall be provided as shown in the drawings.

The waterproofing material shall be provided, around the area of drainage spout and spout pipe, from the top of the deck.

The work shall be executed in accordance with Specifications Section 2700 clause 2705 except to the extent modified below.

The work shall be carried out after the wearing coat around the spout is removed. The existing spouts shall be removed carefully with minimum damage to surrounding concrete. The pocket formed shall be sufficiently large to ensure good flow and compaction of non-shrink cement grout around the new spout. In case the earlier spouts were provided in railing kerb, holes shall be drilled in slab without excessively damaging surrounding concrete.

CLAUSE 2820

REPAIR TO LEACHED, HONEYCOMBED, SPALLED CONCRETE

Leached, honeycombed, spelled concrete (area of damage less than 0.5 m^2) shall be repaired with average 50 mm average thick PMC mortar in two or more layers with a bond coat of PMC slurry between two successive layers.

All loose concrete shall be chipped off with a chipping machine so that loose layers of concrete are removed exposing the reinforcement. All loose concrete sticking with the reinforcement shall be removed. Where reinforcement bars are already exposed, the chipping shall continue so as to expose half the diameter, prior to further treatment. The concrete surface shall be thoroughly cleaned with wire brush and oil free air blast. Where the damaged areas are large, sand blasting should be done to clean the reinforcement and the surrounding concrete. If reinforcement is seen, the same shall also be cleaned thoroughly. The reinforcement shall be coated with PMC slurry within one hour of cleaning to prevent rusting. The PMC shall be brush applied on the cleaned reinforcement ensuring that full surface area is covered in accordance with the manufacturers' recommendation.

Before applying PMC repair mortar the prepared concrete substrata shall be thoroughly soaked with clean water. Free surface water shall be removed before priming. The substrata shall be primed with PMC slurry.

The specifications for polymer modified cementitious (PMC) mortar / debonding slurry are as under:

The anti-corrosive polymer latex, which is to be used should consist of water based QA-Acrylic polymer incorporated with non-alcoholic bipolar corrosion inhibitor. The polymer to be used shall be MONOBOND-2000 or equivalent. Colour: Milky white liquid.

Solid content: The polymer solid content shall be 36 ± 1 percent. The particles shall be of nearly spherical shape with a diameter of 0.35 ± 0.05 micron. The manufacturer shall certify the above requirements about solid content & grain size. In order to

keep control over the quality, the manufacturer shall provide infrared absorption spectrum analysis for the material to be supplied by them.

Mixing proportion: Anti-corrosive polymer modified mortar

- Cement - 100 parts by weight
- Monobond-2000 - 40 parts by weight
- Silica sand - 300 parts by weight

The sand, which is to be used for constituting the PMC repair mortar, should be silica sand as the basic material, which is categorized in two groups.

- a) Coarse Silica and
- b) Fine Silica

The grading of the above groups should follow the limits provide below.

Quartz sand.

I.S. Sieve No.	Percentage passing by weight
10 mm	100
4.75 mm	100
2.36 mm	100
1.18 mm	85 - 90
600 microns	45 - 55
300 microns	15 - 20
150 microns	5 - 10
75 microns	0 - 3

In the event of using local sand, the sand to be used must satisfy the limits of deleterious materials & the requirements of soundness as given in Cl 3.2.1 & Cl 3.6 respectively of IS: 383, confirmatory test shall be conducted by the contractor and sample kept for comparison by the Engineer.

Curing

Air-corrosive polymer modified mortar curing procedure outline apply to normal weather conditions. Under hot weather, take precautions to avoid drying. PMC work should be carried out at a temperature below 40° C.

Under unusual weather conditions e.g. high humidity and / or high wind velocity or imposed constraints special curing procedure shall be followed for which approval shall be obtained from the engineer.



Anti-drying shall be considered to be taken place only during favourable uninterrupted weather condition existing throughout the existing recommend drying period. Some judgments shall be made in this respect & if conditions are deemed unfavourable for drying to occur, then drying must be prolonged for the full recommend period after weather clears.

As PMC work proceeds, precautions shall be taken to prevent rapid drying of the PMC repair mortar. This is usually accomplished by covering the filled surfaces with an impermeable sheet shortly after the work has been done.

The sheet shall be kept in place until further work is carried out over the mortar or in case where the mortar is likely to be disturbed the sheet shall be kept in place for 24 hours.

No foot traffic for further work shall be allowed over mortar until 12 hours after the time of the completion of work.

Curing compound may also be used as curing membrane. Care shall be taken to ensure complete covering particularly around the interface with the host concrete.

For the first day the repaired concrete patch shall be protected from harsh environment by laying a polythene sheet over it, lapping down the edges.

Mixing PMC

Methods of Mortar mixing

To mix PMC, it is necessary to have the following items:

- A suitable sized non-ferrous mixing container preferably plastic.
- A high-speed drill with mixing paddles.
- Promark batching containers for measuring out components to be mixed.

Pour all the liquid polymers latex into mixing container. After shaking the latex to disperse the solid uniformly throughout the liquid before use, begin mechanical mixing & while doing so, slowly add the dry components, i.e. cement & sand.

Mix for about 5 minutes until solids have been well dispersed. The resulting mix should look uniform, feel creamy & be free from lumps & grits.

Precautions shall be taken not to entrap an excessive amount of air into the mix during mixing.

Since the desired consistency depends on type & brand of cement as well as weather conditions start a trial mix with a reduced amount of cement. Once all components are mixed, add cement if necessary to achieve the desired consistency. Record the amounts of cement required & use this for subsequent mixes. Do not reduce the quantity of cement noted in the Mix Proportions.

In case the slurry sets before application of mortar, a fresh coat of slurry shall be applied. Under no circumstances, water shall be added in PMC repairs mortar mix.

Unused mortar or mortar which has partially set shall not be re-mixed & used.

Mechanical Strength of Mortar

Anti-corrosive polymer modified mortar shall have the following:

	7 day	28 days
Compressive strength	18 N/MM ²	38 N/MM ²
Flexural strength (IS 5816 –1959)	-	10 N/MM ²
Split tensile strength (IS 5816 – 1959)	-	6 N/MM ²

For anti –corrosion polymer modified bonding slurry

The anti-corrosive polymer modified bonding slurry shall be QA Acrylic base MONOBOND 2000 or equivalent.

The bonding slurry should remain in tacky state prior to placing of the freshly mixed concrete or mortar.

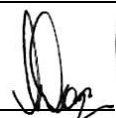
Mixing proportions of Bonding Slurry are as follows:

Cement	-	100 parts by weight
MONOBOND 2000	-	40 parts by weight
Fine Silica sand	-	100 parts by weight

The fine silica sand, which is to be used for consistency in anti-corrosive polymer modified bonding slurry, should be with fine silica sand with following sieve sizes.

I.S. Sieve No.	Percentage passing by weight
10 mm	100
4.75 mm	100
2.36 mm	100
1.18 mm	100
600 microns	90-100
300 microns	40-60
150 microns	0-10
75 microns	0-3

Mechanical Strength of Bonding Slurry




Bond Strength –

- WET - 3-4 N/MM²
- DRY - 7-8 N/MM²

Above bonding slurry should conform to following properties.

- ASTM-C1059-86 (Latex agents for bonding fresh to old concrete)
- ASTM-C1042-86 (Bond strength of latex system with cement)
- Pot life: 1 hour for 5 kg bonding slurry mix.

CLAUSE 2821

REPAIR TO VOID IN ARCHES WITH PMC MORTAR

The voids created in the masonry arches by dislodged stones shall be filled with PMC mortar.

The surface shall be thoroughly cleaned with wire brush and oil free blast. Before applying PMC repairs, the prepared substrate shall be thoroughly soaked with clean water. Free surface water shall be removed before priming. The substrata shall be primed with PMC slurry. Repair mortar shall be applied before primer has set i.e. within 20-30 minutes. The mortar shall be applied with trowel and shall be well worked inside and compacted. The surface shall be smooth finished to match the adjacent surface. Unused mortar or mortar which has partially set shall not be used. Mortar shall be applied in layers to avoid sagging. Manufacturers' recommendation shall be followed. Specifications given in Clause 2818 shall be followed.

CLAUSE 2822

SEALING OF CRACKS IN CONCRETE IN PIER / ABUTMENT CAPS, SLABS, GIRDERS, PEDESTAL WALLS ETC. WITH EPOXY RESIN INJECTION.

The work is to seal all cracks in concrete in pier/abutment caps, slabs, girders, pedestal walls etc.

The work shall be executed in accordance with Specifications Section 2800 clauses 2803 & 2804.

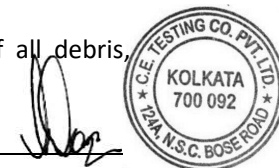
The cracks shall be sealed with epoxy mortar prior to injection.

CLAUSE 2823

INSPECTION & CLEANING OF BRIDGE BEARINGS AND GREASING OF STEEL ROCKER-ROLLER / PLATE BEARINGS AND REMOVAL OF ALL DEBRIS AROUND BEARINGS.

The work shall consist of inspection of bearings to check whether the bearings are functioning properly and if any parts of the bearing or nuts and bolts are missing, to replace them. The work shall also include cleaning of bearings and oiling and greasing of metallic bearings, wherever required. Realignment/ readjustment of bearings, and replacement of missing parts of metallic bearings, requiring jacking up of superstructure is excluded from the scope of work. Replacement of existing bearings with new bearings is also excluded from the scope of the work.

The area around the bearings and their pedestals shall be cleared of all debris, vegetation, dust etc. and cleaned for proper inspection.



When grease boxes are fixed around the metallic bearings, (a) the same shall be permanently removed along with the old grease and (b) bearings shall be cleaned for proper inspection.

In case of elastomeric bearings, these shall be inspected for their proper seating, rotation, bulging, cracking, splitting etc. and a record thereof shall be provided to the Engineer for necessary instructions.

In respect of metallic bearings, fresh graphite grease as approved by the Engineer shall be applied to the surfaces, which are sliding, rotating or moving due to movement in bearings. The materials, specially, graphite grease, required for oiling and greasing of metallic bearings, wherever required, shall be as per approval of the Engineer. Grease used shall be such that it retains its properties for long life and shall not affect the bearing parts. All other surfaces of the metallic bearings shall be cleaned of all rusts, corrosion and a coat of anti-corrosive oil paint applied as per directions of the Engineer.

Missing parts of metallic bearings, nuts and bolts etc. shall be replaced by the contractor at no extra cost to the Employer.

CLAUSE 2824 CONTROLLED JACKING UP OF SUPER STRUCTURE FOR RESETTING/ REPLACEMENT OF ROCKER AND ROCKER CUM ROLLER BEARINGS, SEGMENTAL BEARINGS AND ELASTOMERIC BEARINGS

The work shall be executed before laying of new wearing coat and expansion joint. The superstructure shall be jacked up nominally at abutment end for resetting of the bearings. Jacking up of superstructure is a specialized work. Contractor shall furnish a methodology statement with his proposal for resetting/repair of bearings. Lifting shall be done through hydraulically operated jacks. The jacks shall be placed under cross diaphragm. Adequate distribution plates shall be placed at top and bottom of the jack to reduce the stress on concrete. If the soffit of the cross diaphragm is weak, the same shall be first repaired with epoxy mortar and / or epoxy injection and lifting will commence only after such repair work is fully cured. In addition to jacks, the span will also be supported on packing plates which shall be placed under the cross diaphragm between the jacks. The extent of lifting shall be decided by the Engineer.

Only proven type of jacks shall be used. These jacks shall be provided with lock nut system. The jacks shall be randomly tested for 1.5 times the capacity. In lifted condition the span will be supported on the lock nut arrangement of the jacks with no pressure on the hydraulic circuit. The contact stress on concrete shall not exceed 30 MPa. Suitable M.S. distribution plates have to be provided at top and bottom of the jack for this purpose. All jacks shall be connected to a common pump and it will be ensured that the deck is lifted equally upstream & downstream. For monitoring this, dial gauges shall be provided. Only steel packing plates shall be used. Specification for epoxy mortar / epoxy injection shall be followed for repair to soffit of cross diaphragm.

The cross diaphragms shall be closely watched during lifting and also for the entire duration when the span is supported on jacks and packing. If development of cracks is observed, the lifting will be stopped and alternate arrangement for supporting the superstructure shall be made subject to approval of Engineer.



The cost of all operations under this clause including all tools and plant, materials, jacks, pumps, labour etc. shall be incidental to cost of resetting / replacement of bearings.

CLAUSE 2825 APPLYING 1:3 CEMENT MORTAR TO EXPOSED SURFACE OF MASONRY OF EXISTING WING WALLS / RETURNS, ABUTMENT PIERS

All exposed masonry surface of existing wing walls / returns abutments, piers etc. shall be provided with 20 mm thick plaster where required. Walls / Returns and Retaining Wall at Sides of Approach Slabs with Brick Masonry shall be provided cement plaster in 1:3 cement mortar, 20 mm thick.

Existing wing walls and returns wherever deficient shall be built up and retaining walls shall be constructed at sides of the approach slabs as shown in the drawings.

The work shall be done in accordance with Specifications Section 1300. Masonry for construction of short retaining walls at sides of approach slab shall be laid over a 100 mm thick M 15 PCC levelling course.

CLAUSE 2826 BUILDING UP OF EXISTING WING WALLS/RETURNS AND RETAINING WALL AT SIDES OF APPROACH SLABS WITH BRICK MASONRY AND FINISHING WITH 1:3 CEMENT MORTAR 20mm THICK

Existing wing walls and returns wherever deficient shall be built up and retaining walls shall be constructed at sides of the approach slabs as shown in the drawings. The work shall be done in accordance with Specifications Section 1300. Masonry for construction of short retaining walls at sides of approach slab shall be laid over a 100 mm thick M 15 PCC leveling course.

CLAUSE 2827 SEALING OF WIDE GAPS AT JUNCTION OF WING WALL AND ABUTMENT WITH BRICK BATS AND FINISHING WITH 1:3 CEMENT MORTAR INCLUDING PROVIDING BITUMINOUS DEBONDING LAYER

Due to settlement of the wing wall a gap being created at the junction of the wing wall and the abutment, shall be sealed by filling with brickbats and finishing with plaster.

The abutment face of the gap shall be coated with one layer of bituminous compound. The gap shall be filled with bricks bats and rammed. The vertical exposed surface of the gap shall be plastered. Thereafter cement slurry shall be poured from the top under gravity till refusal. The top surface of the gap shall then be plastered and finally finished.

CLAUSE 2828 EARTH FILLING BELOW APPROACH SLAB

Cavities underneath the slab shall be filled.

The work shall be executed in accordance with Technical Specifications Section 300 clause 305. The cavities formed below the approach slabs shall be filled with approved back fill material. The filling shall be done in layers not exceeding 150mm. The masonry retaining wall shall also be built up in companion layers of 150mm. The compaction shall be done with the help of suitable equipment after necessary



watering.

CLAUSE 2829 CASTING OF APPROACH SLAB

The grade of concrete shall be as indicated in drawings/BOQ.

Approach slabs, which are cracked / missing or otherwise damaged shall be recast.

The work shall be executed in accordance with Specifications Section 2700 clause 2704. The approach slab shall be laid over lean concrete as per drawing. The base shall be consolidated to proctor density 98%.

CLAUSE 2830 STONE PITCHING ON SLOPES GROUTED WITH 1:3 CEMENT MORTAR

Slope protection with stone pitching shall be provided at abutments as indicated in drawing. The work shall be executed in accordance with Specifications, Section 2500.

CLAUSE 2831 PROVIDING AND PLACING IN POSITION MECHANICALLY FABRICATED GABION WALL AROUND ABUTMENT AND PIERS INCLUDING EXCAVATION AND BACK FILLING

The work shall be executed in accordance with Specifications Section 2500 clause 2503. Excavation and back filling shall be done in accordance with Specifications Section 300.

Gabions shall consist of a double twisted Zinc & PVC coated wire mesh container of variable sizes, uniformly partitioned into internal cells, interconnected with other similar units, and filled with stone at the site to form flexible permeable, monolithic structures. Mechanically fabricated double twisted hexagonal mesh type gabion such as Maccaferri or equivalent conforming to ASTM/ BS specifications shall be used.

Mechanically fabricated double twisted hexagonal mesh shall be approved by the Engineer prior to procurement and use.

CLAUSE 2832 the existing clause 2813 of the Specifications shall be renumbered as 2832

CLAUSE 2833 the existing clause 2814 of the Specifications shall be renumbered as 2833.

Add the following as items (h) to (w).

h)	Dismantling of kerbs, railings, parapets, footpaths, solid slab superstructure or part of slab and approach slabs, etc. RCC and masonry items shall be measured under separate heads.	cum
i)	Steel handrail	..running metre
j)	Dismantling of existing damaged brick masonry	cum
k)	Dismantling of course rubble masonry wings walls, piers, abutments and their foundations	cum
l)	Provision of dowel bars	Nos

m)	Drainage spouts	Nos
n)	Repairs to concrete with PMC mortar with average thickness of 50 mm of mortar applied.	sqm
o)	Sealing of cracks in masonry by cement grouting (in terms of weight of cement consumption)	kg
p)	Building up of existing course rubble masonry / concrete wing walls	cum
q)	Repair of voids in arches	cum
r)	Sealing of cracks in RCC abutments, piers, slabs, girders etc. by epoxy injection (In terms of weight of epoxy actually consumed for mortar and injection)	kg
s)	Earth fill below approach slabs	cum
t)	Concrete in approach slab	cum
u)	Inspection, cleaning and greasing of bearings	Nos
v)	Stone pitching	cum
w)	Gabion Walls	cum

Existing clause 2813 of specifications shall be renumbered as 2832.

CLAUSE 2834 RATE

Add the following at the end of the Clause.

- i) The contract unit rate for dismantling of existing railing / parapets shall include the cost of all materials, labour, tools and plants, disposal of dismantled materials, safety measures and all other incidental expenses necessary for the completion of work as per specifications.
- ii) The contract unit rate for dismantling of existing wing walls shall include the cost of all materials, labour, tools and plants, disposal of dismantled materials, safety measures and all other incidental expenses necessary for completion of work as per specifications.
- iii) The contract unit rate for providing dowel bars shall include the cost of all materials, labour, tools and plant, drilling of holes, placing dowel bar in position, grouting with non-shrink free flow cement, wastage, sampling, testing and all other incidental expenses necessary for completion of work excluding steel reinforcement as per specifications.
- iv) The contract unit rate for repair to leached, honeycombed, spalled concrete by PMC or guniting shall include the cost of all materials, labour, tools and plants, safety measures and all other incidental expenses necessary for completion of work as per specifications for the respective items.

- v) The contract unit rate of earth filling below approach slab shall include the cost of all materials, labour, tools and plants and all other incidental expenses necessary for completion of work as per specifications.
- vi) The contract unit rate for approach slabs shall include the cost of all materials, labour, tools and plants and all other incidental expenses necessary for completion of work as per specifications.
- vii) The contract unit rate for cleaning of bearing shall include the cost of all materials, labour, operations, tools and plants and all other incidental expenses necessary for completion of work as per specifications.
- viii) The contract unit rate for stone pitching shall include the cost of all materials, labour, tools and plants and all other incidental expenses necessary for completion of work as per specifications.

SECTION 3000 MAINTENANCE OF WORK

Clause 3002 RESTORATION OF RAIN CUTS

Clause 3002.1 Scope

The work shall consist of earthwork for restoration of rain cuts in the embankment and shoulders, using suitable material, and compacting the same.

Clause 3002.2 Materials

The materials used for restoration of rain cuts shall consist of soil conforming to clause 305.2.

Clause 3002.3 Construction Operation

The area affected by rain cuts shall be cleared of all loose soil and benched. The width of the benches shall be at least 300mm and they shall extend continuously for a sufficient length the height of the benches shall be in the range of 150-300mm.

Fresh material shall be deposited in layer not exceeding 250mm loose thickness and compacted so as to match with the benching at the moisture content close to the optimum. Compaction shall be carried out using suitable equipment such as plate compactors and rammers or by suitable implements handled manually.

Clause 3002.4 Measurement of Payment

The earthwork for restoration of rain cuts shall be measured in cubic meters.

Clause 3003 MAINTENANCE OF EARTHEN SHOULDER

Clause 3003.1 Scope

The work of maintenance of earth shoulder shall include making up the irregularities/loss of material on shoulder to the design level by adding fresh approved soil and compacting it with appropriate equipment or to strip excess soil from the shoulder surface as per the requirement of this Specification.

Clause 3003.2 Material

The material to be added to the shoulder, if required, shall be a select soil.

Clause 3003.4 Measurement of Payment

Maintenance of earthen shoulder shall be measured in sq. meters.

Clause 3004.2 Filling Pot-holes and Patch Repairs

Clause 3004.2.1 Scope

This work shall include repair of Pot-holes and patching of all types of bituminous pavement.

The work shall include the removal of all failed material, in the pavement courses and, if necessary, below the pavement, until the root cause of the failure is removed; the trimming of the completed excavation to provide firm vertical faces; The replacement of material of at least as high a standard as that which was originally specified for the pavement layer; the painting of tack coat on to the sides and bases of excavations prior of placing of any bituminous materials and the compaction, trimming and finishing of the surfaces of all patches to form a smooth continuous surfaces, level with the surrounding road.

Clause 3004.2.5 Measurement of Pavement

Filling of Pot-holes and patch repair shall be measured in sq. m.



ADDITIONAL TECHNICAL SPECIFICATION

Appendix A-1 :: SPECIFICATION FOR PASSENGER SHELTER

1. Scope

The work consists of providing passenger shelter including seating arrangement as per drawing.

2. Description

2.1 Passenger Shelter

It will be a permanent structure supported on R.C. columns at the corners and having sloped reinforced concrete slab with protrusions on all sides. Panel walls on three sides shall be built with brick jail of 125mm thick set in cement mortar 1:4 (1 part cement : 4 parts sand). It shall have seating arrangement with 100mm thick R.C. slab with raised back with atleast 1.5% reinforcement. The mix of concrete for seating slab and back shall be nominal one with 1:2:4 (1 part cement : 2 parts sand : 4 parts stone chips) and it will be finished with neat cement punning not less than 3mm thickness. The flooring shall be with 75mm thick B.F.S. flooring (1:2:4) over 100mm thick M-10 grade concrete. All walls, ceiling and roof top shall be finished with cement mortar (1:3). The exposed surfaces of the structure shall be painted with two coats of cement based paint of make and brand approved by the Engineer.

3.0 Measurement for Payment

The passenger shelter shall be measured in number of finished constructed structure.

4.0 Rate

The Contract unit rate shall be payment in full for construction of the passenger shelter. Raised footpath, ground preparation etc. shall be considered as incidental to work.

Appendix A-2:: PAINTING OF STRUCTURES WITH SYNTHETIC ENAMEL PAINT FOR NUMBERING & SPAN DETAILS OF BRIGES / CULVERTS AND WATER PROOF CEMENT PAINT FOR PARAPET, RAILING, KERB AND CRASH BARRIER

1. Painting with Synthetic Enamel Paint

Materials

Synthetic enamel paint confirming to IS : 2932 of approved brand and manufacture and of the required colour shall be used for the top coat and an undercoat of ordinary paint of shade to match the top coat as recommended by the same manufacturer as far as top coat shall be used.

Painting on New Surface

Preparation of surface.:

The surface shall be thoroughly cleaned and dusted off. All dirt, mortar droppings and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Engineer after inspection, before painting is commenced..

Application: The number of coats including the undercoat shall be as stipulated in the item.

- (a) **Under coat:** One coat of the specified ordinary paint of shade suited to the shade of the top coat, shall be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.
- (b) **Top Coat:** Two top coats of synthetic enamel paint of desired shade shall be applied after the undercoat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.

Lettering and Numbering on New Surface:

The letters and numbers for bridges/culverts span and number shall be as per IRC-7-1971. The size of area for painting shall be varied depend upon the numbers and letters. The background area and letters/numbers shall be painted with one prime coat (under coat) and two coats(top coat) of synthetic enamel paint.

Measurement for payment:

The painting of culverts /Bridges numbering and span arrangement shall be measured in number of each side facing traffic.

Rate:

Rate shall include the cost of materials, labour and other operation described above to complete set of letters and numbers required in each side facing traffic.

2. Water Proof Cement Painting

Material:

The water proof cement paint shall be (conforming to IS: 5410) of approved brand and manufacture.

The water cement paint shall be brought to the site of work by the contractor in its original container in sealed condition. The material shall be brought in at a time in adequate to suffice for the whole work or at least a fortnight's work, the material be kept in the joint custody of the Contractor and the Engineer-in-Charge. The empties shall not be removed from the site of work till the relevant item of the work has been completed and permission obtained from the Engineer-in-Charge.

Preparation of Surface:

For New work, the surface shall be thoroughly cleaned of all mortar dropping, dirt, dust, algae, grease and other foreign matter by brushing and washing. Pitting in plaster shall be made good and a coat of waterproof cement paint shall be applied over patches after wetting them thoroughly.

Preparation of mix:

Cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish, Cement paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously.

The lids of cement paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement paint rapidly becomes air set due to its hygroscopic qualities.

In case of cement paint brought in gunny bags, once the bag is opened, the contents should be consumed in full on the day of its opening. If the same is not likely to be consumed in full, the balance quantity should be transferred and preserved in an airtight container to avoid its exposure to atmosphere.

Application :

The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application of cement paint shall be as per manufacturer's specification. The completed surface shall be watered after the day's work.

The second coat shall be applied after the first coat has been set for at least 24 hours. Before



application of the second or subsequent coats, the surface of the previous coat shall not be wetted.

For the work, the surface shall be treated with three or more coat of waterproof cement paint as found necessary to get a uniform shade.

For old work, the treatment shall be with one or more coats as found necessary to get a uniform shade.

Precaution:

Water proof cement paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound, varnishes, paints, etc. It shall not be applied on gypsums, wood and metal surfaces.

If water proof cement paint is required to be applied on existing surfaces previously treated with white wash, colour wash, etc., the surface shall be thoroughly cleaned by scrapping off all the white wash, colour was etc., completely. Thereafter, a coat of cement primer shall be applied followed by two or more coats of water proof cement paint.

Measurement for Payment:

The painting shall be measured in square metre of surface area treated.

Rate:

Rate shall include one prime coat and two coats of the paint over the prime coat including cost of all labour and materials involved in all operations described above.



Appendix A-3 :: SPECIFICATION FOR DISMANTLED MATERIAL REUSE IN GRANULAR SUB-BASE

1. Scope

The work consists of reusing the dismantled material in preparing granular sub-base.

2. Materials

The material used for work shall be collected from dismantled material of existing granular layer of road. The dismantled material shall be transported to batching plant to separate the materials of required grading. The finished granular material shall be mixed depending upon the required gradation. Use of materials like brick metal, kankar and crushed concrete shall be permitted in the lower sub-base. The reused material collected from dismantled material shall be free from organic or other deleterious constituents and shall conform to the grading given in Table 400-1.

3.0 Measurement for Payment

The Reused Granular Sub-Base shall be measured separately as finished in position in cubic metres.

4.0 Rate

The Contract unit rate shall be payment in full for carrying out the required operations including full compensations for:

- i.) Making arrangements for traffic to clause 112 except for initial treatment to verges, shoulders and construction of diversions.
- ii.) Supplying all materials to be incorporated in the work including all royalties, fees, rents where applicable with all leads and lifts
- iii.) All labour tools, equipments and incidentals to complete work to the specifications.
- iv.) Carrying out the work in part widths of road where directed: and
- v.) Carrying out the required tests for quality control.



VOLUME - VI

RATE ANALYSIS



SCHEDULE OF RATE



Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
1	02.01/i	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth from 300 mm to 600 mm	Each	388.42
2	02.01/ii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 600 mm to 900 mm	Each	716.32
3	02.01/iii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 900 mm to 1800 mm	Each	1,360.04
4	02.01/iv	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 1800 mm to 2700 mm	Each	2,550.68
5	02.01/v	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 2700 mm	Each	4,287.80
6	02.03/a/i	Clearing and grubbing road land including uprooting rank vegetation, grass, brush shrubs, saplings and trees of girth upto 300 mm, removal of stumps, disposal of unserviceable materials and stacking of serviceable materials and stacking of serviceable materials upto 100m. from road boundary. (by manual means) In area of light jungle	Ha	77,440.00
7	02.03/a/ii	Clearing and grubbing road land including uprooting rank vegetation, grass, brush shrubs, saplings and trees of girth upto 300 mm, removal of stumps, disposal of unserviceable materials and stacking of serviceable materials and stacking of serviceable materials upto 100m. from road boundary. (by manual means) In area of thorny jungle	Ha	103,818.00
8	02.03/b	Clearing and grubbing road land including uprooting rank vegetation, grass, brush shrubs, saplings and trees of girth upto 300 mm, removal of stumps, disposal of unserviceable materials and stacking of serviceable materials and stacking of serviceable materials upto 100m. from road boundary. (by mechanical means)	Ha	59,319.65
9	02.04/i/a	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. a) Lime concrete, cement concrete/lean mix concrete.	cum	591.45

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
10	02.04/i/b	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. b)Cement concrete M15 and M20	cum	693.57
11	02.04/i/c	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. c)Pre- stressed/ Reinforced Cement Concrete grade M20 & above	cum	1,739.01
12	02.04/ii/a	Dismantling Brick / Tile work a)In lime	cum	387.20
13	02.04/ii/b	Dismantling Brick / Tile work b)In cement mortar	cum	489.32
14	02.04/ii/c	Dismantling Brick / Tile work c)In mud	cum	346.35
15	02.04/ii/d	Dismantling Brick / Tile work d)Dry brick pitching or brick saling	cum	325.93
16	02.04/iii/a	Dismantling stone masonry a) Rubble stone masonry in lime	Cum	423.46
17	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar	Cum	489.32
18	02.04/iii/c	Dismantling stone masonry c) Rubble stone masonry in mud	Cum	387.20
19	02.04/iii/d	Dismantling stone masonry d) Dry rubble masonry	Cum	366.78
20	02.04/iii/e	Dismantling stone masonry e) Dismantling stone pitching/dry stone spalls	Cum	423.02
21	02.04/iii/f	Dismantling stone masonry f) In wire crates including opening of crates and stacking crates materials.	Cum	387.20

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
22	02.04/v	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. steel works in all type of sections upto a height of 5m or above plinth level excluding cutting of rivet A) Including Dismembering	cum	2,027.17
23	02.04/vii/a	Removing hume pipes class NP-3 a) 300mm to 600mm dia	rm	264.99
24	02.04/vii/b	Removing hume pipes class NP-4 b) Above 600mm to 900mm dia	rm	358.77
25	02.04/vii/c	Removing hume pipes class NP-5 c) Above 900mm dia	rm	614.08
26	02.04/viii/a	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m a) Top bituminous surface dressing or premix carpet	sqm	41.43
27	02.04/viii/b	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m c) Stone metal crust, 50mm to 100mm thick by road roller with scarifier along with 20mm,premix carpet/surface dressing	sqm	57.31
28	02.04/viii/d	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m d) Kankar/Gravel metal crust upto 150mm thick with pickaxes.	sqm	41.53
29	02.04/viii/e	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m e)Kandar/Gravel metal crust upto 150 mm thick with power Roller with scarifier	sqm	33.99
30	02.04/viii/f /ii	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m f)Bituminous coarses 50-70mm along with premix Carpet and Surface dressing but without disturbing the base ii)With road roller attached with scarifier	sqm	57.08
31	02.06	Dismantling Guard Rails by manual means and disposal of dismantled material with all lifts and up to a lead of 1000 metres, stacking serviceable materials and unserviceable materials separately.	rm	118.94
32	02.08	Removal of Telephone / Electric Poles including excavation and dismantling of foundation concrete and lines under the supervision of concerned department, disposal with all lifts and up to a lead of 1000 metres and stacking the serviceable and unserviceable material separately	each	258.70

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
33	02.4/viii/f/i	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m f)Bituminous coarses 50-70mm along with premix Carpet and Surface dressing but without disturbing the base i)Manual Means	sqm	93.23
34	02/nsc/1	Supplying and laying Hydro Seeding on cutting Surface	sqm	315.00
35	03.01/i/a	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work. Ordinary soil a) Manual Means (Depth upto 3m) a) Manual Means (Depth upto 3m)	cum	408.50
36	03.01/i/b	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work. Ordinary soil b) Mechanical Means (Depth upto 3m) b) Mechanical Means (Depth upto 3m)	cum	105.88
37	03.01/ii/a	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work. Ordinary Rock (not requiring blasting) a) Manual Means (Depth upto 3m) a) Manual Means (Depth upto 3m)	cum	510.60
38	03.01/ii/b	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work. Ordinary Rock (not requiring blasting) b) Mechanical Means b) Mechanical Means	cum	142.33

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
39	03.01/iii/a	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work. Hard Rock (requiring blasting) a) Manual Means a) Manual Means	cum	982.17
40	03.01/iii/b	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work. Hard Rock (requiring blasting) b) Hard Rock (blasting prohibited) Mechanical Means b) Hard Rock (blasting prohibited) Mechanical Means	cum	1,900.61
41	03.01/iv/a	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work. Marshy soil a) Manual Means a) Manual Means	cum	773.37
42	03.01/iv/b	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom, backfilling the excavation earth to the extent required and utilising the remaining earth locally for road work. Marshy soil b) Mechanical Means b) Mechanical Means	cum	269.34
43	03.02/i	Earth work in excavation of foundation trenches etc. in drains and channels etc. not exceeding 2.00 metres depth including dressing of bottom and sides of trenches, stacking the excavated soil clear from the edge of excavation including disposal of surplus soil as directed within a lead of 30.00 metres. Ordinary Soil	cum	326.80
44	03.02/ii/a	Earth work in excavation of foundation trenches etc. in drains and channels etc. not exceeding 2.00 metres depth including dressing of bottom and sides of trenches, stacking the excavated soil clear from the edge of excavation including disposal of surplus soil as directed within a lead of 30.00 metres. Blasting work a) Soft rock a) Soft rock	cum	785.74

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
45	03.02/ii/b	Earth work in excavation of foundation trenches etc. in drains and channels etc. not exceeding 2.00 metres depth including dressing of bottom and sides of trenches, stacking the excavated soil clear from the edge of excavation including disposal of surplus soil as directed within a lead of 30.00 metres. Blasting work b) Hard rock b) Hard rock	cum	1,520.49
46	03.02/iii/a	Earth work in excavation of foundation trenches etc. in drains and channels etc. not exceeding 2.00 metres depth including dressing of bottom and sides of trenches, stacking the excavated soil clear from the edge of excavation including disposal of surplus soil as directed within a lead of 30.00 metres. Chiselling/wedging out of rock (where blasting is prohibited). a) Soft rock a) Soft rock	cum	1,765.25
47	03.02/iii/b	Earth work in excavation of foundation trenches etc. in drains and channels etc. not exceeding 2.00 metres depth including dressing of bottom and sides of trenches, stacking the excavated soil clear from the edge of excavation including disposal of surplus soil as directed within a lead of 30.00 metres. Chiselling/wedging out of rock (where blasting is prohibited). b) Hard rock b) Hard rock	cum	2,647.87
48	03.03/a	Filling in foundation trenches as per drawing and Technical specification a) Sandy Soil	cum	326.10
49	03.03/b	Filling in foundation trenches as per drawing and Technical specification b) Sand Gravel	cum	692.96
50	03.04/i	Earth filling with surplus soil excavated from foundation and taken only from outside of building plinth in 15 cm layers including watering and consolidation lead 30 meters Ordinary Soil	cum	217.49
51	03.12	Construction of Embankment with Material Obtained from Borrow Pits Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2	cum	226.26
52	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2	cum	160.20
53	03.14/Nsc	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from Roadway Cutting with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum	246.28

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
54	03.14	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum	312.34
55	03.15	Compacting original ground supporting subgrade Loosening of the ground upto a level of 500 mm below the subgrade level, watered, graded and compacted in layers to meet requirement of table 300-2 for subgrade construction.	cum	86.65
56	03.16	Compacting original ground supporting embankment Loosening, leveling and compacting original ground supporting embankment to facilitate placement of first layer of embankment, scarified to a depth of 150mm, mixed with water at OMC and then compacted dry rolling so as to achieve minimum dry density as given in Table 300-2 for embankment construction.	cum	42.00
57	03.17	Stripping and Storing Top Soil Stripping, storing of top soil by road side at 15 m internal and re-application on embankment slopes, cut slopes and other areas in localities where the available embankment material is not conducive to plant growth	cum	302.68
58	03.19	Turfing with Sods Furnishing and laying of the live sods of perennial turf forming grass on embankment slope, verges or other locations shown on the drawing or as directed by the engineer including preparation of ground, fetching of sods and watering	sqm	61.87
59	03.31	Excavation in Hill Area in Soil by Mechanical Means Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres	cum	211.39
60	03.32	Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting. Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material with all lift and lead upto 1000 metres	cum	304.56
61	03.33	Excavation in Hilly Areas in Hard Rock Requiring Blasting Excavation in hilly areas in hard rock requiring blasting, by mechanical means including trimming of slopes and disposal of cut material with all lifts and lead upto 1000 metres.	cum	423.10
62	03/nsc/1	Island and Median Filling From Roadway Cutting	cum	108.52
63	04.01/i	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- II Material	Cum	2,949.87
66	04.01/ii	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading-III Material	Cum	2,893.00

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
69	04.01/Nsc1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	2,997.00
72	04.02/i	Sub-base with Close Graded Material (Table:- 400-1) By Mix in Place Method Construction of granular sub-base by providing close graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401 For Grading- II Material	Cum	2,413.12
75	04.02/ii	Sub-base with Close Graded Material (Table:- 400-1) By Mix in Place Method Construction of granular sub-base by providing close graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401 For Grading-III Material	Cum	2,356.25
78	04.03/i	Granular Sub-Base with Coarse Graded Material (Table:- 400- 2) Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401 For Grading- II Material	Cum	2,285.30
80	04.03/ii	Granular Sub-Base with Coarse Graded Material (Table:- 400- 2) Construction of granular sub-base by providing coarse graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401 For Grading-III Material	Cum	2,230.59
82	04.04	Granular Sub-Base with Naturally Occuring Sand Gravel Material Providing, laying, spreading and compacting granular base/sub-base according to lines, grades and cross sections by using naturally occurred sand gravel/conforming to IRC-Grd-II of MOST specification free from organic or other deleterious constituent spreading with motor grader and compacted by rolling with power roller of 8-10 capacity in layers not exceeding 150mm (spread thickness) i/c rolling of the road surface to proper level and grades 30 cm width edging on both side etc. complete as directed by Engineer-in-charge.	Cum	782.55
84	04.06/a	Lime Stabilisation for Improving Subgrade (Laying and spreading available soil in the subgrade on a prepared surface, pulverising, mixing the spread soil in place with rotavator with 3 % slaked lime having minimum content of 70% of CaO, grading with motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved sub grade) By Mechanical Means	Cum	1,652.44

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
85	04.06/b	Lime Stabilisation for Improving Subgrade (Laying and spreading available soil in the subgrade on a prepared surface, pulverising, mixing the spread soil in place with rotavator with 3 % slaked lime having minimum content of 70% of CaO, grading with motor grader and compacting with the road roller at OMC to the desired density to form a layer of improved sub grade) By Manual Means	Cum	1,662.67
86	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	2,063.00
87	05.01/b/a	WBM/Providing, laying, spreading and compacting stone aggregate of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with power roller 8-10 tones in stages to proper grade and camber, applying and brooming requisite type of screening & binding materials to fill up the interstices of coarse aggregates, watering and rolling making necessary earthen bund to protect edges, lighting, guarding, barricading and maintenance of diversion etc.	cum	2,216.15
90	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)	Cum	2,965.34
92	05.03	Construction of footpath/separator by providing a 150 mm compacted granular sub base as per clause 401 and 25 mm thick cement concrete grade M15, over laid with pre-cast concrete tiles in cement mortar including provision of all drainage arrangements but excluding kerb channel.	sqm	1,374.51
96	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm	sqm	57.54
97	06.01/b	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) B) Stabilised Soil Based / Crusher run macadam 0.9 - 1.2kg /sqm	sqm	97.04
98	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm	sqm	15.63
99	06.02/ii	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. ii) On granular Surface Pre treated with prime Coat @ 0.25 - 0.30 kg/sqm	sqm	17.16
100	06.02/iii	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. iii) On cement concrete pavement @ 0.300 - 0.35 kg/sqm	sqm	22.22

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
101	06.06/i	Dense Graded Bituminous Macadam (Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects.) for Grading I (40 mm nominal size) Using bitumen 60/70	cum	10,661.33
104	06.06/ii	Dense Graded Bituminous Macadam (Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects.) for GradingII(19 mm nominal size) Using bitumen 60/70	cum	10,707.15
107	06.08/i/a	Bituminous Concrete (Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects) for Grading-I (19 mm nominal size) A) Using Bitumen 60/70	cum	12,064.76
110	06.08/i/b	Bituminous Concrete (Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects) for Grading-I (19 mm nominal size) B) Using Bitumen CRMB Gr-55	cum	12,622.49

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
111	06.08/i/c	Bituminous Concrete (Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects) for Grading-I (19 mm nominal size) C) Using Bitumen PMB 70	cum	15,913.73
112	06.08/ii/a	Bituminous Concrete (Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects) for Grading-II(13 mm nominal size) A) Using Bitumen 60/70	cum	11,950.36
115	06.08/ii/b	Bituminous Concrete (Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects) for Grading-II(13 mm nominal size) B) Using Bitumen CRMB Gr-55	cum	15,599.71
116	06.08/ii/c	Bituminous Concrete (Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects) for Grading-II(13 mm nominal size) C) Using Bitumen PMB 70	cum	15,898.91
117	06.10/A	Open - Graded Premix Surfacing Providing, laying and rolling of open - graded premix surfacing of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen or cut-back or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a smooth wheeled roller 8-10 tonne capacity, finished to required level and grades. A) Mechanical method using Penetration grade Bitumen and HMP of appropriate capacity not less than 75 tonnes/hour .	Sqm	149.23

Item Rate Analysis has been done considering

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
119	06.10/C	Open - Graded Premix Surfacing Providing, laying and rolling of open - graded premix surfacing of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen or cut-back or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a smooth wheeled roller 8-10 tonne capacity, finished to required level and grades. C)Open-Graded Premix Surfacing using cationic Bitumen Emulsion	Sqm	183.17
121	06.12/I	Providing and laying seal coat sealing in the voids in a bituminous surface laid to the specific levels,grade and cross fall using Type A and B Seal Coats Type A	sqm	67.22
122	06.12/II	Providing and laying seal coat sealing in the voids in a bituminous surface laid to the specific levels,grade and cross fall using Type A and B Seal Coats Type B/Providing and Laying of premix sand seal coat with HMP of appropriate capacity not less than 75 tonnes/hour using crushed stone chipping 6.7mm size and penetration bitumen of suitable grade	sqm	53.67
123	06.16	Mastic Asphalt (Providing and laying 25 mm thick mastic asphalt wearing course with paving grade bitumen meeting the requirements given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine-grained hard stone chipping of 13.2 mm nominal size at the rate of 0.005cum per 10 sqm and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces not less than 1000C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 515.)	sqm	1,182.63
129	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	11,264.00
132	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	12,371.00
135	08.01	Precast Cement concrete M20 Kerb including fixing at site	rm	622.79

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
138	08.02/a	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. a) 5th KM stone	each	4,556.84
142	08.02/b	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. b) Ordinary kilometer stone	each	2,676.24
146	08.02/nsc	M15 stone of standard design fixed in Position including painting and painting letters etc. Hectometer stone (precast)	each	2,269.00
150	08.04	Reinforced Cement Concrete M15 Boundary pillars of standard design, fixed in position including finishing but excluding painting	each	843.03
153	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	93.41
154	08.06	Painting on Steel Surfaces Providing and applying two coats of ready mix paint of approved brand on steel surface after through cleaning of surface to give an even shade	sqm	85.06
155	08.11/i	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm equilateral triangle	each	4,931.35
159	08.11/ii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 60 cm equilateral triangle	each	3,621.96
163	08.11/iii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 60 cm circular	each	4,440.80

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
167	08.11/iv	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 80 mm x 60 mm rectangular	each	5,706.23
171	08.11/v	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 60 cm x 45 cm rectangular	each	4,249.15
175	08.11/vi	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 60 cm x 60 cm square	each	5,200.94
179	08.11/vii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm high octagon	each	8,165.25
183	08.12	Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorised sign as per IRC:67 made of high intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75 x 75 x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing)	sqm	12,223.04
187	08.13	Direction and Place Identification signs with size more than 0.9 sqm size board. (Providing and erecting direction and place identification retro- reflectorised sign as per IRC :67 made of high intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area exceeding 0.9 sqm supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm, 2 Nos. firmly fixed to the ground by means of properly designed foundation with M 15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing)	sqm	12,831.40

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
191	08.14	Road Marking with Hot Applied Thermoplastic Compound with Reflectorisng Glass Beads on Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorisng glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.)	sqm	1,002.14
192	08.15/a	Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming toIRC-79 and the drawings.) a)Cat Eye	Nos	296.53
193	08.15/b	Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming toIRC-79 and the drawings.) b)Median Marker	Nos	545.50
194	08.15/c/v	Road Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming toIRC-79 and the drawings.) 120x120 -Road Delineator	each	1,063.19
195	08.15/f/iii	Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming toIRC-79 and the drawings.) f)Speed Bumps(500mm x 425mm x 75mm)	Piece	3,078.32
196	08.17/nsc	RCC Crash Barrier	m	6,947.00
200	08.18/A/a	Metal Beam Crash Barrier Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810) For post Height of 1.2 m	Rm	2,757.81

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
201	08.18/A/b	Metal Beam Crash Barrier Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810) For post Height of 1.5 m	Rm	3,334.08
202	08.18/A/c	Metal Beam Crash Barrier Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810) For post Height of 1.8 m	Rm	3,591.20
203	08.19	Cable Duct Across the Road Single row for one utility service	m	3,039.00
204	08.20/ii	Road Markers/Road stud with lense reflector Providing & fixing of road stud 100x100 mm, die-cast in aluminium , resistance to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30mm upto a depth of 60mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973 Light Reflecting Lense Type	nos	383.64
205	08.21/i	Road Markers/Road stud with lense reflector Providing & fixing of road stud 100x100 mm, die-cast in aluminium , resistance to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30mm upto a depth of 60mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973 Solar light emitting Diodes	nos	2,595.21
206	08.22	Lighting on Bridges Providing & fixing lighting on Bridges, mounted on steel hollow circular poles of standard specification, 5 m high fixed on parapets with cement concrete, 20 m apart and fitted with sodium vapour lamp	nos	21,165.02
207	08/nsc/2	Convex Mirror For Blind Curve	nos	5,000.00

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
208	08/nsc/4/a	Overhead Signs Providing and erecting overhead signs with a corrosion resistant 2mm thick aluminium alloy sheet reflectorised with high intensity retro-reflective sheeting of encapsulated lense type with vertical and lateral clearance given in clause 802.2 and 802.3 and installed as per clause 802.7 over a designed support system of aluminium alloy or galvanised steel trestles and trusses of sections and type as per structural design requirements and approved plans A)Truss and Vertical Support with Base plate on foundation column.	Ton	183,662.00
209	08/nsc/4/b	Overhead Signs Providing and erecting overhead signs with a corrosion resistant 2mm thick aluminium alloy sheet reflectorised with high intensity retro-reflective sheeting of encapsulated lense type with vertical and lateral clearance given in clause 802.2 and 802.3 and installed as per clause 802.7 over a designed support system of aluminium alloy or galvanised steel trestles and trusses of sections and type as per structural design requirements and approved plans B)Aluminium Alloy Plate for Over Head Sign	sqm	695.00
210	08/nsc/5	Reinforced Cement Concrete Crash Barrier-Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with M-40 grade concrete with HYSD reinforcement conforming to IRC:21 and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified	m	6,927.00
211	08/nsc/6	Rumble Strips Provision of 15 nos rumble strips covered with premix bituminous carpet, 15-20 mm high at center, 250 mm wide placed at 1 m center to center at approved locations to control speed, marked with white strips of road marking paint.	sqm	1,224.98
212	09.01/nsc1	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row . B)1200 mm dia	Rm	11,638.00
215	10.02/Nsc	Plain cement concrete M-15 mix with stone aggregate 20mm. Nominal size mechanically mixed and vibrated in foundation depth of 1.5m. below ground / bed level and or 1.5m. above ground/bed level i/c formwork. At Protection	cum	7,496.35
218	10.06/a	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Sub-Structure	Ton	72,983.59
219	10.06/b	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Super-Structure	Ton	72,983.59
220	10.11	Random rubble masonry (uncoursed) in cement sand mortar 1:3 in foundation upto a depth of 1.5m. and 1.5m. above ground/bed level.	cum	5,662.85
221	10.16	Cement Plaster 12mm Thick in Cement Morter 1:3	sqm	223.49

Item Rate Analysis has been done considering

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
222	10.19	Dry Boulder pitching	cum	1,701.75
223	10.20/a	Providing and filling in foundation trenches and at the back of abutments, wing walls etc. and below pipe bed in layers not exceeding 150mm thick including watering and compacting a)Good Sandy Soil free from organic material	cum	785.50
224	10.20/b	Providing and filling in foundation trenches and at the back of abutments, wing walls etc. and below pipe bed in layers not exceeding 150mm thick including watering and compacting b)Selected Granular Material in Filling	cum	1,174.31
225	10.20/c	Providing and filling in foundation trenches and at the back of abutments, wing walls etc. and below pipe bed in layers not exceeding 150mm thick including watering and compacting c)Filler Media behind abutment ,wing and return wall	cum	1,157.28
226	10.20	Plain cement concrete M-15 mix with stone aggregate 20mm. Nominal size mechanically mixed and vibrated in foundation depth of 1.5m. below ground / bed level and or 1.5m. above ground/bed level i/c formwork.	cum	7,496.35
229	10.23/a	Reinforced Cement Concrete M-30 Mixed with Stone aggregate 20 mm nominal soze mechanical mixed and vibrated for reinforced concrete work in slab excluding steel reinforcement but including centering and shuttering and laied in position. a)For Sub-Structure	cum	14,404.16
232	10.23/b	Reinforced Cement Concrete M-30 Mixed with Stone aggregate 20 mm nominal soze mechanical mixed and vibrated for reinforced concrete work in slab excluding steel reinforcement but including centering and shuttering and laied in position. b)For Super-Structure	cum	14,404.16
235	10.24/a	Laying Reinforced Cement Concrete Pipe(Hume Pipe)/Prestressed Concrete Pipe on First Class Beading in Single ROW(Cost of NP 4 To be Paid Seperately). This includes fixing collar with cement mortar 1:2 but excluding excavation,protection works,backfilling,concrete and masonry works in heads walls and parapet a)1000 mm dia	m	711.07
236	10.24/b	Laying Reinforced Cement Concrete Pipe(Hume Pipe)/Prestressed Concrete Pipe on First Class Beading in Single ROW(Cost of NP 4 To be Paid Seperately). This includes fixing collar with cement mortar 1:2 but excluding excavation,protection works,backfilling,concrete and masonry works in heads walls and parapet b)1200 mm dia	m	877.98
237	12/Nsc1	Geo-synthetics and Reinforced Earth With reinforcing elements of synthetic geogrids	Sqm	512.00
238	12/Nsc2	Geo-synthetics and Reinforced Earth Facing elements of RCC	Sqm	3,873.00
242	23/Nsc1	560 mm Dia cover with frame(Heavy Duty)[Ref: Delhi CPWD SOR 2007 Code 3860]	Nos	9,160.80

Item Rate Analysis has been done considering

Schedule Of Rate

SI No	SOR Ref	Item description	Unit	SOR Rate
243	23/Nsc2	Rectangular shape 600x450 mm precast R.C.C. manhole cover(CPWD; Delhi SOR 2014)	Each	958.00
244	24/i/b	Galvanised Mild steel J /L hook	kg	120.00
245	40	Gextextile material (fine net)	sqm	25.50
246	9.2/b/Nsc	Laying Reinforced Cement Concrete Pipe(Hume Pipe)/Prestressed Concrete Pipe on First Class Bedding in Single ROW(Cost of NP 4 To be Paid Separately). This includes fixing collar with cement mortar 1:2 but excluding excavation,protection works,backfilling,concrete and masonry works in heads walls and parapet b)1200 mm dia	m	11,638.00

LEAD CHART



Leads for Various Materials

Sl. No.	Name of Material	Name of Source	Distance from Source to Mid Point of Project Road (Km)	Approach Road (Km)	Total Lead (Km)
1	Sand (Fine)	Noney	21.53	2	23.53
2	Filling Material	Local	-	-	10.00
3	Stone Metal	Noney	21.53	2	23.53
4	Stone Boulder	Barak	59.47	2	61.47
5	Stone Chips, Aggregate	Barak	59.47	2	61.47
6	Coarse Sand	Noney	21.53	2	23.53
7	Cement	Imphal	85.53	-	85.53
8	Steel	Imphal	85.53	-	85.53
9	Bitumen	Imphal	85.53	-	85.53
10	Bitumen Emulsion	Imphal	85.53	-	85.53
11	Structural Steel	Imphal	85.53	-	85.53
12	RCC Pipe	Imphal	85.53	-	85.53



Carriage Cost



Carriage Cost of Material (Including loading & unloading)

Rubbish

Name of Quarries Local
Lead Upto Site (Km)= 10

Lead Upto Site (km)– 10						
Sl.No.	Lead (km)	Kilometer	Unit	Carriage (Km)	Rate (Rs)	Cost of Carriage (In Rs)
1	10.00	Upto 1	per m ³		163.65	
		Upto 2	per m ³		190.55	
		Upto 3	per m ³		216.97	
		Upto 4	per m ³		242.32	
		Upto 5	per m ³	5	266.68	266.68
		for Every km beyond 5 km up to 10 km	per m ³	5	26.51	132.55
					Total	399.23

Stone aggregate below 40mm nominal size

Name of Quarries Noney
Lead Upto Site (Km)= 23.53

Sl.No.	Lead in km	Kilometer	Unit	Carriage (Km)	Rate (Rs)	Cost of Carriage (In Rs)
2	23.53	Upto 1	per m ³		156.35	
		Upto 2	per m ³		182.05	
		Upto 3	per m ³		207.29	
		Upto 4	per m ³		231.51	
		Upto 5	per m ³	5	254.79	254.79
		for Every km beyond 5 km up to 10 km	per m ³	5	25.33	126.65
		for Every km beyond10 km up to 20 km	per m ³	10	20.42	204.20
		for Every km beyond 20 km	per m ³	3.53	16.51	58.28
					Total	643.92

Sand

Name of Quarries Noney
Lead Upto Site (Km)= 23.53

Sl.No.	Lead in km	Kilometer	Unit	Carriage (Km)	Rate (Rs)	Cost of Carriage (In Rs)
3	23.53	Upto 1	per m ³		156.35	
		Upto 2	per m ³		182.05	
		Upto 3	per m ³		207.29	
		Upto 4	per m ³		231.51	
		Upto 5	per m ³	5	254.79	254.79
		for Every km beyond 5 km up to 10 km	per m ³	5	25.33	126.65
		for Every km beyond10 km up to 20 km	per m ³	10	20.42	204.20
		for Every km beyond 20 km	per m ³	3.53	16.51	58.28
					Total	643.92

Boulder

Name of Quarries Barak
Lead Upto Site (Km)= 61.47



Sl.No.	Lead in km	Kilometer	Unit	Carriage	Rate (Rs)	Cost of Carriage (In Rs)
4	61.47	Upto 1	per m ³		173.23	
		Upto 2	per m ³		201.95	
		Upto 3	per m ³		229.94	
		Upto 4	per m ³		256.81	
		Upto 5	per m ³	5	282.63	282.63
		for Every km beyond 5 km up to 10 km	per m ³	5.00	28.10	140.50
		for Every km beyond10 km up to 20 km	per m ³	10.00	22.65	226.50
		for Every km beyond 20 km	per m ³	41.47	18.31	759.34
					Total	1408.97

Cement, Steel

Name of Quarries

Imphal

Lead Upto Site (Km)=

85.53

Sl.No.	Lead in km	Kilometer	Unit	Carriage	Rate (Rs)	Cost of Carriage (In Rs)
5	85.53	Upto 1	per Tone		112.15	
		Upto 2	per Tone		130.59	
		Upto 3	per Tone		148.70	
		Upto 4	per Tone		166.07	
		Upto 5	per Tone	5	182.77	182.77
		for Every km beyond 5 km up to 10 km	per Tone	5	18.17	90.85
		for Every km beyond10 km up to 20 km	per Tone	10	14.65	146.50
		for Every km beyond 20 km	per Tone	65.53	11.84	775.86
					Total	1195.98

Bitumen

Name of Quarries

Imphal

Lead Upto Site (Km)=

85.53

Sl.No.	Lead in km	Kilometer	Unit	Carriage	Rate (Rs)	Cost of Carriage (In Rs)
6	85.53	Upto 1	per Tone		112.15	
		Upto 2	per Tone		130.59	
		Upto 3	per Tone		148.70	
		Upto 4	per Tone		166.07	
		Upto 5	per Tone	5	182.77	182.77
		for Every km beyond 5 km up to 10 km	per Tone	5	18.17	90.85
		for Every km beyond10 km up to 20 km	per Tone	10	14.65	146.50
		for Every km beyond 20 km	per Tone	65.53	11.84	775.86
					Total	1195.98

PIPE

300 mm Dia RCC Pipe from Imphal

Lead Upto Site (Km)=

85.53

Sl.No.	Lead in km	Kilometer	Unit	Carriage	Rate (Rs)	Cost of Carriage (In Rs)
7	85.53	upto 5	Rm	5	18.73	18.73
		for Every km beyond 5 km up to 10 km	Rm	5	1.86	9.30
		for Every km beyond 10 km up to 20 km	Rm	10	1.50	15.00
		for Every km beyond 20 km	Rm	65.53	1.21	79.29
						122.32



CARRIAGE COST



FINISHER RATE**Road Works**

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
1	02.01/i	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth from 300 mm to 600 mm	Each	388.42					0.00	392.3
2	02.01/ii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 600 mm to 900 mm	Each	716.32					0.00	723.4
3	02.01/iii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 900 mm to 1800 mm	Each	1,360.04					0.00	1,373.6
4	02.01/iv	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 1800 mm to 2700 mm	Each	2,550.68					0.00	2,576.1

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
5	02.01/v	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 2700 mm	Each	4,287.80					0.00	4,330.6
6	02.03/b	Clearing and grubbing road land including uprooting rank vegetation, grass, brush shrubs, saplings and trees of girth upto 300 mm, removal of stumps, disposal of unserviceable materials and stacking of serviceable materials and stacking of serviceable materials upto 100m. from road boundary. (by mechanical means)	Ha	59,319.65					0.00	59,912.8
7	02.04/i/c	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. c)Pre- stressed/ Reinforced Cement Concrete grade M20 & above	cum	1,739.01					0.00	1,756.4
8	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar	Cum	489.32					0.00	494.2
9	02.04/vii/a	Removing hume pipes class NP-3 a) 300mm to 600mm dia	rm	264.99					0.00	267.6

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
10	02.04/vii/b	Removing hume pipes class NP-4 b) Above 600mm to 900mm dia	rm	358.77					0.00	362.3
11	02.04/vii/c	Removing hume pipes class NP-5 c) Above 900mm dia	rm	614.08					0.00	620.2
12	02.04/viii/e	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m e)Kandar/Gravel metal crust upto 150 mm thick with power Roller with scarifier	sqm	33.99					0.00	34.3
13	02.04/viii/f /ii	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m f)Bituminous coarses 50-70mm along with premix Carpet and Surface dressing but without disturbing the base ii)With road roller attatched with scarifier	sqm	57.08					0.00	57.6
14	02/nsc/1	Supplying and laying Hydro Seeding on cutting Surface	sqm	315.00					0.00	318.1

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
15	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2	cum	160.20					0.00	161.8
16	03.14/Nsc	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from Roadway Cutting with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum	246.28					0.00	248.7
17	03.14	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum	312.34					0.00	315.4
18	03.15	Compacting original ground supporting subgrade Loosening of the ground upto a level of 500 mm below the subgrade level, watered, graded and compacted in layers to meet requirement of table 300-2 for subgrade construction.	cum	86.65					0.00	87.5

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Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
19	03.31	Excavation in Hill Area in Soil by Mechanical Means Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres	cum	211.39					0.00	213.5
20	03.32	Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting. Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material with all lift and lead upto 1000 metres	cum	304.56					0.00	307.6
21	04.01/Nsc1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	2,997.00					817.78	3,852.9
					Course Sand	0.380	cum	643.92		
					Stone	0.250	cum	643.92		
					Chips/Aggregate					
					Stone Metal Cat1	0.640	cum	643.92		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
22	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	2,063.00					0.00	2,083.6
23	05.01/b/a	WBM/Providing, laying, spreading and compacting stone aggregate of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with power roller 8-10 tones in stages to proper grade and camber, applying and brooming requisite type of screening & binding materials to fill up the interstices of coarse aggregates, watering and rolling making necessary earthen bund to protect edges, lighting, guarding, barricading and maintenance of diversion etc.	cum	2,216.15					965.62	3,213.5
					binder	0.080	Ton	399.23		
					Stone	0.240	cum	643.92		
					Chips/Aggregate					
					Stone Metal Cat1	1.210	cum	643.92		

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Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
24	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)	Cum	2,965.34					849.97	3,853.4
					Course Sand	0.396	cum	643.92		
					Stone Metal Cat1	0.924	cum	643.92		
25	05.03	Construction of footpath/separator by providing a 150 mm compacted granular sub base as per clause 401 and 25 mm thick cement concrete grade M15, over laid with pre-cast concrete tiles in cement mortar including provision of all drainage arrangements but excluding kerb channel.	sqm	1,374.51					172.11	1,562.0
					Cement	0.012	Ton	1,195.98		
					Sand	0.064	cum	643.92		
					Stone	0.112	cum	643.92		
					Chips/Aggregate					
					Stone Metal Cat1	0.069	cum	643.92		
26	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm	sqm	57.54					0.84	58.9
					Bitumen Emulsion	0.001	Ton	1,195.98		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
27	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm	sqm	15.63	Bitumen Emulsion	0.000	Ton	1,195.98	0.24	16.0
28	06.02/ii	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. ii) On granular Surface Pre treated with prime Coat @ 0.25 - 0.30 kg/sqm	sqm	17.16	Bitumen Emulsion	0.000	Ton	1,195.98	0.30	17.6
29	06.10/A	Open - Graded Premix Surfacing Providing, laying and rolling of open - graded premix surfacing of 20 mm thickness composed of 13.2 mm to 5.6 mm aggregates either using penetration grade bitumen or cut-back or emulsion to required line, grade and level to serve as wearing course on a previously prepared base, including mixing in a suitable plant, laying and rolling with a smooth wheeled roller 8-10 tonne capacity, finished to required level and grades. A) Mechanical method using Penetration grade Bitumen and HMP of appropriate capacity not less than 75 tonnes/hour .	Sqm	149.23	Aggregate Bitumen 30/40	0.027 0.001	cum Ton	643.92 1,195.98	19.13	170.0

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
30	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	11,264.00					1,067.60	12,454.9
					Aggregate	1.440	cum	643.92		
					Bitumen 30/40	0.104	Ton	1,195.98		
					Filler	0.040	Ton	399.23		
31	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	12,371.00					1,105.00	13,610.7
					Aggregate	1.456	cum	643.92		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
					Bitumen 30/40	0.130	Ton	1,195.98		
					Filler	0.030	Ton	399.23		
32	08.02/a	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. a) 5th KM stone	each	4,556.84					474.58	5,081.7
					Cement	0.108	Ton	1,195.98		
					Sand	0.176	cum	643.92		
					Steel	0.004	Ton	1,195.98		
					Stone	0.353	cum	643.92		
					Chips/Aggregate					
33	08.02/b	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. b) Ordinary kilometer stone	each	2,676.24					324.52	3,030.7
					Cement	0.074	Ton	1,195.98		
					Sand	0.121	cum	643.92		
					Steel	0.002	Ton	1,195.98		
					Stone	0.242	cum	643.92		
					Chips/Aggregate					
34	08.04	Reinforced Cement Concrete M15 Boundary pillars of standard design, fixed in position including finishing but excluding painting	each	843.03					1,200.65	2,064.1
					Sand	0.566	cum	643.92		
					Steel	0.080	Ton	1,195.98		
					Stone	1.150	cum	643.92		
					Chips/Aggregate					

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
35	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	93.41					0.00	94.3
36	08.11/i	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm equilateral triangle	each	4,931.35					479.45	5,464.9
					Cement	0.033	Ton	1,195.98		
					Sand	0.540	cum	643.92		
					Steel	0.019	Ton	1,195.98		
					Stone	0.108	cum	643.92		
					Chips/Aggregate					
37	08.11/iii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 60 cm circular	each	4,440.80					479.45	4,969.4

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
					Cement	0.033	Ton	1,195.98		
					Sand	0.540	cum	643.92		
					Steel	0.019	Ton	1,195.98		
					Stone	0.108	cum	643.92		
					Chips/Aggregate					
38	08.11/iv	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 80 mm x 60 mm rectangular	each	5,706.23					479.45	6,247.5
					Cement	0.033	Ton	1,195.98		
					Sand	0.540	cum	643.92		
					Steel	0.019	Ton	1,195.98		
					Stone Chips	0.108	cum	643.92		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
39	08.11/vii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm high octagon	each	8,165.25					479.45	8,731.1
					Cement	0.033	Ton	1,195.98		
					Sand	0.540	cum	643.92		
					Steel	0.019	Ton	1,195.98		
					Stone	0.108	cum	643.92		
					Chips/Aggregate					
40	08.12	Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorised sign as per IRC:67 made of high intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75 x 75 x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing)	sqm	12,223.04					185.27	12,532.3
					Cement	0.037	Ton	1,195.98		
					Sand	0.060	cum	643.92		
					Steel	0.021	Ton	1,195.98		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
					Stone Chips/Aggregate	0.120	cum	643.92		
41	08.14	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads on Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.)	sqm	1,002.14					0.00	1,012.1
42	08.15/c/v	Road Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming to IRC-79 and the drawings.) 120x120 -Road Delineator	each	1,063.19					0.00	1,073.8

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
43	08.18/A/b	Metal Beam Crash Barrier Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810) For post Height of 1.5 m	Rm	3,334.08					0.00	3,367.4
44	08.20/ii	Road Markers/Road stud with lense reflector Providing & fixing of road stud 100x100 mm, die-cast in aluminium , resistance to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30mm upto a depth of 60mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973 Light Reflecting Lense Type	nos	383.64					0.00	387.4
45	08.22	Lighting on Bridges Providing & fixing lighting on Bridges, mounted on steel hollow circular poles of standard specification, 5 m high fixed on parapets with cement concrete, 20 m apart and fitted with sodium vapour lamp	nos	21,165.02					0.00	21,376.6

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

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FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
46	08/nsc/5	Reinforced Cement Concrete Crash Barrier-Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with M-40 grade concrete with HYSD reinforcement conforming to IRC:21 and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified	m	6,927.00					0.00	6,996.2
47	08/nsc/6	Rumble Strips Provision of 15 nos rumble strips covered with premix bituminous carpet, 15-20 mm high at center, 250 mm wide placed at 1 m center to center at approved locations to control speed, marked with white strips of road marking paint.	sqm	1,224.98					0.00	1,237.2
48	09.01/nsc1	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row . B)1200 mm dia	Rm	11,638.00	Aggregate	0.400	cum	643.92	268.90	12,025.9
					Cement	0.006	Ton	1,195.98		
					Course Sand	0.007	cum	643.92		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
49	10.06/a	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Sub-Structure	Ton	72,983.59	Steel	1.050	Ton	1,195.98	1,255.78	74,981.7
50	10.06/b	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Super-Structure	Ton	72,983.59	Steel	1.050	Ton	1,195.98	1,255.78	74,981.7
51	10.16	Cement Plaster 12mm Thick in Cement Mortar 1:3	sqm	223.49					0.00	225.7
52	10.19	Dry Boulder pitching	cum	1,701.75	Stone Bolder	1.200	cum	1,408.97	1,690.76	3,426.4
53	10.20/b	Providing and filling in foundation trenches and at the back of abutments, wing walls etc. and below pipe bed in layers not exceeding 150mm thick including watering and compacting b)Selected Granular Material in Filling	cum	1,174.31	Stone Chips/Aggregate	1.200	cum	643.92	772.70	1,966.4
54	10.20/c	Providing and filling in foundation trenches and at the back of abutments, wing walls etc. and below pipe bed in layers not exceeding 150mm thick including watering and compacting c)Filler Media behind abutment ,wing and return wall	cum	1,157.28					772.70	1,949.2

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

FINISHER RATE

Road Works

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
					Stone Chips/Aggregate	1.200	cum	643.92		
55	10.20	Plain cement concrete M-15 mix with stone aggregate 20mm. Nominal size mechanically mixed and vibrated in foundation depth of 1.5m. below ground / bed level and or 1.5m. above ground/bed level i/c formwork.	cum	7,496.35	Aggregate	0.850	cum	643.92	1,231.77	8,815.4
					Cement	0.330	Ton	1,195.98		
					Sand	0.450	cum	643.92		
56	24/i/b	Galvanised Mild steel J /L hook	kg	120.00					0.00	121.2
57	40	Gextextile material (fine net)	sqm	25.50					0.00	25.7

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

FINISHER RATE**Minor Bridge**

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
1	13.01/a/i/N sc	Earth work in excavation Ordinary soil For Protection Work	cum	218.93					0.00	221.1
2	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	218.93					0.00	221.1
3	13.01/b/ii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary rock if blasting is not resorted to	cum	209.22					0.00	211.3
4	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	1,007.86	Stone Chips/Aggregate	1.200	cum	643.92	772.70	1,798.3

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Minor Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
5	13.03/b	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Good Sandy Soil free from organic material	cum	617.02	Sand	1.200	cum	643.92	772.70	1,403.6
6	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	1,274.65	Stone Chips/Aggregate	1.200	cum	643.92	772.70	2,067.8
7	13/nsc1	Confirmatory Boring in Soil	cum	2,000.00					0.00	2,020.0
8	13/nsc2	Confirmatory Boring in Hard Rock	cum	4,000.00					0.00	4,040.0
9	14.01	Brick masonry work in cement mortar 1:3 in foundation complete excluding pointing and plastering, as per drawing and technical specifications	cum	11,849.87					0.00	11,968.3
10	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	6,306.36	Cement	0.170	Ton	1,195.98	1,143.44	7,524.3

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Minor Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
					Sand	0.300	cum	643.92		
					Stone Metal Cat1	1.160	cum	643.92		
11	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	8,348.21					1,231.77	9,675.7
					Aggregate	0.850	cum	643.92		
					Cement	0.330	Ton	1,195.98		
					Sand	0.450	cum	643.92		
12	14.03/b	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M20 Grade	cum	9,333.75					1,323.76	10,764.0
					Aggregate	0.900	cum	643.92		
					Cement	0.380	Ton	1,195.98		
					Sand	0.450	cum	643.92		
13	14.03/e/II	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M25Grade	cum	9,077.25					1,359.64	10,541.2
					Aggregate	0.900	cum	643.92		
					Cement	0.410	Ton	1,195.98		
					Sand	0.450	cum	643.92		
14	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	77,427.65					1,255.78	79,470.2

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Minor Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
					Steel	1.050	Ton	1,195.98		
15	14/nsc2	Brick Flat Soling at Foundation	Sqm	1,077.89					40.00	1,129.0
					Brick	1.000	Sqm	40.00		
16	15.01	Brick masonry work in cement mortar 1:3 in Sub-structure complete excluding pointing and plastering, as per drawing and technical specifications	cum	11,961.59					0.00	12,081.2
17	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	6,787.85					1,143.44	8,010.6
					Cement	0.170	Ton	1,195.98		
					Sand	0.300	cum	643.92		
					Stone Metal Cat1	1.160	cum	643.92		
18	15.03/b/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade Upto 5m	cum	9,067.33					1,280.71	10,451.5
					Cement	0.344	Ton	1,195.98		
					Sand	0.450	cum	643.92		
					Stone	0.900	cum	643.92		
					Chips/Aggregate					

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Minor Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
19	15.03/f/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M25 Grade upto 5m height	cum	9,938.25	Cement	0.403	Ton	1,195.98	1,351.27	11,402.4
					Sand	0.450	cum	643.92		
					Stone Chips/Aggregate	0.900	cum	643.92		
20	15.03/i/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M40 Grade upto 5m height	cum	11,992.30					0.00	12,112.2
21	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	77,427.65	Steel	1.050	Ton	1,195.98	1,255.78	79,470.2
22	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	445.75	Cement	0.001	Ton	1,195.98	2.24	452.4
					Sand	0.002	cum	643.92		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

FINISHER RATE

Minor Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
23	16.01/a/i	cement concrete Reinforced concrete in super-structure as per drawing and Technical Specification i/c form work complete as per drawing and technical specification RCC Grade M25 For solid slab super-structure Upto 5m Upto 5m	cum	10,446.36					1,348.97	11,913.2
					Cement	0.400	Ton	1,195.98		
					Course Sand	0.452	cum	643.92		
					Stone Chips/Aggregate	0.900	cum	643.92		
24	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	85,183.86					1,255.78	87,304.0
					Steel	1.050	Ton	1,195.98		
25	16.11	Drainage Spouts complete as per drawing and Technical specification	each	2,158.99					4.78	2,185.4
					Structural Steel	0.004	Ton	1,195.98		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Minor Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
26	16.17	Mastic asphalt (providing and laying 12mm thick mastic asphalt wearing courses on top of deck slab excluding prime coat with paving grade bitumen meeting the requirement given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 9.5 mm nominal size at the rate of 0.005cum per 10sqm and at an approximate spacing of 10cm centre in both direction, pressed into surface not less than 100 deg. C. protruding 1mm to 4mm over mastic surface, all complete as per clause 515) using Bitumen VG-40 (3/40)	sqm	532.56					14.04	552.0
					Bitumen	0.003	Ton	1,195.98		
					Lime	0.005	Ton	399.23		
					Stone Chips/Aggregate	0.014	cum	643.92		
27	16/nsc	For Protection Work - cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade upto 5m height	cum	9,067.33					1,280.71	10,451.5
					Cement	0.344	Ton	1,195.98		
					Sand	0.450	cum	643.92		
					Stone Chips/Aggregate	0.900	cum	643.92		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Minor Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
28	17.02	Filter material underneath pitching in slopes complete as per drawing and Technical specification	cum	2,426.95	Aggregate	1.200	cum	643.92	772.70	3,231.6
29	17/nsc1	Flexible Apron - Construction of flexible apron 750mm thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.	cum	1,638.00	Stone Bolder	1.200	cum	1,408.97	1,690.76	3,362.0

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

FINISHER RATE**Major Bridge**

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	218.93					0.00	221.1
2	13.01/a/ii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth 3 m to 6 m	cum	294.28					0.00	297.2
3	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	1,007.86	Stone Chips/Aggregate	1.200	cum	643.92	772.70	1,798.3
4	13.03/b	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Good Sandy Soil free from organic material	cum	617.02	Sand	1.200	cum	643.92	772.70	1,403.6
5	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	1,274.65					772.70	2,067.8

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD, Manipur)



FINISHER RATE

Major Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
					Stone Chips/Aggregate	1.200	cum	643.92		
6	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	8,348.21	Aggregate	0.850	cum	643.92	1,231.77	9,675.7
					Cement	0.330	Ton	1,195.98		
					Sand	0.450	cum	643.92		
7	14.03/g	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M30 Grade	cum	10,966.06	Aggregate	0.860	cum	643.92	1,368.85	12,458.2
					Cement	0.450	Ton	1,195.98		
					Sand	0.430	cum	643.92		
8	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	77,427.65	Steel	1.050	Ton	1,195.98	1,255.78	79,470.2
9	14/nsc1/i	Filler joint i)Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.	m	2,060.00					0.00	2,080.6

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

FINISHER RATE

Major Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
10	14/nsc1/ii	Filler joint Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.	m	698.00					0.00	704.9
11	14/nsc1/iii	Filler joint iii)Providing and fixing in position 20 mm thick premoulded joint filler in expansion joint for fixed ends of simply supported spans not exceeding 10 m to cater for a horizontal movement upto 20 mm, covered with sealant complete as per drawing and technical specifications.	m	223.00					0.00	225.2
12	14/nsc1/iv	Filler joint iv)Providing and filling joint sealing compound as per drawings and technical specifications with coarse sand and 6 per cent bitumen by weight.	m	36.00					0.00	36.3
13	15.03/g/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M30 Grade upto 5m height	cum	11,786.08					1,356.06	13,273.5
					Aggregate	0.900	cum	643.92		
					Cement	0.407	Ton	1,195.98		
					Sand	0.450	cum	643.92		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

FINISHER RATE

Major Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
14	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	77,427.65	Steel	1.050	Ton	1,195.98	1,255.78	79,470.2
15	15.09	Supplying, fitting and fixing in position true to line and level elastomeric bearing conforming to IRC: 83 (Part-II) section IX and clause 2005 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications.	cc	3.19					0.00	3.2
16	15.10	Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, complete assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC: 83 part-I & II respectively and other parts conforming to BS: 5400, section 9.1 & 9.2 and clause 2006 of MoRTH Specifications complete as per drawing and approved technical specifications.	Ton	505.27					0.00	510.3
17	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	445.75	Cement Sand	0.001 0.002	Ton cum	1,195.98 643.92	2.24	452.4

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

FINISHER RATE

Major Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
18	16.01/b/i/c 2/ii	RCC Grade M30 For solid slab super-structure Approach Slab	cum	13,287.15					0.00	13,420.0
19	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	85,183.86	Steel	1.050	Ton	1,195.98	1,255.78	87,304.0
20	16.05	Cement concrete wearing coat M-30 grade including reinforcement complete as per drawing and Technical Specifications	cum	18,782.51	Aggregate	0.860	cum	643.92	1,368.85	20,352.8
					Cement	0.450	Ton	1,195.98		
					Course Sand	0.430	cum	643.92		
21	16.08	Reinforced concrete railing of M30 Grade complete as per approved drawings and technical specification	Rm	2,711.68	Cement	0.035	Ton	1,195.98	137.53	2,877.7
					Sand	0.039	cum	643.92		
					Steel	0.018	Ton	1,195.98		
					Stone	0.077	cum	643.92		
					Chips/Aggregate					

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Major Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
22	16.11	Drainage Spouts complete as per drawing and Technical specification	each	2,158.99	Structural Steel	0.004	Ton	1,195.98	4.78	2,185.4
23	16.12/Nsc	Reinforced cement concrete approach slab M-30 including reinforcement and formwork complete as per drawing and Technical specification	cum	15,325.00	Aggregate	0.900	cum	643.92	2,603.46	18,107.7
					Cement	0.400	Ton	1,195.98		
					Course Sand	0.450	cum	643.92		
					Steel	1.050	Ton	1,195.98		
24	16.13	PCC M15 ordinary Grade leveling course below approach slab complete as per drawing and Technical specification Below Approach Slab	cum	8,109.93	Cement	0.275	Ton	1,195.98	1,198.55	9,401.5
					Sand	0.450	cum	643.92		
					Stone Chips/Aggregate	0.900	cum	643.92		
25	16.16	Providing single gap(unitary) strip/seal type of expansion joint of movement capacity of 80 mm with fatigue tested structure section at the nosing and ancourage assembly complete as per approved drawing and standard specification to be installed under supervision of a specialist manufacture	Rm	41,863.77					0.00	42,282.4

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



FINISHER RATE

Major Bridge

SI No	State SOR Ref	Item description	Unit	SOR Rate	Material	Material Qty/Unit	Material Unit	Material Carr Cost	Carriage Cost	Finished Rate
26	16.17	Mastic asphalt (providing and laying 12mm thick mastic asphalt wearing courses on top of deck slab excluding prime coat with paving grade bitumen meeting the requirement given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 9.5 mm nominal size at the rate of 0.005cum per 10sqm and at an approximate spacing of 10cm centre in both direction, pressed into surface not less than 100 deg. C. protruding 1mm to 4mm over mastic surface, all complete as per clause 515) using Bitumen VG-40 (3/40)	sqm	532.56					14.04	552.0
					Bitumen	0.003	Ton	1,195.98		
					Lime	0.005	Ton	399.23		
					Stone Chips/Aggregate	0.014	cum	643.92		
27	17.01/a	laying apron complete as per drawing and Technical specification. Boulder	cum	2,280.25					1,690.76	4,010.7
					Stone Bolder	1.200	cum	1,408.97		

**Note: Finished Rate inclusive of 1% Labour Cess

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)



NON SCHEDULE ITEM



NON SCHEDULE ITEM



Analysis of Non-Schedule Rate							
SUB-BASES, BASES (NON- BITUMINOUS) AND SHOULDERS							
Sr No	Ref. to MoRTH Spec.		Description	Unit	Quantity	Rate Rs	Cost Rs
4.1	401		Granular Sub-Base with Close Graded Material (Table:- 400-1) (Material Reuse)				
		A	Plant Mix Method				
			Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on				
			Unit = cum				
			Taking output = 225 cum (450 tonne)				
			a) Labour				
			Mate	day	0.400	550.000	220.00
			Mazdoor skilled	day	2.000	450.000	900.00
			Mazdoor Unskilled	day	8.000	400.000	3200.00
			b) Machinery				
			Wet mix plant @ 60 tonne capacity per hour	hour	6.000	5362.583	32175.50
			Electric generator 160 KVA	hour	6.000	2202.500	13215.00
			Water tanker	hour	4.500	992.333	4465.50
			Excavator Cum Loader	hour	6.000	1755.333	10532.00
			Tipper 6.5-10 tonne	tonne.	450 x L	63.897	258782.51
			Add 10 per cent of cost of carriage to cover loading and unloading				25878.25
			Motor Grader (BEML-092)	hour	6.000	5049.167	30295.00
			Vibratory roller 8-10 t	hour	6.000	1743.333	10460.00
			c) Material				
			Close graded Granular sub-base Material as per table 400-1				
			For Grading-II Material				
			26.5 mm to 9.5 mm @ 35 per cent	cum	100.800	0.00	0.00
			9.5 mm to 2.36 mm @ 25 per cent	cum	72.000	0.00	0.00
			2.36 mm below @ 40 per cent	cum	115.200	0.00	0.00
			Cost of water	KL	27.000	125.00	3375.00
4.1A		(i)	Rate per cum for grading-II Material				
			d) Overhead charges @ input on (a+b+c)				31479.90
			e) Contractor's profit @ input on (a+b+c+d)				42497.87
			Cost for 225 cum = a+b+c+d+e				464101.53
			Rate per cum = (a+b+c+d+e)/225				2062.67
						say	2063.00
			Labour Cess@1%				20.63
			Rate per cum =				2083.63



CHAPTER - 3						
EARTH WORK, EROSION CONTROL AND DRAINAGE						
Sr No	Ref. to MoRTH Spec.		Description	Unit	Quantity	Rate Rs Cost Rs
3.12	305		Construction of Embankment with Material obtained from Borrowpits			
			Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2.	cum		226.26 -----i
3.13	305		Construction of Embankment with Material Deposited from Roadway Cutting			
			Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2.	cum		160.20 -----ii
			So, Cost of Material obtained from Borrow Pit is Rs. =			66.06 -----(iii=i-ii)
3.14	305		Construction of Subgrade and Earthen Shoulders			
			Construction of sub-grade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum		312.34 -----iv
			So,			
			Construction of Subgrade and Earthen Shoulders			
			Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement of table 300-2.	cum		246.28 -----(v=iv-iii)



CHAPTER-8								
TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES								
Sr No	Ref. to MoRTH Spec.		Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
8.7	802		Overhead Signs					
			Providing and erecting overhead signs with a corrosion resistant 2mm thick aluminium alloy sheet reflectorised with high intensity retro-reflective sheeting of encapsulated lense type with vertical and lateral clearance given in clause 802.2 and 802.3 and installed as per clause 802.7 over a designed support system of aluminium alloy or galvanised steel trestles and trusses of sections and type as per structural design requirements and approved plans					
		A	Truss and Vertical Support					
			<i>Unit = tonne</i>					
			<i>Taking output = 1 tonne</i>					
		a)	Labour					
			Mate	day	0.240	550.00	132.00	L-12
			Blacksmith	day	2.000	550.00	1100.00	L-02
			Mazdoor including for handling & fixing at site.	day	4.000	450.00	1800.00	L-13
		b)	Material					
			Aluminium alloy/galvanised steel including 5 per cent wastage	tonne	1.050	120000.00	126000.00	M-060
			Add 1 per cent on cost of material for nuts, bolts and drilling and welding consumables				1260.00	
			Add 15 per cent on cost of material for fabrication of trusses as per approved design				19089.00	
		c)	Machinery					
			Crane 3 tonne capacity	hour	3.000	1525.88	4577.65	P&M-013
			Truck	hour	0.500	1277.94	638.97	P&M-057
		d)	Overhead charges @ 8% on (a+b+c)				12367.81	
		e)	Contractor's profit @ 10% on (a+b+c+d)				16696.54	
			Rate per tonne = (a+b+c+d+e)				183661.97	
						say	183662.00	
8.7		B	Aluminium Alloy Plate for Over Head Sign					
			<i>Unit = sqm</i>					
			Taking output = 1 sqm					
		a)	Labour					
			Mate	day	0.020	550.00	11.00	L-12
			Blacksmith	day	0.100	550.00	55.00	L-02
			Mazdoor	day	0.150	450.00	67.50	L-13
		b)	Material					
			Aluminium alloy plate, 2 mm thick, fixed with high intensity grade sheeting vide clause 801.3	sqm	1.000	450.00	450.00	M-059
			Miscellaneous					
			Add 1 per cent of cost of labour for lifting arrangement, like ladders, pulleys, ropes etc				1.34	
		c)	Overhead charges @ 8% on (a+b)				46.79	
		d)	Contractor's profit @ 10% on (a+b+c)				63.16	
			Rate per sqm = (a+b+c+d)				694.78	
						say	695.00	
		Note	1. The cost of excavation and foundation concrete for fixing of vertical support system to be worked out separately as per the approved drawing/design and to be included in the estimate.					
			2. Lettering and arrow marks on sign board to be provided separately as per actual requirement. Rates for these items have been included separately in this chapter.					



CHAPTER-8								
TRAFFIC SIGNS, MARKINGS & OTHER ROAD APPURTENANCES								
Sr No	Ref. to MoRTH Spec.		Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.



Sr No	Ref. to MoRTH Spec.	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
8.22	809	Reinforced Cement Concrete Crash Barrier					
		Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with M-40 grade concrete with HYSD reinforcement conforming to IRC:21 and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified					
		Unit = Linear metre					
		Taking output = 10 m					
		(i) a) M 40 grade concrete					
		M 40 grade concrete	cum	3.000	11992.30	35976.90	0.00
		b) Labour					
		Mate	day	0.040	550.00	22.00	0.00
		Mazdoor	day	1.000	450.00	450.00	0.00
		c) Material					
		HYSD steel reinforcement including dowel bars	tonne	0.280	77427.65	21679.74	0.00
		Pre-moulded asphalt filler board	sqm	0.320	1084.84	347.15	0.00
		d) Overhead charges @ on (b+c)				4678.06	
		e) Contractor's profit @ on (b+c+d)				6315.39	
		Cost for 10 metre = a+b+c+d+e				69469.24	
		Rate per metre = (a+b+c+d+e)/10				6946.92	
					say	6947.00	



Sr No	Ref. to MoRTH Spec.		Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
14.18	2605		Filler joint					
		(i)	Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.					
			Unit = Running meter					
			Taking output = 12 m					
		a)	Labour					
			Cutting, bending, carrying & fixing etc.					
			Mate	day	0.04	550.00	22.00	L-12
			Mazdoor	day	0.50	400.00	200.00	L-13
			Mazdoor (Skilled)	day	0.50	450.00	225.00	L-15
		b)	Material					
			Copper plate - 12m long x 250 mm wide	kg	55.00	325.45	17899.75	M-086
			Area = 12 x 0.25 = 3 sqm					
			Weight = 3 x 0.002 x 8900 = 53.4 kg					
			Wastage @ 2.5 per cent = 1.33 kg/54.73 kg say = 55 kg.					
		c)	Overhead charges @ 0.25 on (a+b)				4586.69	
		d)	Contractor's profit @ 0.1 on (a+b+c)				2293.34	
			Cost for 12 m = (a+b+c+d)				25226.78	
			Rate per m = (a+b+c+d)/12				2102.23	
						say	2102.00	
							2102.00	
14.18		(ii)	Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.					
			Unit = Running meter					
			Taking output = 12 m					
		a)	Labour					
			For carrying, placing & fixing.					
			Mate	day	0.01	550.00	4.40	L-12
			Mazdoor	day	0.10	400.00	40.00	L-13
			Mazdoor (Skilled)	day	0.10	450.00	45.00	L-15
		b)	Material					
			20 mm thick compressible fibre board 12 m long x 25 cm deep.	sqm	3.00	2042.05	6126.15	M-084
			Area = 12 x 0.25 = 3 sqm					
		c)	Overhead charges @ 0.25 on (a+b)				1553.89	
		d)	Contractor's profit @ 0.1 on (a+b+c)				776.94	
			Cost for 12 m = (a+b+c+d)				8546.38	
			Rate per m = (a+b+c+d)/12				712.20	
						say	712.00	
							712.00	
14.18		(iii)	Providing and fixing in position 20 mm thick premoulded joint filler in expansion joint for fixed ends of simply supported spans not exceeding 10 m to cater for a horizontal movement upto 20 mm, covered with sealant complete as per drawing and technical specifications.					
			Unit = Running meter					
			Taking output = 12 m					
		a)	Labour					
			Mate	day	0.01	550.00	5.50	L-12
			Mazdoor	day	0.20	400.00	80.00	L-13
			Mazdoor (Skilled)	day	0.10	450.00	45.00	L-15
		b)	Material					
			Premoulded joint filler 12 m long, 20 mm thick and 300 mm deep.	sqm	3.60	516.12	1858.03	M-141
		c)	Overhead charges @ 0.25 on (a+b)				497.13	
		d)	Contractor's profit @ 0.1 on (a+b+c)				248.57	
			Cost for 12 m = (a+b+c+d)				2734.23	
			Rate per m = (a+b+c+d)/12				227.85	
						say	228.00	
							228.00	



Sr No	Ref. to MoRTH Spec.		Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
14.18		(iv)	Providing and filling joint sealing compound as per drawings and technical specifications with coarse sand and 6 per cent bitumen by weight					
			Unit = Running meter					
			Taking output = 12 m					
			12m long x 100 mm wide x 10mm deep recess					
			a) Labour					
			Mate	day	0.02	550.00	11.00	L-12
			Mazdoor	day	0.50	400.00	200.00	L-13
			Mazdoor (Skilled)	day	0.10	450.00	45.00	L-15
			b) Material					
			Sand	cum	0.012	1612.00	19.34	M-005
			Volume $12 \times 0.1 \times 0.01 = 0.012$ cum					
			Weight $0.012 \times 1400 = 16.8$ kg					
			Bitumen	cum	0.001	42361.44	42.36	Schedule M-4 (xix)
			$16.8 \times 0.06 = 1$ kg					
			c) Overhead charges @ 0.25 on (a+b)				79.43	
			d) Contractor's profit @ 0.1 on (a+b+c)				39.71	
			Cost for 12 m = (a+b+c+d)				436.84	
			Rate per m = (a+b+c+d)/12				36.40	
						say	36.40	
							36.00	
		Note	For arriving at the final rate of filler joints per m					
			length and per cm depth of joint filling compound,					
			the rates at Sl. No. i), ii), iii) & iv) shall be added					



Ref. to MoRTH Spec.	Description	Unit	Quantity	Rate Rs	Cost Rs
Rate Analysis performed on basis of sample analysis published in "Guidebook for Fabrication & Erection of Steel Structures" by Alok Baishya, BE(Civil), MBA and published by Institute for Steel Development & Growth (INSDAG)	Supply, fabrication, delivery at bridge site and erection of structural steel works as per IS 2062, including two coats of primer, one at shop and the other at site and two coats of aluminium paints including all labour, material, consumables etc.				
	Unit =1MT				
	Taking output = 1MT				
	a) Material				
	Structural Steel	tonne	1.05	61092.77	64147.41
	Permanent Bolts of tested quality	kg	7.00	105.00	735.00
	Electrode (@10 kg of weld metal (approx 275 nos. of 4mm electrode / ton of fabrication)	nos.	275.00	9.35	2570.70
	Electrode (@2 kg of weld metal (approx 275 nos. of 4mm electrode / ton of erection)	nos.	50.00	9.35	467.40
	DA Gas for fabrication	cum	2.00	734.40	1468.80
	DA Gas for erection	cum	0.50	734.40	367.20
	Oxygen for fabrication	cum	6.00	126.84	761.04
	Oxygen for erection	cum	1.50	126.84	190.26
	Red Lead Primer for fabrication	l	1.50	160.27	240.41
	Red Lead Primer for erection	l	1.00	160.27	160.27
	Paint	l	2.00	191.44	382.88
	Service bolts for erection	kg	7.00	105.00	735.00
	b) Labour				
	Marker for fabrication	day	0.60	450.00	270.00
	Fitter-I for fabrication	day	0.90	550.00	495.00
	Gas Cutter for fabrication	day	0.90	450.00	405.00
	Hammer man	day	0.30	400.00	120.00
	Welder-I for fabrication	day	1.50	450.00	675.00
	Foreman for fabrication	day	0.90	450.00	405.00
	Grinder for fabrication	day	0.90	450.00	405.00
	Work Supervisor for fabrication	day	0.30	550.00	165.00
	Unskilled for fabrication	day	6.00	400.00	2400.00
	Painter for fabrication	day	1.52	550.00	836.00
	Painter for erection	day	5.05	550.00	2777.50
	Sarang for erection	day	1.00	450.00	450.00
	Riggers for erection	day	8.00	400.00	3200.00
	Welder for erection	day	1.00	450.00	450.00
	Gas Cutter for erection	day	1.00	450.00	450.00
	Fitter for erection	day	1.00	550.00	550.00
	Semi skilled for erection	day	3.00	350.00	1050.00
	c) Machinery				
	Welding machine, grinding machine for fabrication	LS		890.40	890.40
	Tools, Zigs and fixtures for fabrication	LS		254.40	254.40
	Crane, inch, Welding generator, rectifier, transformer, etc. for erection	LS		890.40	890.40
	Tools, tackles, safety appliances, etc for erection	LS		254.40	254.40
	d)Overheads @ 22.5% on (a+b+c)				20164.38
	e)Contractor's profit @ 10% on (a+b+c+d)				10978.39
	Rate for per MT (a+b+c+d+e)				120762.24
				say	120762.00



Flexible Apron

Sr No	Ref. to MoRTH Spec.	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
15.11	2507.2	Flexible Apron :Construction of flexible apron 1 m thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall					
		Unit = cum					
		Taking Output = 1 cum					
		a) Material					
		Stone	cum	1.00	575.00	575.00	M-003
		Stone Spalls	cum	0.20	66.00	13.20	M-008
		b) Labour					
		Mate	day	0.05	450.00	22.50	L-12
		Mason	day	0.25	500.00	125.00	L-11
		Mazdoor	day	1.00	400.00	400.00	L-13
		Add 1 per cent of cost of (a+b) for trimming and preparation of bed.				11.36	
		c) Overhead charges @ 8% on (a+b)				91.76	
		d) Contractor's profit @ 10% on (a+b+c)				123.88	
		Rate per cum = (a+b+c+d)				1362.70	
					say	1363.00	



Approach Slab

Sr No	Ref. to MoRTH Spec.	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks / Input ref.
14.11	1500,1600,1700 & 2704	Reinforced cement concrete approach slab including reinforcement and formwork complete as per drawing and Technical specification					
		Unit = 1 cum					
		Taking output = 1 cum					
		a) Material					
		Cement concrete M30 Grade Refer relevant item of concrete in item 12.8(G) by using batching plant, excluding formwork i.e. per cum basic cost (a+b+c) (Excluding OH & CP)	cum	1.00	8235.60	8235.60	Item 12.8 (G)
		(Refer relevant item of concrete in item No. 13.8 (G) except that form work may be added at the rate of 2 per cent of cost against 3.5 per cent provided in the foundation concrete.				164.71	
		HYSD bar reinforcement Rate as per item No 14.2(Excluding OH & CP)	tonne	0.05	59458.22	2972.91	Item 14.2 A
		b) Overhead charges @ 22.5% on (a)				2558.97	
		c) Contractor's profit @ 10% on (a+b)				1393.22	
		Rate per cum (a+b+c)				15325.42	
					say	15325.00	
						15325.00	



BASES AND SURFACE COURSES (BITUMINOUS VG-40)

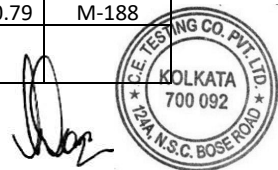
Sr No	Ref. to MoRTH Spec.	Description	Unit	Quantity	Rate Rs	Cost Rs	Remarks/ Input ref.
5.6	507	Dense Graded Bituminous Macadam					
		Providing and laying dense graded bituminous macadam with 100-120 TPH batch type HMP producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.0 to 4.5 per cent by weight of total mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in					
		Unit = cum					
		Taking output = 195 cum (450 tonnes)					
		a) Labour					
		Mate	day	0.840	550.00	462.00	L-12
		Mazdoor working with HMP, mechanical broom, paver, roller, asphalt cutter and assistance for setting out lines, levels and layout of construction	day	16.000	400.00	6400.00	L-13
		Skilled mazdoor for checking line & levels	day	5.000	450.00	2250.00	L-15
		b) Machinery					
		Batch mix HMP @ 75 tonne per hour	hour	6.000	49595.33	297572.00	P&M-022
		Paver finisher hydrostatic with sensor control @ 75 cum per hour	hour	6.000	6852.67	41116.00	P&M-034
		Generator 250 KVA	hour	6.000	3441.41	20648.44	P&M-081
		Front end loader 1 cum bucket capacity	hour	6.000	1755.33	10532.00	P&M-017
		Tipper 10 tonne capacity	tonne.km	450 x L	547.69	246459.54	Lead =1 km & P&M-058
		Add 10 per cent of cost of carriage to cover cost of loading and unloading				24645.95	
		smooth wheeled roller 8-10 tonnes for initial break down rolling.	hour	6.00x0.65*	1072.88	4184.25	P&M-044
		Vibratory roller 8 tonnes for intermediate rolling.	hour	6.00x0.65*	1743.33	6799.00	P&M-059
		Finish rolling with 6-8 tonnes smooth wheeled tandem roller.	hour	6.00x0.65*	1191.66	4647.47	P&M-045

		c) Materials					
		Bitumen @ 4.25 per cent of weight of mix	tonne	19.130	42361.44	810374.35	M-074
		Aggregate					
		Total weight of mix = 450 tonnes					
		Weight of bitumen = 19.13 tonnes					
		Weight of aggregate = 450 - 19.13 = 430.87 tonnes					
		Taking density of aggregate = 1.5 ton/cum					
		Volume of aggregate = 287.25 cum					
		Grading - I (40 mm Nominal Size)					
		37.5 - 25 mm 22 per cent	cum	63.190	1214.45	76741.10	M-049
		25 - 10 mm 13 per cent	cum	37.340	1351.50	50464.92	M-046
		10 - 4.75 mm 19 per cent	cum	54.580	1224.55	66835.94	M-040
		4.75 mm and below 44 per cent	cum	126.390	1174.20	148407.14	M-030
		Filler @ 2 per cent of weight of aggregates.	tonne	8.620	2653.22	22870.79	M-188
		or					
		Grading - II (19 mm Nominal Size)					
		25 - 10 mm 30 per cent	cum	86.160	1351.50	116445.02	M-046
		10 - 5 mm 28 per cent	cum	80.430	1224.55	98490.56	M-040
		5 mm and below 40 per cent	cum	114.900	1174.20	134915.58	M-030
		Filler @ 2 per cent of weight of aggregates.	tonne	8.620	2653.22	22870.79	M-188
		* Any one of the alternative may be adopted as per approved design					
		(i) For Grading I (40 mm nominal size)					
		d) Overhead charges @ 0.08 on (a+b+c)				147312.87	
		e) Contractor's profit @ 0.1 on (a+b+c+d)				198872.37	
		Cost for 205 cum = a+b+c+d+e				2187596.12	
		Rate per cum = (a+b+c+d+e)/195 (For Grading I)				11218.44	
					say	11218.00	
		(ii) For Grading II (19 mm nominal size)					
		d) Overhead charges @ 0.08 on (a+b+c)				147905.04	
		e) Contractor's profit @ 0.1 on (a+b+c+d)				199671.80	
		Cost for 205 cum = a+b+c+d+e				2196389.78	
		Rate per cum = (a+b+c+d+e)/195 (For Grading-II)				11263.54	
					say	11264.00	



		Note	*1. Although the roller are required only for 3 hours as per norms of output, but the same have to be available at site for six hours as the hot mix plant and paver will take six hours for mixing and paving the output of 450 tonnes considered in this analysis. To cater for the idle period of these rollers, their usage rates have been multiplied by a factor of 0.65.					
			2.Quantity of Bitumen has been taken for analysis purpose. The actual quantity will depend upon job mix formula.					
			3. Labour for traffic control, watch and ward and other miscellaneous duties at site including sundries have been included in administrative overheads of the contractor.					
			4. In case DBM is laid over freshly laid tack coat, provision of mechanical broom and 2 mazdoors shall be deleted as the same has been included in the cost of tack coat.					
			5. The individual density for each size of aggregates to be used for construction i.e. 37.5-25 mm, 25-10 mm etc. should be found in the laboratory and accordingly the quantities should be ammended for use in field. The average density of 1.5 tonne/cum is only a reference density in this Data Book.					
			6. The individual percentage of aggregates should be calculated from the total weight of dry aggregates i.e.. excluding the weight of bitumen. The weight of filler will also be 2 per cent by weight of dry aggregates.					

5.8	509	Bituminous Concrete					
		Providing and laying bituminous concrete with 100-120 TPH batch type hot mix plant producing an average output of 75 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.4 to 5.6 per cent of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all					
		Unit = cum					
		Taking output = 191 cum (450 tonnes)					
		a) Labour					
		Mate	day	0.840	550.00	462.00	L-12
		Mazdoor working with HMP, mechanical broom, paver, roller, asphalt cutter and assistance for setting out lines, levels and layout of construction	day	16.000	400.00	6400.00	L-13
		Skilled mazdoor for checking line & levels	day	5.000	450.00	2250.00	L-15
		b) Machinery					
		Batch mix HMP @ 75 tonne per hour	hour	6.000	49595.33	297572.00	P&M-022
		Paver finisher hydrostatic with sensor control @ 75 cum per hour	hour	6.000	6852.67	41116.00	P&M-034
		Generator 250 KVA	hour	6.000	3441.41	20648.44	P&M-081
		Front end loader 1 cum bucket capacity	hour	6.000	1755.33	10532.00	P&M-017
		Tipper 10 tonne capacity	tonne.km	450 x L	547.69	246459.54	Lead =1 km & P&M-058
		Add 10 per cent of cost of carriage to cover cost of loading and unloading				24645.95	
		Smooth wheeled roller 8-10 tonnes for initial break down rolling.	hour	6.00x0.65*	1072.88	4184.25	P&M-044
		Vibratory roller 8 tonnes for intermediate rolling.	hour	6.00x0.65*	1743.33	6799.00	P&M-059
		Finish rolling with 6-8 tonnes smooth wheeled tandem roller.	hour	6.00x0.65*	1191.66	4647.47	P&M-045
		c) Material					
		i) Bitumen@ 5 per cent of weight of mix	tonne	22.500	42361.44	953132.40	M-074
		ii) Aggregate					
		Total weight of mix = 450 tonnes					
		Weight of bitumen = 22.5 tonnes					
		Weight of aggregate = 450 -22.50 = 427.50 tonnes					
		Taking density of aggregate = 1.5 ton/cum					
		Volume of aggregate = 285 cum					
		Grading - I (19 mm Nominal Size)					
		20 - 10 mm 35 per cent	cum	99.750	1399.51	139601.46	M-045
		10 - 5 mm 23 per cent	cum	65.550	1224.55	80269.25	M-040
		5 mm and below 40 per cent	cum	114.000	1174.20	133858.80	M-030
		Filler @ 2 per cent of weight of aggregates.	tonne	8.620	2653.22	22870.79	M-188
		or					
		Grading - II (13 mm Nominal Size)					
		13.2 - 10 mm 30 per cent	cum	85.500	1358.50	116151.75	M-044
		10 - 5 mm 25 per cent	cum	71.250	1224.55	87249.19	M-040
		5 mm and below 43 per cent	cum	122.550	1174.20	143898.21	M-030
		Filler @ 2 per cent of weight of aggregates.	tonne	8.620	2653.22	22870.79	M-188
		*Any one of the alternative may be adopted as per approved design					



		(i)	for Grading-I (19 mm nominal size)				
			d) Overhead charges @ 0.08 on (a+b+c)			159635.95	
			e) Contractor's profit @ 0.1 on (a+b+c+d)			215508.53	
			Cost for 205 cum = a+b+c+d+e			2370593.82	
			Rate per cum = (a+b+c+d+e)/191			12411.49	
					say	12411.00	
5.8		(ii)	for Grading-II(13 mm nominal size)				
			d) Overhead charges @ 0.08 on (a+b+c)			159121.52	
			e) Contractor's profit @ 0.1 on (a+b+c+d)			214814.05	
			Cost for 205 cum = a+b+c+d+e			2362954.55	
			Rate per cum = (a+b+c+d+e)/191 (For Grading-II)			12371.49	
					say	12371.00	
		Note	*1. Although the rollers are required only for 3 hours as per norms of output, but the same have to be available at site for six hours as the hot mix plant and paver will take six hours for mixing and paving the output of 450 tonnes considered in this analysis. To cater for the idle period of these rollers, their usage rates have been multiplied by a factor of 0.65.				
			2.Quantity of Bitumen has been taken for analysis purpose. The actual quantity will depend upon job mix formula.				
			3. Labour for traffic control, watch and ward and other miscellaneous duties at site including sundries have been included in administrative overheads of the contractor.				
			4. In case BC is laid over freshly laid tack coat, provision of mechanical broom and 2 mazdoors shall be deleted as the same has been included in the cost of tack coat.				
			5. The individual density for each size of aggregates to be used for construction i.e. 37.5-25 mm, 25-10 mm etc. should be found in the laboratory and accordingly the quantities should be ammended for use in field. The average density of 1.5 tonne/cum is only a reference density in this Data Book.				
			6. The individual percentage of aggregates should be calculated from the total weight of dry aggregates i.e.. excluding the weight of bitumen. The weight of filler will also be 2 per cent by weight of dry aggregates.				

CHAPTER-9						
PIPE CULVERTS						
Sr No	to MoRTH Spec.	Description	Unit	Quantity	Rate Rs	Cost Rs
9.2	2900	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row .				
		Laying Reinforced cement concrete pipe NP4/prestressed concrete pipe for culverts on first class bedding of granular material in single row including fixing collar with cement mortar 1:2 but excluding excavation, protection works, backfilling, concrete and masonry works in head walls and parapets .				
		Unit = metre				
		Taking output = 12.5 metres (5 pipes of 2.5 m length each)				
9.2	B	1200 mm dia				
		a) Labour				
		Mate	day	0.280	550.00	154.00
		Mason	day	1.000	400.00	400.00
		Mazdoor	day	6.000	450.00	2700.00
		b) Material				
		Sand at site	cum	0.090	1612.00	145.08
		Cement at site	tonne	0.070	9830.60	688.14
		RCC pipe NP-4/prestressed concrete pipe including collar	metre	12.500	8970.00	112125.00
		Granular material passing 5-6 mm sieve for class bedding	cum	5.000	1174.20	5871.00
		c) Overhead charges @ on (a+b)				9766.66
		d) Contractor's profit @ on (a+b+c)				13184.99
		Cost for 12.5 metres = a+b+c+d				145034.87
		Rate per metre= (a+b+c+d)/12.5				11602.79
					say	11603.00
		Note 1. In case of cement craddle bedding, quantity of PCC M15 is to be calculated as per design and priced separately and added .				
		2. The rate analysis does not include excavation, cement /masonry works in head walls, backfilling, protection works and parapet walls. The same are to be calculated as per approved design and drawings and priced separately on rates available under respective sections				



CHAPTER - 4						
SUB-BASES, BASES (NON- BITUMINOUS) AND SHOULDERS						
Sr No	Ref. to MoRTH Spec.	Description	Unit	Quantity	Rate Rs	Cost Rs
4.1	401	Granular Sub-Base with Close Graded Material (Table:- 400-1)				
	A	Plant Mix Method				
		Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401				
		Unit = cum				
		Taking output = 225 cum (450 tonne)				
		a) Labour				
		Mate	day	0.400	550.00	220.00
		Mazdoor skilled	day	2.000	450.00	900.00
		Mazdoor	day	8.000	400.00	3200.00
		b) Machinery				
		Wet mix plant @ 75 tonne capacity per hour	hour	6.000	5362.58	32175.50
		Electric generator 125 KVA	hour	6.000	2202.50	13215.00
		Water tanker 6 KL capacity 5 km lead with one trip per hour	hour	4.500	992.33	4465.50
		Front end loader 1 cum bucket capacity	hour	6.000	1755.33	10532.00
		Tipper 10 tonne (taking Lead, L= 2km)	tonne.km	450 x L	63.90	57507.23
		Add 10 per cent of cost of carriage to cover loading and unloading				5750.72
		Motor Grader 110 HP	hour	6.000	5049.17	30295.00
		Vibratory roller 8-10 t	hour	6.000	1743.33	10460.00
		c) Material				
		Close graded Granular sub-base Material as per table 400-1				
		For Grading-V Material				
		53 mm to 9.5 mm @ 50 per cent	cum	144.000	1325.49	190870.27
		9.5 mm to 2.36 mm @ 20 per cent	cum	57.000	1224.55	69799.35
		2.36 mm below @ 30 per cent	cum	86.400	1560.72	134846.21
		Cost of water	KL	27.000	125.00	3375.00
4.1A	(i)	Rate per cum for grading-V Material				
		d) Overhead charges @ on (a+b+c)				45408.94
		e) Contractor's profit @ on (a+b+c+d)				61302.07
		Cost for 225 cum = a+b+c+d+e				674322.79
		Rate per cum = (a+b+c+d+e)/225				2996.99
					say	2997.00
	Note	Any one of the grading for material may be adopted as per design				



8.38	Sug ges tive	Rumble Strips				
		Provision of 15 nos rumble strips covered with premix bituminous carpet, 15-20 mm high at center, 250 mm wide placed at 1 m center to center at approved locations to control speed, marked with white strips of road marking paint.				
		Unit = sqm				
		Taking output = 1 sqm (including gaps)				
		The rate per sqm of premix carpet and road marking may be adopted				
6.1	511	Open - Graded Premix Surfacing By Manual Method				222.54
8.14		Road Marking With Hot Applied Thermo Plastic Compound				1002.44
		Rate per sqm =				1224.98



Dumping of Excavated Soil over Tunnel

3.11	301	Dumping of Excavated Soil over Tunnel				
		<i>Unit = cum</i>				
		<i>Taking output = 360 cum</i>				
		a) Labour				
		Mate	day	0.080	450.00	36.00
		Mazdoor	day	2.000	400.00	800.00
		b) Machinery				
		Excavator 0.90 cum bucket capacity @ 60 cum per hour	hour	6.000	1316.50	7899.00
		Tipper 5.5 cum capacity, 4 trips per hour.	hour	16.360	0.00	0.00
		c) Overhead charges @ input on (a+b)				698.80
		d) Contractor's profit @ input on (a+b+c)				943.38
		Cost for 360 cum = a+b+c+d				10377.18
		Rate per cum = (a+b+c+d)/360				28.83
					say	<u>29.00</u>



			Description	Unit	Quantity	Rate Rs	Cost Rs
12.9	1200		WELL FOUNDATION				
			Providing and Constructing Temporary Island 16 m diameter for Construction of Well Foundation for 8m dia. Well.				
		A	Assuming depth of water 1.0 m and height of island to be 1.25 m.				
			<i>Unit = 1 No</i>				
			<i>Taking output = 1 No.</i>				
			a) Material				
			Earth (compacted)	cum	251.20	60.5	15197.60
			Sand bags	each	750.00	2.25	1686.75
			b) Labour				
			Mate	day	0.40	450.00	180.00
			Mazdoor for filling sand bags, stitching and placing	day	15.00	450.00	6750.00
			c) Machinery				
			Crane with grab 1 cum capacity	hour	20.00	762.94	15258.83
			Consumables @ 2.5 per cent of (c) above				381.47
			d) Overhead charges @ input on (a+b+c)				3156.37
			e) Contractor's profit @ input on (a+b+c+d)				4261.10
			Rate per No. (a+b+c+d+e)				46872.13
						say	46872.00
		Note	It is assumed that earth will be available within the working space of crane with grab bucket.				
12.9	C		Providing and constructing one span service road to reach island location from one pier location to another pier location				
			Assuming span length 30 m, width of service road 10m and depth of water 1m				
			<i>Unit = 1 meter</i>				
			<i>Taking output = 30 metre</i>				
			a) Material				
			Earth	cum	450.00	60.50	27225.00
			Sand bags	each	300.00	2.25	674.70
			b) Labour				
			Mate	day	0.24	450.00	108.00
			Mazdoor for filling sand bags, stitching and placing	day	6.00	450.00	2700.00
			c) Machinery				
			Front end Loader 1 cum capacity	hour	27.00	1316.50	35545.50
			Tipper 5.5 cum capacity	hour	28.00	958.45	26836.71
			d) Overhead charges @ input on (a+b+c)				7447.19
			e) Contractor's profit @ input on (a+b+c+d)				10053.71
			Cost for 30 m (a+b+c+d+e)				110590.82
			Rate per m (a+b+c+d+e)/30				3686.36
						say	3686.00



VOLUME VII

COST ESTIMATE



ABSTRACT OF COST



Road name- IMPHAL-JIRIBAM ROAD SECTION OF NH-53 (OLD NH-37)
PKG-V
(FROM DESIGN CH KM 66+110 TO KM 101+280)
GENERAL ABSTRACT OF COST

Length of Road (KM) : 35.170

DESCRIPTION OF WORKS		TOTAL COST (IN Cr.)	COST PER KM. OF TOTAL ROAD LENGTH (IN Cr.)	% of Cost of Civil Works (% of C)
A.	ROAD WORKS			
1	Site Clearance and Dismantling	2.73	0.08	0.83%
2	Earth work ,Subgrade and Erosion control	81.63	2.32	24.78%
3	Sub-Base & Base	68.81	1.96	20.89%
4	Bituminous Courses	56.53	1.61	17.16%
5	Junction Improvement	1.55	0.04	0.47%
6	Traffic signs, Road marking & other road appurtenances	4.74	0.13	1.44%
7	Passenger Shelter	0.21	0.01	0.06%
8	Busbay	1.38	0.04	0.42%
	Drainage and Protective Works			
9	Longitudinal Drains	21.14	0.60	6.42%
11	Retaining wall	4.63	0.13	1.41%
12	Breast wall	22.50	0.64	6.83%
B.	BRIDGES & CULVERTS			
12	Culvert	43.93	1.25	13.34%
14	Minor Bridge	10.02	0.28	3.04%
C.	COST OF CIVIL WORKS IN LAKHS (AS PER SOR 2018)	319.80	9.09	
D.	Escalation @ 3% WPI	9.59		
E.	Total Civil Cost including Escalation@3%	329.39	9.37	
F.	Maintenance for 5 years, i.e 2.5% on civil cost (E)	8.23		
G.	GST @ 12% of (E)	39.53		
H.	Contingencies @ 2.8% over Civil Cost (E)	9.22		
I.	Supervision Charges @ 3% of (E)	9.88		
J.	Agency Charges @3% of (E)	9.88		
K	Escalation Cost @ 2.5% during Construction Period(For 1.5 Yrs of construction period, No escalation in 1st Year and 2.5% for 0.5 Years)	8.23		
L.	TOTAL CONSTRUCTION COST (C+D+E+F+G+H+I)=J	414.36	11.78	
M.	DEPARTMENTAL COST			
a.	LA Cost & Structure Cost	99.34		
c.	Utility Shifting(Electrical+PHE)	12.98		
d.	Environmental Budget	9.88		
e.	Muck Disposal	32.94		
f.	Forest Clearance	3.61		
N	Sub Total (L)	158.75		
O	TOTAL PROJECT COST (N+M)=O	573.11	16.30	



BILL
(ROAD PART)



Summary of Bill of Quantity

Bill No : 01. Site Clearance and Dismantling

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	02.01/i	Cutting of Girth 300-600mm	Each	4.00	392.30	1,569
2	02.01/ii	Cutting of Girth 600-900mm	Each	48.00	723.48	34,727
3	02.01/iii	Cutting of Girth 900-1800mm	Each	110.00	1,373.64	151,100
4	02.01/iv	Cutting of Girth 1800-2700mm	Each	4.00	2,576.19	10,305
5	02.01/v	Cutting of Girth 2700mm more	Each	4.00	4,330.68	17,323
6	02.03/b	Clearing & grubbing(Mechanical - Light Jungle)	Ha	30.08	59,912.85	1,802,179
7	02.04/i/c	Dismantling Structure RCC	cum	299.00	1,756.40	525,164
8	02.04/iii/b	Dismantling Structure Rubble Stone Masonry Cement	Cum	674.00	494.21	333,098
9	02.04/vii/a	Mortar Dismantle HP (300-600)	rm	72.00	267.64	19,270
10	02.04/vii/b	Dismantle HP (upto 600 - 900 mm dia)	rm	108.00	362.36	39,135
11	02.04/vii/c	Dismantle HP (above 900 mm dia)	rm	192.00	620.22	119,082
12	02.04/viii/e	Dismantle Flexible Pavement Granular	sqm	285,987.00	34.33	9,817,934
13	02.04/viii/f/ii	Dismantle Flexible Pavement Bituminous(Roller & Scarifier)	sqm	251,121.00	57.65	14,477,126
Total of Bill						27,348,010

Bill No : 02. Earth work,Subgrade and Erosion control

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	02/nsc/1	Hydro Seeding On Cutting Surface	sqm	70,531.04	318.15	22,439,450
2	03.13	Embankment fill from Roadway Cutting	cum	315,983.00	161.80	51,126,049
3	03.14	Subgrade and Earthen Shoulder Fill From Borrow Pit	cum	57,960.58	315.46	18,284,243
4	03.15	Compacting original ground supporting sub-grade	cum	77,934.75	87.52	6,820,849
5	03.31	Excavation in Hill in Soil For Roadway	cum	2,471,122.40	213.50	527,584,632
6	03.32	Excavation for Roadway Ordinary Rock Mechanical (Without Blasting)	cum	617,780.60	307.61	190,035,490
Total of Bill						816,290,715

Bill No : 03. Sub-Base & Base Courses

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	04.01/Nsc1	GSB Close Graded GR V	Cum	69,037.73	3,852.93	265,997,553
2	04/nsc1	GSB Reuse	Cum	24,510.59	2,083.63	51,071,009
3	05.02	WMM	Cum	96,277.70	3,853.46	371,002,277
Total of Bill						688,070,839

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Summary of Bill of Quantity

Bill No : 04. Bituminous Courses

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	06.01/a	Prime Coat	sqm	378,883.00	58.96	22,338,942
2	06.02/ii	Tack Coat(Granular Layer)	sqm	351,700.00	17.63	6,200,471
3	06/Nsc1	DBM GR II	cum	26,534.31	12,454.92	330,482,708
4	06/Nsc2	BC GR II	cum	15,155.32	13,610.76	206,275,423
Total of Bill						565,297,544

Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	03.13	Embankment fill from Roadway Cutting	cum	201.18	161.80	32,550
2	04.01/Nsc1	GSB Close Graded GR V	Cum	758.66	3,852.93	2,923,045
3	04/nsc1	GSB Reuse	Cum	276.35	2,083.63	575,801
4	05.02	WMM	Cum	1,185.13	3,853.46	4,566,832
5	06.01/a	Prime Coat	sqm	4,740.50	58.96	279,500
6	06.02/i	Tack Coat(Bituminous Layer)	sqm	4,740.50	16.03	75,990
7	06/Nsc1	DBM GR II	cum	331.84	12,454.92	4,132,978
8	06/Nsc2	BC GR II	cum	189.62	13,610.76	2,580,872
9	08.01	Precast Concrete Kerb(M20) fix at site	rm	413.00	707.53	292,210
Total of Bill						15,459,778

Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	08.02/a	5 th km Stone	each	7.00	5,081.73	35,572
2	08.02/b	Ordinary km Stone	each	28.00	3,030.77	84,862
3	08.04	Boundary Stone	each	354.00	2,064.12	730,698
4	08.11/i	90 cm equilateral triangle	each	465.00	5,464.91	2,541,183
5	08.11/iii	60 cm circular	each	84.00	4,969.45	417,434
6	08.11/iv	80 cm x 60 cm rectangular	each	4.00	6,247.54	24,990
7	08.11/vii	90 cm high octagon	each	18.00	8,731.15	157,161
8	08.14	Paint on Bituminous Surface	sqm	11,725.73	1,012.16	11,868,318
9	08.15/c/v	Road Delineators(100 cm long above Road)	each	3,717.00	1,073.82	3,991,389
10	08.18/A/b	Type-A, "W" Metal Beam Crash Barrier	Rm	5,325.00	3,367.42	17,931,512
11	08.20/ii	Road Stud/Road Markers	nos	19,344.00	387.48	7,495,413

Summary of Bill of Quantity

Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
12	08.22	Lighting on Bridges	nos	61.00	21,376.67	1,303,977
13	08/nsc/6	Rumble Strip	sqm	700.00	1,237.23	866,061
Total of Bill						47,448,569

Bill No : 07. Passenger Shelter

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	08.05	Paint on Concrete Surface(2 Coat)	sqm	660.68	94.34	62,328
2	10.16	Sub Structure Plaster with 1:3 Cement Morter	sqm	660.68	225.72	149,128
3	13.01/a/i	Foundation Earthwork Ordinary Soil (0 -3m)	cum	99.08	221.12	21,909
4	14.01	Foundation Brick Work C.M. 1:3	cum	15.19	11,968.37	181,776
5	14.03/a	Foundation PCC M15	cum	10.06	9,675.78	97,367
6	14.03/e/II	Foundation RCC M25	cum	6.94	10,541.26	73,135
7	14.08	Foundation Steel (HYSD)	MT	0.83	79,470.26	66,199
8	14/nsc2	Brick Flat Soling	Sqm	134.38	1,129.07	151,719
9	15.01	Sub Structure Brick Work	cum	32.39	12,081.21	391,286
10	16.01/a/i	Super Structure RCC M25 - Solid Slab Super	cum	41.52	11,913.28	494,580
11	16.03	Structure(Upto 5m) Super Structure Steel(HYSD)	MT	4.15	87,304.04	362,399
Total of Bill						2,051,826

Bill No : 08. Bus Bay

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	03.14/Nsc	Subgrade and Earthen Shoulder Fill From Roadway	cum	1,770.00	248.74	440,270
2	04.01/Nsc1	Cutting GSB Close Graded GR V	Cum	518.96	3,852.93	1,999,532
3	04/nsc1	GSB Reuse	Cum	189.04	2,083.63	393,881
4	05.02	WMM	Cum	885.00	3,853.46	3,410,312
5	05.03	Foothpath Area	sqm	1,475.00	1,562.09	2,304,083
6	06.01/a	Prime Coat	sqm	3,540.00	58.96	208,718
7	06.02/i	Tack Coat(Bituminous Layer)	sqm	3,540.00	16.03	56,746
8	06/Nsc1	DBM GR II	cum	247.80	12,454.92	3,086,329
9	06/Nsc2	BC GR II	cum	141.60	13,610.76	1,927,284
Total of Bill						13,827,155

Summary of Bill of Quantity

Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	13.01/a/i	Foundation Earthwork Ordinary Soil (0 -3m)	cum	51,721.89	221.12	11,436,745
2	14.02/b	Foundation Random Rubble Masonry (coursed/uncoursed) Cement Morter(1:3)	cum	16,994.39	7,524.30	127,870,904
3	14.03/a	Foundation PCC M15	cum	700.64	9,675.78	6,779,190
4	14.03/b	Foundation PCC M20	cum	84.81	10,764.09	912,902
5	15.02/b	Sub Structure Random Rubble Masonry Cement Morter(1:3)	cum	1,879.20	8,010.60	15,053,520
6	15.03/b/i	Sub Structure PCC M20	cum	196.61	10,451.52	2,054,821
7	15.03/f/i	Sub Structure RCC M25 (Upto 5m)	cum	3,022.61	11,402.42	34,465,080
8	15.05	Sub Structure Steel (HYSD)	MT	151.13	79,470.26	12,010,420
9	15.12	Sub Structure Weepholes per Meter	Rm	1,797.50	452.47	813,315
10	24/i/b	MS Hook(300gm each)	kg	287.44	121.20	34,838
11	40	Geotextile filter(75mm sqm)	sqm	323.37	25.76	8,330
Total of Bill						211,440,065

Bill No : 10. Retaining wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	13.01/a/i	Foundation Earthwork Ordinary Soil (0 -3m)	cum	2,651.86	221.12	586,379
2	13.01/b/ii	Foundation Earthwork Ordinary Rock(0-3m)	cum	642.79	211.31	135,828
3	13.04	Sub Structure Filter Media	cum	2,354.23	2,067.82	4,868,132
4	14.02/b	Foundation Random Rubble Masonry (coursed/uncoursed) Cement Morter(1:3)	cum	1,451.38	7,524.30	10,920,596
5	14.03/a	Foundation PCC M15	cum	810.55	9,675.78	7,842,655
6	15.02/b	Sub Structure Random Rubble Masonry Cement Morter(1:3)	cum	2,261.21	8,010.60	18,113,649
7	15.03/b/i	Sub Structure PCC M20	cum	210.57	10,451.52	2,200,745
8	15.12	Sub Structure Weepholes per Meter	Rm	3,561.00	452.47	1,611,246
Total of Bill						46,279,230

Bill No : 11. Breast wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	13.01/a/i	Foundation Earthwork Ordinary Soil (0 -3m)	cum	14,289.07	221.12	3,159,600
2	13.01/b/ii	Foundation Earthwork Ordinary Rock(0-3m)	cum	3,572.27	211.31	754,856
3	13.03/a	Sub Structure Backfill Granular Material	cum	3,684.24	1,798.37	6,625,627

Summary of Bill of Quantity

Bill No : 11. Breast wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
4	13.03/b	Sub Structure Backfill Sandy Material	cum	650.16	1,403.62	912,578
5	14.02/b	Foundation Random Rubble Masonry (coursed/uncoursed) Cement Morter(1:3)	cum	6,724.04	7,524.30	50,593,687
6	14.03/a	Foundation PCC M15	cum	3,214.68	9,675.78	31,104,536
7	15.02/b	Sub Structure Random Rubble Masonry Cement Morter(1:3)	cum	16,109.52	8,010.60	129,046,921
8	15.12	Sub Structure Weepholes per Meter	Rm	6,120.33	452.47	2,769,267
Total of Bill						224,967,071

Bill No : 01. Site Clearance and Dismantling

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	02.01/i	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth from 300 mm to 600 mm	Each	4.00	392.30	1,569.20
2	02.01/ii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 600 mm to 900 mm	Each	48.00	723.48	34,727.04
3	02.01/iii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 900 mm to 1800 mm	Each	110.00	1373.64	151,100.40
4	02.01/iv	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 1800 mm to 2700 mm	Each	4.00	2576.19	10,304.76
5	02.01/v	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 2700 mm	Each	4.00	4330.68	17,322.72
6	02.03/b	Clearing and grubbing road land including uprooting rank vegetation, grass, brush shrubs, saplings and trees of girth upto 300 mm, removal of stumps, disposal of unserviceable materials and stacking of serviceable materials and stacking of serviceable materials upto 100m. from road boundary. (by mechanical means)	Ha	30.08	59912.85	1,802,178.53

Bill No : 01. Site Clearance and Dismantling

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
7	02.04/i/c	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. c)Pre- stressed/ Reinforced Cement Concrete grade M20 & above	cum	299.00	1756.40	525,163.60
8	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar	Cum	674.00	494.21	333,097.54
9	02.04/vii/a	Removing hume pipes class NP-3 a) 300mm to 600mm dia	rm	72.00	267.64	19,270.08
10	02.04/vii/b	Removing hume pipes class NP-4 b) Above 600mm to 900mm dia	rm	108.00	362.36	39,134.88
11	02.04/vii/c	Removing hume pipes class NP-5 c) Above 900mm dia	rm	192.00	620.22	119,082.24
12	02.04/viii/e	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m e)Kandar/Gravel metal crust upto 150 mm thick with power Roller with scarifier	sqm	285,987.00	34.33	9,817,933.71
13	02.04/viii/f/ii	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m f)Bituminous coarses 50-70mm along with premix Carpet and Surface dressing but without disturbing the base ii)With road roller attached with scarifier	sqm	251,121.00	57.65	14,477,125.65
Total of Bill 01. Site Clearance and Dismantling						27,348,010.35

Item Rate Analysis has been done considering

Bill No : 02. Earth work,Subgrade and Erosion control

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	02/nsc/1	Supplying and laying Hydro Seeding on cutting Surface	sqm	70,531.04	318.15	22,439,450.38
2	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2	cum	315,983.00	161.80	51,126,049.40
3	03.14	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum	57,960.58	315.46	18,284,242.99
4	03.15	Compacting original ground supporting subgrade Loosening of the ground upto a level of 500 mm below the subgrade level, watered, graded and compacted in layers to meet requirement of table 300-2 for subgrade construction.	cum	77,934.75	87.52	6,820,849.32
5	03.31	Excavation in Hill Area in Soil by Mechanical Means Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres	cum	2,471,122.40	213.50	527,584,632.40
6	03.32	Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting. Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material with all lift and lead upto 1000 metres	cum	617,780.60	307.61	190,035,490.37
Total of Bill 02. Earth work,Subgrade and Erosion control						816,290,714.85

Item Rate Analysis has been done considering

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Bill No : 03. Sub-Base & Base Courses

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	04.01/Ns c1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	69,037.73	3852.93	265,997,552.61
2	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	24,510.59	2083.63	51,071,008.98
3	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)	Cum	96,277.70	3853.46	371,002,277.40
Total of Bill 03. Sub-Base & Base Courses						688,070,838.99

Bill No : 04. Bituminous Courses

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm	sqm	378,883.00	58.96	22,338,941.68
2	06.02/ii	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. ii) On granular Surface Pre treated with prime Coat @ 0.25 - 0.30 kg/sqm	sqm	351,700.00	17.63	6,200,471.00
3	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	26,534.31	12454.92	330,482,708.31

Bill No : 04. Bituminous Courses

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
4	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	15,155.32	13610.76	206,275,423.24
Total of Bill 04. Bituminous Courses						565,297,544.23

Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2	cum	201.18	161.80	32,550.44
2	04.01/Nsc1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	758.66	3852.93	2,923,044.61
3	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	276.35	2083.63	575,800.73
4	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)	Cum	1,185.13	3853.46	4,566,831.78

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
5	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm	sqm	4,740.50	58.96	279,499.88
6	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm	sqm	4,740.50	16.03	75,990.22
7	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	331.84	12454.92	4,132,978.38

Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
8	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	189.62	13610.76	2,580,872.31
9	08.01	Precast Cement concrete M20 Kerb including fixing at site	rm	413.00	707.53	292,209.89
Total of Bill 05. Junction Improvement (Major & Minor)						15,459,778.24

Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	08.02/a	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. a) 5th KM stone	each	7.00	5081.73	35,572.11
2	08.02/b	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. b) Ordinary kilometer stone	each	28.00	3030.77	84,861.56
3	08.04	Reinforced Cement Concrete M15 Boundary pillars of standard design, fixed in position including finishing but excluding painting	each	354.00	2064.12	730,698.48
4	08.11/i	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm equilateral triangle	each	465.00	5464.91	2,541,183.15
5	08.11/iii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 60 cm circular	each	84.00	4969.45	417,433.80

Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
6	08.11/iv	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 80 mm x 60 mm rectangular	each	4.00	6247.54	24,990.16
7	08.11/vii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm high octagon	each	18.00	8731.15	157,160.70
8	08.14	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads on Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.)	sqm	11,725.73	1012.16	11,868,317.91

Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	08.15/c/v	Road Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming to IRC-79 and the drawings.) 120x120 -Road Delineator	each	3,717.00	1073.82	3,991,388.94
10	08.18/A/b	Metal Beam Crash Barrier Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fittings to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810) For post Height of 1.5 m	Rm	5,325.00	3367.42	17,931,511.50
11	08.20/ii	Road Markers/Road stud with lense reflector Providing & fixing of road stud 100x100 mm, die-cast in aluminium, resistance to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30mm upto a depth of 60mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973 Light Reflecting Lense Type	nos	19,344.00	387.48	7,495,413.12
12	08.22	Lighting on Bridges Providing & fixing lighting on Bridges, mounted on steel hollow circular poles of standard specification, 5 m high fixed on parapets with cement concrete, 20 m apart and fitted with sodium vapour lamp	nos	61.00	21376.67	1,303,976.87

Item Rate Analysis has been done considering

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Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
13	08/nsc/6	Rumble Strips Provision of 15 nos rumble strips covered with premix bituminous carpet, 15-20 mm high at center, 250 mm wide placed at 1 m center to center at approved locations to control speed, marked with white strips of road marking paint.	sqm	700.00	1237.23	866,061.00
Total of Bill 06. Traffic signs, Road marking & other road appurtenances						47,448,569.30

Item Rate Analysis has been done considering

Bill No : 07. Passenger Shelter

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	660.68	94.34	62,328.08
2	10.16	Cement Plaster 12mm Thick in Cement Mortar 1:3	sqm	660.68	225.72	149,127.56
3	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	99.08	221.12	21,909.23
4	14.01	Brick masonry work in cement mortar 1:3 in foundation complete excluding pointing and plastering, as per drawing and technical specifications	cum	15.19	11968.37	181,775.60
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	10.06	9675.78	97,367.37
6	14.03/e/l	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M25Grade	cum	6.94	10541.26	73,135.26
7	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	0.83	79470.26	66,198.73
8	14/nsc2	Brick Flat Soling at Foundation	Sqm	134.38	1129.07	151,718.78
9	15.01	Brick masonry work in cement mortar 1:3 in Sub-structure complete excluding pointing and plastering, as per drawing and technical specifications				

Item Rate Analysis has been done considering

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Bill No : 07. Passenger Shelter

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			cum	32.39	12081.21	391,286.23
10	16.01/a/i	cement concrete Reinforced concrete in super-structure as per drawing and Technical Specification i/c form work complet eas per drawing and technical specification RCC Grade M25 For solid slab super-structure Upto 5m Upto 5m	cum	41.52	11913.28	494,579.82
11	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	4.15	87304.04	362,399.07
		Total of Bill 07. Passenger Shelter				2,051,825.74

Bill No : 08. Bus Bay

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	03.14/Nsc	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from Roadway Cutting with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum	1,770.00	248.74	440,269.80
2	04.01/Nsc1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	518.96	3852.93	1,999,531.96
3	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	189.04	2083.63	393,881.08
4	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)	Cum	885.00	3853.46	3,410,312.10

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 08. Bus Bay

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
5	05.03	Construction of footpath/separator by providing a 150 mm compacted granular sub base as per clause 401 and 25 mm thick cement concrete grade M15, over laid with pre-cast concrete tiles in cement mortar including provision of all drainage arrangements but excluding kerb channel.	sqm	1,475.00	1562.09	2,304,082.75
6	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm	sqm	3,540.00	58.96	208,718.40
7	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm	sqm	3,540.00	16.03	56,746.20
8	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	247.80	12454.92	3,086,329.18

Bill No : 08. Bus Bay

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	141.60	13610.76	1,927,283.62
Total of Bill 08. Bus Bay						13,827,155.09

Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	51,721.89	221.12	11,436,745.20
2	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	16,994.39	7524.30	127,870,903.73
3	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	700.64	9675.78	6,779,190.12
4	14.03/b	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M20 Grade	cum	84.81	10764.09	912,902.47
5	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	1,879.20	8010.60	15,053,519.52
6	15.03/b/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade Upto 5m	cum	196.61	10451.52	2,054,821.09
7	15.03/f/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M25 Grade upto 5m height	cum	3,022.61	11402.42	34,465,080.12

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
8	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	151.13	79470.26	12,010,419.86
9	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	1,797.50	452.47	813,314.83
10	24/i/b	Galvanised Mild steel J /L hook	kg	287.44	121.20	34,837.73
11	40	Gextextile material (fine net)	sqm	323.37	25.76	8,330.01
Total of Bill 09. Longitudinal Drains						211,440,064.68

Item Rate Analysis has been done considering

Bill No : 10. Retaining wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	2,651.86	221.12	586,379.28
2	13.01/b/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary rock if blasting is not resorted to	cum	642.79	211.31	135,827.53
3	13.04	Filter medium behind abutment,wing wall and return wall complete as per drawing and technical specification .	cum	2,354.23	2067.82	4,868,132.15
4	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	1,451.38	7524.30	10,920,595.96
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	810.55	9675.78	7,842,655.10
6	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	2,261.21	8010.60	18,113,648.83
7	15.03/b/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade Upto 5m	cum	210.57	10451.52	2,200,745.21
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications				

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 10. Retaining wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			Rm	3,561.00	452.47	1,611,245.67
		Total of Bill 10. Retaining wall				46,279,229.73



Bill No : 11. Breast wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	14,289.07	221.12	3,159,599.60
2	13.01/b/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary rock if blasting is not resorted to	cum	3,572.27	211.31	754,855.95
3	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	3,684.24	1798.37	6,625,626.69
4	13.03/b	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Good Sandy Soil free from organic material	cum	650.16	1403.62	912,577.58
5	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	6,724.04	7524.30	50,593,686.65
6	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	3,214.68	9675.78	31,104,536.45
7	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	16,109.52	8010.60	129,046,920.91
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	6,120.33	452.47	2,769,267.07

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

		Total of Bill11. Breast wall	224,967,070.90

BILL
(STRUCTURE PART)



Summary of Bill of Quantity

Bill No : 13. Minor Bridge

Sl No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
Foundation						
1	13.01/a/i	Foundation Earthwork Ordinary Soil (0 -3m)	cum	4,092.00	221.12	904,823
2	13.01/a/ii	Foundation Earthwork Ordinary Soil (3m-6m)	cum	304.00	297.22	90,355
3	14.03/a	Foundation PCC M15	cum	233.00	9,675.78	2,254,457
4	14.03/g	Foundation RCC M30	cum	613.00	12,458.26	7,636,913
5	14.08	Foundation Steel (HYSD)	MT	74.00	79,470.26	5,880,799
End of Sub Total Foundation						16,767,347
Sub Structure						
6	13.03/a	Sub Structure Backfill Granular Material	cum	203.00	1,798.37	365,069
7	13.03/b	Sub Structure Backfill Sandy Material	cum	3,291.00	1,403.62	4,619,313
8	13.04	Sub Structure Filter Media	cum	657.00	2,067.82	1,358,558
9	15.03/g/i	Sub Structure RCC M30 (Upto 5m)	cum	725.00	13,273.56	9,623,331
10	15.03/i/i	Super Structure RCC M40 (5m to 10m)	cum	7.00	12,112.22	84,786
11	15.05	Sub Structure Steel (HYSD)	MT	105.00	79,470.26	8,344,377
12	15.09	Sub Structure Elastometric Bearing	cc	57,810.00	3.22	186,148
13	15.10	Sub Structure POT Cum PTFE Bearing	Ton	2,100.00	510.32	1,071,672
14	15.12	Sub Structure Weepholes per Meter	Rm	972.00	452.47	439,801
End of Sub Total Sub Structure						26,093,055
Super Structure						
15	06.02/i	Tack Coat(Bituminous Layer)	sqm	1,043.00	16.03	16,719
16	06/Nsc2	BC GR II	cum	42.00	13,610.76	571,652
17	14/nsc1/i	Super Structure Filler (Copper Plate)	m	128.00	2,080.60	266,317
18	14/nsc1/ii	Super Structure Filler (Fibre Board)	m	128.00	704.98	90,237
19	14/nsc1/iii	Super Structure Filler (Premoulder Joint)	m	128.00	225.23	28,829
20	14/nsc1/iv	Super Structure Filler (Sealing Compound)	m	128.00	36.36	4,654
21	16.01/b/i/c2/i	Super Structure RCC M30 (T Beam & Slab)	cum	747.00	13,420.02	10,024,755
22	16.03	Super Structure Steel(HYSD)	MT	134.00	87,304.04	11,698,741
23	16.05	Cement concrete wearing coat M30	cum	8.00	20,352.87	162,823
24	16.08	Protection Work RCC Railing M30 (In situ	Rm	287.00	2,877.70	825,900
25	16.11	20mm Aggregate) Super Structure Drainage Spout	each	36.00	2,185.41	78,675
26	16.12/Nsc	Super Structure Approach Slab (M30)	cum	209.00	18,107.74	3,784,518
27	16.13	Super Structure PCC M15 Levelling Course	cum	91.00	9,401.56	855,542
28	16.16	Below Approach Slab Super Structure Strip Seal Expansion Joint	Rm	32.00	42,282.41	1,353,037
29	16.17	Super Structure Mastic Asphalt	sqm	1,043.00	552.07	575,809
End of Sub Total Super Structure						30,338,209

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Summary of Bill of Quantity

Bill No : 13. Minor Bridge

Sl No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
Protection Work						
30	08/nsc/5	Crash Barrier RCC M40	m	125.00	6,996.27	874,534
31	16/nsc	Protection Work Curtain Wall- PCC (M-15)	cum	188.00	10,451.52	1,964,886
32	17.01/a	Protection Work Boulder Apron Laid in Wire	cum	362.00	4,010.72	1,451,881
33	17.02	Crates Protection Work Filter material underneath	cum	181.00	3,231.65	584,929
34	17/nsc1	pitching in slopes Protection Work Flexible Apron	cum	208.00	3,362.05	699,306
End of Sub Total Protection Work						5,575,535
Miscellaneous Work						
35	02.04/i/c	Dismantling Structure RCC	cum	1,810.00	1,756.40	3,179,084
36	08.05	Paint on Concrete Surface(2 Coat)	sqm	1,197.00	94.34	112,925
37	08.12	Direction Sign(<0.9 sqm)	sqm	6.00	12,532.39	75,194
38	13/nsc1	Confirmatory Boring in soil	cum	12.00	2,020.00	24,240
39	13/nsc2	Confirmatory Boring in Hard Rock	cum	20.00	4,040.00	80,800
End of Sub Total Miscellaneous Work						3,472,243
Diversion Work						
40	03.13	Embankment fill from Roadway Cutting	cum	12,800.00	161.80	2,071,040
41	03.31	Excavation in Hill in Soil For Roadway	cum	14,400.00	213.50	3,074,400
42	04.01/Nsc1	GSB Close Graded GR V	Cum	720.00	3,852.93	2,774,110
43	05.01/b/a	WBM GR-II	cum	1,200.00	3,213.59	3,856,308
44	06/Nsc1	DBM GR II	cum	240.00	12,454.92	2,989,181
45	06/Nsc2	BC GR II	cum	120.00	13,610.76	1,633,291
46	09.01/nsc1	Hume Pipe(NP4 1200 dia Single ROW)	Rm	130.00	12,025.97	1,563,376
End of Sub Total Diversion Work						17,961,706
Total						100,208,095

Item Rate Analysis has been done considering

Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
Foundation						
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	4,092.00	221.12	904,823.04
2	13.01/a/ii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth 3 m to 6 m	cum	304.00	297.22	90,354.88
3	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	233.00	9675.78	2,254,456.74
4	14.03/g	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M30 Grade	cum	613.00	12458.26	7,636,913.38
5	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	74.00	79470.26	5,880,799.24
Sub Total of Foundation						16,767,347.28
Sub Structure						
6	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	203.00	1798.37	365,069.11
7	13.03/b	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Good Sandy Soil free from organic material	cum	3,291.00	1403.62	4,619,313.42
8	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	657.00	2067.82	1,358,557.74

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	15.03/g/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M30 Grade upto 5m height	cum	725.00	13273.56	9,623,331.00
10	15.03/i/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M40 Grade upto 5m height	cum	7.00	12112.22	84,785.54
11	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	105.00	79470.26	8,344,377.30
12	15.09	Supplying, fitting and fixing in position true to line and level elastomeric bearing conforming to IRC: 83 (Part-II) section IX and clause 2005 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications.	cc	57,810.00	3.22	186,148.20
13	15.10	Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, complete assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC: 83 part-I & II respectively and other parts conforming to BS: 5400, section 9.1 & 9.2 and clause 2006 of MoRTH Specifications complete as per drawing and approved technical specifications.	Ton	2,100.00	510.32	1,071,672.00
14	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications				

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			Rm	972.00	452.47	439,800.84
Sub Total of Sub Structure						26,093,055.15
		Super Structure				
15	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm	sqm	1,043.00	16.03	16,719.29
16	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	42.00	13610.76	571,651.92
17	14/nsc1 /i	Filler joint i)Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.	m	128.00	2080.60	266,316.80
18	14/nsc1 /ii	Filler joint Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.	m	128.00	704.98	90,237.44
19	14/nsc1 /iii	Filler joint iii)Providing and fixing in position 20 mm thick premoulded joint filler in expansion joint for fixed ends of simply supported spans not exceeding 10 m to cater for a horizontal movement upto 20 mm, covered with sealant complete as per drawing and technical specifications.	m	128.00	225.23	28,828.40

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
20	14/nsc1/iv	Filler joint iv)Providing and filling joint sealing compound as per drawings and technical specifications with coarse sand and 6 per cent bitumen by weight.	m	128.00	36.36	4,654.08
21	16.01/b/i/c2/ii	RCC Grade M30 For solid slab super-structure Approach Slab	cum	747.00	13420.02	10,024,754.94
22	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	134.00	87304.04	11,698,741.36
23	16.05	Cement concrete wearing coat M-30 grade including reinforcement complete as per drawing and Technical Specifications	cum	8.00	20352.87	162,822.96
24	16.08	Reinforced concrete railing of M30 Grade complete as per approved drawings and technical specification	Rm	287.00	2877.70	825,899.90
25	16.11	Drainage Spouts complete as per drawing and Technical specification	each	36.00	2185.41	78,674.76
26	16.12/Nsc	Reinforced cement concrete approach slab M-30 including reinforcement and formwork complete as per drawing and Technical specification	cum	209.00	18107.74	3,784,517.66
27	16.13	PCC M15 ordinary Grade leveling course below approach slab complete as per drawing and Technical specification Below Approach Slab	cum	91.00	9401.56	855,541.96
28	16.16	Providing single gap(unitary) strip/seal type of expansion joint of movement capacity of 80 mm with fatigue tested structure section at the nosing and ancourage assembly complete as per approved drawing and standard specification to be installed under supervision of a specialist manufacture	Rm	32.00	42282.41	1,353,037.12

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
29	16.17	Mastic asphalt (providing and laying 12mm thick mastic asphalt wearing courses on top of deck slab excluding prime coat with paving grade bitumen meeting the requirement given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 9.5 mm nominal size at the rate of 0.005cum per 10sqm and at an approximate spacing of 10cm centre in both direction ,pressed into surface not less than 100 deg. C. protruding 1mm to 4mm over mastic surface ,all complete as per clause 515) using Bitumen VG-40 (3/40)	sqm	1,043.00	552.07	575,809.01
Sub Total of Super Structure						30,338,208.64
		Protection Work				
30	08/nsc/5	Reinforced Cement Concrete Crash Barrier-Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with M-40 grade concrete with HYSD reinforcement conforming to IRC:21 and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified	m	125.00	6996.27	874,533.75
31	16/nsc	For Protection Work - cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade upto 5m height	cum	188.00	10451.52	1,964,885.76
32	17.01/a	laying apron complete as per drawing and Technical specification. Boulder				

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			cum	362.00	4010.72	1,451,880.64
33	17.02	Filter material underneath pitching in slopes complete as per drawing and Technical specification	cum	181.00	3231.65	584,928.65
34	17/nsc1	Flexible Apron - Construction of flexible apron 750mm thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.	cum	208.00	3362.05	699,306.40
Sub Total of Protection Work						5,575,535.20
		Miscellaneous Work				
35	02.04/i/c	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. c)Pre- stressed/ Reinforced Cement Concrete grade M20 & above	cum	1,810.00	1756.40	3,179,084.00
36	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	1,197.00	94.34	112,924.98
37	08.12	Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorised sign as per IRC:67 made of high intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75 x 75 x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing)	sqm	6.00	12532.39	75,194.34
38	13/nsc1	Confirmatory Boring in Soil	cum	12.00	2020.00	24,240.00
39	13/nsc2	Confirmatory Boring in Hard Rock				

Item Rate Analysis has been done considering

Manipur Schedule of Rates For National Highways - Works 2018(PWD,Manipur)

Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			cum	20.00	4040.00	80,800.00
Sub Total of Miscellaneous Work						3,472,243.32
Diversion Work						
40	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2	cum	12,800.00	161.80	2,071,040.00
41	03.31	Excavation in Hill Area in Soil by Mechanical Means Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres	cum	14,400.00	213.50	3,074,400.00
42	04.01/N sc1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	720.00	3852.93	2,774,109.60
43	05.01/b/a	WBM/Providing, laying, spreading and compacting stone aggregate of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with power roller 8-10 tones in stages to proper grade and camber, applying and brooming requisite type of screening & binding materials to fill up the interstices of coarse aggregates, watering and rolling making necessary earthen bund to protect edges, lighting, guarding, barricading and maintenance of diversion etc.	cum	1,200.00	3213.59	3,856,308.00

Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
44	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	240.00	12454.92	2,989,180.80
45	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	120.00	13610.76	1,633,291.20
46	09.01/ns c1	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row . B)1200 mm dia	Rm	130.00	12025.97	1,563,376.10
Sub Total of Diversion Work						17,961,705.70
Total of Bill 13. Minor Bridge						100,208,095.29

Item Rate Analysis has been done considering



**VARIABLE NOTATION
&
CHAINAGE DETAILS
(ROAD PART)**



TCS Number	TCS Description	Length (km)
TCS-1	Typical Cross Section of Two Lane Carriageway with Paved Shoulder in Built up area with Both side covered drain cum footpath in plain terrain (Reconstruction)	0.000
TCS-2	Typical Cross Section of Two Lane Carriageway with Paved Shoulder in Rural area in Plain Terrain (Reconstruction)	0.000
TCS-2A	Typical Cross Section of Two Lane Carriageway with Paved Shoulder in Rural area in Hilly Terrain (Reconstruction)	0.125
TCS-3	Typical Cross Section of Two Lane Carriageway with Paved Shoulder in Rural area with trapezoidal open drain on hill side and earthen shoulder on valley side (Reconstruction)	22.400
TCS-3A	Typical Cross Section of Two Lane Carriageway with Paved Shoulder in Rural area with trapezoidal open drain on hill side and earthen shoulder on valley side (New Construction)	4.195
TCS-4	Typical Cross Section of Two Lane Carriageway In Rural Area With Retaining Wall on Valley Side And Trapezoidal Open drain on Hill side (Reconstruction)	1.605
TCS-4A	Typical Cross Section of Two Lane Carriageway In Rural Area With Retaining Wall on Valley Side And Trapezoidal Open drain on Hill side (New Construction)	0.085
TCS-5	Typical Cross Section of Two Lane Carriageway In Rural Area With Breast Wall on Hill Side And Earthen Shoulder on Valley side (Reconstruction)	2.830
TCS-5A	Typical Cross Section of Two Lane Carriageway In Rural Area With Breast Wall on Hill Side And Earthen Shoulder on Valley side (Reconstruction)	1.850
TCS-6	Typical Cross Section of Two Lane Carriageway In Built Up Area With Both Side Footpath Cum RCC Rectangular Covered Drain in Hilly Terrain (New Construction)	1.780
TCS-7	Typical Cross Section of Two Lane Carriageway In Built-Up Area With Breast Wall on Hill Side And Footpath Cum RCC Rectangular Covered Drain on Valley side (Reconstruction)	0.100
TCS-7A	Typical Cross Section of Two Lane Carriageway In Rural Area With Beast Wall on One Side And tapezoidal drain on other side (Reconstruction)	0.200
TCS-9A	Typical Cross Section of Two Lane Carriageway In Rural Area With Breast Wall on both sides (New Construction)	0.000
TCS-10	Typical Cross Section of Two Lane Carriageway In Rural Area With Cut and Cover Tunnel and Retaining Wall on Valley side (New Construction)	0.000
TCS-11	Typical Cross Section of Two Lane Carriageway In Rural Area With Retaining Wall on Valley Side And Breast Wall on Hill side (Reconstruction)	0.000
Total =		35.170



Typical Cross Section

List of TCS

Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			
66110	66180		70	TCS-3
66180	66280		100	TCS-6
66280	66550	3.84	266.16	TCS-3
66550	66600	2.6	47.4	TCS-4
66600	66650	3.96	46.04	TCS-3
66650	66860		210	TCS-5A
66860	67010	2.6	147.4	TCS-3
67010	67090		80	TCS-4
67090	67310	2.6	217.4	TCS-3
67310	67360		50	TCS-4
67360	67410		50	TCS-3
67410	67480		70	TCS-5
67480	67690	5.2	204.8	TCS-3
67690	67745	8	47	TCS-3A
67745	68055	7.8	302.2	TCS-3
68055	68105		50	TCS-5
68105	68155		50	TCS-5A
68155	68205		50	TCS-5
68205	68265		60	TCS-4
68265	68850	7.8	577.2	TCS-3
68850	68910		60	TCS-4
68910	69010	2.6	97.4	TCS-3
69010	69140		130	TCS-4
69140	69280	5.3	134.7	TCS-3
69280	69520	8	232	TCS-5A
69520	69570		50	TCS-3
69570	69670		100	TCS-5A
69670	69720	2.7	47.3	TCS-3
69720	69820	2.6	97.4	TCS-5
69820	70240	16.56	403.44	TCS-3
70240	70355		115	TCS-5
70355	70420		65	TCS-4
70420	70630		210	TCS-5A
70630	70805	2.6	172.4	TCS-3
70805	70955		150	TCS-5
70955	71105	2.6	147.4	TCS-3
71105	71155		50	TCS-5
71155	71555	7.8	392.2	TCS-3
71555	71750	5	190	TCS-5A
71750	71930	2.7	177.3	TCS-3
71930	72055		125	TCS-5A
72055	72305		250	TCS-3A
72305	72380		75	TCS-3
72380	72510	2.6	127.4	TCS-4
72510	72655	3.84	141.16	TCS-5
72655	72715		60	TCS-3
72715	72765	2.6	47.4	TCS-4




Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			
72765	72900		135	TCS-3
72900	72950	2.6	47.4	TCS-3A
72950	73030		80	TCS-3
73030	73080	2.6	47.4	TCS-4
73080	73200	3.96	116.04	TCS-5
73200	73465	2.6	262.4	TCS-3
73465	73520		55	TCS-5
73520	73700		180	TCS-3
73700	73830	14.06	115.94	TCS-5
73830	73910		80	TCS-3
73910	74010		100	TCS-5A
74010	74070		60	TCS-3
74070	74180	2.6	107.4	TCS-4
74180	75230	25.58	1024.42	TCS-3
75230	75355	2.6	122.4	TCS-5
75355	75880	7.86	517.14	TCS-3
75880	77030	21.92	1128.08	TCS-6
77030	77100		70	TCS-3
77100	77150	2.6	47.4	TCS-4
77150	77295		145	TCS-3
77295	77450		155	TCS-5A
77450	77880	5.2	424.8	TCS-3
77880	77960		80	TCS-5
77960	78280	5.3	314.7	TCS-3
78280	78480	5.3	194.7	TCS-4
78480	79080	7.9	592.1	TCS-3
79080	79150		70	TCS-4
79150	79210		60	TCS-3
79210	79295		85	TCS-3A
79295	79345	2.7	47.3	TCS-3
79345	79395		50	TCS-3A
79395	79445	3.84	46.16	TCS-4
79445	79510	5.26	59.74	TCS-3
79510	79590		80	TCS-5
79590	79820	6.14	223.86	TCS-3
79820	79890		70	TCS-5
79890	80190	11.84	288.16	TCS-3
80190	80330	5.26	134.74	TCS-5A
80330	81315	13.2	971.8	TCS-3
81315	81630	2.7	312.3	TCS-5
81630	82040	2.6	407.4	TCS-3
82040	82120		80	TCS-3A
82120	82620	5.3	494.7	TCS-3
82620	82670		50	TCS-3A
82670	83180	5.2	504.8	TCS-3
83180	83300		120	TCS-5
83300	83380		80	TCS-3A
83380	83730	5.2	344.8	TCS-3
83730	83800	6.54	63.46	TCS-4
83800	84600	9.04	790.96	TCS-3




Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			
84600	84675	2.7	72.3	TCS-5A
84675	84750	5	70	TCS-3
84750	84830		80	TCS-3A
84830	85175	9.16	335.84	TCS-3
85175	85320		145	TCS-3A
85320	85370	2.6	47.4	TCS-3
85370	85420		50	TCS-3A
85420	85575		155	TCS-3
85575	85630	2.6	52.4	TCS-3A
85630	85680		50	TCS-3
85680	85780	2.6	97.4	TCS-5
85780	85840		60	TCS-4
85840	85900		60	TCS-5
85900	86100	2.6	197.4	TCS-3
86100	86300	5.2	194.8	TCS-3A
86300	86600	2.6	297.4	TCS-3
86600	86650	6.14	43.86	TCS-3A
86650	87180	11.34	518.66	TCS-3
87180	87250		70	TCS-4
87250	87400		150	TCS-3
87400	87650	2.6	247.4	TCS-5
87650	87700		50	TCS-5A
87700	87775		75	TCS-5
87775	87820	5.12	39.88	TCS-3
87820	87880		60	TCS-3A
87880	88060	2.6	177.4	TCS-3
88060	88100		40	TCS-3A
88100	88270	2.6	167.4	TCS-3
88270	88350		80	TCS-3A
88350	88450	5.12	94.88	TCS-5
88450	88550		100	TCS-3A
88550	89850	18.3	1281.7	TCS-3
89850	89970		120	TCS-3A
89970	90510	9.04	530.96	TCS-3
90510	90560		50	TCS-3A
90560	90630		70	TCS-3
90630	90970	5	335	TCS-3A
90970	91015	2.7	42.3	TCS-4A
91015	91110		95	TCS-3A
91110	91150		40	TCS-4A
91150	91240		90	TCS-5A
91240	91280		40	TCS-5
91280	91400		120	TCS-3A
91400	91460	2.6	57.4	TCS-3
91460	91770		310	TCS-3A
91770	92010	5.3	234.7	TCS-3
92010	92080		70	TCS-3A
92080	92180	2.6	97.4	TCS-3
92180	92240		60	TCS-5
92240	92390		150	TCS-3




Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			
92390	92420	2.6	27.4	TCS-4
92420	92500		80	TCS-3A
92500	92575	2.6	72.4	TCS-3
92575	92625		50	TCS-4
92625	92820	5.2	189.8	TCS-3
92820	92980	2.6	157.4	TCS-3A
92980	93060	5.26	74.74	TCS-3
93060	93090		30	TCS-4
93090	93270	2.6	177.4	TCS-3A
93270	93580		310	TCS-3
93580	93630	2.6	47.4	TCS-4
93630	93880	123	127	TCS-3A
93880	93940		60	TCS-7A
93940	94275	9.14	325.86	TCS-3
94275	94375		100	TCS-5
94375	94430	2.6	52.4	TCS-3
94430	94490		60	TCS-3A
94490	94610	2.6	117.4	TCS-3
94610	94660		50	TCS-3A
94660	94800	2.7	137.3	TCS-3
94800	94850		50	TCS-3A
94850	94930		80	TCS-3
94930	94970		40	TCS-4
94970	95550	10.6	569.4	TCS-3
95550	95640		90	TCS-5
95640	95700		60	TCS-5A
95700	95940	8.84	231.16	TCS-3
95940	96020		80	TCS-3A
96020	96475	10.46	444.54	TCS-3
96475	96560		85	TCS-5
96560	96630	2.6	67.4	TCS-3
96630	96690		60	TCS-3A
96690	96880	2.6	187.4	TCS-3
96880	96930		50	TCS-3A
96930	97120	2.6	187.4	TCS-3
97120	97165	2.6	42.4	TCS-5
97165	98460	11.64	1283.36	TCS-3
98460	98600		140	TCS-7A
98600	98700	2.6	97.4	TCS-7
98700	98790		90	TCS-6
98790	98900		110	TCS-3A
98900	99025	2.6	122.4	TCS-2A
99025	99350	2.7	322.3	TCS-3
99350	99400		50	TCS-5A
99400	99650	5.2	244.8	TCS-3A
99650	99970	5.3	314.7	TCS-3
99970	100120	2.6	147.4	TCS-3A
100120	100840	22.38	697.62	TCS-3
100840	101280	10.28	429.72	TCS-6
Total Length =		695	34475	




Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			

Summary of TCS Length :

TCS No.	Net Length (m)	CD Length (m)	Total Length (m)
TCS-2A	122.4	2.6	125.0
TCS-3	22011	388.9	22400.0
TCS-3A	4029	165.5	4195.0
TCS-4	1569	36.5	1605.0
TCS-4A	82	2.7	85.0
TCS-5	2787	42.7	2830.0
TCS-5A	1829	21.0	1850.0
TCS-6	1748	32.2	1780.0
TCS-7	97.4	2.6	100.0
TCS-7A	200.0	0.0	200.0
Total =	34475	695	35170

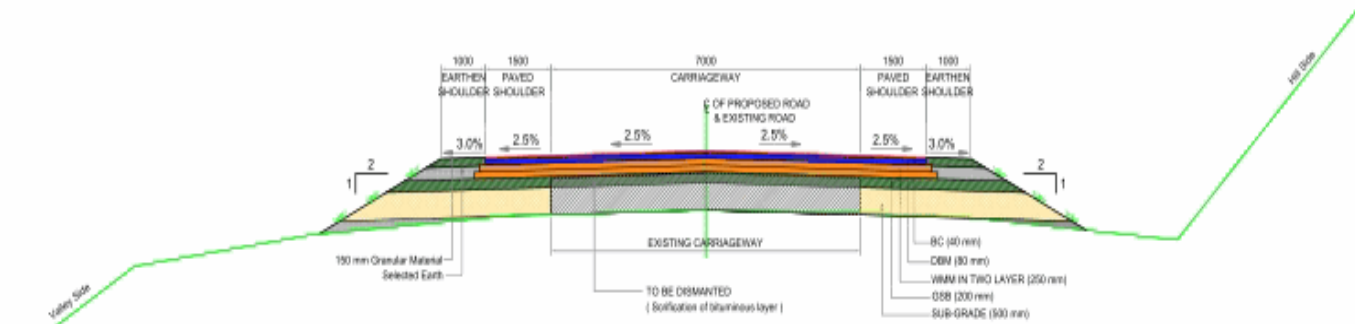


Variable Declaration

TCS-02A

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.080	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	125.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	1.000	m
16	GSB Reuse	gsb_per	36.600	
17	Hard Shoulder	hs	1.000	m
18	150mm GSB at Earthen Shoulder Portion area	es_gsb	0.158	sqm
19	Earthen Shoulder Portion area	es_area	0.343	sqm

Variable Declaration



TCS- 2A :- TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY WITH PAVED SHOULDER
IN RURAL AREA IN HILLY TERRAIN (RECONSTRUCTION)

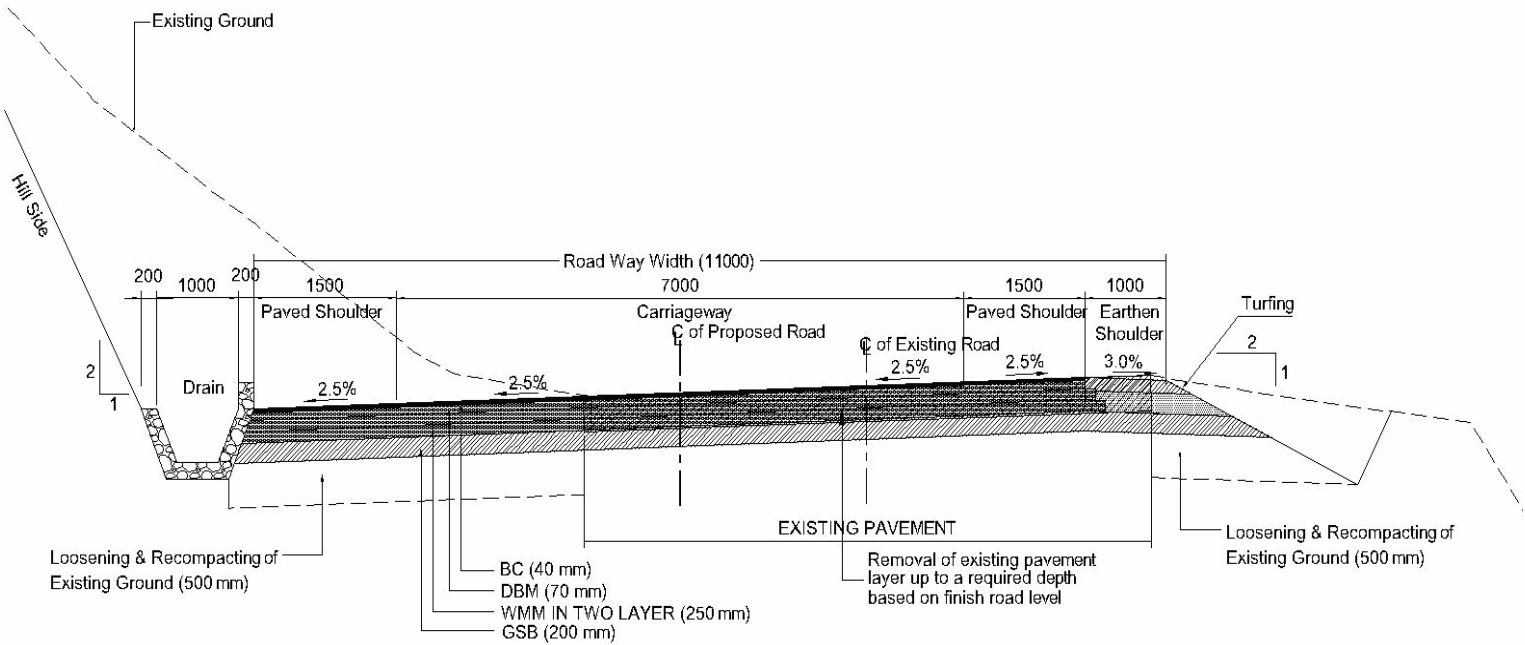

KOLKATA
700 092
124A, N.S.C. BOSE ROAD

Variable Declaration

TCS-03

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	22400.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	1.000	m
16	GSB Reuse	gsb_per	0.000	
17	Hard Shoulder	hs	1.000	m
18	150mm GSB at Earthen Shoulder Portion area	es_gsb	0.171	sqm
19	Earthen Shoulder Portion area	es_area	0.315	sqm

Variable Declaration



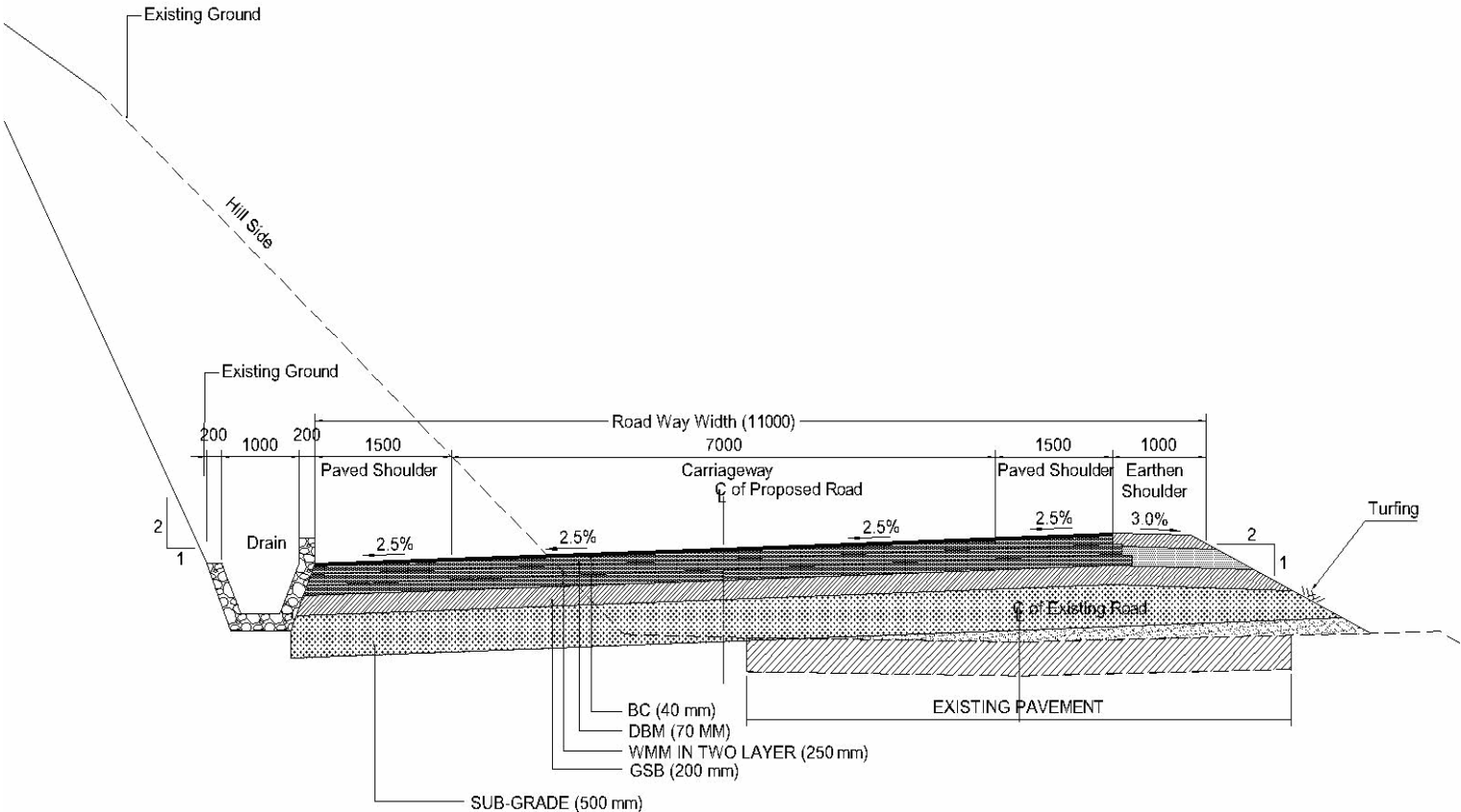
TCS-3 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY WITH PAVED SHOULDER IN RURAL AREA WITH TRAPEZOIDAL OPEN DRAIN ON HILL SIDE AND EARTHEN SHOULDER ON VALLEY SIDE (RECONSTRUCTION)

Variable Declaration

TCS-03A

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	4195.000	m
9	Existing Pavement Width	ext_pav	0.000	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	1.000	m
16	GSB Reuse	gsb_per	0.000	
17	Hard Shoulder	hs	1.000	m
18	150mm GSB at Earthen Shoulder Portion area	es_gsb	0.171	sqm
19	Earthen Shoulder Portion area	es_area	0.315	sqm

Variable Declaration



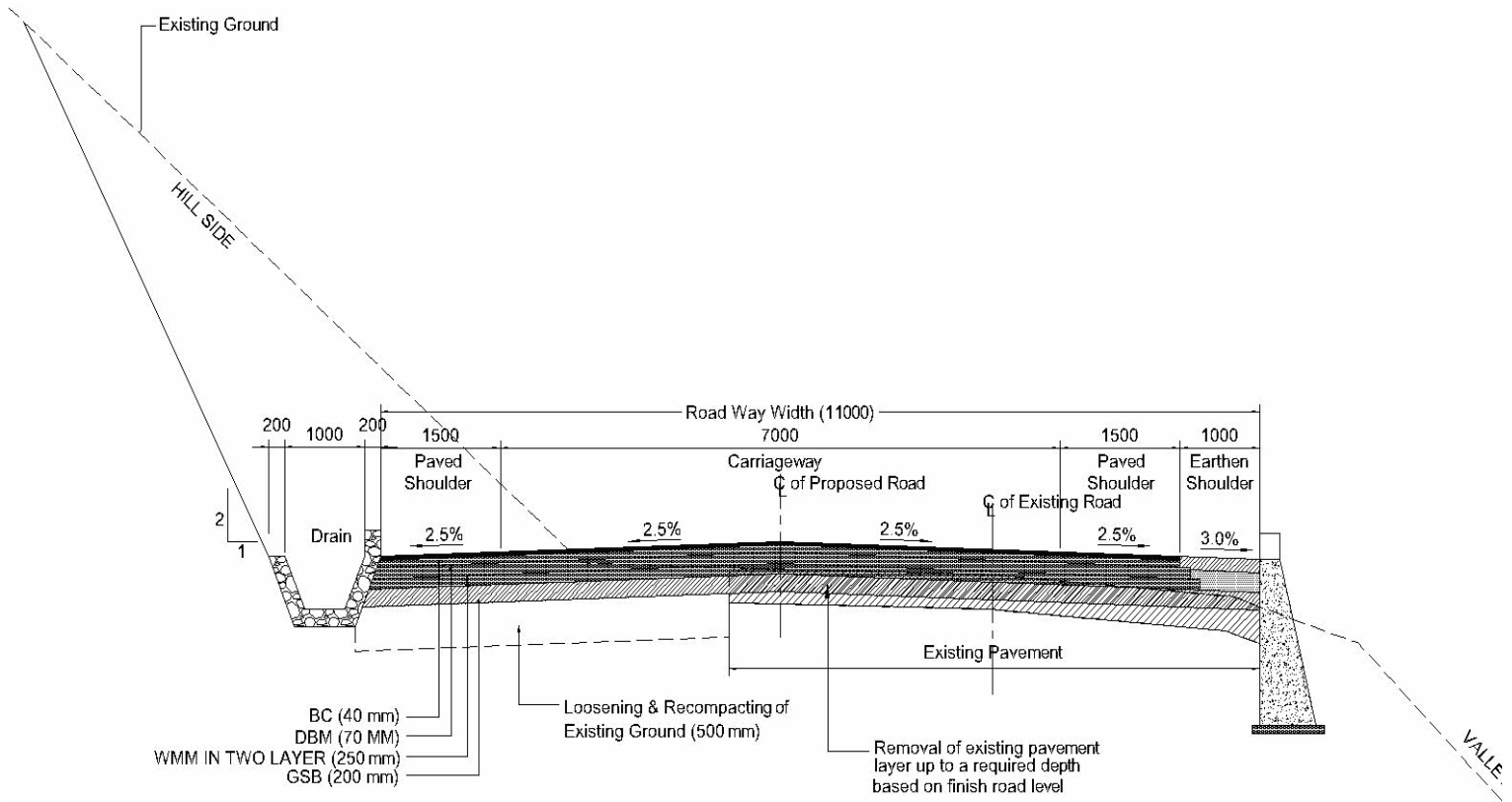
TCS-3A : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY WITH PAVED SHOULDER IN RURAL AREA WITH TRAPEZOIDAL OPEN DRAIN ON HILL SIDE AND EARTHEN SHOULDER ON VALLEY SIDE (NEW CONSTRUCTION)

Variable Declaration

TCS-04

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	1605.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	1.000	m
16	GSB Reuse	gsb_per	0.000	
17	Hard Shoulder	hs	1.000	m
18	150mm GSB at Earthen Shoulder Portion area	es_gsb	0.171	sqm
19	Earthen Shoulder Portion area	es_area	0.315	sqm

Variable Declaration



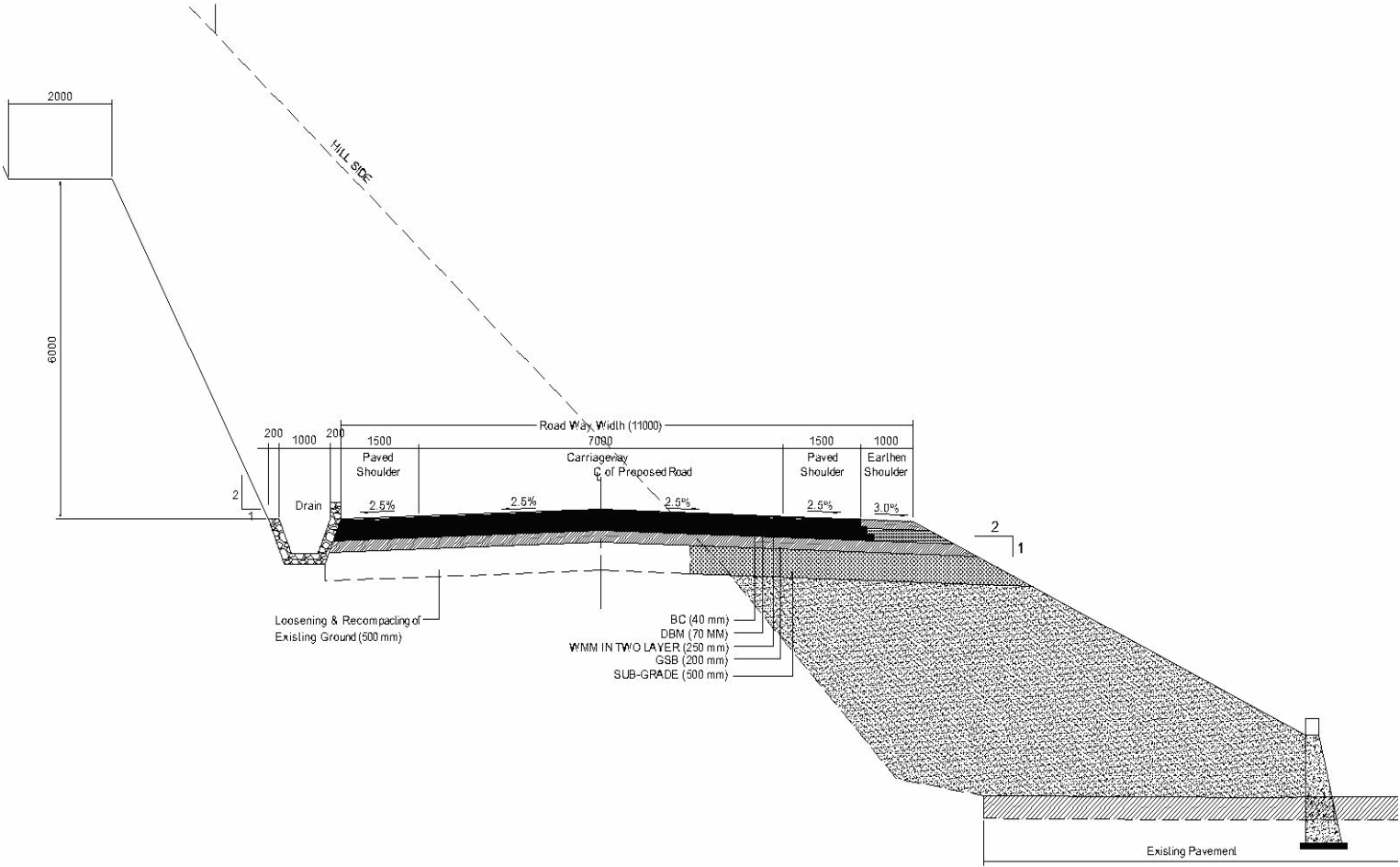
TCS-4 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH RETAINING WALL ON VALLEY SIDE AND TRAPEZOIDAL OPEN DRAIN ON HILL SIDE (RECONSTRUCTION)

Variable Declaration

TCS-04A

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	85.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	1.000	m
16	GSB Reuse	gsb_per	0.000	
17	Hard Shoulder	hs	1.000	m
18	150mm GSB at Earthen Shoulder Portion area	es_gsb	0.171	sqm
19	Earthen Shoulder Portion area	es_area	0.315	sqm

Variable Declaration



TCS-4A : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH RETAINING WALL ON VALLEY SIDE AND TRAPEZOIDAL OPEN DRAIN ON HILL SIDE (NEW CONSTRUCTION)

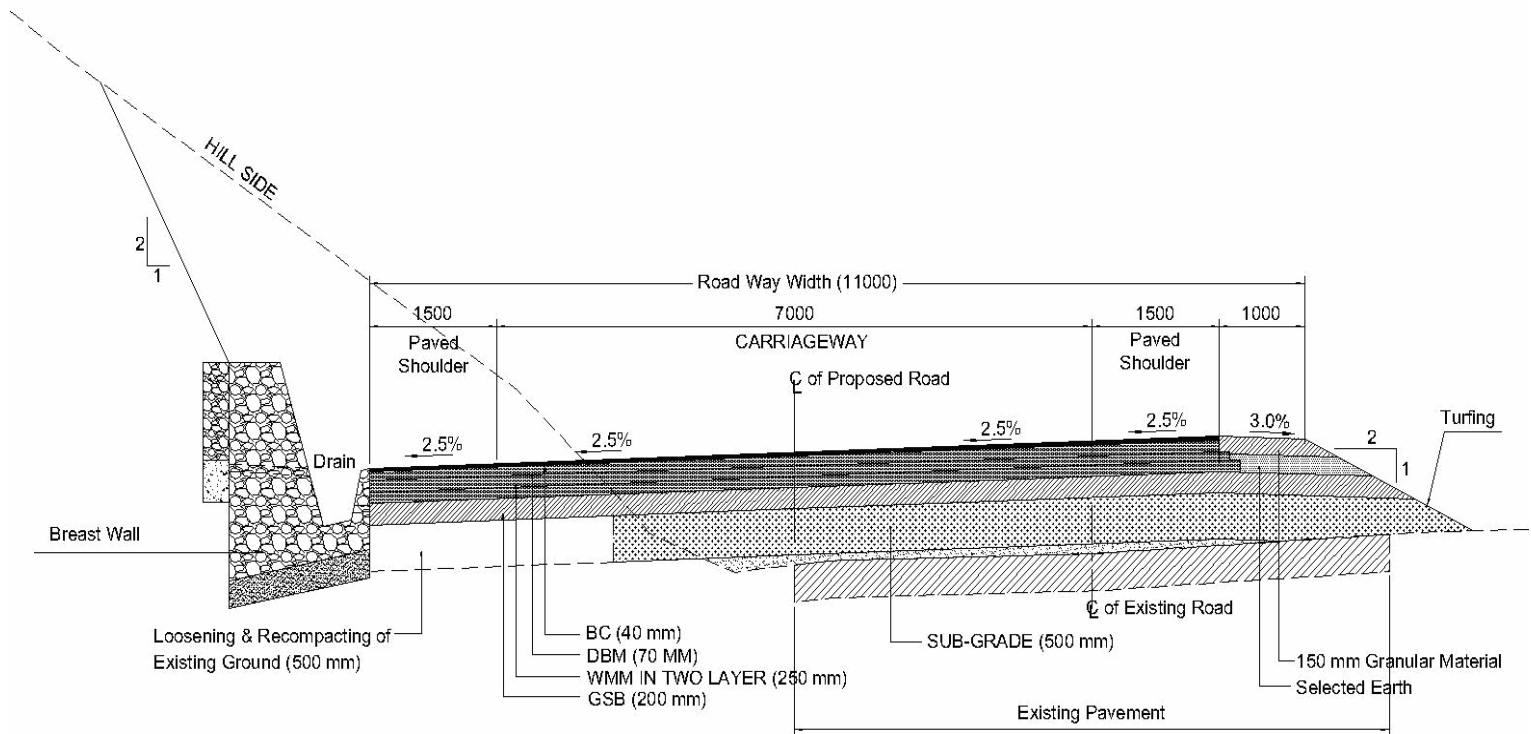
Variable Declaration

TCS-05

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	2830.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	1.000	m
16	GSB Reuse	gsb_per	0.000	
17	Hard Shoulder	hs	1.000	m
18	150mm GSB at Earthen Shoulder Portion area	es_gsb	0.171	sqm
19	Earthen Shoulder Portion area	es_area	0.315	sqm

Variable Declaration

—Existing Ground



TCS-5 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH BREAST WALL ON HILL SIDE AND EARTHEN SHOULDER ON VALLEY SIDE (RECONSTRUCTION)

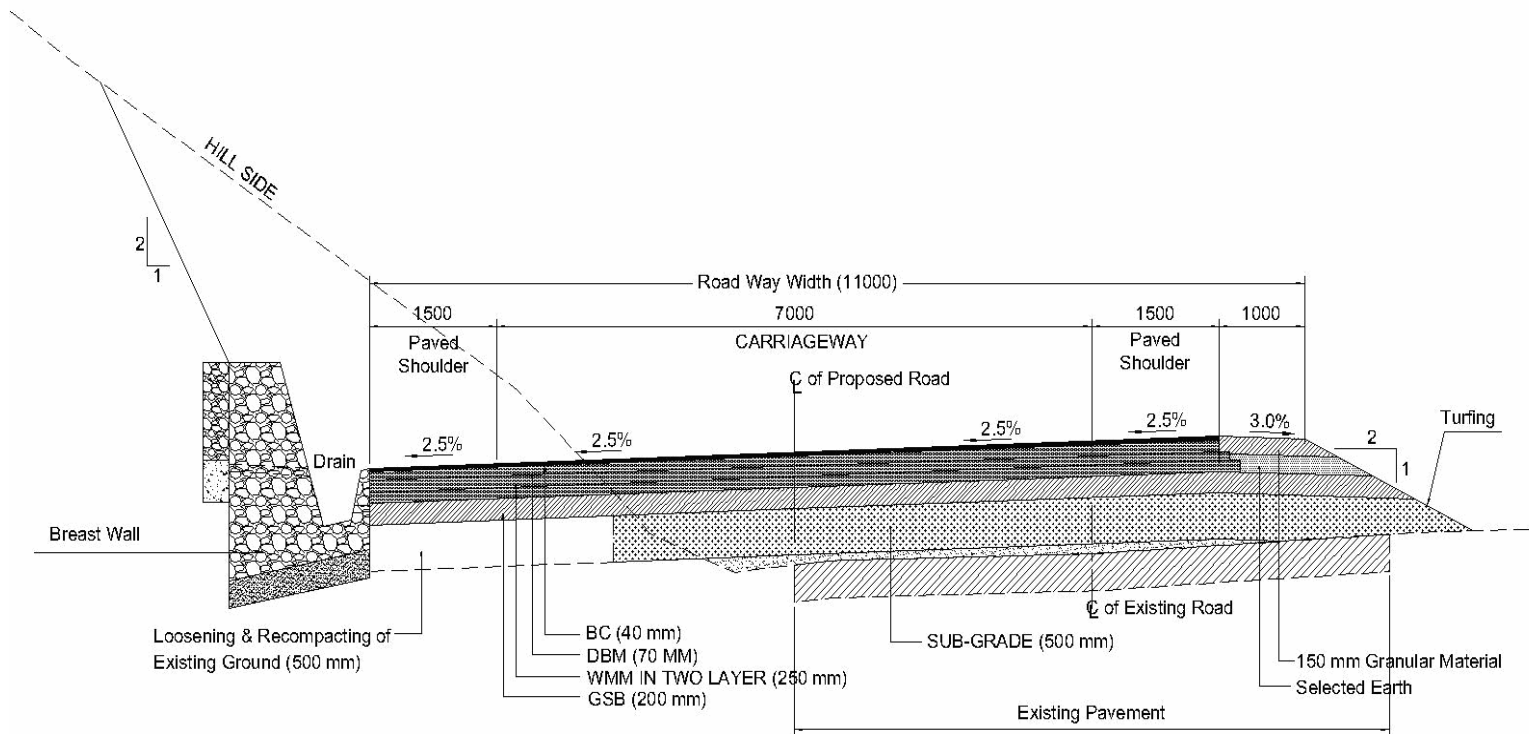
Variable Declaration

TCS-05A

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	1850.000	m
9	Existing Pavement Width	ext_pav	0.000	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	1.000	m
16	GSB Reuse	gsb_per	0.000	
17	Hard Shoulder	hs	1.000	m
18	150mm GSB at Earthen Shoulder Portion area	es_gsb	0.171	sqm
19	Earthen Shoulder Portion area	es_area	0.315	sqm

Variable Declaration

—Existing Ground



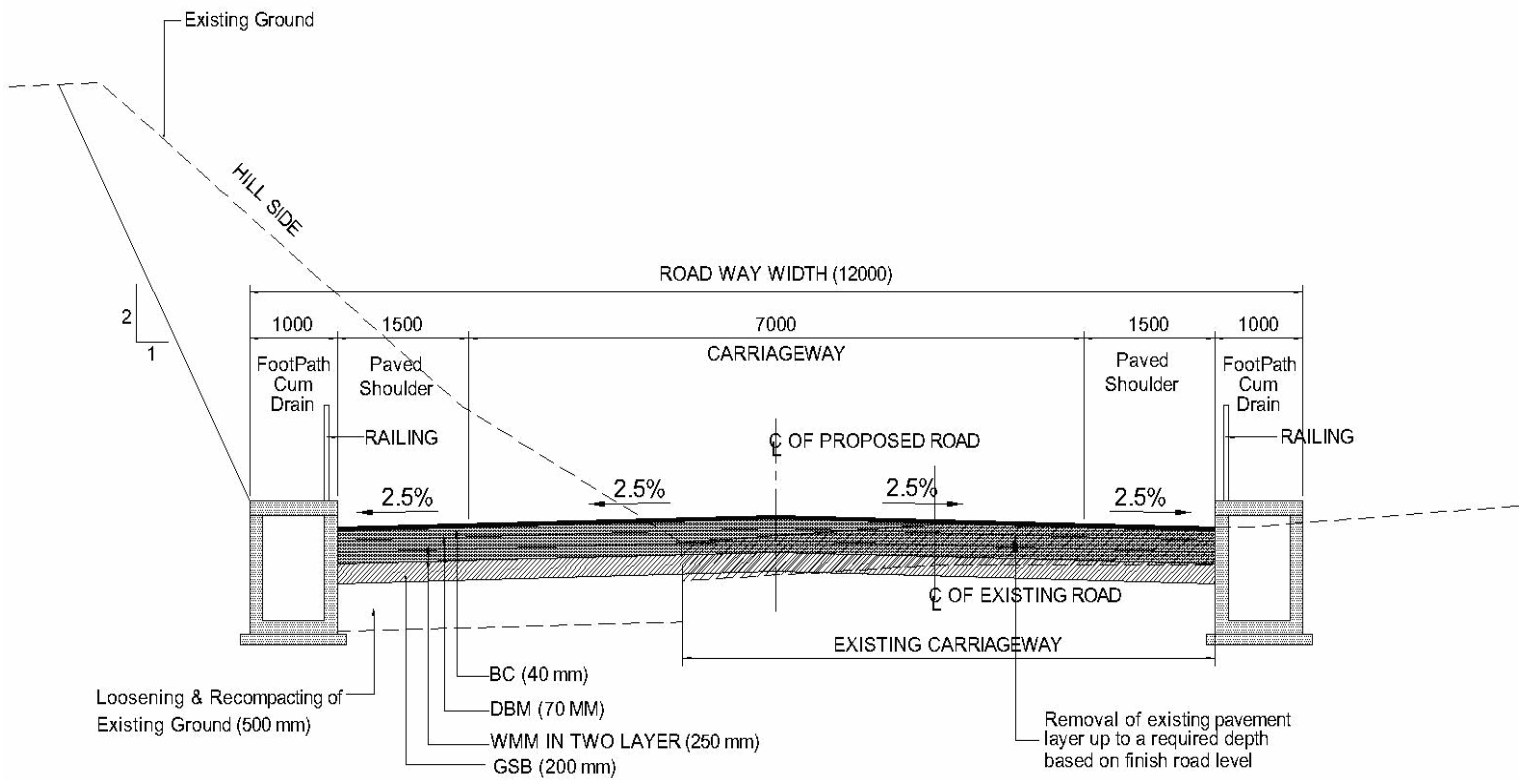
TCS-5 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH BREAST WALL ON HILL SIDE AND EARTHEN SHOULDER ON VALLEY SIDE (RECONSTRUCTION)

Variable Declaration

TCS-06

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	1780.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	0.000	m
16	GSB Reuse	gsb_per	0.000	

Variable Declaration



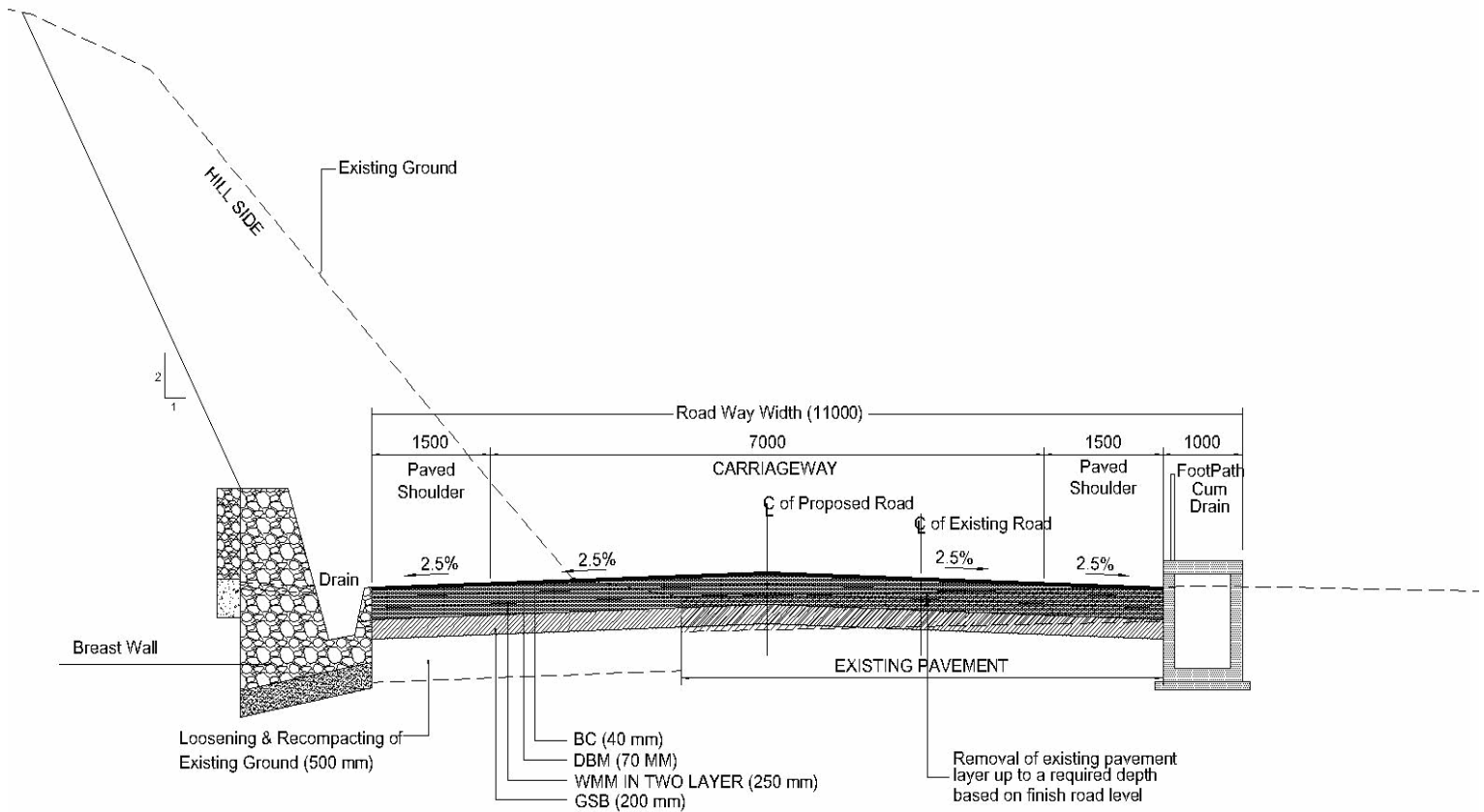
TCS-6 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN BUILT UP AREA
WITH BOTH SIDE FOOTPATH CUM RCC RECTANGULAR COVERED DRAIN IN HILLY TERRAIN (RECONSTRUCTION)

Variable Declaration

TCS-07

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	100.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	0.000	m
16	GSB Reuse	gsb_per	0.000	

Variable Declaration



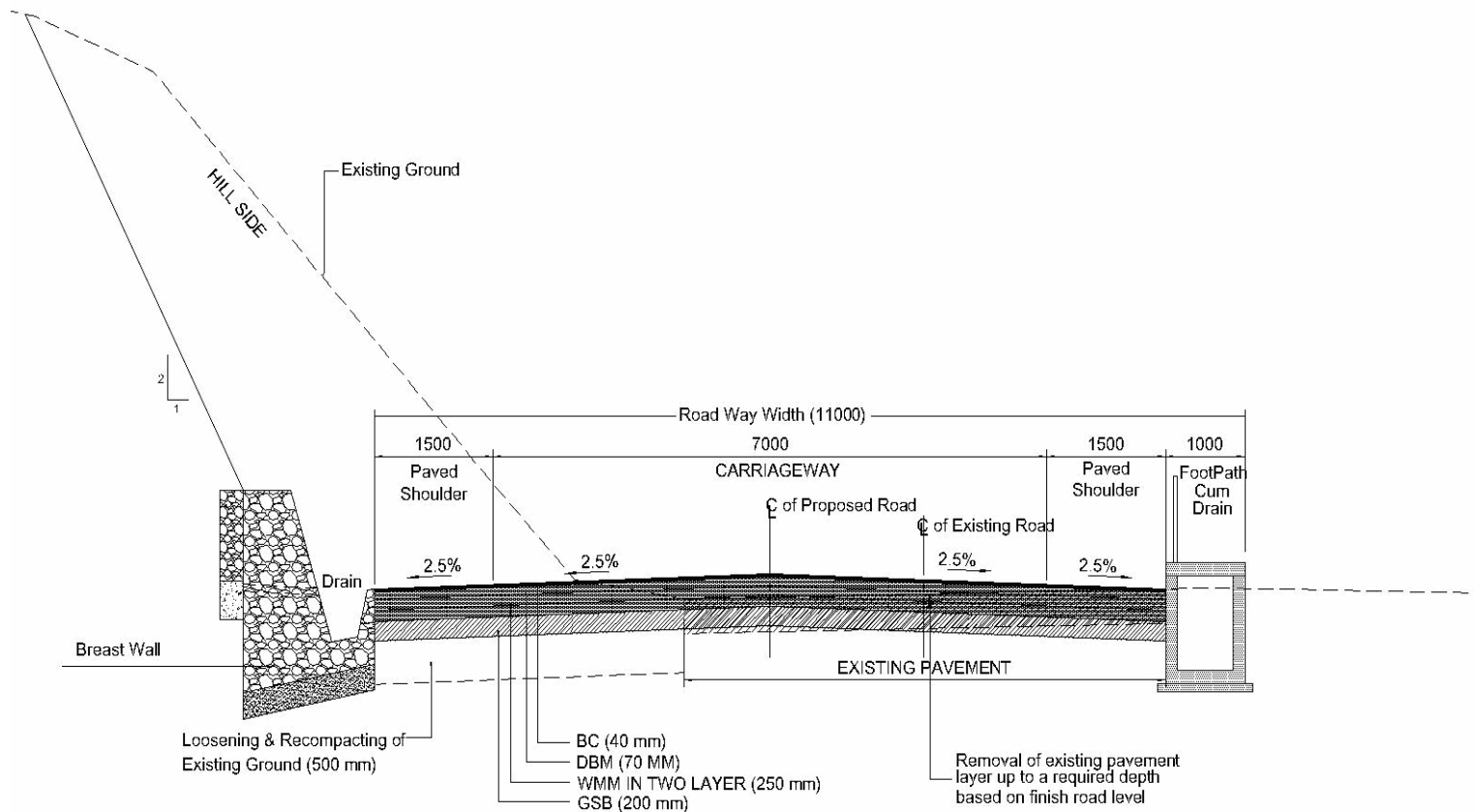
TCS-7 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN BUILT-UP AREA WITH BREAST WALL ON HILL SIDE AND FOOTPATH CUM RCC RECTANGULAR COVERED DRAIN ON VALLEY SIDE (RECONSTRUCTION)

Variable Declaration

TCS-07A

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	200.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	0.000	m
16	GSB Reuse	gsb_per	0.000	

Variable Declaration



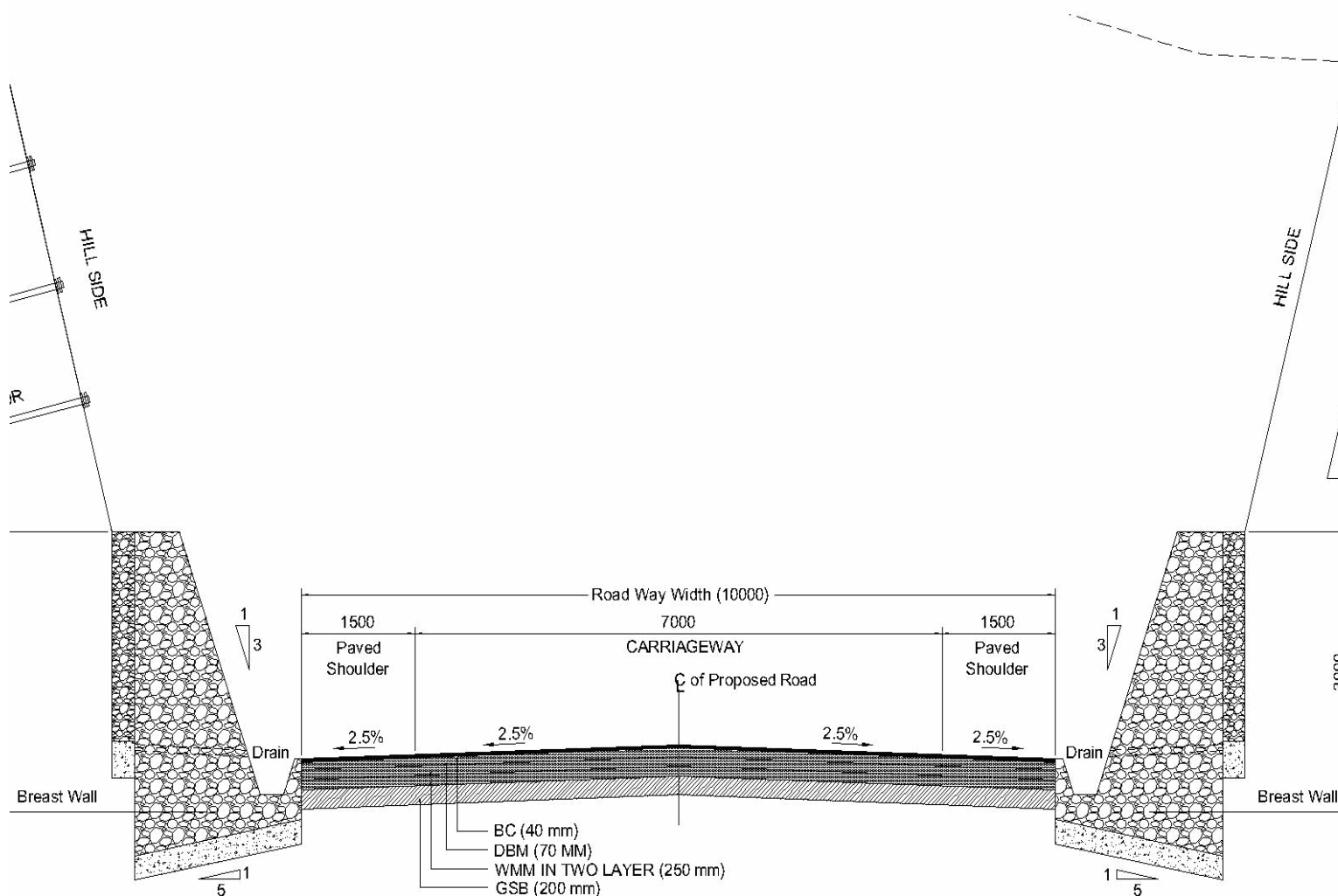
TCS-7 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN BUILT-UP AREA WITH BREAST WALL ON HILL SIDE AND FOOTPATH CUM RCC RECTANGULAR COVERED DRAIN ON VALLEY SIDE (RECONSTRUCTION)

Variable Declaration

TCS-09A

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	0.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	0.000	m
16	GSB Reuse	gsb_per	0.000	

Variable Declaration



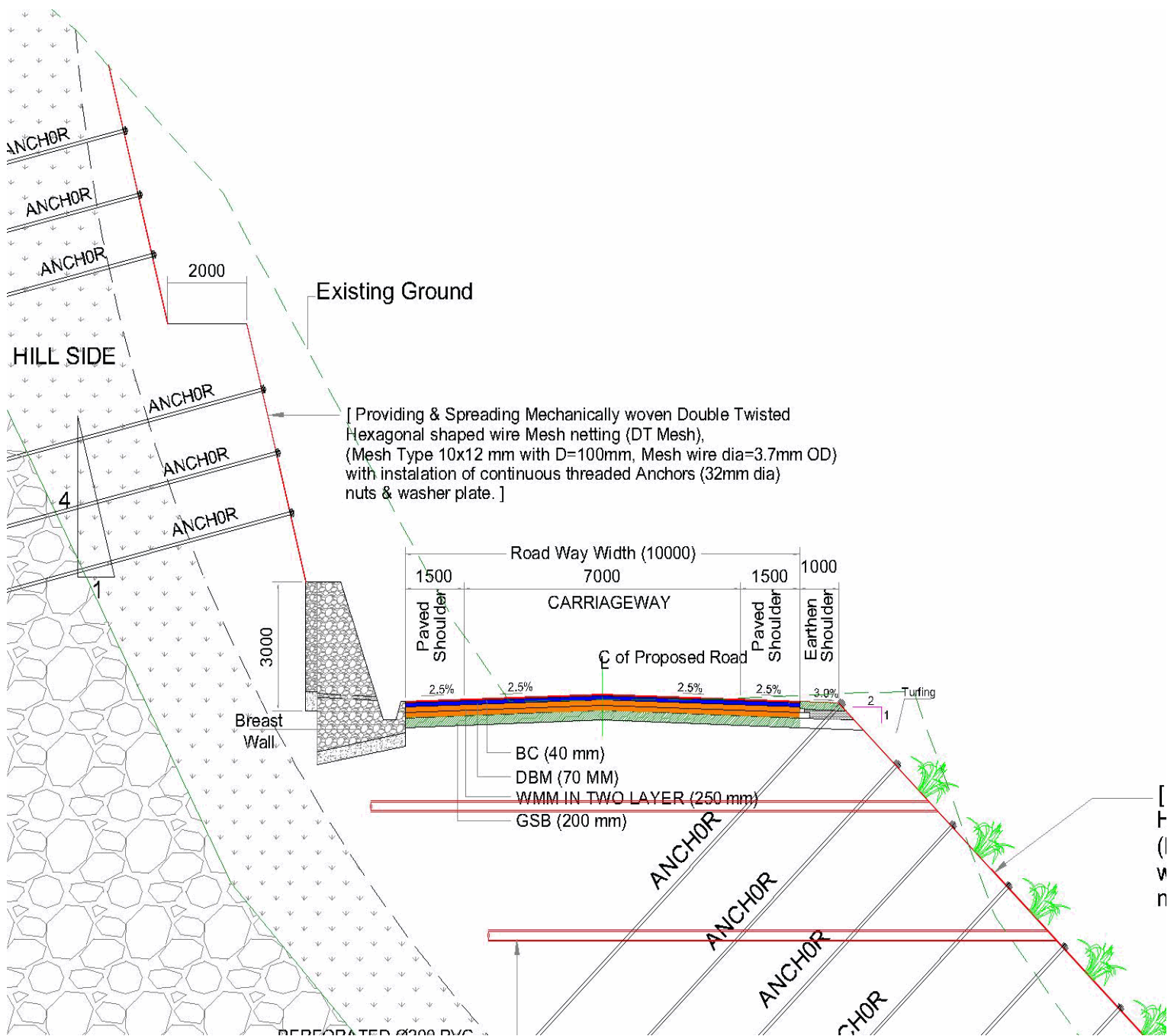
TCS-9A : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH BREAST WALL ON BOTH SIDES (NEW CONSTRUCTION)

Variable Declaration

TCS-12

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	1.500	m
3	BC Thickness	bc	0.040	m
4	DBM Thickness	dbm	0.070	m
5	WMM Layer-I Thickness	wmm1	0.125	m
6	GSB Thickness	gsb	0.200	m
7	Subgrade Thickness	sg	0.500	m
8	Length	l	0.000	m
9	Existing Pavement Width	ext_pav	6.700	m
10	Length of each centreline marking	lc	3.000	m
11	Width of each centreline marking	wc	0.100	m
12	No of Lines for Carriageway Marking for 2 Lane	nc	2.000	nos.
13	Width of Carriageway Marking	wid_mar	0.150	m
14	WMM Layer-II Thickness	wmm2	0.125	m
15	Earthen Shoulder	es	0.000	m
16	GSB Reuse	gsb_per	0.000	

Variable Declaration



Site Clearance and Dismantling

A.Tree Cutting

SI No	Girth Details		
1	Girth from 300 mm to 600 mm	4	Each
1	Girth from 600 mm to 900 mm	48	Each
2	Girth from 900 mm to 1800 mm	110	Each
4	Girth from 1800 mm to 2700 mm	4	Each
5	Above 2700 mm	4	Each

..... Bill No- 01, Sl. No- 1
 Bill No- 01, Sl. No- 2
 Bill No- 01, Sl. No- 3
 Bill No- 01, Sl. No- 4
 Bill No- 01, Sl. No- 5

B.Clearing and grubbing

Clearing and Grubbing Area 54.33 Ha

..... Bill No- 01, Sl. No-6

C. Dismantling

SI No A.Rubble stone masonry in cement mortar

1	Culvert	=	1348	Cum
		Total=	1348	cum

..... Bill No- 01, Sl. No- 8

SI No B.Total Dismantling of Reinforced cement concrete

1	Culvert	=	598	Cum
		Total=	598	cum

..... Bill No- 01, Sl. No- 7

SI No C.Total Dismantling Hume Pipe Culvert

1	up to 600 mm dia=	144	m
2	600-900 mm dia=	216	m
3	above 900 mm dia=	384	m

..... Bill No- 01, Sl. No- 9
 Bill No- 01, Sl. No-10
 Bill No- 01, Sl. No- 11

SI No D.Total Dismantling of Bituminous layer

1	Road	=	251121	sqm
		Total=	251121	sqm

..... Bill No- 01, Sl. No- 12

SI No E.Total Dismantling of Granular Layer

1	Road	=	285987	sqm
	Refer backup calculation sheet			
		Total=	285987	sqm

..... Bill No- 01, Sl. No- 13



Site Clearance and Dismantling (Tree Cutting List)

Sl No	Design Ch	EASTING(M)	NORTHING	Side	GIRTH (M)
1	67+165	559346.795	2749841.065	LHS	1
2	67+377	559330.491	2749717.753	LHS	0.7
3	67+513	559236.562	2749809.77	LHS	1.5
4	68+070	558879.451	2750034.756	LHS	1
5	68+133	558839.499	2750085.695	RHS	1.2
6	68+215	558753.5309	2750092.403	RHS	1
7	68+217	558752.0852	2750090.339	RHS	0.9
8	68+220	558750.765	2750086.532	RHS	0.8
9	68+427	558646.3569	2749907.008	LHS	0.8
10	68+428	558645.3829	2749906.048	LHS	0.8
11	68+441	558634.8613	2749898.062	LHS	0.8
12	68+445	558636.4262	2749893.793	LHS	0.8
13	68+449	558632.2603	2749892.777	LHS	0.7
14	68+449	558631.1308	2749892.505	LHS	0.7
15	68+882	558396.7412	2749637.119	LHS	0.6
16	68+884	558394.869	2749636.16	LHS	1.4
17	68+884	558394.9641	2749636.173	LHS	1.1
18	68+887	558392.2157	2749634.43	LHS	0.6
19	68+889	558390.0576	2749633.013	LHS	0.7
20	68+893	558386.3655	2749630.196	LHS	0.6
21	68+904	558376.998	2749624.532	LHS	1.3
22	69+229	558113.5897	2749544.249	LHS	0.9
23	69+775	558150.304	2749769.888	LHS	2.5
24	69+791	558124.4444	2749765.541	LHS	1.1
25	69+792	558123.71	2749765.218	LHS	1.8
26	73+074	557957.237	2747806.073	LHS	1.4
27	73+088	557961.895	2747795.303	LHS	1.6
28	73+094	557963.854	2747790.613	LHS	1.6
29	73+585	557707.566	2747523.208	RHS	1.2
30	73+693	557754.718	2747436.829	LHS	1.1
31	73+697	557755.213	2747431.26	LHS	1.3
32	74+437	557900.469	2747091.315	LHS	0.5
33	74+487	557872.097	2747048.981	RHS	0.9
34	74+539	557824.099	2747023.84	RHS	1.5
35	75+054	557390.775	2746807.482	LHS	1.7
36	75+061	557392.26	2746800.401	LHS	0.8
37	75+064	557393.326	2746796.154	LHS	1.6
38	75+210	557262.725	2746727.458	LHS	1.3
39	75+229	557247.945	2746718.146	LHS	1.5
40	75+231	557246.907	2746716.744	LHS	3.2
41	75+321	557173.188	2746665.848	LHS	2.9
42	75+772	556989.098	2746370.734	RHS	1.3
43	75+831	556992.39	2746303.144	LHS	0.9
44	76+430	556679.215	2745917.406	LHS	0.8
45	76+590	556633.826	2745797.263	RHS	0.7
46	76+855	556660.154	2745564.404	LHS	0.8
47	76+857	556663.039	2745565.985	LHS	1
48	76+859	556658.378	2745560.957	LHS	0.9
49	76+850	556655.108	2745557.574	LHS	0.8
50	76+863	556657.164	2745556.443	LHS	0.7
51	76+870	556668.087	2745556.742	LHS	0.6



Site Clearance and Dismantling (Tree Cutting List)

SI No	Design Ch	EASTING(M)	NORTHING	Side	GIRTH (M)
52	76+881	556669.768	2745557.521	LHS	0.9
53	76+881	556669.825	2745557.579	LHS	1
54	76+887	556675.261	2745559.495	LHS	1
55	76+895	556683.775	2745561.999	LHS	0.6
56	76+899	556688.404	2745559.971	LHS	0.8
57	76+900	556690.46	2745562.951	LHS	0.5
58	76+902	556692.891	2745562.246	LHS	0.9
59	76+903	556695.071	2745562.095	LHS	1.1
60	76+904	556695.478	2745560.777	LHS	1
61	76+907	556700.185	2745562.015	LHS	0.9
62	77+701	556536.388	2745257.647	RHS	1.1
63	77+704	556536.106	2745254.636	RHS	0.9
64	77+726	556526.742	2745237.056	RHS	1.1
65	77+762	556510.796	2745203.022	LHS	1
66	77+766	556506.92	2745201.273	LHS	0.9
67	77+768	556504.256	2745200.406	LHS	1.1
68	77+776	556496.031	2745198.573	LHS	1
69	77+777	556494.95	2745197.758	LHS	0.9
70	77+783	556488.126	2745197.933	LHS	1
71	77+785	556485.366	2745199.44	LHS	0.8
72	77+789	556480.267	2745197.961	LHS	0.9
73	77+848	556421.689	2745215.458	LHS	0.6
74	77+849	556422.718	2745219.325	LHS	1.1
75	77+865	556408.149	2745221.524	LHS	1.2
76	77+871	556403.414	2745221.467	LHS	1
77	77+875	556400.886	2745222.043	LHS	1
78	77+879	556398.388	2745221.341	LHS	1.2
79	77+883	556395.433	2745220.555	LHS	0.9
80	77+896	556386.392	2745217.354	LHS	1
81	79+994	555554.644	2745034.935	LHS	0.9
82	79+996	555552.538	2745037.248	LHS	1
83	79+997	555553.246	2745037.789	LHS	1.1
84	80+015	555557.746	2745055.179	LHS	0.8
85	81+565	555057.107	2744373.467	LHS	1

Summary:

Girth from 300 mm to 600 mm	4	Nos
Girth from 600 mm to 900 mm	48	Nos
Girth from 900 mm to 1800 mm	110	Nos
Girth from 1800 mm to 2700 mm	4	Nos
Above 2700 mm	4	Nos



Site Clearance and Dismantling
Clearing and Grubbing Road Land

TCS Type	Net Length (m)	Avg.Existing Road Width (m)	Width to be cleared and grubbed (m)	Area to be cleared and grubbed (Ha)
TCS-1	0	8.0	24.0	0.00
TCS-2	0	8.5	24.0	0.00
TCS-2A	125	9.0	24.0	0.19
TCS-3	22211	8.0	24.0	35.54
TCS-3A	4184	10.0	24.0	5.86
TCS-4	1574	8.0	24.0	2.52
TCS-4A	85	7.0	24.0	0.14
TCS-5	2800	7.0	24.0	4.76
TCS-5A	1832	10.0	24.0	2.56
TCS-6	1758	11.0	24.0	2.29
TCS-7	100	8.5	24.0	0.16
TCS-7A	200	8.0	24.0	0.32
TCS-9A	0	8.0	24.0	0.00
TCS-10	0	8.0	24.0	0.00
TCS-11	0	8.0	24.0	0.00

Total= 54.33

Total area of clearing & grubbing=

54.33 ha



Site Clearance and Dismantling
Calculation of Quantities for Dismantling

Sl. No.	Brief Description	Unit	Survey ch.	No.	L	B / H	T	Quantity	Total Quantity
A) Stone Masonry	Head wall for existing pipe culvert H=h, Length=L, and thickness=t	Cum	66.917	2	5.8	2.8	0.8	25.98	
			67.429	2	5.8	2.8	0.8	25.98	
			67.936	2	5.8	2.8	0.8	25.98	
			68.032	2	5.8	2.8	0.8	25.98	
			68.203	2	5.8	2.8	0.8	25.98	
			68.266	2	5.8	2.8	0.8	25.98	
			68.564	2	5.8	2.8	0.8	25.98	
			68.778	2	7.0	2.8	0.8	31.36	
			69.014	2	5.8	2.8	0.8	25.98	
			69.481	2	5.5	2.5	0.8	22.00	
			70.474	2	7.3	2.5	0.8	29.20	
			71.063	2	6.4	2.2	0.8	22.53	
			72.116	2	7.1	4.1	0.8	46.58	
			75.936	2	7.0	2.8	0.8	31.36	
			78.358	2	5.5	2.5	0.8	22.00	
			78.692	2	5.2	2.2	0.8	18.30	
			78.919	2	5.6	2.6	0.8	23.30	
			79.059	2	5.6	2.6	0.8	23.30	
			79.575	2	5.2	2.2	0.8	18.30	
			79.669	2	5.5	2.5	0.8	22.00	
			80.550	2	5.6	2.6	0.8	23.30	
			80.774	2	5.5	2.5	0.8	22.00	
			80.925	2	5.2	2.2	0.8	18.30	
			81.883	2	5.5	2.5	0.8	22.00	



Site Clearance and Dismantling
Calculation of Quantities for Dismantling

Sl. No.	Brief Description	Unit	Survey ch.	No.	L	B / H	T	Quantity	Total Quantity
A) Stone Masonry	Abutments for existing slab culvert H=h, Length=L, and thickness=t.	cum	66.659	2	0.2	3.00	1.50	1.80	
			66.833	2	0.2	3.00	1.50	1.80	
			69.411	2	0.2	3.00	1.50	1.80	
			69.967	2	0.2	3.00	1.50	1.80	
			70.203	2	0.2	3.00	1.50	1.80	
			71.322	2	0.2	3.00	1.50	1.80	
			71.952	2	0.2	3.00	1.50	1.80	
			72.886	2	0.2	3.00	1.50	1.80	
			73.340	2	0.2	3.00	1.50	1.80	
			73.422	2	0.2	3.00	1.50	1.80	
			73.625	2	0.2	3.00	1.50	1.80	
			74.048	2	0.2	3.00	1.50	1.80	
			74.536	2	0.2	3.00	1.50	1.80	
			75.017	2	0.2	3.00	1.50	1.80	
			75.224	2	0.2	3.00	1.50	1.80	
			76.256	2	0.2	3.00	1.50	1.80	
			76.415	2	0.2	3.00	1.50	1.80	
			76.480	2	0.2	3.00	1.50	1.80	
			76.600	2	0.2	3.00	1.50	1.80	
			76.695	2	0.2	3.00	1.50	1.80	
76.854	2	0.2	3.00	1.50	1.80				
77.260	2	0.2	3.00	1.50	1.80				
A) Stone Masonry	Abutments for existing slab culvert H=h, Length=L, and thickness=t.	cum	77.904	2	0.2	3.00	1.50	1.80	
			78.546	2	0.2	3.00	1.50	1.80	
			78.75	2	0.2	3.00	1.50	1.80	
			79.338	2	0.2	3.00	1.50	1.80	
			79.761	2	0.2	3.00	1.50	1.80	
			79.927	2	0.2	3.00	1.50	1.80	
			80.230	2	0.2	3.00	1.50	1.80	
			81.111	2	0.2	3.00	1.50	1.80	
			81.399	2	0.2	3.00	1.50	1.80	
			81.572	2	0.2	3.00	1.50	1.80	
			82.4	2	0.2	3.00	1.50	1.80	
			82.666	2	0.2	3.00	1.50	1.80	
			82.952	2	0.2	3.00	1.50	1.80	
			83.438	2	0.2	3.00	1.50	1.80	
			83.659	2	0.2	3.00	1.50	1.80	
			84.041	2	0.2	3.00	1.50	1.80	
84.146	2	0.2	3.00	1.50	1.80				
Total =								673.90	



Site Clearance and Dismantling
Calculation of Quantities for Dismantling

Sl. No.	Brief Description	Unit	Survey ch.	No.	L	B / H	T	Quantity	Total Quantity
B) RCC	For Slab culvert	Cum	66.659	1	10.0	3.00	0.3	9.00	
			66.833	1	12.5	1.40	0.3	5.25	
			69.411	1	10.0	2.00	0.3	6.00	
			69.967	1	10.0	3.50	0.3	10.50	
			70.203	1	9.3	1.60	0.3	4.46	
			71.322	1	12.0	2.10	0.3	7.56	
			71.952	1	9.6	4.20	0.3	12.10	
			72.886	1	12.4	3.50	0.3	13.02	
			73.340	1	12.4	1.00	0.3	3.72	
			73.422	1	11.3	1.00	0.3	3.39	
			73.625	1	15.2	1.95	0.3	8.89	
			74.048	1	9.6	4.49	0.3	12.93	
			74.536	1	15.0	2.50	0.3	11.25	
			75.017	1	10.0	3.50	0.3	10.50	
			75.224	1	10.0	4.90	0.3	14.70	
			76.256	1	13.0	1.60	0.3	6.24	
			76.415	1	14.0	3.30	0.3	13.86	
			76.480	1	11.3	1.57	0.3	5.32	
			76.600	1	9.7	3.0	0.3	8.73	
			76.695	1	10.8	2.48	0.3	8.04	
			76.854	1	12.0	2.00	0.3	7.20	
			77.260	1	15.8	2.00	0.3	9.48	
			77.904	1	12.8	1.30	0.3	4.99	
			78.546	1	8.0	1.50	0.3	3.60	
			78.750	1	14.5	1.50	0.3	6.53	
			79.338	1	11.3	1.50	0.3	5.09	
			79.761	1	10.0	1.50	0.3	4.50	
			79.927	1	12.0	4.44	0.3	15.98	
			80.230	1	13.0	2.40	0.3	9.36	
			81.111	1	9.7	1.30	0.3	3.78	
			81.399	1	10.8	1.80	0.3	5.83	
			81.572	1	12.0	1.45	0.3	5.22	
			82.400	1	15.8	1.67	0.3	7.92	
			82.666	1	12.8	1.20	0.3	4.61	
			82.952	1	13.7	1.20	0.3	4.93	
			83.438	1	8.0	1.44	0.3	3.46	
			83.659	1	12.5	1.40	0.3	5.25	
			84.041	1	12.5	2.50	0.3	9.38	
			84.146	1	14.5	1.50	0.3	6.53	
								Total=	299.08
	Hume Pipe								
C) Hume Pipe	Dia upto 600 mm =	m		6	12.00				72.00
	Dia from 600-900 mm =	m		8	13.50				108.00
	Dia above 900mm=	m		16	12.00				192.00

Quantity Summary of Dismantling of Existing Culvert::

Total Dismantling of Rubble stone masonry in cement mortar=	1348 cum
Total Dismantling of Reinforced cement concrete=	598 cum
Total Dismantling of up to 600 mm dia Hume Pipe=	144 cum
Total Dismantling of above 600 mm to 900 mm dia Hume Pipe=	216 cum
Total Dismantling of above 900 mm dia Hume Pipe=	384 cum



Site Clearance and Dismantling
Quantity calculation for dismentling of Flexible Pavement

From	To	Avg. Width (m)	Thickness of Bituminous Layer (m)	Quantity of Bituminous Layer to be dismantled (cum)
66000	66500	6.0	0.080	240
66500	67000	6.6	0.080	264
67000	67500	7.0	0.080	280
67500	68000	5.5	0.150	413
68000	68500	5.7	0.110	314
68500	69000	6.0	0.160	480
69000	69500	6.0	0.110	330
69500	70000	6.8		0
70000	70500	6.2	0.080	248
70500	71000	6.7	0.080	268
71000	71500	7.0	0.080	280
71500	72000	6.3		0
72000	72500	6.7	0.070	235
72500	73000	6.5	0.050	163
73000	73500	7.0	0.070	245
73500	74000	6.7	0.045	151
74000	74500	7.0	0.140	490
74500	75000	6.5	0.150	488
75000	75500	6.5	0.150	488
75500	76000	6.8	0.150	510
76000	76500	6.8	0.150	510
76500	77000	7.0	0.150	525
77000	77500	6.5	0.150	488
77500	78000	7.0	0.100	350
78000	78500	6.2	0.130	403
78500	79000	6.5	0.080	260
79000	79500	7.0	0.130	455
79500	80000	6.7	0.085	285
80000	80500	7.0	0.100	350
80500	81000	7.0	0.085	298
81000	81500	7.0	0.095	333
81500	82000	7.0	0.100	350
82000	82500	6.8	0.065	221
82500	83000	7.0	0.100	350
83000	83500	6.7	0.070	235
83500	84000	6.7	0.050	168
84000	84500	7.0	0.080	280
84500	85000	7.0	0.050	175
85000	85500	6.7	0.080	268
85500	86000	7.0	0.085	298
86000	86500	7.0	0.100	350
86500	87000	7.0	0.070	245
87000	87500	7.0	0.070	245
87500	88000	7.0	0.060	210
88000	88500	7.0	0.070	245
88500	89000	7.0	0.060	210
89000	89500	7.0	0.070	245
89500	90000	7.0	0.040	140
90000	90500	7.0	0.070	245
90500	91000	7.0	0.040	140



91000	91500	6.0	0.050	150
91500	92000	6.7	0.080	268
92000	92500	7.0	0.040	140
92500	93000	6.5	0.050	163
93000	93500	6.3	0.045	142
93500	94000	5.7	0.070	200
94000	94500	6.0	0.040	120
94500	95000	5.2	0.050	130
95000	95500	6.5	0.070	228
95500	96000	7.0	0.065	228
96000	96500	6.8	0.080	272
96500	97000	6.5	0.060	195
97000	97500	6.5	0.040	130
97500	98000	6.4	0.070	224
98000	98500	6.0	0.045	135
98500	99000	5.7	0.080	228
99000	99500	6.2	0.090	279
99500	100000	6.0	0.075	225
100000	100500	6.0	0.075	225
100500	101000	6.7	0.075	251
101000	101280	6.5	0.080	146
Total =				18834

Total quantity for dismantling (Bituminous layer)=	18834	cum
Quantity of Dismantelled Bituminous Material(sqm) (Assume avg thickness 75mm)	251121	sqm



Details of Granular dismantling quantity

Chainage	FRL	EGL	Avg.Ext. Bituminou s layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
66110	409.282	409.074	0.1	408.974	0.308						
66125	409.642	409.478	0.1	409.378	0.264	20	6.7	0.38	0.296	39.66	TCS-3
66150	410.242	410.176	0.1	410.076	0.166	25	6.7	0.38	0.38	63.65	TCS-3
66175	410.842	411.433	0.1	411.333	-0.491	25	6.7	0.38	0.38	63.65	TCS-3
66200	411.442	412.088	0.1	411.988	-0.546	25		0.38	0.38		TCS-6
66225	412.042	412.408	0.1	412.308	-0.266	25		0.38	0.38		TCS-6
66250	412.642	413.075	0.1	412.975	-0.333	25		0.38	0.38		TCS-6
66275	413.242	413.39	0.1	413.29	-0.048	25		0.38	0.38		TCS-6
66300	413.804	413.448	0.1	413.348	0.456	25	6.7	0.38	0.104	17.42	TCS-3
66325	414.212	413.931	0.1	413.831	0.381	25	6.7	0.38	0.179	29.98	TCS-3
66350	414.457	414.436	0.1	414.336	0.121	25	6.7	0.38	0.38	63.65	TCS-3
66375	414.558	414.459	0.1	414.359	0.199	25	6.7	0.38	0.361	60.47	TCS-3
66400	414.638	413.979	0.1	413.879	0.759	25	6.7	0.38	0	0.00	TCS-3
66425	414.717	414.44	0.1	414.34	0.377	25	6.7	0.38	0.183	30.65	TCS-3
66450	414.797	414.632	0.1	414.532	0.265	25	6.7	0.38	0.295	49.41	TCS-3
66475	414.876	415.978	0.1	415.878	-1.002	25	6.7	0.38	0.38	63.65	TCS-3
66500	414.956	415.27	0.1	415.17	-0.214	25	6.7	0.2	0.2	33.50	TCS-3
66525	415.036	415.244	0.1	415.144	-0.108	25	6.7	0.2	0.2	33.50	TCS-3
66550	415.115	414.85	0.1	414.75	0.365	25	6.7	0.2	0.195	32.66	TCS-4
66575	415.199	414.991	0.1	414.891	0.308	25	6.7	0.2	0.2	33.50	TCS-4
66600	415.383	415.109	0.1	415.009	0.374	25	6.7	0.2	0.186	31.15	TCS-3
66625	415.697	415.417	0.1	415.317	0.38	25	6.7	0.2	0.18	30.15	TCS-3
66650	416.048	415.795	0.1	415.695	0.353	25		0.2	0.2		TCS-5A
66675	416.4	417.936	0.1	417.836	-1.436	25		0.2	0.2		TCS-5A
66700	416.751	420.391	0.1	420.291	-3.54	25		0.2	0.2		TCS-5A
66725	417.025	419.32	0.1	419.22	-2.195	25		0.2	0.2		TCS-5A
66750	417.122	417.082	0.1	416.982	0.14	25		0.2	0.2		TCS-5A
66775	417.123	417.117	0.1	417.017	0.106	25		0.2	0.2		TCS-5A
66800	417.08	427.614	0.1	427.514	-10.434	25		0.2	0.2		TCS-5A
66825	416.948	424.585	0.1	424.485	-7.537	25		0.2	0.2		TCS-5A
66850	416.742	420.937	0.1	420.837	-4.095	25		0.2	0.2		TCS-5A
66875	416.528	422.215	0.1	422.115	-5.587	25	6.7	0.2	0.2	33.50	TCS-3
66900	416.315	415.884	0.1	415.784	0.531	25	6.7	0.2	0.029	4.86	TCS-3
66925	416.101	415.939	0.1	415.839	0.262	25	6.7	0.2	0.2	33.50	TCS-3
66950	415.887	423.104	0.1	423.004	-7.117	25	6.7	0.2	0.2	33.50	TCS-3
66975	415.673	419.82	0.1	419.72	-4.047	25	6.7	0.2	0.2	33.50	TCS-3
67000	415.459	417.801	0.1	417.701	-2.242	25	6.7	0.41	0.41	68.68	TCS-3
67025	415.245	415.192	0.1	415.092	0.153	25	6.7	0.41	0.407	68.17	TCS-4
67050	415.031	413.979	0.1	413.879	1.152	25	6.7	0.41	0	0.00	TCS-4
67075	414.817	420.43	0.1	420.33	-5.513	25	6.7	0.41	0.41	68.68	TCS-4
67100	414.604	424.068	0.1	423.968	-9.364	25	6.7	0.41	0.41	68.68	TCS-3
67125	414.39	419.56	0.1	419.46	-5.07	25	6.7	0.41	0.41	68.68	TCS-3
67150	414.176	418.437	0.1	418.337	-4.161	25	6.7	0.41	0.41	68.68	TCS-3
67175	414.033	414.29	0.1	414.19	-0.157	25	6.7	0.41	0.41	68.68	TCS-3
67200	414.011	413.895	0.1	413.795	0.216	25	6.7	0.41	0.344	57.62	TCS-3
67225	414.106	413.699	0.1	413.599	0.507	25	6.7	0.41	0.053	8.88	TCS-3
67250	414.231	413.749	0.1	413.649	0.582	25	6.7	0.41	0	0.00	TCS-3
67275	414.357	414.043	0.1	413.943	0.414	25	6.7	0.41	0.146	24.45	TCS-3
67300	414.482	414.566	0.1	414.466	0.016	25	6.7	0.41	0.41	68.68	TCS-3
67325	414.608	414.763	0.1	414.663	-0.055	25	6.7	0.41	0.41	68.68	TCS-4
67350	414.733	414.875	0.1	414.775	-0.042	25	6.7	0.41	0.41	68.68	TCS-4
67375	414.859	417.848	0.1	417.748	-2.889	25	6.7	0.41	0.41	68.68	TCS-3
67400	414.97	429.405	0.1	429.305	-14.335	25	6.7	0.41	0.41	68.68	TCS-3
67425	415.055	419.183	0.1	419.083	-4.028	25	6.7	0.41	0.41	68.68	TCS-5



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
67450	415.113	414.603	0.1	414.503	0.61	25	6.7	0.41	0	0.00	TCS-5
67475	415.144	414.507	0.1	414.407	0.737	25	6.7	0.41	0	0.00	TCS-5
67500	415.15	418.409	0.1	418.309	-3.159	25	6.7	0.22	0.22	36.85	TCS-3
67525	415.128	417.344	0.1	417.244	-2.116	25	6.7	0.22	0.22	36.85	TCS-3
67550	415.08	415.555	0.1	415.455	-0.375	25	6.7	0.22	0.22	36.85	TCS-3
67575	415.006	414.738	0.1	414.638	0.368	25	6.7	0.22	0.192	32.16	TCS-3
67600	414.919	414.591	0.1	414.491	0.428	25	6.7	0.22	0.132	22.11	TCS-3
67625	414.833	415.574	0.1	415.474	-0.641	25	6.7	0.22	0.22	36.85	TCS-3
67650	414.746	417.773	0.1	417.673	-2.927	25	6.7	0.22	0.22	36.85	TCS-3
67675	414.659	416.659	0.1	416.559	-1.9	25	6.7	0.22	0.22	36.85	TCS-3
67700	414.573	414.17	0.1	414.07	0.503	25		0.22	0.057		TCS-3A
67725	414.486	413.975	0.1	413.875	0.611	25		0.22	0		TCS-3A
67750	414.399	414.052	0.1	413.952	0.447	25	6.7	0.22	0.113	18.93	TCS-3
67775	414.313	414.03	0.1	413.93	0.383	25	6.7	0.22	0.177	29.65	TCS-3
67800	414.226	414.232	0.1	414.132	0.094	25	6.7	0.22	0.22	36.85	TCS-3
67825	414.141	420.701	0.1	420.601	-6.46	25	6.7	0.22	0.22	36.85	TCS-3
67850	414.132	419.053	0.1	418.953	-4.821	25	6.7	0.22	0.22	36.85	TCS-3
67875	414.237	414.997	0.1	414.897	-0.66	25	6.7	0.22	0.22	36.85	TCS-3
67900	414.383	414.51	0.1	414.41	-0.027	25	6.7	0.22	0.22	36.85	TCS-3
67925	414.528	414.455	0.1	414.355	0.173	25	6.7	0.22	0.22	36.85	TCS-3
67950	414.584	414.327	0.1	414.227	0.357	25	6.7	0.22	0.203	34.00	TCS-3
67975	414.463	414.073	0.1	413.973	0.49	25	6.7	0.22	0.07	11.72	TCS-3
68000	414.255	413.876	0.1	413.776	0.479	25	6.7	0.22	0.081	13.57	TCS-3
68025	414.047	413.84	0.1	413.74	0.307	25	6.7	0.22	0.22	36.85	TCS-3
68050	413.839	413.831	0.1	413.731	0.108	25	6.7	0.22	0.22	36.85	TCS-3
68075	413.661	417.692	0.1	417.592	-3.931	25	6.7	0.22	0.22	36.85	TCS-5
68100	413.606	420.522	0.1	420.422	-6.816	25	6.7	0.22	0.22	36.85	TCS-5
68125	413.682	417.322	0.1	417.222	-3.54	25		0.22	0.22		TCS-5A
68150	413.839	413.653	0.1	413.553	0.286	25		0.22	0.22		TCS-5A
68175	413.997	413.847	0.1	413.747	0.25	25	6.7	0.22	0.22	36.85	TCS-5
68200	414.154	413.841	0.1	413.741	0.413	25	6.7	0.22	0.147	24.62	TCS-5
68225	414.312	415.37	0.1	415.27	-0.958	25	6.7	0.22	0.22	36.85	TCS-4
68250	414.47	416.526	0.1	416.426	-1.956	25	6.7	0.22	0.22	36.85	TCS-4
68275	414.628	417.564	0.1	417.464	-2.836	25	6.7	0.22	0.22	36.85	TCS-3
68300	414.78	417.533	0.1	417.433	-2.653	25	6.7	0.22	0.22	36.85	TCS-3
68325	414.87	417.129	0.1	417.029	-2.159	25	6.7	0.22	0.22	36.85	TCS-3
68350	414.886	414.898	0.1	414.798	0.088	25	6.7	0.22	0.22	36.85	TCS-3
68375	414.829	414.626	0.1	414.526	0.303	25	6.7	0.22	0.22	36.85	TCS-3
68400	414.703	414.303	0.1	414.203	0.5	25	6.7	0.22	0.06	10.05	TCS-3
68425	414.565	414.236	0.1	414.136	0.429	25	6.7	0.22	0.131	21.94	TCS-3
68450	414.427	414.048	0.1	413.948	0.479	25	6.7	0.22	0.081	13.57	TCS-3
68475	414.289	414.751	0.1	414.651	-0.362	25	6.7	0.22	0.22	36.85	TCS-3
68500	414.152	414.788	0.1	414.688	-0.536	25	6.7	0.23	0.23	38.53	TCS-3
68525	414.014	414.691	0.1	414.591	-0.577	25	6.7	0.23	0.23	38.53	TCS-3
68550	413.876	414.027	0.1	413.927	-0.051	25	6.7	0.23	0.23	38.53	TCS-3
68575	413.738	413.703	0.1	413.603	0.135	25	6.7	0.23	0.23	38.53	TCS-3
68600	413.6	413.474	0.1	413.374	0.226	25	6.7	0.23	0.23	38.53	TCS-3
68625	413.495	413.421	0.1	413.321	0.174	25	6.7	0.23	0.23	38.53	TCS-3
68650	413.446	413.372	0.1	413.272	0.174	25	6.7	0.23	0.23	38.53	TCS-3
68675	413.453	413.345	0.1	413.245	0.208	25	6.7	0.23	0.23	38.53	TCS-3
68700	413.516	413.262	0.1	413.162	0.354	25	6.7	0.23	0.206	34.50	TCS-3
68725	413.602	413.415	0.1	413.315	0.287	25	6.7	0.23	0.23	38.53	TCS-3
68750	413.688	413.242	0.1	413.142	0.546	25	6.7	0.23	0.014	2.35	TCS-3
68775	413.775	413.159	0.1	413.059	0.716	25	6.7	0.23	0	0.00	TCS-3
68800	413.861	413.3	0.1	413.2	0.661	25	6.7	0.23	0	0.00	TCS-3
68825	413.923	413.417	0.1	413.317	0.606	25	6.7	0.23	0	0.00	TCS-3
68850	413.849	413.273	0.1	413.173	0.676	25	6.7	0.23	0	0.00	TCS-3
68875	413.652	415.365	0.1	415.265	-1.613	25	6.7	0.23	0.23	38.53	TCS-3
68900	413.441	412.857	0.1	412.757	0.684	25	6.7	0.23	0	0.00	TCS-4



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
68925	413.23	412.372	0.1	412.272	0.958	25	6.7	0.23	0	0.00	TCS-3
68950	413.02	412.499	0.1	412.399	0.621	25	6.7	0.23	0	0.00	TCS-3
68975	412.809	412.674	0.1	412.574	0.235	25	6.7	0.23	0.23	38.53	TCS-3
69000	412.598	413.535	0.1	413.435	-0.837	25	6.7	0.23	0.23	38.53	TCS-3
69025	412.387	415.467	0.1	415.367	-2.98	25	6.7	0.23	0.23	38.53	TCS-4
69050	412.176	413.218	0.1	413.118	-0.942	25	6.7	0.23	0.23	38.53	TCS-4
69075	411.965	411.598	0.1	411.498	0.467	25	6.7	0.23	0.093	15.58	TCS-4
69100	411.755	411.273	0.1	411.173	0.582	25	6.7	0.23	0	0.00	TCS-4
69125	411.544	411.21	0.1	411.11	0.434	25	6.7	0.23	0.126	21.10	TCS-4
69150	411.333	411.15	0.1	411.05	0.283	25	6.7	0.23	0.23	38.53	TCS-3
69175	411.156	411.066	0.1	410.966	0.19	25	6.7	0.23	0.23	38.53	TCS-3
69200	411.031	411.07	0.1	410.97	0.061	25	6.7	0.23	0.23	38.53	TCS-3
69225	410.959	411.352	0.1	411.252	-0.293	25	6.7	0.23	0.23	38.53	TCS-3
69250	410.939	416.461	0.1	416.361	-5.422	25	6.7	0.23	0.23	38.53	TCS-3
69275	410.939	412.117	0.1	412.017	-1.078	25	6.7	0.23	0.23	38.53	TCS-3
69300	410.939	410.668	0.1	410.568	0.371	25		0.23	0.189		TCS-5A
69325	410.939	410.841	0.1	410.741	0.198	25		0.23	0.23		TCS-5A
69350	410.984	414.854	0.1	414.754	-3.77	25		0.23	0.23		TCS-5A
69375	411.168	415.365	0.1	415.265	-4.097	25		0.23	0.23		TCS-5A
69400	411.448	417.202	0.1	417.102	-5.654	25		0.23	0.23		TCS-5A
69425	411.731	415.788	0.1	415.688	-3.957	25		0.23	0.23		TCS-5A
69450	412.014	417.866	0.1	417.766	-5.752	25		0.23	0.23		TCS-5A
69475	412.296	412.413	0.1	412.313	-0.017	25		0.23	0.23		TCS-5A
69500	412.579	412.648	0.1	412.548	0.031	25		0.33	0.33		TCS-5A
69525	412.831	418.033	0.1	417.933	-5.102	25	6.7	0.33	0.33	55.28	TCS-3
69550	412.901	420.878	0.1	420.778	-7.877	25	6.7	0.33	0.33	55.28	TCS-3
69575	412.796	419.019	0.1	418.919	-6.123	25		0.33	0.33		TCS-5A
69600	412.671	415.014	0.1	414.914	-2.243	25		0.33	0.33		TCS-5A
69625	412.546	412.524	0.1	412.424	0.122	25		0.33	0.33		TCS-5A
69650	412.421	412.122	0.1	412.022	0.399	25		0.33	0.161		TCS-5A
69675	412.296	412.035	0.1	411.935	0.361	25	6.7	0.33	0.199	33.33	TCS-3
69700	412.171	411.626	0.1	411.526	0.645	25	6.7	0.33	0	0.00	TCS-3
69725	412.069	411.723	0.1	411.623	0.446	25	6.7	0.33	0.114	19.09	TCS-5
69750	412.025	412.165	0.1	412.065	-0.04	25	6.7	0.33	0.33	55.28	TCS-5
69775	412.036	412.994	0.1	412.894	-0.858	25	6.7	0.33	0.33	55.28	TCS-5
69800	412.105	412.89	0.1	412.79	-0.685	25	6.7	0.33	0.33	55.28	TCS-5
69825	412.231	412.713	0.1	412.613	-0.382	25	6.7	0.33	0.33	55.28	TCS-3
69850	412.413	412.094	0.1	411.994	0.419	25	6.7	0.33	0.141	23.62	TCS-3
69875	412.628	412.119	0.1	412.019	0.609	25	6.7	0.33	0	0.00	TCS-3
69900	412.843	412.302	0.1	412.202	0.641	25	6.7	0.33	0	0.00	TCS-3
69925	413.059	412.813	0.1	412.713	0.346	25	6.7	0.33	0.214	35.84	TCS-3
69950	413.274	413.071	0.1	412.971	0.303	25	6.7	0.33	0.257	43.05	TCS-3
69975	413.489	413.281	0.1	413.181	0.308	25	6.7	0.33	0.252	42.21	TCS-3
70000	413.705	413.458	0.1	413.358	0.347	25	6.7	0.1	0.1	16.75	TCS-3
70025	413.884	413.685	0.1	413.585	0.299	25	6.7	0.1	0.1	16.75	TCS-3
70050	413.958	413.99	0.1	413.89	0.068	25	6.7	0.1	0.1	16.75	TCS-3
70075	413.96	413.862	0.1	413.762	0.198	25	6.7	0.1	0.1	16.75	TCS-3
70100	413.96	413.851	0.1	413.751	0.209	25	6.7	0.1	0.1	16.75	TCS-3
70125	413.96	413.396	0.1	413.296	0.664	25	6.7	0.1	0	0.00	TCS-3
70150	413.999	413.705	0.1	413.605	0.394	25	6.7	0.1	0.1	16.75	TCS-3
70175	414.14	414.839	0.1	414.739	-0.599	25	6.7	0.1	0.1	16.75	TCS-3
70200	414.346	416.695	0.1	416.595	-2.249	25	6.7	0.1	0.1	16.75	TCS-3
70225	414.553	414.618	0.1	414.518	0.035	25	6.7	0.1	0.1	16.75	TCS-3
70250	414.76	414.882	0.1	414.782	-0.022	25	6.7	0.1	0.1	16.75	TCS-5
70275	414.868	414.807	0.1	414.707	0.161	25	6.7	0.1	0.1	16.75	TCS-5
70300	414.797	414.257	0.1	414.157	0.64	25	6.7	0.1	0	0.00	TCS-5
70325	414.643	414.57	0.1	414.47	0.173	25	6.7	0.1	0.1	16.75	TCS-5
70350	414.488	415.228	0.1	415.128	-0.64	25	6.7	0.1	0.1	16.75	TCS-5
70375	414.334	420.808	0.1	420.708	-6.374	25	6.7	0.1	0.1	16.75	TCS-4



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
70400	414.237	418.934	0.1	418.834	-4.597	25	6.7	0.1	0.1	16.75	TCS-4
70425	414.279	414.047	0.1	413.947	0.332	25		0.1	0.1		TCS-5A
70450	414.404	416.302	0.1	416.202	-1.798	25		0.1	0.1		TCS-5A
70475	414.53	419.456	0.1	419.356	-4.826	25		0.1	0.1		TCS-5A
70500	414.656	417.064	0.1	416.964	-2.308	25		0.24	0.24		TCS-5A
70525	414.781	415.442	0.1	415.342	-0.561	25		0.24	0.24		TCS-5A
70550	414.836	414.568	0.1	414.468	0.368	25		0.24	0.192		TCS-5A
70575	414.703	414.507	0.1	414.407	0.296	25		0.24	0.24		TCS-5A
70600	414.453	421.674	0.1	421.574	-7.121	25		0.24	0.24		TCS-5A
70625	414.202	420.089	0.1	419.989	-5.787	25		0.24	0.24		TCS-5A
70650	413.95	416.499	0.1	416.399	-2.449	25	6.7	0.24	0.24	40.20	TCS-3
70675	413.766	413.655	0.1	413.555	0.211	25	6.7	0.24	0.24	40.20	TCS-3
70700	413.768	415.738	0.1	415.638	-1.87	25	6.7	0.24	0.24	40.20	TCS-3
70725	413.892	414.428	0.1	414.328	-0.436	25	6.7	0.24	0.24	40.20	TCS-3
70750	414.018	414.536	0.1	414.436	-0.418	25	6.7	0.24	0.24	40.20	TCS-3
70775	414.144	414.372	0.1	414.272	-0.128	25	6.7	0.24	0.24	40.20	TCS-3
70800	414.27	414.128	0.1	414.028	0.242	25	6.7	0.24	0.24	40.20	TCS-3
70825	414.396	414.114	0.1	414.014	0.382	25	6.7	0.24	0.178	29.81	TCS-5
70850	414.522	417.074	0.1	416.974	-2.452	25	6.7	0.24	0.24	40.20	TCS-5
70875	414.648	421.363	0.1	421.263	-6.615	25	6.7	0.24	0.24	40.20	TCS-5
70900	414.774	420.086	0.1	419.986	-5.212	25	6.7	0.24	0.24	40.20	TCS-5
70925	414.9	415.124	0.1	415.024	-0.124	25	6.7	0.24	0.24	40.20	TCS-5
70950	415.026	414.191	0.1	414.091	0.935	25	6.7	0.24	0	0.00	TCS-5
70975	415.152	414.542	0.1	414.442	0.71	25	6.7	0.24	0	0.00	TCS-3
71000	415.31	414.968	0.1	414.868	0.442	25	6.7	0.15	0.118	19.76	TCS-3
71025	415.525	414.377	0.1	414.277	1.248	25	6.7	0.15	0	0.00	TCS-3
71050	415.785	415.206	0.1	415.106	0.679	25	6.7	0.15	0	0.00	TCS-3
71075	416.048	415.635	0.1	415.535	0.513	25	6.7	0.15	0.047	7.87	TCS-3
71100	416.312	415.922	0.1	415.822	0.49	25	6.7	0.15	0.07	11.72	TCS-3
71125	416.575	419.377	0.1	419.277	-2.702	25	6.7	0.15	0.15	25.13	TCS-5
71150	416.839	420.34	0.1	420.24	-3.401	25	6.7	0.15	0.15	25.13	TCS-5
71175	417.103	419.401	0.1	419.301	-2.198	25	6.7	0.15	0.15	25.13	TCS-3
71200	417.366	417.169	0.1	417.069	0.297	25	6.7	0.15	0.15	25.13	TCS-3
71225	417.642	417.617	0.1	417.517	0.125	25	6.7	0.15	0.15	25.13	TCS-3
71250	417.977	417.825	0.1	417.725	0.252	25	6.7	0.15	0.15	25.13	TCS-3
71275	418.376	418.224	0.1	418.124	0.252	25	6.7	0.15	0.15	25.13	TCS-3
71300	418.839	418.445	0.1	418.345	0.494	25	6.7	0.15	0.066	11.05	TCS-3
71325	419.354	418.966	0.1	418.866	0.488	25	6.7	0.15	0.072	12.06	TCS-3
71350	419.874	418.851	0.1	418.751	1.123	25	6.7	0.15	0	0.00	TCS-3
71375	420.393	419.122	0.1	419.022	1.371	25	6.7	0.15	0	0.00	TCS-3
71400	420.913	421.141	0.1	421.041	-0.128	25	6.7	0.15	0.15	25.13	TCS-3
71425	421.287	424.771	0.1	424.671	-3.384	25	6.7	0.15	0.15	25.13	TCS-3
71450	421.364	429.717	0.1	429.617	-8.253	25	6.7	0.15	0.15	25.13	TCS-3
71475	421.29	434.861	0.1	434.761	-13.471	25	6.7	0.15	0.15	25.13	TCS-3
71500	421.216	428.727	0.1	428.627	-7.411	25	6.7	0.62	0.62	103.85	TCS-3
71525	421.142	424.455	0.1	424.355	-3.213	25	6.7	0.62	0.62	103.85	TCS-3
71550	421.159	420.685	0.1	420.585	0.574	25	6.7	0.62	0	0.00	TCS-3
71575	421.57	421.524	0.1	421.424	0.146	25		0.62	0.414		TCS-5A
71600	422.311	433.056	0.1	432.956	-10.645	25		0.62	0.62		TCS-5A
71625	423.077	424.448	0.1	424.348	-1.271	25		0.62	0.62		TCS-5A
71650	423.554	424.039	0.1	423.939	-0.385	25		0.62	0.62		TCS-5A
71675	423.11	423.097	0.1	422.997	0.113	25		0.62	0.447		TCS-5A
71700	421.79	421.933	0.1	421.833	-0.043	25		0.62	0.603		TCS-5A
71725	420.291	420.056	0.1	419.956	0.335	25		0.62	0.225		TCS-5A
71750	418.996	418.64	0.1	418.54	0.456	25	6.7	0.62	0.104	17.42	TCS-3
71775	418.058	418.003	0.1	417.903	0.155	25	6.7	0.62	0.405	67.84	TCS-3
71800	417.395	417.24	0.1	417.14	0.255	25	6.7	0.62	0.305	51.09	TCS-3
71825	416.75	416.672	0.1	416.572	0.178	25	6.7	0.62	0.382	63.99	TCS-3
71850	415.967	417.835	0.1	417.735	-1.768	25	6.7	0.62	0.62	103.85	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
71875	414.903	420.541	0.1	420.441	-5.538	25	6.7	0.62	0.62	103.85	TCS-3
71900	413.696	413.615	0.1	413.515	0.181	25	6.7	0.62	0.379	63.48	TCS-3
71925	412.489	412.23	0.1	412.13	0.359	25	6.7	0.62	0.201	33.67	TCS-3
71950	411.127	411.199	0.1	411.099	0.028	25		0.62	0.532		TCS-5A
71975	409.495	410.467	0.1	410.367	-0.872	25		0.62	0.62		TCS-5A
72000	407.745	409.857	0.1	409.757	-2.012	25		0.345	0.345		TCS-5A
72025	405.995	415.004	0.1	414.904	-8.909	25		0.345	0.345		TCS-5A
72050	404.245	407.198	0.1	407.098	-2.853	25		0.345	0.345		TCS-5A
72075	402.507	405.448	0.1	405.348	-2.841	25		0.345	0.345		TCS-3A
72100	401.003	403.744	0.1	403.644	-2.641	25		0.345	0.345		TCS-3A
72125	399.811	402.242	0.1	402.142	-2.331	25		0.345	0.345		TCS-3A
72150	398.809	401.178	0.1	401.078	-2.269	25		0.345	0.345		TCS-3A
72175	397.809	398.798	0.1	398.698	-0.889	25		0.345	0.345		TCS-3A
72200	396.625	396.17	0.1	396.07	0.555	25		0.345	0.005		TCS-3A
72225	395.066	392.998	0.1	392.898	2.168	25		0.345	0		TCS-3A
72250	393.316	390.748	0.1	390.648	2.668	25		0.345	0		TCS-3A
72275	391.566	389.02	0.1	388.92	2.646	25		0.345	0		TCS-3A
72300	389.816	386.963	0.1	386.863	2.953	25		0.345	0		TCS-3A
72325	388.066	387.994	0.1	387.894	0.172	25	6.7	0.345	0.345	57.79	TCS-3
72350	386.333	386.868	0.1	386.768	-0.435	25	6.7	0.345	0.345	57.79	TCS-3
72375	384.802	382.515	0.1	382.415	2.387	25	6.7	0.345	0	0.00	TCS-3
72400	383.504	381.802	0.1	381.702	1.802	25	6.7	0.345	0	0.00	TCS-4
72425	382.254	381.653	0.1	381.553	0.701	25	6.7	0.345	0	0.00	TCS-4
72450	381.004	380.3	0.1	380.2	0.804	25	6.7	0.345	0	0.00	TCS-4
72475	379.754	379.239	0.1	379.139	0.615	25	6.7	0.345	0	0.00	TCS-4
72500	378.504	378.303	0.1	378.203	0.301	25	6.7	0.41	0.259	43.38	TCS-4
72525	377.254	377.393	0.1	377.293	-0.039	25	6.7	0.41	0.41	68.68	TCS-5
72550	376.004	376.607	0.1	376.507	-0.503	25	6.7	0.41	0.41	68.68	TCS-5
72575	374.754	375.048	0.1	374.948	-0.194	25	6.7	0.41	0.41	68.68	TCS-5
72600	373.504	373.648	0.1	373.548	-0.044	25	6.7	0.41	0.41	68.68	TCS-5
72625	372.254	372.235	0.1	372.135	0.119	25	6.7	0.41	0.41	68.68	TCS-5
72650	371.004	370.975	0.1	370.875	0.129	25	6.7	0.41	0.41	68.68	TCS-5
72675	369.754	370.004	0.1	369.904	-0.15	25	6.7	0.41	0.41	68.68	TCS-3
72700	368.504	369.537	0.1	369.437	-0.933	25	6.7	0.41	0.41	68.68	TCS-3
72725	367.254	368.985	0.1	368.885	-1.631	25	6.7	0.41	0.41	68.68	TCS-4
72750	366.004	367.984	0.1	367.884	-1.88	25	6.7	0.41	0.41	68.68	TCS-4
72775	364.754	366.954	0.1	366.854	-2.1	25	6.7	0.41	0.41	68.68	TCS-3
72800	363.504	365.414	0.1	365.314	-1.81	25	6.7	0.41	0.41	68.68	TCS-3
72825	362.254	365.298	0.1	365.198	-2.944	25	6.7	0.41	0.41	68.68	TCS-3
72850	361.004	360.951	0.1	360.851	0.153	25	6.7	0.41	0.407	68.17	TCS-3
72875	359.835	359.801	0.1	359.701	0.134	25	6.7	0.41	0.41	68.68	TCS-3
72900	358.94	358.744	0.1	358.644	0.296	25		0.41	0.264		TCS-3A
72925	358.328	357.979	0.1	357.879	0.449	25		0.41	0.111		TCS-3A
72950	357.955	357.579	0.1	357.479	0.476	25	6.7	0.41	0.084	14.07	TCS-3
72975	357.609	357.259	0.1	357.159	0.45	25	6.7	0.41	0.11	18.43	TCS-3
73000	357.264	357.183	0.1	357.083	0.181	25	6.7	0.36	0.36	60.30	TCS-3
73025	356.918	357.543	0.1	357.443	-0.525	25	6.7	0.36	0.36	60.30	TCS-3
73050	356.435	356.595	0.1	356.495	-0.06	25	6.7	0.36	0.36	60.30	TCS-4
73075	355.561	356.802	0.1	356.702	-1.141	25	6.7	0.36	0.36	60.30	TCS-4
73100	354.328	355.516	0.1	355.416	-1.088	25	6.7	0.36	0.36	60.30	TCS-5
73125	353.031	352.221	0.1	352.121	0.91	25	6.7	0.36	0	0.00	TCS-5
73150	351.734	351.072	0.1	350.972	0.762	25	6.7	0.36	0	0.00	TCS-5
73175	350.437	349.714	0.1	349.614	0.823	25	6.7	0.36	0	0.00	TCS-5
73200	349.14	351.984	0.1	351.884	-2.744	25	6.7	0.36	0.36	60.30	TCS-3
73225	347.843	352.689	0.1	352.589	-4.746	25	6.7	0.36	0.36	60.30	TCS-3
73250	346.546	353.772	0.1	353.672	-7.126	25	6.7	0.36	0.36	60.30	TCS-3
73275	345.25	347.639	0.1	347.539	-2.289	25	6.7	0.36	0.36	60.30	TCS-3
73300	343.953	346.889	0.1	346.789	-2.836	25	6.7	0.36	0.36	60.30	TCS-3
73325	342.656	342.964	0.1	342.864	-0.208	25	6.7	0.36	0.36	60.30	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
73350	341.359	340.886	0.1	340.786	0.573	25	6.7	0.36	0	0.00	TCS-3
73375	340.062	341.941	0.1	341.841	-1.779	25	6.7	0.36	0.36	60.30	TCS-3
73400	338.766	342.632	0.1	342.532	-3.766	25	6.7	0.36	0.36	60.30	TCS-3
73425	337.633	340.881	0.1	340.781	-3.148	25	6.7	0.36	0.36	60.30	TCS-3
73450	336.799	336.919	0.1	336.819	-0.02	25	6.7	0.36	0.36	60.30	TCS-3
73475	336.1	335.964	0.1	335.864	0.236	25	6.7	0.36	0.324	54.27	TCS-5
73500	335.4	335.907	0.1	335.807	-0.407	25	6.7	0.41	0.41	68.68	TCS-5
73525	334.623	338.486	0.1	338.386	-3.763	25	6.7	0.41	0.41	68.68	TCS-3
73550	333.474	334.607	0.1	334.507	-1.033	25	6.7	0.41	0.41	68.68	TCS-3
73575	332.002	331.885	0.1	331.785	0.217	25	6.7	0.41	0.343	57.45	TCS-3
73600	330.502	330.144	0.1	330.044	0.458	25	6.7	0.41	0.102	17.08	TCS-3
73625	329.114	332.052	0.1	331.952	-2.838	25	6.7	0.41	0.41	68.68	TCS-3
73650	328.115	338.101	0.1	338.001	-9.886	25	6.7	0.41	0.41	68.68	TCS-3
73675	327.519	327.748	0.1	327.648	-0.129	25	6.7	0.41	0.41	68.68	TCS-3
73700	327.143	327.314	0.1	327.214	-0.071	25	6.7	0.41	0.41	68.68	TCS-5
73725	326.768	326.95	0.1	326.85	-0.082	25	6.7	0.41	0.41	68.68	TCS-5
73750	326.399	330.536	0.1	330.436	-4.037	25	6.7	0.41	0.41	68.68	TCS-5
73775	326.319	325.817	0.1	325.717	0.602	25	6.7	0.41	0	0.00	TCS-5
73800	326.688	326.261	0.1	326.161	0.527	25	6.7	0.41	0.033	5.53	TCS-5
73825	327.504	327.153	0.1	327.053	0.451	25	6.7	0.41	0.109	18.26	TCS-5
73850	328.563	328.472	0.1	328.372	0.191	25	6.7	0.41	0.369	61.81	TCS-3
73875	329.622	331.591	0.1	331.491	-1.869	25	6.7	0.41	0.41	68.68	TCS-3
73900	330.68	331.529	0.1	331.429	-0.749	25	6.7	0.41	0.41	68.68	TCS-3
73925	331.739	332.486	0.1	332.386	-0.647	25		0.41	0.41		TCS-5A
73950	332.798	333.185	0.1	333.085	-0.287	25		0.41	0.41		TCS-5A
73975	333.856	334.193	0.1	334.093	-0.237	25		0.41	0.41		TCS-5A
74000	334.915	334.98	0.1	334.88	0.035	25		0.27	0.27		TCS-5A
74025	335.974	335.969	0.1	335.869	0.105	25	6.7	0.27	0.27	45.23	TCS-3
74050	337.033	337.343	0.1	337.243	-0.21	25	6.7	0.27	0.27	45.23	TCS-3
74075	338.091	338.455	0.1	338.355	-0.264	25	6.7	0.27	0.27	45.23	TCS-4
74100	339.15	339.923	0.1	339.823	-0.673	25	6.7	0.27	0.27	45.23	TCS-4
74125	340.216	340.877	0.1	340.777	-0.561	25	6.7	0.27	0.27	45.23	TCS-4
74150	341.339	341.541	0.1	341.441	-0.102	25	6.7	0.27	0.27	45.23	TCS-4
74175	342.528	342.482	0.1	342.382	0.146	25	6.7	0.27	0.27	45.23	TCS-4
74200	343.785	343.739	0.1	343.639	0.146	25	6.7	0.27	0.27	45.23	TCS-3
74225	345.101	345.146	0.1	345.046	0.055	25	6.7	0.27	0.27	45.23	TCS-3
74250	346.427	347.144	0.1	347.044	-0.617	25	6.7	0.27	0.27	45.23	TCS-3
74275	347.753	348.349	0.1	348.249	-0.496	25	6.7	0.27	0.27	45.23	TCS-3
74300	349.079	349.574	0.1	349.474	-0.395	25	6.7	0.27	0.27	45.23	TCS-3
74325	350.405	350.709	0.1	350.609	-0.204	25	6.7	0.27	0.27	45.23	TCS-3
74350	351.731	351.911	0.1	351.811	-0.08	25	6.7	0.27	0.27	45.23	TCS-3
74375	353.057	352.688	0.1	352.588	0.469	25	6.7	0.27	0.091	15.24	TCS-3
74400	354.301	354.126	0.1	354.026	0.275	25	6.7	0.27	0.27	45.23	TCS-3
74425	355.318	355.443	0.1	355.343	-0.025	25	6.7	0.27	0.27	45.23	TCS-3
74450	356.129	356.223	0.1	356.123	0.006	25	6.7	0.27	0.27	45.23	TCS-3
74475	356.904	357.027	0.1	356.927	-0.023	25	6.7	0.27	0.27	45.23	TCS-3
74500	357.678	357.913	0.1	357.813	-0.135	25	6.7	0.28	0.28	46.90	TCS-3
74525	358.453	358.692	0.1	358.592	-0.139	25	6.7	0.28	0.28	46.90	TCS-3
74550	359.228	359.57	0.1	359.47	-0.242	25	6.7	0.28	0.28	46.90	TCS-3
74575	360.003	360.213	0.1	360.113	-0.11	25	6.7	0.28	0.28	46.90	TCS-3
74600	360.778	360.94	0.1	360.84	-0.062	25	6.7	0.28	0.28	46.90	TCS-3
74625	361.553	361.839	0.1	361.739	-0.186	25	6.7	0.28	0.28	46.90	TCS-3
74650	362.328	362.529	0.1	362.429	-0.101	25	6.7	0.28	0.28	46.90	TCS-3
74675	363.102	363.153	0.1	363.053	0.049	25	6.7	0.28	0.28	46.90	TCS-3
74700	363.807	363.728	0.1	363.628	0.179	25	6.7	0.28	0.28	46.90	TCS-3
74725	364.401	364.639	0.1	364.539	-0.138	25	6.7	0.28	0.28	46.90	TCS-3
74750	364.913	365.067	0.1	364.967	-0.054	25	6.7	0.28	0.28	46.90	TCS-3
74775	365.421	365.415	0.1	365.315	0.106	25	6.7	0.28	0.28	46.90	TCS-3
74800	365.928	365.869	0.1	365.769	0.159	25	6.7	0.28	0.28	46.90	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
74825	366.436	366.66	0.1	366.56	-0.124	25	6.7	0.28	0.28	46.90	TCS-3
74850	366.944	367.283	0.1	367.183	-0.239	25	6.7	0.28	0.28	46.90	TCS-3
74875	367.452	367.826	0.1	367.726	-0.274	25	6.7	0.28	0.28	46.90	TCS-3
74900	367.96	368.318	0.1	368.218	-0.258	25	6.7	0.28	0.28	46.90	TCS-3
74925	368.467	368.095	0.1	367.995	0.472	25	6.7	0.28	0.088	14.74	TCS-3
74950	368.975	368.763	0.1	368.663	0.312	25	6.7	0.28	0.248	41.54	TCS-3
74975	369.483	369.604	0.1	369.504	-0.021	25	6.7	0.28	0.28	46.90	TCS-3
75000	369.988	370.047	0.1	369.947	0.041	25	6.7	0.26	0.26	43.55	TCS-3
75025	370.404	370.182	0.1	370.082	0.322	25	6.7	0.26	0.238	39.86	TCS-3
75050	370.694	373.676	0.1	373.576	-2.882	25	6.7	0.26	0.26	43.55	TCS-3
75075	370.857	372.997	0.1	372.897	-2.04	25	6.7	0.26	0.26	43.55	TCS-3
75100	370.896	371.171	0.1	371.071	-0.175	25	6.7	0.26	0.26	43.55	TCS-3
75125	370.896	376.706	0.1	376.606	-5.71	25	6.7	0.26	0.26	43.55	TCS-3
75150	370.896	380.166	0.1	380.066	-9.17	25	6.7	0.26	0.26	43.55	TCS-3
75175	370.896	372.92	0.1	372.82	-1.924	25	6.7	0.26	0.26	43.55	TCS-3
75200	370.93	370.899	0.1	370.799	0.131	25	6.7	0.26	0.26	43.55	TCS-3
75225	371.13	371.027	0.1	370.927	0.203	25	6.7	0.26	0.26	43.55	TCS-3
75250	371.473	371.7	0.1	371.6	-0.127	25	6.7	0.26	0.26	43.55	TCS-5
75275	371.83	372.394	0.1	372.294	-0.464	25	6.7	0.26	0.26	43.55	TCS-5
75300	372.186	372.584	0.1	372.484	-0.298	25	6.7	0.26	0.26	43.55	TCS-5
75325	372.542	372.786	0.1	372.686	-0.144	25	6.7	0.26	0.26	43.55	TCS-5
75350	372.899	373.077	0.1	372.977	-0.078	25	6.7	0.26	0.26	43.55	TCS-5
75375	373.255	373.344	0.1	373.244	0.011	25	6.7	0.26	0.26	43.55	TCS-3
75400	373.611	373.799	0.1	373.699	-0.088	25	6.7	0.26	0.26	43.55	TCS-3
75425	373.968	374.146	0.1	374.046	-0.078	25	6.7	0.26	0.26	43.55	TCS-3
75450	374.342	374.573	0.1	374.473	-0.131	25	6.7	0.26	0.26	43.55	TCS-3
75475	374.816	374.653	0.1	374.553	0.263	25	6.7	0.26	0.26	43.55	TCS-3
75500	375.396	375.36	0.1	375.26	0.136	25	6.7	0.46	0.424	71.02	TCS-3
75525	376.013	376.413	0.1	376.313	-0.3	25	6.7	0.46	0.46	77.05	TCS-3
75550	376.629	376.908	0.1	376.808	-0.179	25	6.7	0.46	0.46	77.05	TCS-3
75575	377.246	376.873	0.1	376.773	0.473	25	6.7	0.46	0.087	14.57	TCS-3
75600	377.863	377.25	0.1	377.15	0.713	25	6.7	0.46	0	0.00	TCS-3
75625	378.48	377.803	0.1	377.703	0.777	25	6.7	0.46	0	0.00	TCS-3
75650	379.086	379.406	0.1	379.306	-0.22	25	6.7	0.46	0.46	77.05	TCS-3
75675	379.47	382.215	0.1	382.115	-2.645	25	6.7	0.46	0.46	77.05	TCS-3
75700	379.544	380.827	0.1	380.727	-1.183	25	6.7	0.46	0.46	77.05	TCS-3
75725	379.422	379.037	0.1	378.937	0.485	25	6.7	0.46	0.075	12.56	TCS-3
75750	379.296	379.221	0.1	379.121	0.175	25	6.7	0.46	0.385	64.49	TCS-3
75775	379.171	379.121	0.1	379.021	0.15	25	6.7	0.46	0.41	68.67	TCS-3
75800	379.045	379.058	0.1	378.958	0.087	25	6.7	0.46	0.46	77.05	TCS-3
75825	378.92	378.946	0.1	378.846	0.074	25	6.7	0.46	0.46	77.05	TCS-3
75850	378.794	378.717	0.1	378.617	0.177	25	6.7	0.46	0.383	64.15	TCS-3
75875	378.669	378.484	0.1	378.384	0.285	25	6.7	0.46	0.275	46.06	TCS-3
75900	378.543	378.32	0.1	378.22	0.323	25		0.46	0.237		TCS-6
75925	378.418	379.193	0.1	379.093	-0.675	25		0.46	0.46		TCS-6
75950	378.292	378.421	0.1	378.321	-0.029	25		0.46	0.46		TCS-6
75975	378.167	378.464	0.1	378.364	-0.197	25		0.46	0.46		TCS-6
76000	378.052	386.619	0.1	386.519	-8.467	25		0.46	0.46		TCS-6
76025	378.085	378.249	0.1	378.149	-0.064	25		0.46	0.46		TCS-6
76050	378.305	378.72	0.1	378.62	-0.315	25		0.46	0.46		TCS-6
76075	378.713	378.96	0.1	378.86	-0.147	25		0.46	0.46		TCS-6
76100	379.298	379.634	0.1	379.534	-0.236	25		0.46	0.46		TCS-6
76125	379.923	379.65	0.1	379.55	0.373	25		0.46	0.187		TCS-6
76150	380.548	380.254	0.1	380.154	0.394	25		0.46	0.166		TCS-6
76175	381.173	380.607	0.1	380.507	0.666	25		0.46	0		TCS-6
76200	381.798	381.005	0.1	380.905	0.893	25		0.46	0		TCS-6
76225	382.423	382.136	0.1	382.036	0.387	25		0.46	0.173		TCS-6
76250	383.048	384.283	0.1	384.183	-1.135	25		0.46	0.46		TCS-6
76275	383.678	384.676	0.1	384.576	-0.898	25		0.46	0.46		TCS-6



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
76300	384.391	384.554	0.1	384.454	-0.063	25		0.46	0.46		TCS-6
76325	385.215	385.362	0.1	385.262	-0.047	25		0.46	0.46		TCS-6
76350	386.103	386.394	0.1	386.294	-0.191	25		0.46	0.46		TCS-6
76375	386.993	387.142	0.1	387.042	-0.049	25		0.46	0.46		TCS-6
76400	387.882	387.01	0.1	386.91	0.972	25		0.46	0		TCS-6
76425	388.772	387.94	0.1	387.84	0.932	25		0.46	0		TCS-6
76450	389.626	389.348	0.1	389.248	0.378	25		0.46	0.182		TCS-6
76475	390.374	390.303	0.1	390.203	0.171	25		0.46	0.389		TCS-6
76500	391.019	390.266	0.1	390.166	0.853	25		0.46	0		TCS-6
76525	391.644	391.397	0.1	391.297	0.347	25		0.46	0.213		TCS-6
76550	392.269	392.705	0.1	392.605	-0.336	25		0.46	0.46		TCS-6
76575	392.894	392.938	0.1	392.838	0.056	25		0.46	0.46		TCS-6
76600	393.478	393.4	0.1	393.3	0.178	25		0.46	0.382		TCS-6
76625	393.878	392.897	0.1	392.797	1.081	25		0.46	0		TCS-6
76650	394.082	393.208	0.1	393.108	0.974	25		0.46	0		TCS-6
76675	394.09	393.544	0.1	393.444	0.646	25		0.46	0		TCS-6
76700	393.944	393.849	0.1	393.749	0.195	25		0.46	0.365		TCS-6
76725	393.785	393.839	0.1	393.739	0.046	25		0.46	0.46		TCS-6
76750	393.626	393.62	0.1	393.52	0.106	25		0.46	0.454		TCS-6
76775	393.467	393.449	0.1	393.349	0.118	25		0.46	0.442		TCS-6
76800	393.309	393.266	0.1	393.166	0.143	25		0.46	0.417		TCS-6
76825	393.15	393.191	0.1	393.091	0.059	25		0.46	0.46		TCS-6
76850	392.991	393.081	0.1	392.981	0.01	25		0.46	0.46		TCS-6
76875	392.832	393.348	0.1	393.248	-0.416	25		0.46	0.46		TCS-6
76900	392.673	392.024	0.1	391.924	0.749	25		0.46	0		TCS-6
76925	392.514	392.206	0.1	392.106	0.408	25		0.46	0.152		TCS-6
76950	392.356	392.261	0.1	392.161	0.195	25		0.46	0.365		TCS-6
76975	392.197	391.968	0.1	391.868	0.329	25		0.46	0.231		TCS-6
77000	392.038	397.53	0.1	397.43	-5.392	25		0.46	0.46		TCS-6
77025	391.879	391.156	0.1	391.056	0.823	25		0.46	0		TCS-6
77050	391.72	395.178	0.1	395.078	-3.358	25	6.7	0.46	0.46	77.05	TCS-3
77075	391.558	390.827	0.1	390.727	0.831	25	6.7	0.46	0	0.00	TCS-3
77100	391.382	390.926	0.1	390.826	0.556	25	6.7	0.46	0.004	0.67	TCS-4
77125	391.192	390.811	0.1	390.711	0.481	25	6.7	0.46	0.079	13.23	TCS-4
77150	390.989	391.395	0.1	391.295	-0.306	25	6.7	0.46	0.46	77.05	TCS-3
77175	390.777	398.96	0.1	398.86	-8.083	25	6.7	0.46	0.46	77.05	TCS-3
77200	390.565	407.953	0.1	407.853	-17.288	25	6.7	0.46	0.46	77.05	TCS-3
77225	390.352	411.904	0.1	411.804	-21.452	25	6.7	0.46	0.46	77.05	TCS-3
77250	390.139	390.206	0.1	390.106	0.033	25	6.7	0.46	0.46	77.05	TCS-3
77275	389.927	389.742	0.1	389.642	0.285	25	6.7	0.46	0.275	46.06	TCS-3
77300	389.714	389.566	0.1	389.466	0.248	25		0.46	0.312		TCS-5A
77325	389.502	389.143	0.1	389.043	0.459	25		0.46	0.101		TCS-5A
77350	389.289	388.672	0.1	388.572	0.717	25		0.46	0		TCS-5A
77375	389.077	388.521	0.1	388.421	0.656	25		0.46	0		TCS-5A
77400	388.864	388.644	0.1	388.544	0.32	25		0.46	0.24		TCS-5A
77425	388.652	388.603	0.1	388.503	0.149	25		0.46	0.411		TCS-5A
77450	388.439	388.426	0.1	388.326	0.113	25	6.7	0.46	0.447	74.87	TCS-3
77475	388.226	388.136	0.1	388.036	0.19	25	6.7	0.46	0.37	61.98	TCS-3
77500	388.014	387.95	0.1	387.85	0.164	25	6.7	0.32	0.32	53.60	TCS-3
77525	387.801	387.768	0.1	387.668	0.133	25	6.7	0.32	0.32	53.60	TCS-3
77550	387.589	387.708	0.1	387.608	-0.019	25	6.7	0.32	0.32	53.60	TCS-3
77575	387.376	387.561	0.1	387.461	-0.085	25	6.7	0.32	0.32	53.60	TCS-3
77600	387.164	387.163	0.1	387.063	0.101	25	6.7	0.32	0.32	53.60	TCS-3
77625	386.958	387.016	0.1	386.916	0.042	25	6.7	0.32	0.32	53.60	TCS-3
77650	386.796	386.898	0.1	386.798	-0.002	25	6.7	0.32	0.32	53.60	TCS-3
77675	386.684	386.737	0.1	386.637	0.047	25	6.7	0.32	0.32	53.60	TCS-3
77700	386.608	386.419	0.1	386.319	0.289	25	6.7	0.32	0.271	45.39	TCS-3
77725	386.534	386.167	0.1	386.067	0.467	25	6.7	0.32	0.093	15.58	TCS-3
77750	386.461	386.259	0.1	386.159	0.302	25	6.7	0.32	0.258	43.21	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminou s layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
77775	386.387	386.034	0.1	385.934	0.453	25	6.7	0.32	0.107	17.92	TCS-3
77800	386.322	386.691	0.1	386.591	-0.269	25	6.7	0.32	0.32	53.60	TCS-3
77825	386.488	386.999	0.1	386.899	-0.411	25	6.7	0.32	0.32	53.60	TCS-3
77850	386.917	387.363	0.1	387.263	-0.346	25	6.7	0.32	0.32	53.60	TCS-3
77875	387.367	387.305	0.1	387.205	0.162	25	6.7	0.32	0.32	53.60	TCS-3
77900	387.818	387.565	0.1	387.465	0.353	25	6.7	0.32	0.207	34.67	TCS-5
77925	388.247	387.669	0.1	387.569	0.678	25	6.7	0.32	0	0.00	TCS-5
77950	388.612	388.853	0.1	388.753	-0.141	25	6.7	0.32	0.32	53.60	TCS-5
77975	388.914	389.154	0.1	389.054	-0.14	25	6.7	0.32	0.32	53.60	TCS-3
78000	389.164	388.413	0.1	388.313	0.851	25	6.7	0.48	0	0.00	TCS-3
78025	389.409	388.732	0.1	388.632	0.777	25	6.7	0.48	0	0.00	TCS-3
78050	389.655	389.325	0.1	389.225	0.43	25	6.7	0.48	0.13	21.77	TCS-3
78075	389.901	390.174	0.1	390.074	-0.173	25	6.7	0.48	0.48	80.40	TCS-3
78100	390.15	390.419	0.1	390.319	-0.169	25	6.7	0.48	0.48	80.40	TCS-3
78125	390.451	390.517	0.1	390.417	0.034	25	6.7	0.48	0.48	80.40	TCS-3
78150	390.817	402.98	0.1	402.88	-12.063	25	6.7	0.48	0.48	80.40	TCS-3
78175	391.247	391.692	0.1	391.592	-0.345	25	6.7	0.48	0.48	80.40	TCS-3
78200	391.701	391.621	0.1	391.521	0.18	25	6.7	0.48	0.38	63.65	TCS-3
78225	392.155	392.076	0.1	391.976	0.179	25	6.7	0.48	0.381	63.82	TCS-3
78250	392.61	391.963	0.1	391.863	0.747	25	6.7	0.48	0	0.00	TCS-3
78275	393.064	392.674	0.1	392.574	0.49	25	6.7	0.48	0.07	11.72	TCS-3
78300	393.518	393.123	0.1	393.023	0.495	25	6.7	0.48	0.065	10.89	TCS-4
78325	393.972	393.47	0.1	393.37	0.602	25	6.7	0.48	0	0.00	TCS-4
78350	394.426	394.028	0.1	393.928	0.498	25	6.7	0.48	0.062	10.39	TCS-4
78375	394.881	394.422	0.1	394.322	0.559	25	6.7	0.48	0.001	0.17	TCS-4
78400	395.335	394.817	0.1	394.717	0.618	25	6.7	0.48	0	0.00	TCS-4
78425	395.761	395.354	0.1	395.254	0.507	25	6.7	0.48	0.053	8.88	TCS-4
78450	395.99	396.837	0.1	396.737	-0.747	25	6.7	0.48	0.48	80.40	TCS-4
78475	395.996	395.979	0.1	395.879	0.117	25	6.7	0.48	0.443	74.20	TCS-4
78500	395.912	395.459	0.1	395.359	0.553	25	6.7	0.34	0.007	1.17	TCS-3
78525	395.828	395.534	0.1	395.434	0.394	25	6.7	0.34	0.166	27.80	TCS-3
78550	395.743	395.512	0.1	395.412	0.331	25	6.7	0.34	0.229	38.36	TCS-3
78575	395.659	395.634	0.1	395.534	0.125	25	6.7	0.34	0.34	56.95	TCS-3
78600	395.575	395.952	0.1	395.852	-0.277	25	6.7	0.34	0.34	56.95	TCS-3
78625	395.5	396.299	0.1	396.199	-0.699	25	6.7	0.34	0.34	56.95	TCS-3
78650	395.562	396.405	0.1	396.305	-0.743	25	6.7	0.34	0.34	56.95	TCS-3
78675	395.801	395.957	0.1	395.857	-0.056	25	6.7	0.34	0.34	56.95	TCS-3
78700	396.215	396.339	0.1	396.239	-0.024	25	6.7	0.34	0.34	56.95	TCS-3
78725	396.697	396.777	0.1	396.677	0.02	25	6.7	0.34	0.34	56.95	TCS-3
78750	397.179	396.913	0.1	396.813	0.366	25	6.7	0.34	0.194	32.50	TCS-3
78775	397.639	397.807	0.1	397.707	-0.068	25	6.7	0.34	0.34	56.95	TCS-3
78800	397.983	398.16	0.1	398.06	-0.077	25	6.7	0.34	0.34	56.95	TCS-3
78825	398.201	398.037	0.1	397.937	0.264	25	6.7	0.34	0.296	49.58	TCS-3
78850	398.301	398.061	0.1	397.961	0.34	25	6.7	0.34	0.22	36.85	TCS-3
78875	398.377	397.845	0.1	397.745	0.632	25	6.7	0.34	0	0.00	TCS-3
78900	398.453	397.829	0.1	397.729	0.724	25	6.7	0.34	0	0.00	TCS-3
78925	398.541	397.888	0.1	397.788	0.753	25	6.7	0.34	0	0.00	TCS-3
78950	398.699	397.978	0.1	397.878	0.821	25	6.7	0.34	0	0.00	TCS-3
78975	398.935	398.533	0.1	398.433	0.502	25	6.7	0.34	0.058	9.71	TCS-3
79000	399.25	398.843	0.1	398.743	0.507	25	6.7	0.3	0.053	8.88	TCS-3
79025	399.632	399.25	0.1	399.15	0.482	25	6.7	0.3	0.078	13.06	TCS-3
79050	400.023	399.669	0.1	399.569	0.454	25	6.7	0.3	0.106	17.75	TCS-3
79075	400.413	400.815	0.1	400.715	-0.302	25	6.7	0.3	0.3	50.25	TCS-3
79100	400.803	400.655	0.1	400.555	0.248	25	6.7	0.3	0.3	50.25	TCS-4
79125	401.194	403.053	0.1	402.953	-1.759	25	6.7	0.3	0.3	50.25	TCS-4
79150	401.584	413.308	0.1	413.208	-11.624	25	6.7	0.3	0.3	50.25	TCS-3
79175	401.974	404.57	0.1	404.47	-2.496	25	6.7	0.3	0.3	50.25	TCS-3
79200	402.365	402.133	0.1	402.033	0.332	25	6.7	0.3	0.228	38.19	TCS-3
79225	402.755	402.417	0.1	402.317	0.438	25	6.7	0.3	0.122		TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminou s layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
79250	403.145	404.62	0.1	404.52	-1.375	25		0.3	0.3		TCS-3A
79275	403.506	408.872	0.1	408.772	-5.266	25		0.3	0.3		TCS-3A
79300	403.817	403.142	0.1	403.042	0.775	25	6.7	0.3	0	0.00	TCS-3
79325	404.08	405.336	0.1	405.236	-1.156	25	6.7	0.3	0.3	50.25	TCS-3
79350	404.314	409.035	0.1	408.935	-4.621	25		0.3	0.3		TCS-3A
79375	404.548	410.556	0.1	410.456	-5.908	25		0.3	0.3		TCS-3A
79400	404.782	404.326	0.1	404.226	0.556	25	6.7	0.3	0.004	0.67	TCS-4
79425	405.016	404.67	0.1	404.57	0.446	25	6.7	0.3	0.114	19.09	TCS-4
79450	405.249	405.188	0.1	405.088	0.161	25	6.7	0.3	0.3	50.25	TCS-3
79475	405.483	405.899	0.1	405.799	-0.316	25	6.7	0.3	0.3	50.25	TCS-3
79500	405.717	406.24	0.1	406.14	-0.423	25	6.7	0.43	0.43	72.03	TCS-3
79525	405.969	406.69	0.1	406.59	-0.621	25	6.7	0.43	0.43	72.03	TCS-5
79550	406.259	406.419	0.1	406.319	-0.06	25	6.7	0.43	0.43	72.03	TCS-5
79575	406.587	408.711	0.1	408.611	-2.024	25	6.7	0.43	0.43	72.03	TCS-5
79600	406.952	410.723	0.1	410.623	-3.671	25	6.7	0.43	0.43	72.03	TCS-3
79625	407.337	407.07	0.1	406.97	0.367	25	6.7	0.43	0.193	32.33	TCS-3
79650	407.721	407.155	0.1	407.055	0.666	25	6.7	0.43	0	0.00	TCS-3
79675	408.106	408.025	0.1	407.925	0.181	25	6.7	0.43	0.379	63.48	TCS-3
79700	408.478	408.601	0.1	408.501	-0.023	25	6.7	0.43	0.43	72.03	TCS-3
79725	408.719	411.441	0.1	411.341	-2.622	25	6.7	0.43	0.43	72.03	TCS-3
79750	408.8	413.151	0.1	413.051	-4.251	25	6.7	0.43	0.43	72.03	TCS-3
79775	408.8	408.421	0.1	408.321	0.479	25	6.7	0.43	0.081	13.57	TCS-3
79800	408.8	408.664	0.1	408.564	0.236	25	6.7	0.43	0.324	54.27	TCS-3
79825	408.81	408.524	0.1	408.424	0.386	25	6.7	0.43	0.174	29.14	TCS-5
79850	408.978	409.07	0.1	408.97	0.008	25	6.7	0.43	0.43	72.03	TCS-5
79875	409.353	409.402	0.1	409.302	0.051	25	6.7	0.43	0.43	72.03	TCS-5
79900	409.848	409.657	0.1	409.557	0.291	25	6.7	0.43	0.269	45.06	TCS-3
79925	410.345	410.273	0.1	410.173	0.172	25	6.7	0.43	0.388	64.99	TCS-3
79950	410.842	422.846	0.1	422.746	-11.904	25	6.7	0.43	0.43	72.03	TCS-3
79975	411.338	425.611	0.1	425.511	-14.173	25	6.7	0.43	0.43	72.03	TCS-3
80000	411.835	415.798	0.1	415.698	-3.863	25	6.7	0.28	0.28	46.90	TCS-3
80025	412.351	417.195	0.1	417.095	-4.744	25	6.7	0.28	0.28	46.90	TCS-3
80050	412.981	413.937	0.1	413.837	-0.856	25	6.7	0.28	0.28	46.90	TCS-3
80075	413.732	413.469	0.1	413.369	0.363	25	6.7	0.28	0.197	33.00	TCS-3
80100	414.526	414.056	0.1	413.956	0.57	25	6.7	0.28	0	0.00	TCS-3
80125	415.321	418.019	0.1	417.919	-2.598	25	6.7	0.28	0.28	46.90	TCS-3
80150	416.115	430.972	0.1	430.872	-14.757	25	6.7	0.28	0.28	46.90	TCS-3
80175	416.81	418.87	0.1	418.77	-1.96	25	6.7	0.28	0.28	46.90	TCS-3
80200	417.22	417.118	0.1	417.018	0.202	25		0.28	0.28		TCS-5A
80225	417.438	417.151	0.1	417.051	0.387	25		0.28	0.173		TCS-5A
80250	417.652	417.028	0.1	416.928	0.724	25		0.28	0		TCS-5A
80275	417.865	416.719	0.1	416.619	1.246	25		0.28	0		TCS-5A
80300	418.079	417.199	0.1	417.099	0.98	25		0.28	0		TCS-5A
80325	418.293	418.858	0.1	418.758	-0.465	25		0.28	0.28		TCS-5A
80350	418.507	418.25	0.1	418.15	0.357	25	6.7	0.28	0.203	34.00	TCS-3
80375	418.72	418.464	0.1	418.364	0.356	25	6.7	0.28	0.204	34.17	TCS-3
80400	418.934	418.623	0.1	418.523	0.411	25	6.7	0.28	0.149	24.96	TCS-3
80425	419.148	419.023	0.1	418.923	0.225	25	6.7	0.28	0.28	46.90	TCS-3
80450	419.361	419.448	0.1	419.348	0.013	25	6.7	0.28	0.28	46.90	TCS-3
80475	419.575	419.567	0.1	419.467	0.108	25	6.7	0.28	0.28	46.90	TCS-3
80500	419.789	419.534	0.1	419.434	0.355	25	6.7	0.44	0.205	34.34	TCS-3
80525	420.003	420.021	0.1	419.921	0.082	25	6.7	0.44	0.44	73.70	TCS-3
80550	420.216	420.168	0.1	420.068	0.148	25	6.7	0.44	0.412	69.01	TCS-3
80575	420.43	420.23	0.1	420.13	0.3	25	6.7	0.44	0.26	43.55	TCS-3
80600	420.644	420.631	0.1	420.531	0.113	25	6.7	0.44	0.44	73.70	TCS-3
80625	420.857	420.74	0.1	420.64	0.217	25	6.7	0.44	0.343	57.45	TCS-3
80650	421.071	420.874	0.1	420.774	0.297	25	6.7	0.44	0.263	44.05	TCS-3
80675	421.285	421.22	0.1	421.12	0.165	25	6.7	0.44	0.395	66.16	TCS-3
80700	421.499	425.981	0.1	425.881	-4.382	25	6.7	0.44	0.44	73.70	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminou s layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
80725	421.765	423.774	0.1	423.674	-1.909	25	6.7	0.44	0.44	73.70	TCS-3
80750	422.292	421.938	0.1	421.838	0.454	25	6.7	0.44	0.106	17.75	TCS-3
80775	423.096	430.046	0.1	429.946	-6.85	25	6.7	0.44	0.44	73.70	TCS-3
80800	423.988	436.352	0.1	436.252	-12.264	25	6.7	0.44	0.44	73.70	TCS-3
80825	424.88	424.688	0.1	424.588	0.292	25	6.7	0.44	0.268	44.89	TCS-3
80850	425.762	426.035	0.1	425.935	-0.173	25	6.7	0.44	0.44	73.70	TCS-3
80875	426.497	431.508	0.1	431.408	-4.911	25	6.7	0.44	0.44	73.70	TCS-3
80900	427.049	427.994	0.1	427.894	-0.845	25	6.7	0.44	0.44	73.70	TCS-3
80925	427.555	426.858	0.1	426.758	0.797	25	6.7	0.44	0	0.00	TCS-3
80950	428.062	427.606	0.1	427.506	0.556	25	6.7	0.44	0.004	0.67	TCS-3
80975	428.569	428.052	0.1	427.952	0.617	25	6.7	0.44	0	0.00	TCS-3
81000	429.083	428.853	0.1	428.753	0.33	25	6.7	0.3	0.23	38.52	TCS-3
81025	429.719	429.342	0.1	429.242	0.477	25	6.7	0.3	0.083	13.90	TCS-3
81050	430.511	430.269	0.1	430.169	0.342	25	6.7	0.3	0.218	36.51	TCS-3
81075	431.344	431.237	0.1	431.137	0.207	25	6.7	0.3	0.3	50.25	TCS-3
81100	432.176	432.303	0.1	432.203	-0.027	25	6.7	0.3	0.3	50.25	TCS-3
81125	433.009	432.775	0.1	432.675	0.334	25	6.7	0.3	0.226	37.85	TCS-3
81150	433.828	433.657	0.1	433.557	0.271	25	6.7	0.3	0.289	48.41	TCS-3
81175	434.6	434.483	0.1	434.383	0.217	25	6.7	0.3	0.3	50.25	TCS-3
81200	435.326	435.354	0.1	435.254	0.072	25	6.7	0.3	0.3	50.25	TCS-3
81225	436.013	435.825	0.1	435.725	0.288	25	6.7	0.3	0.272	45.56	TCS-3
81250	436.695	436.286	0.1	436.186	0.509	25	6.7	0.3	0.051	8.54	TCS-3
81275	437.377	436.464	0.1	436.364	1.013	25	6.7	0.3	0	0.00	TCS-3
81300	438.06	438.208	0.1	438.108	-0.048	25	6.7	0.3	0.3	50.25	TCS-3
81325	438.742	438.633	0.1	438.533	0.209	25	6.7	0.3	0.3	50.25	TCS-5
81350	439.424	439.206	0.1	439.106	0.318	25	6.7	0.3	0.242	40.54	TCS-5
81375	440.106	439.568	0.1	439.468	0.638	25	6.7	0.3	0	0.00	TCS-5
81400	440.788	440.317	0.1	440.217	0.571	25	6.7	0.3	0	0.00	TCS-5
81425	441.471	442.065	0.1	441.965	-0.494	25	6.7	0.3	0.3	50.25	TCS-5
81450	442.153	443.026	0.1	442.926	-0.773	25	6.7	0.3	0.3	50.25	TCS-5
81475	442.782	443.231	0.1	443.131	-0.349	25	6.7	0.3	0.3	50.25	TCS-5
81500	443.286	443.152	0.1	443.052	0.234	25	6.7	0.39	0.326	54.60	TCS-5
81525	443.665	443.077	0.1	442.977	0.688	25	6.7	0.39	0	0.00	TCS-5
81550	443.952	443.421	0.1	443.321	0.631	25	6.7	0.39	0	0.00	TCS-5
81575	444.234	443.874	0.1	443.774	0.46	25	6.7	0.39	0.1	16.75	TCS-5
81600	444.516	444.528	0.1	444.428	0.088	25	6.7	0.39	0.39	65.33	TCS-5
81625	444.799	445.453	0.1	445.353	-0.554	25	6.7	0.39	0.39	65.33	TCS-5
81650	445.081	446.032	0.1	445.932	-0.851	25	6.7	0.39	0.39	65.33	TCS-3
81675	445.363	445.945	0.1	445.845	-0.482	25	6.7	0.39	0.39	65.33	TCS-3
81700	445.645	445.75	0.1	445.65	-0.005	25	6.7	0.39	0.39	65.33	TCS-3
81725	445.927	445.578	0.1	445.478	0.449	25	6.7	0.39	0.111	18.59	TCS-3
81750	446.209	445.781	0.1	445.681	0.528	25	6.7	0.39	0.032	5.36	TCS-3
81775	446.492	445.522	0.1	445.422	1.07	25	6.7	0.39	0	0.00	TCS-3
81800	446.774	447.749	0.1	447.649	-0.875	25	6.7	0.39	0.39	65.33	TCS-3
81825	447.056	447.23	0.1	447.13	-0.074	25	6.7	0.39	0.39	65.33	TCS-3
81850	447.338	447.586	0.1	447.486	-0.148	25	6.7	0.39	0.39	65.33	TCS-3
81875	447.62	448.122	0.1	448.022	-0.402	25	6.7	0.39	0.39	65.33	TCS-3
81900	447.902	448.571	0.1	448.471	-0.569	25	6.7	0.39	0.39	65.33	TCS-3
81925	448.185	448.848	0.1	448.748	-0.563	25	6.7	0.39	0.39	65.33	TCS-3
81950	448.467	449.096	0.1	448.996	-0.529	25	6.7	0.39	0.39	65.33	TCS-3
81975	448.749	450.107	0.1	450.007	-1.258	25	6.7	0.39	0.39	65.33	TCS-3
82000	449.005	453.061	0.1	452.961	-3.956	25	6.7	0.35	0.35	58.63	TCS-3
82025	449.21	449.238	0.1	449.138	0.072	25	6.7	0.35	0.35	58.63	TCS-3
82050	449.363	449.721	0.1	449.621	-0.258	25		0.35	0.35		TCS-3A
82075	449.464	453.225	0.1	453.125	-3.661	25		0.35	0.35		TCS-3A
82100	449.539	458.255	0.1	458.155	-8.616	25		0.35	0.35		TCS-3A
82125	449.614	449.081	0.1	448.981	0.633	25	6.7	0.35	0	0.00	TCS-3
82150	449.69	448.959	0.1	448.859	0.831	25	6.7	0.35	0	0.00	TCS-3
82175	449.765	449.274	0.1	449.174	0.591	25	6.7	0.35	0	0.00	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
82200	449.84	449.135	0.1	449.035	0.805	25	6.7	0.35	0	0.00	TCS-3
82225	449.915	453.666	0.1	453.566	-3.651	25	6.7	0.35	0.35	58.63	TCS-3
82250	449.99	452.679	0.1	452.579	-2.589	25	6.7	0.35	0.35	58.63	TCS-3
82275	450.066	451.594	0.1	451.494	-1.428	25	6.7	0.35	0.35	58.63	TCS-3
82300	450.147	449.514	0.1	449.414	0.733	25	6.7	0.35	0	0.00	TCS-3
82325	450.235	450.495	0.1	450.395	-0.16	25	6.7	0.35	0.35	58.63	TCS-3
82350	450.331	451.666	0.1	451.566	-1.235	25	6.7	0.35	0.35	58.63	TCS-3
82375	450.433	451.196	0.1	451.096	-0.663	25	6.7	0.35	0.35	58.63	TCS-3
82400	450.538	453.486	0.1	453.386	-2.848	25	6.7	0.35	0.35	58.63	TCS-3
82425	450.642	460.167	0.1	460.067	-9.425	25	6.7	0.35	0.35	58.63	TCS-3
82450	450.747	454.039	0.1	453.939	-3.192	25	6.7	0.35	0.35	58.63	TCS-3
82475	450.852	453.474	0.1	453.374	-2.522	25	6.7	0.35	0.35	58.63	TCS-3
82500	450.956	450.669	0.1	450.569	0.387	25	6.7	0.54	0.173	28.98	TCS-3
82525	451.061	452.129	0.1	452.029	-0.968	25	6.7	0.54	0.54	90.45	TCS-3
82550	451.165	458.431	0.1	458.331	-7.166	25	6.7	0.54	0.54	90.45	TCS-3
82575	451.27	454.273	0.1	454.173	-2.903	25	6.7	0.54	0.54	90.45	TCS-3
82600	451.375	452.244	0.1	452.144	-0.769	25	6.7	0.54	0.54	90.45	TCS-3
82625	451.498	453.406	0.1	453.306	-1.808	25		0.54	0.54		TCS-3A
82650	451.658	451.473	0.1	451.373	0.285	25		0.54	0.275		TCS-3A
82675	451.854	451.443	0.1	451.343	0.511	25	6.7	0.54	0.049	8.21	TCS-3
82700	452.073	451.583	0.1	451.483	0.59	25	6.7	0.54	0	0.00	TCS-3
82725	452.292	451.969	0.1	451.869	0.423	25	6.7	0.54	0.137	22.95	TCS-3
82750	452.511	455.838	0.1	455.738	-3.227	25	6.7	0.54	0.54	90.45	TCS-3
82775	452.731	453.723	0.1	453.623	-0.892	25	6.7	0.54	0.54	90.45	TCS-3
82800	452.798	465.003	0.1	464.903	-12.105	25	6.7	0.54	0.54	90.45	TCS-3
82825	452.353	453.049	0.1	452.949	-0.596	25	6.7	0.54	0.54	90.45	TCS-3
82850	451.534	452.156	0.1	452.056	-0.522	25	6.7	0.54	0.54	90.45	TCS-3
82875	450.7	451.214	0.1	451.114	-0.414	25	6.7	0.54	0.54	90.45	TCS-3
82900	449.866	450.827	0.1	450.727	-0.861	25	6.7	0.54	0.54	90.45	TCS-3
82925	449.032	449.491	0.1	449.391	-0.359	25	6.7	0.54	0.54	90.45	TCS-3
82950	448.228	448.121	0.1	448.021	0.207	25	6.7	0.54	0.353	59.13	TCS-3
82975	447.509	447.306	0.1	447.206	0.303	25	6.7	0.54	0.257	43.05	TCS-3
83000	446.847	446.909	0.1	446.809	0.038	25	6.7	0.32	0.32	53.60	TCS-3
83025	446.186	446.045	0.1	445.945	0.241	25	6.7	0.32	0.319	53.43	TCS-3
83050	445.525	446.892	0.1	446.792	-1.267	25	6.7	0.32	0.32	53.60	TCS-3
83075	444.864	449.249	0.1	449.149	-4.285	25	6.7	0.32	0.32	53.60	TCS-3
83100	444.203	453.727	0.1	453.627	-9.424	25	6.7	0.32	0.32	53.60	TCS-3
83125	443.542	453.114	0.1	453.014	-9.472	25	6.7	0.32	0.32	53.60	TCS-3
83150	442.881	444.581	0.1	444.481	-1.6	25	6.7	0.32	0.32	53.60	TCS-3
83175	442.22	441.559	0.1	441.459	0.761	25	6.7	0.32	0	0.00	TCS-3
83200	441.558	452.171	0.1	452.071	-10.513	25	6.7	0.32	0.32	53.60	TCS-5
83225	440.882	449.203	0.1	449.103	-8.221	25	6.7	0.32	0.32	53.60	TCS-5
83250	440.129	449.387	0.1	449.287	-9.158	25	6.7	0.32	0.32	53.60	TCS-5
83275	439.292	448.745	0.1	448.645	-9.353	25	6.7	0.32	0.32	53.60	TCS-5
83300	438.379	438.219	0.1	438.119	0.26	25		0.32	0.3		TCS-3A
83325	437.45	437.907	0.1	437.807	-0.357	25		0.32	0.32		TCS-3A
83350	436.521	438.206	0.1	438.106	-1.585	25		0.32	0.32		TCS-3A
83375	435.593	444.603	0.1	444.503	-8.91	25		0.32	0.32		TCS-3A
83400	434.752	435.112	0.1	435.012	-0.26	25	6.7	0.32	0.32	53.60	TCS-3
83425	434.063	434.102	0.1	434.002	0.061	25	6.7	0.32	0.32	53.60	TCS-3
83450	433.438	433.806	0.1	433.706	-0.268	25	6.7	0.32	0.32	53.60	TCS-3
83475	432.816	432.509	0.1	432.409	0.407	25	6.7	0.32	0.153	25.63	TCS-3
83500	432.346	431.789	0.1	431.689	0.657	25	6.7	0.49	0	0.00	TCS-3
83525	432.103	431.64	0.1	431.54	0.563	25	6.7	0.49	0	0.00	TCS-3
83550	432.02	431.89	0.1	431.79	0.23	25	6.7	0.49	0.33	55.27	TCS-3
83575	431.943	432.104	0.1	432.004	-0.061	25	6.7	0.49	0.49	82.08	TCS-3
83600	431.866	432.157	0.1	432.057	-0.191	25	6.7	0.49	0.49	82.08	TCS-3
83625	431.788	431.728	0.1	431.628	0.16	25	6.7	0.49	0.4	67.00	TCS-3
83650	431.676	431.807	0.1	431.707	-0.031	25	6.7	0.49	0.49	82.08	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
83675	431.451	431.318	0.1	431.218	0.233	25	6.7	0.49	0.327	54.77	TCS-3
83700	431.112	430.955	0.1	430.855	0.257	25	6.7	0.49	0.303	50.75	TCS-3
83725	430.659	431.987	0.1	431.887	-1.228	25	6.7	0.49	0.49	82.08	TCS-3
83750	430.127	429.301	0.1	429.201	0.926	25	6.7	0.49	0	0.00	TCS-4
83775	429.592	429.198	0.1	429.098	0.494	25	6.7	0.49	0.066	11.05	TCS-4
83800	429.057	428.954	0.1	428.854	0.203	25	6.7	0.49	0.357	59.80	TCS-3
83825	428.521	428.021	0.1	427.921	0.6	25	6.7	0.49	0	0.00	TCS-3
83850	427.986	427.337	0.1	427.237	0.749	25	6.7	0.49	0	0.00	TCS-3
83875	427.451	427.08	0.1	426.98	0.471	25	6.7	0.49	0.089	14.91	TCS-3
83900	426.916	426.721	0.1	426.621	0.295	25	6.7	0.49	0.265	44.39	TCS-3
83925	426.381	426.559	0.1	426.459	-0.078	25	6.7	0.49	0.49	82.08	TCS-3
83950	425.846	425.643	0.1	425.543	0.303	25	6.7	0.49	0.257	43.05	TCS-3
83975	425.346	424.849	0.1	424.749	0.597	25	6.7	0.49	0	0.00	TCS-3
84000	425.032	424.588	0.1	424.488	0.544	25	6.7	0.555	0.016	2.68	TCS-3
84025	424.92	424.795	0.1	424.695	0.225	25	6.7	0.555	0.335	56.11	TCS-3
84050	424.994	425.204	0.1	425.104	-0.11	25	6.7	0.555	0.555	92.96	TCS-3
84075	425.105	425.63	0.1	425.53	-0.425	25	6.7	0.555	0.555	92.96	TCS-3
84100	425.216	426.004	0.1	425.904	-0.688	25	6.7	0.555	0.555	92.96	TCS-3
84125	425.328	426.465	0.1	426.365	-1.037	25	6.7	0.555	0.555	92.96	TCS-3
84150	425.439	425.658	0.1	425.558	-0.119	25	6.7	0.555	0.555	92.96	TCS-3
84175	425.55	424.8	0.1	424.7	0.85	25	6.7	0.555	0	0.00	TCS-3
84200	425.661	425.127	0.1	425.027	0.634	25	6.7	0.555	0	0.00	TCS-3
84225	425.773	425.473	0.1	425.373	0.4	25	6.7	0.555	0.16	26.80	TCS-3
84250	425.884	426.049	0.1	425.949	-0.065	25	6.7	0.555	0.555	92.96	TCS-3
84275	425.995	426.275	0.1	426.175	-0.18	25	6.7	0.555	0.555	92.96	TCS-3
84300	426.106	427.575	0.1	427.475	-1.369	25	6.7	0.555	0.555	92.96	TCS-3
84325	426.218	425.846	0.1	425.746	0.472	25	6.7	0.555	0.088	14.74	TCS-3
84350	426.248	425.983	0.1	425.883	0.365	25	6.7	0.555	0.195	32.66	TCS-3
84375	426.123	425.767	0.1	425.667	0.456	25	6.7	0.555	0.104	17.42	TCS-3
84400	425.841	425.8	0.1	425.7	0.141	25	6.7	0.555	0.419	70.18	TCS-3
84425	425.404	425.279	0.1	425.179	0.225	25	6.7	0.555	0.335	56.11	TCS-3
84450	424.891	425.261	0.1	425.161	-0.27	25	6.7	0.555	0.555	92.96	TCS-3
84475	424.379	425.593	0.1	425.493	-1.114	25	6.7	0.555	0.555	92.96	TCS-3
84500	423.866	426.419	0.1	426.319	-2.453	25	6.7	0.61	0.61	102.18	TCS-3
84525	423.353	424.871	0.1	424.771	-1.418	25	6.7	0.61	0.61	102.18	TCS-3
84550	422.905	422.907	0.1	422.807	0.098	25	6.7	0.61	0.462	77.38	TCS-3
84575	422.583	421.95	0.1	421.85	0.733	25	6.7	0.61	0	0.00	TCS-3
84600	422.388	421.407	0.1	421.307	1.081	25		0.61	0		TCS-5A
84625	422.278	424.82	0.1	424.72	-2.442	25		0.61	0.61		TCS-5A
84650	422.17	436.405	0.1	436.305	-14.135	25		0.61	0.61		TCS-5A
84675	422.062	429.716	0.1	429.616	-7.554	25	6.7	0.61	0.61	102.18	TCS-3
84700	421.954	422.275	0.1	422.175	-0.221	25	6.7	0.61	0.61	102.18	TCS-3
84725	421.836	422.271	0.1	422.171	-0.335	25	6.7	0.61	0.61	102.18	TCS-3
84750	421.408	423.886	0.1	423.786	-2.378	25		0.61	0.61		TCS-3A
84775	420.54	425.473	0.1	425.373	-4.833	25		0.61	0.61		TCS-3A
84800	419.533	425.716	0.1	425.616	-6.083	25		0.61	0.61		TCS-3A
84825	418.525	417.376	0.1	417.276	1.249	25		0.61	0		TCS-3A
84850	417.517	415.651	0.1	415.551	1.966	25	6.7	0.61	0	0.00	TCS-3
84875	416.51	415.282	0.1	415.182	1.328	25	6.7	0.61	0	0.00	TCS-3
84900	415.502	414.684	0.1	414.584	0.918	25	6.7	0.61	0	0.00	TCS-3
84925	414.494	413.84	0.1	413.74	0.754	25	6.7	0.61	0	0.00	TCS-3
84950	413.486	412.952	0.1	412.852	0.634	25	6.7	0.61	0	0.00	TCS-3
84975	412.487	412.565	0.1	412.465	0.022	25	6.7	0.61	0.538	90.11	TCS-3
85000	411.528	412.174	0.1	412.074	-0.546	25	6.7	0.395	0.395	66.16	TCS-3
85025	410.611	411	0.1	410.9	-0.289	25	6.7	0.395	0.395	66.16	TCS-3
85050	409.737	410.516	0.1	410.416	-0.679	25	6.7	0.395	0.395	66.16	TCS-3
85075	408.906	409.533	0.1	409.433	-0.527	25	6.7	0.395	0.395	66.16	TCS-3
85100	408.118	407.687	0.1	407.587	0.531	25	6.7	0.395	0.029	4.86	TCS-3
85125	407.372	406.972	0.1	406.872	0.5	25	6.7	0.395	0.06	10.05	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
85150	406.67	406.557	0.1	406.457	0.213	25	6.7	0.395	0.347	58.12	TCS-3
85175	406.001	405.849	0.1	405.749	0.252	25		0.395	0.308		TCS-3A
85200	405.336	408.096	0.1	407.996	-2.66	25		0.395	0.395		TCS-3A
85225	404.67	409.265	0.1	409.165	-4.495	25		0.395	0.395		TCS-3A
85250	404.005	411.301	0.1	411.201	-7.196	25		0.395	0.395		TCS-3A
85275	403.339	407.667	0.1	407.567	-4.228	25		0.395	0.395		TCS-3A
85300	402.736	407.313	0.1	407.213	-4.477	25		0.395	0.395		TCS-3A
85325	402.396	402.327	0.1	402.227	0.169	25	6.7	0.395	0.391	65.49	TCS-3
85350	402.337	401.782	0.1	401.682	0.655	25	6.7	0.395	0	0.00	TCS-3
85375	402.529	402.545	0.1	402.445	0.084	25		0.395	0.395		TCS-3A
85400	402.761	410.534	0.1	410.434	-7.673	25		0.395	0.395		TCS-3A
85425	402.994	406.513	0.1	406.413	-3.419	25	6.7	0.395	0.395	66.16	TCS-3
85450	403.226	403.801	0.1	403.701	-0.475	25	6.7	0.395	0.395	66.16	TCS-3
85475	403.458	404.073	0.1	403.973	-0.515	25	6.7	0.395	0.395	66.16	TCS-3
85500	403.69	403.501	0.1	403.401	0.289	25	6.7	0.56	0.271	45.39	TCS-3
85525	403.922	404.037	0.1	403.937	-0.015	25	6.7	0.56	0.56	93.80	TCS-3
85550	404.155	406.053	0.1	405.953	-1.798	25	6.7	0.56	0.56	93.80	TCS-3
85575	404.38	404.604	0.1	404.504	-0.124	25		0.56	0.56		TCS-3A
85600	404.567	406.379	0.1	406.279	-1.712	25		0.56	0.56		TCS-3A
85625	404.713	414.939	0.1	414.839	-10.126	25		0.56	0.56		TCS-3A
85650	404.821	404.232	0.1	404.132	0.689	25	6.7	0.56	0	0.00	TCS-3
85675	404.92	404.535	0.1	404.435	0.485	25	6.7	0.56	0.075	12.56	TCS-3
85700	405.02	404.43	0.1	404.33	0.69	25	6.7	0.56	0	0.00	TCS-5
85725	405.119	404.447	0.1	404.347	0.772	25	6.7	0.56	0	0.00	TCS-5
85750	405.218	404.676	0.1	404.576	0.642	25	6.7	0.56	0	0.00	TCS-5
85775	405.318	406.249	0.1	406.149	-0.831	25	6.7	0.56	0.56	93.80	TCS-5
85800	405.417	405.759	0.1	405.659	-0.242	25	6.7	0.56	0.56	93.80	TCS-4
85825	405.517	404.968	0.1	404.868	0.649	25	6.7	0.56	0	0.00	TCS-4
85850	405.616	409.849	0.1	409.749	-4.133	25	6.7	0.56	0.56	93.80	TCS-5
85875	405.716	409.545	0.1	409.445	-3.729	25	6.7	0.56	0.56	93.80	TCS-5
85900	405.815	408.122	0.1	408.022	-2.207	25	6.7	0.56	0.56	93.80	TCS-3
85925	405.915	406.658	0.1	406.558	-0.643	25	6.7	0.56	0.56	93.80	TCS-3
85950	406.014	406.291	0.1	406.191	-0.177	25	6.7	0.56	0.56	93.80	TCS-3
85975	406.114	406.835	0.1	406.735	-0.621	25	6.7	0.56	0.56	93.80	TCS-3
86000	406.211	405.628	0.1	405.528	0.683	25	6.7	0.44	0	0.00	TCS-3
86025	406.25	405.549	0.1	405.449	0.801	25	6.7	0.44	0	0.00	TCS-3
86050	406.209	405.407	0.1	405.307	0.902	25	6.7	0.44	0	0.00	TCS-3
86075	406.087	405.693	0.1	405.593	0.494	25	6.7	0.44	0.066	11.05	TCS-3
86100	405.886	405.797	0.1	405.697	0.189	25		0.44	0.371		TCS-3A
86125	405.661	407.93	0.1	407.83	-2.169	25		0.44	0.44		TCS-3A
86150	405.437	411.425	0.1	411.325	-5.888	25		0.44	0.44		TCS-3A
86175	405.212	413.1	0.1	413	-7.788	25		0.44	0.44		TCS-3A
86200	404.988	408.622	0.1	408.522	-3.534	25		0.44	0.44		TCS-3A
86225	404.763	405.062	0.1	404.962	-0.199	25		0.44	0.44		TCS-3A
86250	404.539	406.599	0.1	406.499	-1.96	25		0.44	0.44		TCS-3A
86275	404.314	408.875	0.1	408.775	-4.461	25		0.44	0.44		TCS-3A
86300	404.09	404.499	0.1	404.399	-0.309	25	6.7	0.44	0.44	73.70	TCS-3
86325	403.866	403.92	0.1	403.82	0.046	25	6.7	0.44	0.44	73.70	TCS-3
86350	403.603	403.638	0.1	403.538	0.065	25	6.7	0.44	0.44	73.70	TCS-3
86375	403.129	402.911	0.1	402.811	0.318	25	6.7	0.44	0.242	40.53	TCS-3
86400	402.463	401.846	0.1	401.746	0.717	25	6.7	0.44	0	0.00	TCS-3
86425	401.776	403.769	0.1	403.669	-1.893	25	6.7	0.44	0.44	73.70	TCS-3
86450	401.088	402.447	0.1	402.347	-1.259	25	6.7	0.44	0.44	73.70	TCS-3
86475	400.401	400.03	0.1	399.93	0.471	25	6.7	0.44	0.089	14.91	TCS-3
86500	399.714	398.656	0.1	398.556	1.158	25	6.7	0.23	0	0.00	TCS-3
86525	398.986	398.296	0.1	398.196	0.79	25	6.7	0.23	0	0.00	TCS-3
86550	398.08	397.84	0.1	397.74	0.34	25	6.7	0.23	0.22	36.85	TCS-3
86575	397.027	397.38	0.1	397.28	-0.253	25	6.7	0.23	0.23	38.53	TCS-3
86600	395.963	397.823	0.1	397.723	-1.76	25		0.23	0.23		TCS-3A



Chainage	FRL	EGL	Avg.Ext. Bituminou s layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
86625	394.9	396.918	0.1	396.818	-1.918	25		0.23	0.23		TCS-3A
86650	393.837	394.006	0.1	393.906	-0.069	25	6.7	0.23	0.23	38.53	TCS-3
86675	392.877	392.361	0.1	392.261	0.616	25	6.7	0.23	0	0.00	TCS-3
86700	392.184	391.596	0.1	391.496	0.688	25	6.7	0.23	0	0.00	TCS-3
86725	391.758	391.24	0.1	391.14	0.618	25	6.7	0.23	0	0.00	TCS-3
86750	391.447	390.928	0.1	390.828	0.619	25	6.7	0.23	0	0.00	TCS-3
86775	391.135	390.835	0.1	390.735	0.4	25	6.7	0.23	0.16	26.80	TCS-3
86800	390.823	391.193	0.1	391.093	-0.27	25	6.7	0.23	0.23	38.53	TCS-3
86825	390.503	389.847	0.1	389.747	0.756	25	6.7	0.23	0	0.00	TCS-3
86850	390.049	389.32	0.1	389.22	0.829	25	6.7	0.23	0	0.00	TCS-3
86875	389.423	388.639	0.1	388.539	0.884	25	6.7	0.23	0	0.00	TCS-3
86900	388.7	389.305	0.1	389.205	-0.505	25	6.7	0.23	0.23	38.53	TCS-3
86925	387.976	392.242	0.1	392.142	-4.166	25	6.7	0.23	0.23	38.53	TCS-3
86950	387.251	388.019	0.1	387.919	-0.668	25	6.7	0.23	0.23	38.53	TCS-3
86975	386.527	386.402	0.1	386.302	0.225	25	6.7	0.23	0.23	38.53	TCS-3
87000	385.819	385.176	0.1	385.076	0.743	25	6.7	0.38	0	0.00	TCS-3
87025	385.284	384.673	0.1	384.573	0.711	25	6.7	0.38	0	0.00	TCS-3
87050	384.959	384.718	0.1	384.618	0.341	25	6.7	0.38	0.219	36.68	TCS-3
87075	384.741	384.784	0.1	384.684	0.057	25	6.7	0.38	0.38	63.65	TCS-3
87100	384.522	384.269	0.1	384.169	0.353	25	6.7	0.38	0.207	34.67	TCS-3
87125	384.303	384.049	0.1	383.949	0.354	25	6.7	0.38	0.206	34.50	TCS-3
87150	383.959	384.093	0.1	383.993	-0.034	25	6.7	0.38	0.38	63.65	TCS-3
87175	383.251	383.763	0.1	383.663	-0.412	25	6.7	0.38	0.38	63.65	TCS-3
87200	382.207	382.756	0.1	382.656	-0.449	25	6.7	0.38	0.38	63.65	TCS-4
87225	381.101	380.491	0.1	380.391	0.71	25	6.7	0.38	0	0.00	TCS-4
87250	379.996	380.174	0.1	380.074	-0.078	25	6.7	0.38	0.38	63.65	TCS-3
87275	378.89	395.317	0.1	395.217	-16.327	25	6.7	0.38	0.38	63.65	TCS-3
87300	377.785	383.196	0.1	383.096	-5.311	25	6.7	0.38	0.38	63.65	TCS-3
87325	376.734	377.788	0.1	377.688	-0.954	25	6.7	0.38	0.38	63.65	TCS-3
87350	376.04	379.168	0.1	379.068	-3.028	25	6.7	0.38	0.38	63.65	TCS-3
87375	375.748	381.579	0.1	381.479	-5.731	25	6.7	0.38	0.38	63.65	TCS-3
87400	375.836	377.899	0.1	377.799	-1.963	25	6.7	0.38	0.38	63.65	TCS-5
87425	376.016	375.796	0.1	375.696	0.32	25	6.7	0.38	0.24	40.20	TCS-5
87450	376.196	375.585	0.1	375.485	0.711	25	6.7	0.38	0	0.00	TCS-5
87475	376.376	378.359	0.1	378.259	-1.883	25	6.7	0.38	0.38	63.65	TCS-5
87500	376.556	376.054	0.1	375.954	0.602	25	6.7	0.37	0	0.00	TCS-5
87525	376.736	379.587	0.1	379.487	-2.751	25	6.7	0.37	0.37	61.98	TCS-5
87550	376.917	377.566	0.1	377.466	-0.549	25	6.7	0.37	0.37	61.98	TCS-5
87575	377.097	376.678	0.1	376.578	0.519	25	6.7	0.37	0.041	6.87	TCS-5
87600	377.277	376.856	0.1	376.756	0.521	25	6.7	0.37	0.039	6.53	TCS-5
87625	377.457	376.736	0.1	376.636	0.821	25	6.7	0.37	0	0.00	TCS-5
87650	377.637	378.562	0.1	378.462	-0.825	25		0.37	0.37		TCS-5A
87675	377.817	381.352	0.1	381.252	-3.435	25		0.37	0.37		TCS-5A
87700	377.997	382.306	0.1	382.206	-4.209	25	6.7	0.37	0.37	61.98	TCS-5
87725	378.177	392.474	0.1	392.374	-14.197	25	6.7	0.37	0.37	61.98	TCS-5
87750	378.357	381.323	0.1	381.223	-2.866	25	6.7	0.37	0.37	61.98	TCS-5
87775	378.537	382.581	0.1	382.481	-3.944	25	6.7	0.37	0.37	61.98	TCS-3
87800	378.717	377.699	0.1	377.599	1.118	25	6.7	0.37	0	0.00	TCS-3
87825	378.898	382.334	0.1	382.234	-3.336	25		0.37	0.37		TCS-3A
87850	379.078	386.214	0.1	386.114	-7.036	25		0.37	0.37		TCS-3A
87875	379.258	382.629	0.1	382.529	-3.271	25		0.37	0.37		TCS-3A
87900	379.438	378.79	0.1	378.69	0.748	25	6.7	0.37	0	0.00	TCS-3
87925	379.618	378.052	0.1	377.952	1.666	25	6.7	0.37	0	0.00	TCS-3
87950	379.798	379.142	0.1	379.042	0.756	25	6.7	0.37	0	0.00	TCS-3
87975	379.988	380.148	0.1	380.048	-0.06	25	6.7	0.37	0.37	61.98	TCS-3
88000	380.268	380.182	0.1	380.082	0.186	25	6.7	0.38	0.374	62.65	TCS-3
88025	380.659	379.741	0.1	379.641	1.018	25	6.7	0.38	0	0.00	TCS-3
88050	381.156	380.471	0.1	380.371	0.785	25	6.7	0.38	0	0.00	TCS-3
88075	381.687	388.037	0.1	387.937	-6.25	25		0.38	0.38		TCS-3A



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
88100	382.218	382.279	0.1	382.179	0.039	25	6.7	0.38	0.38	63.65	TCS-3
88125	382.749	382.181	0.1	382.081	0.668	25	6.7	0.38	0	0.00	TCS-3
88150	383.28	382.784	0.1	382.684	0.596	25	6.7	0.38	0	0.00	TCS-3
88175	383.737	388.05	0.1	387.95	-4.213	25	6.7	0.38	0.38	63.65	TCS-3
88200	383.881	385.713	0.1	385.613	-1.732	25	6.7	0.38	0.38	63.65	TCS-3
88225	383.77	383.085	0.1	382.985	0.785	25	6.7	0.38	0	0.00	TCS-3
88250	383.641	383.14	0.1	383.04	0.601	25	6.7	0.38	0	0.00	TCS-3
88275	383.513	384.541	0.1	384.441	-0.928	25		0.38	0.38		TCS-3A
88300	383.384	394.352	0.1	394.252	-10.868	25		0.38	0.38		TCS-3A
88325	383.255	390.557	0.1	390.457	-7.202	25		0.38	0.38		TCS-3A
88350	383.126	388.088	0.1	387.988	-4.862	25	6.7	0.38	0.38	63.65	TCS-5
88375	382.998	382.576	0.1	382.476	0.522	25	6.7	0.38	0.038	6.37	TCS-5
88400	382.869	393.422	0.1	393.322	-10.453	25	6.7	0.38	0.38	63.65	TCS-5
88425	382.701	386.127	0.1	386.027	-3.326	25	6.7	0.38	0.38	63.65	TCS-5
88450	382.464	383.916	0.1	383.816	-1.352	25		0.38	0.38		TCS-3A
88475	382.158	387.913	0.1	387.813	-5.655	25		0.38	0.38		TCS-3A
88500	381.783	386.37	0.1	386.27	-4.487	25		0.257	0.257		TCS-3A
88525	381.377	382.378	0.1	382.278	-0.901	25		0.257	0.257		TCS-3A
88550	380.972	382.973	0.1	382.873	-1.901	25	6.7	0.257	0.257	43.05	TCS-3
88575	380.567	380.36	0.1	380.26	0.307	25	6.7	0.257	0.253	42.38	TCS-3
88600	380.162	379.57	0.1	379.47	0.692	25	6.7	0.257	0	0.00	TCS-3
88625	379.757	380.427	0.1	380.327	-0.57	25	6.7	0.257	0.257	43.05	TCS-3
88650	379.352	379.105	0.1	379.005	0.347	25	6.7	0.257	0.213	35.68	TCS-3
88675	378.957	379.104	0.1	379.004	-0.047	25	6.7	0.257	0.257	43.05	TCS-3
88700	378.716	379.025	0.1	378.925	-0.209	25	6.7	0.257	0.257	43.05	TCS-3
88725	378.675	378.665	0.1	378.565	0.11	25	6.7	0.257	0.257	43.05	TCS-3
88750	378.75	378.66	0.1	378.56	0.19	25	6.7	0.257	0.257	43.05	TCS-3
88775	378.825	378.619	0.1	378.519	0.306	25	6.7	0.257	0.254	42.55	TCS-3
88800	378.9	378.681	0.1	378.581	0.319	25	6.7	0.257	0.241	40.37	TCS-3
88825	378.975	378.706	0.1	378.606	0.369	25	6.7	0.257	0.191	31.99	TCS-3
88850	379.05	378.801	0.1	378.701	0.349	25	6.7	0.257	0.211	35.34	TCS-3
88875	379.125	378.654	0.1	378.554	0.571	25	6.7	0.257	0	0.00	TCS-3
88900	379.2	378.851	0.1	378.751	0.449	25	6.7	0.257	0.111	18.59	TCS-3
88925	379.275	378.96	0.1	378.86	0.415	25	6.7	0.257	0.145	24.29	TCS-3
88950	379.35	379.643	0.1	379.543	-0.193	25	6.7	0.257	0.257	43.05	TCS-3
88975	379.425	379.054	0.1	378.954	0.471	25	6.7	0.257	0.089	14.91	TCS-3
89000	379.5	379.055	0.1	378.955	0.545	25	6.7	0.35	0.015	2.51	TCS-3
89025	379.575	379.106	0.1	379.006	0.569	25	6.7	0.35	0	0.00	TCS-3
89050	379.636	379.109	0.1	379.009	0.627	25	6.7	0.35	0	0.00	TCS-3
89075	379.673	380.213	0.1	380.113	-0.44	25	6.7	0.35	0.35	58.63	TCS-3
89100	379.684	380.031	0.1	379.931	-0.247	25	6.7	0.35	0.35	58.63	TCS-3
89125	379.671	379.303	0.1	379.203	0.468	25	6.7	0.35	0.092	15.41	TCS-3
89150	379.633	379.375	0.1	379.275	0.358	25	6.7	0.35	0.202	33.83	TCS-3
89175	379.569	379.002	0.1	378.902	0.667	25	6.7	0.35	0	0.00	TCS-3
89200	379.494	379.082	0.1	378.982	0.512	25	6.7	0.35	0.048	8.04	TCS-3
89225	379.419	379.168	0.1	379.068	0.351	25	6.7	0.35	0.209	35.01	TCS-3
89250	379.344	379.041	0.1	378.941	0.403	25	6.7	0.35	0.157	26.30	TCS-3
89275	379.321	378.911	0.1	378.811	0.51	25	6.7	0.35	0.05	8.37	TCS-3
89300	379.412	379.044	0.1	378.944	0.468	25	6.7	0.35	0.092	15.41	TCS-3
89325	379.599	378.982	0.1	378.882	0.717	25	6.7	0.35	0	0.00	TCS-3
89350	379.797	381.079	0.1	380.979	-1.182	25	6.7	0.35	0.35	58.63	TCS-3
89375	379.995	385.642	0.1	385.542	-5.547	25	6.7	0.35	0.35	58.63	TCS-3
89400	380.194	381.323	0.1	381.223	-1.029	25	6.7	0.35	0.35	58.63	TCS-3
89425	380.392	380.124	0.1	380.024	0.368	25	6.7	0.35	0.192	32.16	TCS-3
89450	380.483	380.314	0.1	380.214	0.269	25	6.7	0.35	0.291	48.74	TCS-3
89475	380.341	379.576	0.1	379.476	0.865	25	6.7	0.35	0	0.00	TCS-3
89500	380.001	379.073	0.1	378.973	1.028	25	6.7	0.475	0	0.00	TCS-3
89525	379.638	378.613	0.1	378.513	1.125	25	6.7	0.475	0	0.00	TCS-3
89550	379.275	378.197	0.1	378.097	1.178	25	6.7	0.475	0	0.00	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
89575	378.912	378.292	0.1	378.192	0.72	25	6.7	0.475	0	0.00	TCS-3
89600	378.549	378.296	0.1	378.196	0.353	25	6.7	0.475	0.207	34.67	TCS-3
89625	378.186	378.656	0.1	378.556	-0.37	25	6.7	0.475	0.475	79.56	TCS-3
89650	377.823	379.1	0.1	379	-1.177	25	6.7	0.475	0.475	79.56	TCS-3
89675	377.46	385.594	0.1	385.494	-8.034	25	6.7	0.475	0.475	79.56	TCS-3
89700	377.097	377.779	0.1	377.679	-0.582	25	6.7	0.475	0.475	79.56	TCS-3
89725	376.734	376.601	0.1	376.501	0.233	25	6.7	0.475	0.327	54.77	TCS-3
89750	376.371	376.096	0.1	375.996	0.375	25	6.7	0.475	0.185	30.99	TCS-3
89775	376.007	375.601	0.1	375.501	0.506	25	6.7	0.475	0.054	9.04	TCS-3
89800	375.644	375.123	0.1	375.023	0.621	25	6.7	0.475	0	0.00	TCS-3
89825	375.281	374.874	0.1	374.774	0.507	25	6.7	0.475	0.053	8.88	TCS-3
89850	374.918	375.847	0.1	375.747	-0.829	25		0.475	0.475		TCS-3A
89875	374.555	377.615	0.1	377.515	-2.96	25		0.475	0.475		TCS-3A
89900	374.192	376.963	0.1	376.863	-2.671	25		0.475	0.475		TCS-3A
89925	373.814	377.024	0.1	376.924	-3.11	25		0.475	0.475		TCS-3A
89950	373.377	380.432	0.1	380.332	-6.955	25		0.475	0.475		TCS-3A
89975	372.891	373.812	0.1	373.712	-0.821	25	6.7	0.475	0.475	79.56	TCS-3
90000	372.401	371.733	0.1	371.633	0.768	25	6.7	0.265	0	0.00	TCS-3
90025	371.912	370.998	0.1	370.898	1.014	25	6.7	0.265	0	0.00	TCS-3
90050	371.423	370.337	0.1	370.237	1.186	25	6.7	0.265	0	0.00	TCS-3
90075	370.933	369.703	0.1	369.603	1.33	25	6.7	0.265	0	0.00	TCS-3
90100	370.444	369.523	0.1	369.423	1.021	25	6.7	0.265	0	0.00	TCS-3
90125	369.955	369.282	0.1	369.182	0.773	25	6.7	0.265	0	0.00	TCS-3
90150	369.465	369.33	0.1	369.23	0.235	25	6.7	0.265	0.265	44.39	TCS-3
90175	368.976	368.708	0.1	368.608	0.368	25	6.7	0.265	0.192	32.16	TCS-3
90200	368.487	370.085	0.1	369.985	-1.498	25	6.7	0.265	0.265	44.39	TCS-3
90225	367.997	367.807	0.1	367.707	0.29	25	6.7	0.265	0.265	44.39	TCS-3
90250	367.508	367.69	0.1	367.59	-0.082	25	6.7	0.265	0.265	44.39	TCS-3
90275	367.019	366.18	0.1	366.08	0.939	25	6.7	0.265	0	0.00	TCS-3
90300	366.529	365.605	0.1	365.505	1.024	25	6.7	0.265	0	0.00	TCS-3
90325	366.04	365.208	0.1	365.108	0.932	25	6.7	0.265	0	0.00	TCS-3
90350	365.496	365.133	0.1	365.033	0.463	25	6.7	0.265	0.097	16.25	TCS-3
90375	364.856	364.432	0.1	364.332	0.524	25	6.7	0.265	0.036	6.03	TCS-3
90400	364.121	363.624	0.1	363.524	0.597	25	6.7	0.265	0	0.00	TCS-3
90425	363.291	363.187	0.1	363.087	0.204	25	6.7	0.265	0.265	44.39	TCS-3
90450	362.419	363.323	0.1	363.223	-0.804	25	6.7	0.265	0.265	44.39	TCS-3
90475	361.548	361.994	0.1	361.894	-0.346	25	6.7	0.265	0.265	44.39	TCS-3
90500	360.677	360.836	0.1	360.736	-0.059	25	6.7	0.41	0.41	68.68	TCS-3
90525	359.805	360.632	0.1	360.532	-0.727	25		0.41	0.41		TCS-3A
90550	358.934	359.933	0.1	359.833	-0.899	25		0.41	0.41		TCS-3A
90575	358.062	358.253	0.1	358.153	-0.091	25	6.7	0.41	0.41	68.68	TCS-3
90600	357.197	357.327	0.1	357.227	-0.03	25	6.7	0.41	0.41	68.68	TCS-3
90625	356.429	357.673	0.1	357.573	-1.144	25	6.7	0.41	0.41	68.68	TCS-3
90650	355.791	359.406	0.1	359.306	-3.515	25		0.41	0.41		TCS-3A
90675	355.283	359.987	0.1	359.887	-4.604	25		0.41	0.41		TCS-3A
90700	354.827	354.499	0.1	354.399	0.428	25		0.41	0.132		TCS-3A
90725	354.372	354.259	0.1	354.159	0.213	25		0.41	0.347		TCS-3A
90750	353.917	358.853	0.1	358.753	-4.836	25		0.41	0.41		TCS-3A
90775	353.461	361.092	0.1	360.992	-7.531	25		0.41	0.41		TCS-3A
90800	352.921	361.436	0.1	361.336	-8.415	25		0.41	0.41		TCS-3A
90825	352.082	354.196	0.1	354.096	-2.014	25		0.41	0.41		TCS-3A
90850	351.021	350.83	0.1	350.73	0.291	25		0.41	0.269		TCS-3A
90875	349.949	352.402	0.1	352.302	-2.353	25		0.41	0.41		TCS-3A
90900	348.878	359.825	0.1	359.725	-10.847	25		0.41	0.41		TCS-3A
90925	347.806	353.932	0.1	353.832	-6.026	25		0.41	0.41		TCS-3A
90950	346.734	350.516	0.1	350.416	-3.682	25		0.41	0.41		TCS-3A
90975	345.663	345.502	0.1	345.402	0.261	25		0.41	0.299		TCS-3A
91000	344.591	340.782	0.1	340.682	3.909	25		0.6	0		TCS-3A
91025	343.53	343.576	0.1	343.476	0.054	25		0.6	0.506		TCS-3A



Chainage	FRL	EGL	Avg.Ext. Bituminou s layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
91050	342.542	346.916	0.1	346.816	-4.274	25		0.6	0.6		TCS-3A
91075	341.638	343.486	0.1	343.386	-1.748	25		0.6	0.6		TCS-3A
91100	340.814	340.963	0.1	340.863	-0.049	25		0.6	0.6		TCS-3A
91125	340.01	340.201	0.1	340.101	-0.091	25		0.6	0.6		TCS-4A
91150	339.207	339.12	0.1	339.02	0.187	25		0.6	0.373		TCS-5A
91175	338.404	350.793	0.1	350.693	-12.289	25		0.6	0.6		TCS-5A
91200	337.601	355.741	0.1	355.641	-18.04	25		0.6	0.6		TCS-5A
91225	336.797	341.055	0.1	340.955	-4.158	25		0.6	0.6		TCS-5A
91250	335.994	335.386	0.1	335.286	0.708	25	6.7	0.6	0	0.00	TCS-5
91275	335.191	334.863	0.1	334.763	0.428	25	6.7	0.6	0.132	22.11	TCS-5
91300	334.388	339.966	0.1	339.866	-5.478	25		0.6	0.6		TCS-3A
91325	333.585	340.367	0.1	340.267	-6.682	25		0.6	0.6		TCS-3A
91350	332.781	336.222	0.1	336.122	-3.341	25		0.6	0.6		TCS-3A
91375	331.978	331.335	0.1	331.235	0.743	25		0.6	0		TCS-3A
91400	331.175	337.349	0.1	337.249	-6.074	25	6.7	0.6	0.6	100.50	TCS-3
91425	330.372	330.148	0.1	330.048	0.324	25	6.7	0.6	0.236	39.53	TCS-3
91450	329.568	329.454	0.1	329.354	0.214	25	6.7	0.6	0.346	57.96	TCS-3
91475	328.765	333.045	0.1	332.945	-4.18	25		0.6	0.6		TCS-3A
91500	327.962	335.53	0.1	335.43	-7.468	25		0.66	0.66		TCS-3A
91525	327.159	329.032	0.1	328.932	-1.773	25		0.66	0.66		TCS-3A
91550	326.35	327.867	0.1	327.767	-1.417	25		0.66	0.66		TCS-3A
91575	325.498	331.182	0.1	331.082	-5.584	25		0.66	0.66		TCS-3A
91600	324.595	326.363	0.1	326.263	-1.668	25		0.66	0.66		TCS-3A
91625	323.639	328.402	0.1	328.302	-4.663	25		0.66	0.66		TCS-3A
91650	322.637	324.299	0.1	324.199	-1.562	25		0.66	0.66		TCS-3A
91675	321.628	320.516	0.1	320.416	1.212	25		0.66	0		TCS-3A
91700	320.618	321.562	0.1	321.462	-0.844	25		0.66	0.66		TCS-3A
91725	319.608	328.44	0.1	328.34	-8.732	25		0.66	0.66		TCS-3A
91750	318.598	337.374	0.1	337.274	-18.676	25		0.66	0.66		TCS-3A
91775	317.588	317.381	0.1	317.281	0.307	25	6.7	0.66	0.253	42.38	TCS-3
91800	316.579	316.496	0.1	316.396	0.183	25	6.7	0.66	0.377	63.15	TCS-3
91825	315.569	315.753	0.1	315.653	-0.084	25	6.7	0.66	0.644	107.87	TCS-3
91850	314.559	314.288	0.1	314.188	0.371	25	6.7	0.66	0.189	31.66	TCS-3
91875	313.553	313.237	0.1	313.137	0.416	25	6.7	0.66	0.144	24.12	TCS-3
91900	312.592	312.419	0.1	312.319	0.273	25	6.7	0.66	0.287	48.07	TCS-3
91925	311.687	311.611	0.1	311.511	0.176	25	6.7	0.66	0.384	64.32	TCS-3
91950	310.837	319.318	0.1	319.218	-8.381	25	6.7	0.66	0.66	110.55	TCS-3
91975	310.039	314.415	0.1	314.315	-4.276	25	6.7	0.66	0.66	110.55	TCS-3
92000	309.252	308.651	0.1	308.551	0.701	25	6.7	0.56	0	0.00	TCS-3
92025	308.465	320.276	0.1	320.176	-11.711	25		0.56	0.56		TCS-3A
92050	307.666	321.689	0.1	321.589	-13.923	25		0.56	0.56		TCS-3A
92075	306.607	309.784	0.1	309.684	-3.077	25		0.56	0.56		TCS-3A
92100	305.204	305.046	0.1	304.946	0.258	25	6.7	0.56	0.302	50.58	TCS-3
92125	303.704	304.052	0.1	303.952	-0.248	25	6.7	0.56	0.56	93.80	TCS-3
92150	302.204	302.56	0.1	302.46	-0.256	25	6.7	0.56	0.56	93.80	TCS-3
92175	300.704	300.887	0.1	300.787	-0.083	25	6.7	0.56	0.56	93.80	TCS-3
92200	299.204	299.184	0.1	299.084	0.12	25	6.7	0.56	0.44	73.70	TCS-5
92225	297.842	301.512	0.1	301.412	-3.57	25	6.7	0.56	0.56	93.80	TCS-5
92250	296.852	296.381	0.1	296.281	0.571	25	6.7	0.56	0	0.00	TCS-3
92275	296.099	295.418	0.1	295.318	0.781	25	6.7	0.56	0	0.00	TCS-3
92300	295.349	295.412	0.1	295.312	0.037	25	6.7	0.56	0.523	87.60	TCS-3
92325	294.599	294.719	0.1	294.619	-0.02	25	6.7	0.56	0.56	93.80	TCS-3
92350	293.849	293.845	0.1	293.745	0.104	25	6.7	0.56	0.456	76.38	TCS-3
92375	293.099	292.562	0.1	292.462	0.637	25	6.7	0.56	0	0.00	TCS-3
92400	292.349	291.29	0.1	291.19	1.159	25	6.7	0.56	0	0.00	TCS-4
92425	291.599	290.822	0.1	290.722	0.877	25		0.56	0		TCS-3A
92450	290.849	296.888	0.1	296.788	-5.939	25		0.56	0.56		TCS-3A
92475	290.099	294.499	0.1	294.399	-4.3	25		0.56	0.56		TCS-3A
92500	289.349	290.341	0.1	290.241	-0.892	25	6.7	0.6	0.6	100.50	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
92525	288.599	289.188	0.1	289.088	-0.489	25	6.7	0.6	0.6	100.50	TCS-3
92550	287.834	288.009	0.1	287.909	-0.075	25	6.7	0.6	0.6	100.50	TCS-3
92575	287.028	286.655	0.1	286.555	0.473	25	6.7	0.6	0.087	14.57	TCS-4
92600	286.195	285.314	0.1	285.214	0.981	25	6.7	0.6	0	0.00	TCS-4
92625	285.361	284.312	0.1	284.212	1.149	25	6.7	0.6	0	0.00	TCS-3
92650	284.527	283.82	0.1	283.72	0.807	25	6.7	0.6	0	0.00	TCS-3
92675	283.693	283.457	0.1	283.357	0.336	25	6.7	0.6	0.224	37.52	TCS-3
92700	282.859	282.605	0.1	282.505	0.354	25	6.7	0.6	0.206	34.51	TCS-3
92725	282.026	282.385	0.1	282.285	-0.259	25	6.7	0.6	0.6	100.50	TCS-3
92750	281.192	280.913	0.1	280.813	0.379	25	6.7	0.6	0.181	30.32	TCS-3
92775	280.358	280.076	0.1	279.976	0.382	25	6.7	0.6	0.178	29.81	TCS-3
92800	279.524	279.453	0.1	279.353	0.171	25	6.7	0.6	0.389	65.16	TCS-3
92825	278.69	279.801	0.1	279.701	-1.011	25		0.6	0.6		TCS-3A
92850	277.848	300.592	0.1	300.492	-22.644	25		0.6	0.6		TCS-3A
92875	276.821	281.741	0.1	281.641	-4.82	25		0.6	0.6		TCS-3A
92900	275.547	275.651	0.1	275.551	-0.004	25		0.6	0.564		TCS-3A
92925	274.203	275.04	0.1	274.94	-0.737	25		0.6	0.6		TCS-3A
92950	272.859	295.681	0.1	295.581	-22.722	25		0.6	0.6		TCS-3A
92975	271.516	277.246	0.1	277.146	-5.63	25		0.6	0.6		TCS-3A
93000	270.175	269.687	0.1	269.587	0.588	25	6.7	0.3	0	0.00	TCS-3
93025	268.967	268.872	0.1	268.772	0.195	25	6.7	0.3	0.3	50.25	TCS-3
93050	267.953	267.88	0.1	267.78	0.173	25	6.7	0.3	0.3	50.25	TCS-3
93075	267.005	266.746	0.1	266.646	0.359	25	6.7	0.3	0.201	33.67	TCS-4
93100	266.057	269.26	0.1	269.16	-3.103	25		0.3	0.3		TCS-3A
93125	265.109	275.434	0.1	275.334	-10.225	25		0.3	0.3		TCS-3A
93150	264.16	268.713	0.1	268.613	-4.453	25		0.3	0.3		TCS-3A
93175	263.061	262.976	0.1	262.876	0.185	25		0.3	0.3		TCS-3A
93200	261.713	261.504	0.1	261.404	0.309	25		0.3	0.251		TCS-3A
93225	260.113	261.403	0.1	261.303	-1.19	25		0.3	0.3		TCS-3A
93250	258.365	265.074	0.1	264.974	-6.609	25		0.3	0.3		TCS-3A
93275	256.615	256.669	0.1	256.569	0.046	25	6.7	0.3	0.3	50.25	TCS-3
93300	254.865	254.488	0.1	254.388	0.477	25	6.7	0.3	0.083	13.90	TCS-3
93325	253.125	254.022	0.1	253.922	-0.797	25	6.7	0.3	0.3	50.25	TCS-3
93350	251.441	253.157	0.1	253.057	-1.616	25	6.7	0.3	0.3	50.25	TCS-3
93375	249.82	251.452	0.1	251.352	-1.532	25	6.7	0.3	0.3	50.25	TCS-3
93400	248.262	250.072	0.1	249.972	-1.71	25	6.7	0.3	0.3	50.25	TCS-3
93425	246.756	248.203	0.1	248.103	-1.347	25	6.7	0.3	0.3	50.25	TCS-3
93450	245.256	246.171	0.1	246.071	-0.815	25	6.7	0.3	0.3	50.25	TCS-3
93475	243.756	244.241	0.1	244.141	-0.385	25	6.7	0.3	0.3	50.25	TCS-3
93500	242.256	242.513	0.1	242.413	-0.157	25	6.7	0.18	0.18	30.15	TCS-3
93525	240.756	240.838	0.1	240.738	0.018	25	6.7	0.18	0.18	30.15	TCS-3
93550	239.256	239.129	0.1	239.029	0.227	25	6.7	0.18	0.18	30.15	TCS-3
93575	238.078	237.497	0.1	237.397	0.681	25	6.7	0.18	0	0.00	TCS-3
93600	237.725	236.252	0.1	236.152	1.573	25	6.7	0.18	0	0.00	TCS-4
93625	238.202	235.175	0.1	235.075	3.127	25	6.7	0.18	0	0.00	TCS-4
93650	239.301	246.308	0.1	246.208	-6.907	25		0.18	0.18		TCS-3A
93675	239.945	262.893	0.1	262.793	-22.848	25		0.18	0.18		TCS-3A
93700	240	263.213	0.1	263.113	-23.113	25		0.18	0.18		TCS-3A
93725	240	248.417	0.1	248.317	-8.317	25		0.18	0.18		TCS-3A
93750	240	236.52	0.1	236.42	3.58	25		0.18	0		TCS-3A
93775	240	224.718	0.1	224.618	15.382	25		0.18	0		TCS-3A
93800	240	218.982	0.1	218.882	21.118	25		0.18	0		TCS-3A
93825	240	220.379	0.1	220.279	19.721	25		0.18	0		TCS-3A
93850	240	230.834	0.1	230.734	9.266	25		0.18	0		TCS-3A
93875	240	236.11	0.1	236.01	3.99	25		0.18	0		TCS-3A
93900	240.154	249.851	0.1	249.751	-9.597	25	6.7	0.18	0.18	30.15	TCS-7A
93925	240.485	258.957	0.1	258.857	-18.372	25	6.7	0.18	0.18	30.15	TCS-7A
93950	240.857	241.29	0.1	241.19	-0.333	25	6.7	0.18	0.18	30.15	TCS-3A
93975	242.015	242.276	0.1	242.176	-0.161	25	6.7	0.18	0.18	30.15	TCS-3A



Chainage	FRL	EGL	Avg.Ext. Bituminou s layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
94000	243.642	244.014	0.1	243.914	-0.272	25	6.7	0.28	0.28	46.90	TCS-3
94025	245.268	244.655	0.1	244.555	0.713	25	6.7	0.28	0	0.00	TCS-3
94050	246.895	248.007	0.1	247.907	-1.012	25	6.7	0.28	0.28	46.90	TCS-3
94075	248.474	249.804	0.1	249.704	-1.23	25	6.7	0.28	0.28	46.90	TCS-3
94100	249.838	250.31	0.1	250.21	-0.372	25	6.7	0.28	0.28	46.90	TCS-3
94125	251.019	251.283	0.1	251.183	-0.164	25	6.7	0.28	0.28	46.90	TCS-3
94150	252.186	251.819	0.1	251.719	0.467	25	6.7	0.28	0.093	15.58	TCS-3
94175	253.352	253.481	0.1	253.381	-0.029	25	6.7	0.28	0.28	46.90	TCS-3
94200	254.519	255.735	0.1	255.635	-1.116	25	6.7	0.28	0.28	46.90	TCS-3
94225	255.689	255.781	0.1	255.681	0.008	25	6.7	0.28	0.28	46.90	TCS-3
94250	257.052	257.309	0.1	257.209	-0.157	25	6.7	0.28	0.28	46.90	TCS-3
94275	258.702	258.593	0.1	258.493	0.209	25	6.7	0.28	0.28	46.90	TCS-5
94300	260.452	261.471	0.1	261.371	-0.919	25	6.7	0.28	0.28	46.90	TCS-5
94325	262.202	261.699	0.1	261.599	0.603	25	6.7	0.28	0	0.00	TCS-5
94350	263.858	263.475	0.1	263.375	0.483	25	6.7	0.28	0.077	12.90	TCS-5
94375	264.892	265.296	0.1	265.196	-0.304	25	6.7	0.28	0.28	46.90	TCS-3
94400	265.52	265.911	0.1	265.811	-0.291	25	6.7	0.28	0.28	46.90	TCS-3
94425	266.147	269.521	0.1	269.421	-3.274	25	6.7	0.28	0.28	46.90	TCS-3
94450	266.978	273.091	0.1	272.991	-6.013	25		0.28	0.28		TCS-3A
94475	268.146	278.956	0.1	278.856	-10.71	25		0.28	0.28		TCS-3A
94500	269.607	269.948	0.1	269.848	-0.241	25	6.7	0.26	0.26	43.55	TCS-3
94525	271.107	271.134	0.1	271.034	0.073	25	6.7	0.26	0.26	43.55	TCS-3
94550	272.607	274.11	0.1	274.01	-1.403	25	6.7	0.26	0.26	43.55	TCS-3
94575	274.107	273.683	0.1	273.583	0.524	25	6.7	0.26	0.036	6.03	TCS-3
94600	275.503	275.506	0.1	275.406	0.097	25	6.7	0.26	0.26	43.55	TCS-3
94625	276.693	283.244	0.1	283.144	-6.451	25		0.26	0.26		TCS-3A
94650	277.778	283.954	0.1	283.854	-6.076	25		0.26	0.26		TCS-3A
94675	278.863	278.781	0.1	278.681	0.182	25	6.7	0.26	0.26	43.55	TCS-3
94700	279.948	279.449	0.1	279.349	0.599	25	6.7	0.26	0	0.00	TCS-3
94725	281.033	280.433	0.1	280.333	0.7	25	6.7	0.26	0	0.00	TCS-3
94750	282.118	281.079	0.1	280.979	1.139	25	6.7	0.26	0	0.00	TCS-3
94775	283.203	282.515	0.1	282.415	0.788	25	6.7	0.26	0	0.00	TCS-3
94800	284.288	284.318	0.1	284.218	0.07	25		0.26	0.26		TCS-3A
94825	285.372	301.634	0.1	301.534	-16.162	25		0.26	0.26		TCS-3A
94850	286.37	291.253	0.1	291.153	-4.783	25	6.7	0.26	0.26	43.55	TCS-3
94875	287.228	287.424	0.1	287.324	-0.096	25	6.7	0.26	0.26	43.55	TCS-3
94900	288.033	291.409	0.1	291.309	-3.276	25	6.7	0.26	0.26	43.55	TCS-3
94925	288.838	288.733	0.1	288.633	0.205	25	6.7	0.26	0.26	43.55	TCS-3
94950	289.643	289.718	0.1	289.618	0.025	25	6.7	0.26	0.26	43.55	TCS-4
94975	290.447	290.236	0.1	290.136	0.311	25	6.7	0.26	0.249	41.71	TCS-3
95000	291.293	290.745	0.1	290.645	0.648	25	6.7	0.4	0	0.00	TCS-3
95025	292.351	291.814	0.1	291.714	0.637	25	6.7	0.4	0	0.00	TCS-3
95050	293.639	293.679	0.1	293.579	0.06	25	6.7	0.4	0.4	67.00	TCS-3
95075	295.084	296.014	0.1	295.914	-0.83	25	6.7	0.4	0.4	67.00	TCS-3
95100	296.534	297.952	0.1	297.852	-1.318	25	6.7	0.4	0.4	67.00	TCS-3
95125	297.983	299.06	0.1	298.96	-0.977	25	6.7	0.4	0.4	67.00	TCS-3
95150	299.432	300.051	0.1	299.951	-0.519	25	6.7	0.4	0.4	67.00	TCS-3
95175	300.882	299.219	0.1	299.119	1.763	25	6.7	0.4	0	0.00	TCS-3
95200	302.331	308.76	0.1	308.66	-6.329	25	6.7	0.4	0.4	67.00	TCS-3
95225	303.78	303.801	0.1	303.701	0.079	25	6.7	0.4	0.4	67.00	TCS-3
95250	305.23	304.81	0.1	304.71	0.52	25	6.7	0.4	0.04	6.70	TCS-3
95275	306.679	306.442	0.1	306.342	0.337	25	6.7	0.4	0.223	37.35	TCS-3
95300	308.119	307.946	0.1	307.846	0.273	25	6.7	0.4	0.287	48.07	TCS-3
95325	309.31	315.666	0.1	315.566	-6.256	25	6.7	0.4	0.4	67.00	TCS-3
95350	310.15	311.503	0.1	311.403	-1.253	25	6.7	0.4	0.4	67.00	TCS-3
95375	310.671	310.071	0.1	309.971	0.7	25	6.7	0.4	0	0.00	TCS-3
95400	311.134	310.222	0.1	310.122	1.012	25	6.7	0.4	0	0.00	TCS-3
95425	311.598	310.672	0.1	310.572	1.026	25	6.7	0.4	0	0.00	TCS-3
95450	312.062	316.086	0.1	315.986	-3.924	25	6.7	0.4	0.4	67.00	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminou s layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
95475	312.526	312.64	0.1	312.54	-0.014	25	6.7	0.4	0.4	67.00	TCS-3
95500	312.99	312.929	0.1	312.829	0.161	25	6.7	0.12	0.12	20.10	TCS-3
95525	313.454	317.226	0.1	317.126	-3.672	25	6.7	0.12	0.12	20.10	TCS-3
95550	313.918	317.325	0.1	317.225	-3.307	25	6.7	0.12	0.12	20.10	TCS-5
95575	314.382	318.551	0.1	318.451	-4.069	25	6.7	0.12	0.12	20.10	TCS-5
95600	314.846	314.217	0.1	314.117	0.729	25	6.7	0.12	0	0.00	TCS-5
95625	315.31	314.537	0.1	314.437	0.873	25	6.7	0.12	0	0.00	TCS-5
95650	315.774	320.987	0.1	320.887	-5.113	25		0.12	0.12		TCS-5A
95675	316.238	326.86	0.1	326.76	-10.522	25		0.12	0.12		TCS-5A
95700	316.702	320.224	0.1	320.124	-3.422	25	6.7	0.12	0.12	20.10	TCS-3
95725	317.211	316.757	0.1	316.657	0.554	25	6.7	0.12	0.006	1.00	TCS-3
95750	318.061	318.47	0.1	318.37	-0.309	25	6.7	0.12	0.12	20.10	TCS-3
95775	319.259	320.723	0.1	320.623	-1.364	25	6.7	0.12	0.12	20.10	TCS-3
95800	320.509	319.947	0.1	319.847	0.662	25	6.7	0.12	0	0.00	TCS-3
95825	321.759	321.523	0.1	321.423	0.336	25	6.7	0.12	0.12	20.10	TCS-3
95850	323.009	333.214	0.1	333.114	-10.105	25	6.7	0.12	0.12	20.10	TCS-3
95875	324.259	324.16	0.1	324.06	0.199	25	6.7	0.12	0.12	20.10	TCS-3
95900	325.509	325.197	0.1	325.097	0.412	25	6.7	0.12	0.12	20.10	TCS-3
95925	326.839	326.431	0.1	326.331	0.508	25	6.7	0.12	0.052	8.71	TCS-3
95950	328.415	340.045	0.1	339.945	-11.53	25		0.12	0.12		TCS-3A
95975	330.16	337.064	0.1	336.964	-6.804	25		0.12	0.12		TCS-3A
96000	331.91	337.322	0.1	337.222	-5.312	25		0.4	0.4		TCS-3A
96025	333.656	333.995	0.1	333.895	-0.239	25	6.7	0.4	0.4	67.00	TCS-3
96050	335.278	335.211	0.1	335.111	0.167	25	6.7	0.4	0.393	65.83	TCS-3
96075	336.721	338.662	0.1	338.562	-1.841	25	6.7	0.4	0.4	67.00	TCS-3
96100	337.985	337.489	0.1	337.389	0.596	25	6.7	0.4	0	0.00	TCS-3
96125	339.07	338.642	0.1	338.542	0.528	25	6.7	0.4	0.032	5.36	TCS-3
96150	339.976	339.809	0.1	339.709	0.267	25	6.7	0.4	0.293	49.08	TCS-3
96175	340.707	348.122	0.1	348.022	-7.315	25	6.7	0.4	0.4	67.00	TCS-3
96200	341.383	342.776	0.1	342.676	-1.293	25	6.7	0.4	0.4	67.00	TCS-3
96225	342.059	341.898	0.1	341.798	0.261	25	6.7	0.4	0.299	50.08	TCS-3
96250	342.735	342.552	0.1	342.452	0.283	25	6.7	0.4	0.277	46.40	TCS-3
96275	343.41	345.667	0.1	345.567	-2.157	25	6.7	0.4	0.4	67.00	TCS-3
96300	344.086	348.354	0.1	348.254	-4.168	25	6.7	0.4	0.4	67.00	TCS-3
96325	344.762	348.24	0.1	348.14	-3.378	25	6.7	0.4	0.4	67.00	TCS-3
96350	345.438	345.602	0.1	345.502	-0.064	25	6.7	0.4	0.4	67.00	TCS-3
96375	346.113	346.221	0.1	346.121	-0.008	25	6.7	0.4	0.4	67.00	TCS-3
96400	346.587	348.247	0.1	348.147	-1.56	25	6.7	0.4	0.4	67.00	TCS-3
96425	346.637	347.415	0.1	347.315	-0.678	25	6.7	0.4	0.4	67.00	TCS-3
96450	346.467	345.891	0.1	345.791	0.676	25	6.7	0.4	0	0.00	TCS-3
96475	346.296	345.979	0.1	345.879	0.417	25	6.7	0.4	0.143	23.95	TCS-5
96500	346.125	351.135	0.1	351.035	-4.91	25	6.7	0.14	0.14	23.45	TCS-5
96525	346.04	348.807	0.1	348.707	-2.667	25	6.7	0.14	0.14	23.45	TCS-5
96550	346.242	347.141	0.1	347.041	-0.799	25	6.7	0.14	0.14	23.45	TCS-5
96575	346.741	346.815	0.1	346.715	0.026	25	6.7	0.14	0.14	23.45	TCS-3
96600	347.535	347.393	0.1	347.293	0.242	25	6.7	0.14	0.14	23.45	TCS-3
96625	348.626	348.554	0.1	348.454	0.172	25	6.7	0.14	0.14	23.45	TCS-3
96650	349.876	355.818	0.1	355.718	-5.842	25		0.14	0.14		TCS-3A
96675	351.126	356.266	0.1	356.166	-5.04	25		0.14	0.14		TCS-3A
96700	352.376	352.263	0.1	352.163	0.213	25	6.7	0.14	0.14	23.45	TCS-3
96725	353.518	353.422	0.1	353.322	0.196	25	6.7	0.14	0.14	23.45	TCS-3
96750	354.42	354.855	0.1	354.755	-0.335	25	6.7	0.14	0.14	23.45	TCS-3
96775	355.188	355.457	0.1	355.357	-0.169	25	6.7	0.14	0.14	23.45	TCS-3
96800	355.957	355.431	0.1	355.331	0.626	25	6.7	0.14	0	0.00	TCS-3
96825	356.725	355.859	0.1	355.759	0.966	25	6.7	0.14	0	0.00	TCS-3
96850	357.494	357.012	0.1	356.912	0.582	25	6.7	0.14	0	0.00	TCS-3
96875	358.262	358.266	0.1	358.166	0.096	25	6.7	0.14	0.14	23.45	TCS-3
96900	359.031	367.833	0.1	367.733	-8.702	25		0.14	0.14		TCS-3A
96925	359.799	363.571	0.1	363.471	-3.672	25		0.14	0.14		TCS-3A



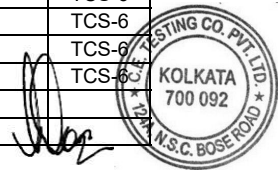
Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
96950	360.568	360.555	0.1	360.455	0.113	25	6.7	0.14	0.14	23.45	TCS-3
96975	361.359	361.11	0.1	361.01	0.349	25	6.7	0.14	0.14	23.45	TCS-3
97000	362.328	362.627	0.1	362.527	-0.199	25	6.7	0.22	0.22	36.85	TCS-3
97025	363.478	371.93	0.1	371.83	-8.352	25	6.7	0.22	0.22	36.85	TCS-3
97050	364.655	364.325	0.1	364.225	0.43	25	6.7	0.22	0.13	21.77	TCS-3
97075	365.833	366.845	0.1	366.745	-0.912	25	6.7	0.22	0.22	36.85	TCS-3
97100	367.011	366.48	0.1	366.38	0.631	25	6.7	0.22	0	0.00	TCS-3
97125	368.189	367.941	0.1	367.841	0.348	25	6.7	0.22	0.212	35.51	TCS-5
97150	369.367	370.983	0.1	370.883	-1.516	25	6.7	0.22	0.22	36.85	TCS-5
97175	370.544	371.578	0.1	371.478	-0.934	25	6.7	0.22	0.22	36.85	TCS-3
97200	371.722	371.419	0.1	371.319	0.403	25	6.7	0.22	0.157	26.30	TCS-3
97225	372.9	372.55	0.1	372.45	0.45	25	6.7	0.22	0.11	18.43	TCS-3
97250	374.078	373.158	0.1	373.058	1.02	25	6.7	0.22	0	0.00	TCS-3
97275	375.252	375.554	0.1	375.454	-0.202	25	6.7	0.22	0.22	36.85	TCS-3
97300	376.296	375.408	0.1	375.308	0.988	25	6.7	0.22	0	0.00	TCS-3
97325	377.181	377.367	0.1	377.267	-0.086	25	6.7	0.22	0.22	36.85	TCS-3
97350	378.049	378.522	0.1	378.422	-0.373	25	6.7	0.22	0.22	36.85	TCS-3
97375	378.918	379.911	0.1	379.811	-0.893	25	6.7	0.22	0.22	36.85	TCS-3
97400	379.787	380.699	0.1	380.599	-0.812	25	6.7	0.22	0.22	36.85	TCS-3
97425	380.656	380.545	0.1	380.445	0.211	25	6.7	0.22	0.22	36.85	TCS-3
97450	381.696	382.033	0.1	381.933	-0.237	25	6.7	0.22	0.22	36.85	TCS-3
97475	383.108	383.209	0.1	383.109	-0.001	25	6.7	0.22	0.22	36.85	TCS-3
97500	384.608	384.78	0.1	384.68	-0.072	25	6.7	0.26	0.26	43.55	TCS-3
97525	386.108	386.43	0.1	386.33	-0.222	25	6.7	0.26	0.26	43.55	TCS-3
97550	387.608	387.765	0.1	387.665	-0.057	25	6.7	0.26	0.26	43.55	TCS-3
97575	389.063	389.022	0.1	388.922	0.141	25	6.7	0.26	0.26	43.55	TCS-3
97600	390.341	390.289	0.1	390.189	0.152	25	6.7	0.26	0.26	43.55	TCS-3
97625	391.435	391.068	0.1	390.968	0.467	25	6.7	0.26	0.093	15.58	TCS-3
97650	392.366	391.663	0.1	391.563	0.803	25	6.7	0.26	0	0.00	TCS-3
97675	393.275	392.826	0.1	392.726	0.549	25	6.7	0.26	0.011	1.84	TCS-3
97700	394.183	393.857	0.1	393.757	0.426	25	6.7	0.26	0.134	22.45	TCS-3
97725	395.092	394.676	0.1	394.576	0.516	25	6.7	0.26	0.044	7.37	TCS-3
97750	396	395.738	0.1	395.638	0.362	25	6.7	0.26	0.198	33.16	TCS-3
97775	396.908	397.147	0.1	397.047	-0.139	25	6.7	0.26	0.26	43.55	TCS-3
97800	397.817	399.139	0.1	399.039	-1.222	25	6.7	0.26	0.26	43.55	TCS-3
97825	398.715	399.566	0.1	399.466	-0.751	25	6.7	0.26	0.26	43.55	TCS-3
97850	399.498	399.811	0.1	399.711	-0.213	25	6.7	0.26	0.26	43.55	TCS-3
97875	400.15	400.118	0.1	400.018	0.132	25	6.7	0.26	0.26	43.55	TCS-3
97900	400.775	400.86	0.1	400.76	0.015	25	6.7	0.26	0.26	43.55	TCS-3
97925	401.4	405.33	0.1	405.23	-3.83	25	6.7	0.26	0.26	43.55	TCS-3
97950	402.025	402.558	0.1	402.458	-0.433	25	6.7	0.26	0.26	43.55	TCS-3
97975	402.704	403.166	0.1	403.066	-0.362	25	6.7	0.26	0.26	43.55	TCS-3
98000	403.552	403.658	0.1	403.558	-0.006	25	6.7	0.19	0.19	31.83	TCS-3
98025	404.575	404.637	0.1	404.537	0.038	25	6.7	0.19	0.19	31.83	TCS-3
98050	405.77	405.57	0.1	405.47	0.3	25	6.7	0.19	0.19	31.83	TCS-3
98075	407.022	415.624	0.1	415.524	-8.502	25	6.7	0.19	0.19	31.83	TCS-3
98100	408.274	413.312	0.1	413.212	-4.938	25	6.7	0.19	0.19	31.83	TCS-3
98125	409.527	409.413	0.1	409.313	0.214	25	6.7	0.19	0.19	31.83	TCS-3
98150	410.779	409.789	0.1	409.689	1.09	25	6.7	0.19	0	0.00	TCS-3
98175	412.031	415.054	0.1	414.954	-2.923	25	6.7	0.19	0.19	31.83	TCS-3
98200	413.217	418.803	0.1	418.703	-5.486	25	6.7	0.19	0.19	31.83	TCS-3
98225	414.05	417.605	0.1	417.505	-3.455	25	6.7	0.19	0.19	31.83	TCS-3
98250	414.565	414.909	0.1	414.809	-0.244	25	6.7	0.19	0.19	31.83	TCS-3
98275	415.047	414.858	0.1	414.758	0.289	25	6.7	0.19	0.19	31.83	TCS-3
98300	415.53	415.392	0.1	415.292	0.238	25	6.7	0.19	0.19	31.83	TCS-3
98325	416.012	415.647	0.1	415.547	0.465	25	6.7	0.19	0.095	15.91	TCS-3
98350	416.5	416.104	0.1	416.004	0.496	25	6.7	0.19	0.064	10.72	TCS-3
98375	417.176	416.543	0.1	416.443	0.733	25	6.7	0.19	0	0.00	TCS-3
98400	418.126	418.353	0.1	418.253	-0.127	25	6.7	0.19	0.19	31.83	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
98425	419.327	420.657	0.1	420.557	-1.23	25	6.7	0.19	0.19	31.83	TCS-3
98450	420.577	421.428	0.1	421.328	-0.751	25	6.7	0.19	0.19	31.83	TCS-3
98475	421.827	425.69	0.1	425.59	-3.763	25	6.7	0.19	0.19	31.83	TCS-7A
98500	423.077	436.821	0.1	436.721	-13.644	25	6.7	0.43	0.43	72.03	TCS-7A
98525	424.327	443.337	0.1	443.237	-18.91	25	6.7	0.43	0.43	72.03	TCS-7A
98550	425.577	444.274	0.1	444.174	-18.597	25	6.7	0.43	0.43	72.03	TCS-7A
98575	426.827	442.723	0.1	442.623	-15.796	25	6.7	0.43	0.43	72.03	TCS-7A
98600	428.077	439.901	0.1	439.801	-11.724	25	6.7	0.43	0.43	72.03	TCS-7
98625	429.327	431.385	0.1	431.285	-1.958	25	6.7	0.43	0.43	72.03	TCS-7
98650	430.568	430.674	0.1	430.574	-0.006	25	6.7	0.43	0.43	72.03	TCS-7
98675	431.628	431.071	0.1	430.971	0.657	25	6.7	0.43	0	0.00	TCS-7
98700	432.445	434.928	0.1	434.828	-2.383	25		0.43	0.43		TCS-6
98725	433.195	434.02	0.1	433.92	-0.725	25		0.43	0.43		TCS-6
98750	433.945	433.552	0.1	433.452	0.493	25		0.43	0.067		TCS-6
98775	434.695	434.397	0.1	434.297	0.398	25		0.43	0.162		TCS-6
98800	435.445	439.082	0.1	438.982	-3.537	25		0.43	0.43		TCS-3A
98825	436.195	448.209	0.1	448.109	-11.914	25		0.43	0.43		TCS-3A
98850	436.945	444.31	0.1	444.21	-7.265	25		0.43	0.43		TCS-3A
98875	437.692	444.1	0.1	444	-6.308	25		0.43	0.43		TCS-3A
98900	438.403	442.54	0.1	442.44	-4.037	25	6.7	0.43	0.43	72.03	TCS-2A
98925	439.072	437.94	0.1	437.84	1.232	25	6.7	0.43	0	0.00	TCS-2A
98950	439.729	451.413	0.1	451.313	-11.584	25	6.7	0.43	0.43	72.03	TCS-2A
98975	440.386	439.5	0.1	439.4	0.986	25	6.7	0.43	0	0.00	TCS-2A
99000	441.043	440.439	0.1	440.339	0.704	25	6.7	0.12	0	0.00	TCS-2A
99025	441.7	441.267	0.1	441.167	0.533	25	6.7	0.12	0.027	4.52	TCS-3
99050	442.357	441.437	0.1	441.337	1.02	25	6.7	0.12	0	0.00	TCS-3
99075	443.014	443.785	0.1	443.685	-0.671	25	6.7	0.12	0.12	20.10	TCS-3
99100	443.671	443.425	0.1	443.325	0.346	25	6.7	0.12	0.12	20.10	TCS-3
99125	444.328	443.863	0.1	443.763	0.565	25	6.7	0.12	0	0.00	TCS-3
99150	444.984	444.436	0.1	444.336	0.648	25	6.7	0.12	0	0.00	TCS-3
99175	445.641	445.239	0.1	445.139	0.502	25	6.7	0.12	0.058	9.71	TCS-3
99200	446.298	445.854	0.1	445.754	0.544	25	6.7	0.12	0.016	2.68	TCS-3
99225	446.972	446.41	0.1	446.31	0.662	25	6.7	0.12	0	0.00	TCS-3
99250	447.736	447.346	0.1	447.246	0.49	25	6.7	0.12	0.07	11.72	TCS-3
99275	448.599	448.411	0.1	448.311	0.288	25	6.7	0.12	0.12	20.10	TCS-3
99300	449.561	449.325	0.1	449.225	0.336	25	6.7	0.12	0.12	20.10	TCS-3
99325	450.621	451.218	0.1	451.118	-0.497	25	6.7	0.12	0.12	20.10	TCS-3
99350	451.781	462.414	0.1	462.314	-10.533	25		0.12	0.12		TCS-5A
99375	453.022	467.462	0.1	467.362	-14.34	25		0.12	0.12		TCS-5A
99400	454.272	461.68	0.1	461.58	-7.308	25		0.12	0.12		TCS-3A
99425	455.522	454.57	0.1	454.47	1.052	25		0.12	0		TCS-3A
99450	456.772	457.523	0.1	457.423	-0.651	25		0.12	0.12		TCS-3A
99475	458.022	460.568	0.1	460.468	-2.446	25		0.12	0.12		TCS-3A
99500	459.193	459.221	0.1	459.121	0.072	25		0.4	0.4		TCS-3A
99525	460.106	464.644	0.1	464.544	-4.438	25		0.4	0.4		TCS-3A
99550	460.833	460.451	0.1	460.351	0.482	25		0.4	0.078		TCS-3A
99575	461.553	460.596	0.1	460.496	1.057	25		0.4	0		TCS-3A
99600	462.273	472.223	0.1	472.123	-9.85	25		0.4	0.4		TCS-3A
99625	462.993	469.072	0.1	468.972	-5.979	25		0.4	0.4		TCS-3A
99650	463.8	464.237	0.1	464.137	-0.337	25	6.7	0.4	0.4	67.00	TCS-3
99675	464.796	465.217	0.1	465.117	-0.321	25	6.7	0.4	0.4	67.00	TCS-3
99700	465.979	465.978	0.1	465.878	0.101	25	6.7	0.4	0.4	67.00	TCS-3
99725	467.229	467.224	0.1	467.124	0.105	25	6.7	0.4	0.4	67.00	TCS-3
99750	468.479	468.287	0.1	468.187	0.292	25	6.7	0.4	0.268	44.89	TCS-3
99775	469.729	469.145	0.1	469.045	0.684	25	6.7	0.4	0	0.00	TCS-3
99800	470.974	476.591	0.1	476.491	-5.517	25	6.7	0.4	0.4	67.00	TCS-3
99825	472.158	471.592	0.1	471.492	0.666	25	6.7	0.4	0	0.00	TCS-3
99850	473.267	472.722	0.1	472.622	0.645	25	6.7	0.4	0	0.00	TCS-3
99875	474.314	474.187	0.1	474.087	0.227	25	6.7	0.4	0.333	55.78	TCS-3



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarification (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantling thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type
99900	475.353	481.21	0.1	481.11	-5.757	25	6.7	0.4	0.4	67.00	TCS-3
99925	476.393	477.856	0.1	477.756	-1.363	25	6.7	0.4	0.4	67.00	TCS-3
99950	477.433	478.062	0.1	477.962	-0.529	25	6.7	0.4	0.4	67.00	TCS-3
99975	478.473	482.452	0.1	482.352	-3.879	25		0.4	0.4		TCS-3A
100000	479.512	486.484	0.1	486.384	-6.872	25		0.19	0.19		TCS-3A
100025	480.552	494.404	0.1	494.304	-13.752	25		0.19	0.19		TCS-3A
100050	481.592	481.327	0.1	481.227	0.365	25		0.19	0.19		TCS-3A
100075	482.631	481.442	0.1	481.342	1.289	25		0.19	0		TCS-3A
100100	483.671	487.875	0.1	487.775	-4.104	25		0.19	0.19		TCS-3A
100125	484.711	484.517	0.1	484.417	0.294	25	6.7	0.19	0.19	31.83	TCS-3
100150	485.751	485.523	0.1	485.423	0.328	25	6.7	0.19	0.19	31.83	TCS-3
100175	486.79	486.111	0.1	486.011	0.779	25	6.7	0.19	0	0.00	TCS-3
100200	487.83	487.176	0.1	487.076	0.754	25	6.7	0.19	0	0.00	TCS-3
100225	488.87	488.501	0.1	488.401	0.469	25	6.7	0.19	0.091	15.24	TCS-3
100250	489.909	489.947	0.1	489.847	0.062	25	6.7	0.19	0.19	31.83	TCS-3
100275	490.949	490.655	0.1	490.555	0.394	25	6.7	0.19	0.166	27.80	TCS-3
100300	491.948	491.503	0.1	491.403	0.545	25	6.7	0.19	0.015	2.51	TCS-3
100325	492.753	492.673	0.1	492.573	0.18	25	6.7	0.19	0.19	31.83	TCS-3
100350	493.392	496.793	0.1	496.693	-3.301	25	6.7	0.19	0.19	31.83	TCS-3
100375	494.017	495.079	0.1	494.979	-0.962	25	6.7	0.19	0.19	31.83	TCS-3
100400	494.642	494.137	0.1	494.037	0.605	25	6.7	0.19	0	0.00	TCS-3
100425	495.405	496.531	0.1	496.431	-1.026	25	6.7	0.19	0.19	31.83	TCS-3
100450	496.53	498.08	0.1	497.98	-1.45	25	6.7	0.19	0.19	31.83	TCS-3
100475	497.979	499.056	0.1	498.956	-0.977	25	6.7	0.19	0.19	31.83	TCS-3
100500	499.472	499.918	0.1	499.818	-0.346	25	6.7	0.21	0.21	35.18	TCS-3
100525	500.87	500.335	0.1	500.235	0.635	25	6.7	0.21	0	0.00	TCS-3
100550	502.149	502.61	0.1	502.51	-0.361	25	6.7	0.21	0.21	35.18	TCS-3
100575	503.33	502.717	0.1	502.617	0.713	25	6.7	0.21	0	0.00	TCS-3
100600	504.498	504.211	0.1	504.111	0.387	25	6.7	0.21	0.173	28.98	TCS-3
100625	505.667	508.021	0.1	507.921	-2.254	25	6.7	0.21	0.21	35.18	TCS-3
100650	506.835	512.639	0.1	512.539	-5.704	25	6.7	0.21	0.21	35.18	TCS-3
100675	508.004	508.465	0.1	508.365	-0.361	25	6.7	0.21	0.21	35.18	TCS-3
100700	509.173	509.1	0.1	509	0.173	25	6.7	0.21	0.21	35.18	TCS-3
100725	510.36	513.128	0.1	513.028	-2.668	25	6.7	0.21	0.21	35.18	TCS-3
100750	511.631	511.597	0.1	511.497	0.134	25	6.7	0.21	0.21	35.18	TCS-3
100775	512.972	512.328	0.1	512.228	0.744	25	6.7	0.21	0	0.00	TCS-3
100800	514.317	515.785	0.1	515.685	-1.368	25	6.7	0.21	0.21	35.18	TCS-3
100825	515.663	516.682	0.1	516.582	-0.919	25	6.7	0.21	0.21	35.18	TCS-3
100850	517.008	516.625	0.1	516.525	0.483	25		0.21	0.077		TCS-6
100875	518.273	518.016	0.1	517.916	0.357	25		0.21	0.203		TCS-6
100900	519.198	519.069	0.1	518.969	0.229	25		0.21	0.21		TCS-6
100925	519.843	519.601	0.1	519.501	0.342	25		0.21	0.21		TCS-6
100950	520.468	520.117	0.1	520.017	0.451	25		0.21	0.109		TCS-6
100975	521.093	520.996	0.1	520.896	0.197	25		0.21	0.21		TCS-6
101000	521.718	521.665	0.1	521.565	0.153	25		0.21	0.21		TCS-6
101025	522.343	522.319	0.1	522.219	0.124	25		0.21	0.21		TCS-6
101050	522.968	522.812	0.1	522.712	0.256	25		0.21	0.21		TCS-6
101075	523.531	524.021	0.1	523.921	-0.39	25		0.21	0.21		TCS-6
101100	523.852	523.97	0.1	523.87	-0.018	25		0.21	0.21		TCS-6
101125	523.983	523.912	0.1	523.812	0.171	25		0.21	0.21		TCS-6
101150	524.102	523.898	0.1	523.798	0.304	25		0.21	0.21		TCS-6
101175	524.222	523.766	0.1	523.666	0.556	25		0.21	0.004		TCS-6
101200	524.341	523.94	0.1	523.84	0.501	25		0.21	0.059		TCS-6
101225	524.46	524.059	0.1	523.959	0.501	25		0.21	0.059		TCS-6
101250	524.579	524.317	0.1	524.217	0.362	25		0.21	0.198		TCS-6
101275	524.699	524.662	0.1	524.562	0.137	15		0.21	0.21		TCS-6
101280	524.723	524.75	0.1	524.65	0.073	2.5		0.21	0.21		TCS-6



Chainage	FRL	EGL	Avg.Ext. Bituminous layer thck (m)	EGL- Bituminous layer	Difference after Scarificati on (m)	Length (m)	Existing Road Width (m)	Ext. Granular thickness (mm)	Granular material dismantlin g thickness (mm)	Granular material dismantling Quantity (cum)	TCS Type

35162.5

42898.06

Dismantling GSB material=

42898 cum

Quantity of Granular Material(sqm)

(Assume avg thickness 150mm)

285987 sqm

Quantity of GSB material for reuse (@ 60%) =

25739 cum



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
66110	28.27	0	331.37	0.00
66125	45.73	0	919.17	0.00
66150	24.62	0	865.45	0.00
66175	18.7	0	504.69	0.00
66200	13.32	0	151.71	0.00
66225	11.7	0	281.65	0.00
66250	8.14	0	91.62	0.00
66275	6.31	0	198.37	0.00
66300	14.47	0	262.86	0.00
66325	17.92	0	377.75	0.00
66350	1.91	0	21.93	0.00
66375	5.29	0	81.61	0.00
66400	26.74	0	322.81	0.00
66425	73.48	0	1165.04	0.00
66450	47.45	0	1405.83	0.00
66475	23.65	0	826.58	0.00
66500	17.6	0	467.19	0.00
66525	10.66	88.74	309.89	1371.91
66550	13.54	0	281.28	1109.21
66575	21.7	0.06	426.54	0.70
66600	12.83	0.75	399.97	10.19
66625	27.99	0	467.17	9.81
66650	88.98	0	1359.78	0.00
66675	54.8	0	647.75	0.00
66700	8.5	0	797.86	0.00
66725	5.92	0	162.81	0.00
66750	247.26	0	3538.63	0.00
66775	269.17	0	6759.73	0.00
66800	164.42	0	5040.42	0.00
66825	189.67	0	3954.78	0.00
66850	39.5	0	2743.67	0.00
66875	24.02	0	787.86	0.00
66900	50.27	0	892.77	0.00
66925	12.85	0	729.59	0.00
66950	9.58	0	107.40	0.00
66975	9.7	0	213.29	0.00
67000	6.7	56.27	178.78	1093.01
67025	13.38	0	227.31	781.45
67050	8.89	35.17	256.43	456.62
67075	14.22	0.08	143.48	0.89
67100	16.23	0	303.74	0.87
67125	18.82	0	397.94	0.00
67150	63.77	0	982.68	0.00
67175	95.61	0	1957.90	0.00
67200	38.6	0	1664.40	0.00
67225	12.78	0	624.09	0.00
67250	9.93	0	263.99	0.00
67275	27.62	0.56	413.04	6.92
67300	19.19	109.3	490.29	1777.82
67325	17.93	67.48	421.77	2394.11
67350	10.98	0	353.44	660.25
67375	19.49	0	383.42	0.00
67400	239.66	0	3105.36	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
67425	131.53	0	4315.10	0.00
67450	83.61	0	2725.43	0.00
67475	20.52	0	1434.13	0.00
67500	7.36	0	83.77	0.00
67525	19.13	0	270.34	0.00
67550	11.89	0	317.67	0.00
67575	10.29	0	250.11	0.00
67600	7.47	0	196.36	0.00
67625	6.97	0	165.21	0.00
67650	9.55	0	192.07	0.00
67675	66.54	0	945.72	0.00
67700	123.93	0	2444.07	0.00
67725	30.01	0	1902.78	0.00
67750	39.22	0.01	804.80	0.17
67775	29.35	0	797.18	0.17
67800	5.89	0.14	410.82	1.76
67825	4.98	0	122.30	1.80
67850	5.69	16.5	123.72	197.22
67875	7.86	0	91.65	0.00
67900	4.3	0.39	142.67	5.63
67925	12.78	0	202.37	5.63
67950	13.69	0	308.70	0.00
67975	17.77	0	365.76	0.00
68000	12.22	0	348.63	0.00
68025	39.41	0	603.08	0.00
68050	109.26	0	1758.19	0.00
68075	116.22	0	2651.18	0.00
68100	180.18	0	3445.64	0.00
68125	102.47	0	3285.91	0.00
68150	46.7	0.55	1835.76	7.08
68175	135.04	0	2616.65	7.41
68200	31.35	102.82	2237.56	921.33
68225	22.85	116.09	619.28	2874.08
68250	95.53	0.03	1228.07	1969.30
68275	11.94	0	1106.22	0.45
68300	6.88	0.49	201.83	6.95
68325	17.12	0	256.36	6.92
68350	61.27	0	903.46	0.10
68375	28.84	0	1077.57	0.00
68400	8.15	0.03	434.38	0.41
68425	11.51	0	228.48	0.40
68450	17.55	0.03	337.80	0.40
68475	12.26	0	350.81	0.41
68500	26.9	0	511.46	0.00
68525	14.56	0	528.07	0.00
68550	69.45	0	960.20	0.00
68575	23.16	0	953.51	0.00
68600	7.24	0	329.15	0.00
68625	8.79	0	186.09	0.00
68650	161.85	0	1983.67	0.00
68675	27.59	0	2202.21	0.00
68700	65.16	1.02	1118.95	12.26
68725	7.7	0	1004.58	10.59



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
68750	26.19	0	395.06	0.00
68775	37.28	0	659.65	0.00
68800	6.67	0.13	443.65	1.81
68825	9.3	2.33	192.73	38.28
68850	7.83	130.21	200.67	1879.03
68875	4.47	126.52	143.47	3114.69
68900	29.24	0	395.16	1495.21
68925	28.19	0	648.25	0.00
68950	10.42	0	383.36	0.00
68975	38.12	0.13	474.89	1.69
69000	29.23	37.94	765.89	509.66
69025	10.34	57.45	460.05	1192.38
69050	20	0	343.64	821.46
69075	13.41	0.12	376.69	1.51
69100	11.95	42.13	296.48	513.06
69125	18.39	0	367.38	396.16
69150	74.53	0	1202.53	0.00
69175	24.98	0	1230.78	0.00
69200	12.24	0	432.68	0.00
69225	16.94	22.86	332.01	306.33
69250	55.55	0	804.01	309.95
69275	209.2	0	3077.69	0.00
69300	209.42	0	2837.73	0.00
69325	5.36	4.07	3297.17	37.27
69350	2.95	18.41	97.58	198.70
69375	208.44	0	3353.56	169.71
69400	200.69	0	2493.80	0.00
69425	221.57	0	4908.81	0.00
69450	224.82	0.06	5003.33	0.71
69475	266.8	0	4995.07	0.76
69500	30.34	0	3111.47	0.00
69525	68.58	0	1117.57	0.00
69550	269.82	0	3933.83	0.00
69575	298.13	0	6602.31	0.00
69600	263.15	0	6524.81	0.00
69625	215.61	0	5565.60	0.00
69650	59.25	0	748.56	0.00
69675	5.76	0.06	1021.87	0.64
69700	49.79	0	713.22	0.71
69725	142	0	2009.14	0.00
69750	5.82	0.14	1337.43	1.86
69775	100.62	0	995.94	1.86
69800	8.05	0.47	1222.82	5.95
69825	5.36	0	155.78	5.07
69850	9.63	0	174.38	0.00
69875	9.86	0	230.84	0.00
69900	12.73	0	256.91	0.00
69925	20.22	0	336.40	0.00
69950	32.45	0	568.90	0.00
69975	94.21	8.56	1472.42	107.06
70000	80.92	0	2044.23	103.52
70025	113.24	0	2754.99	0.00
70050	38.79	0.27	1963.11	3.41



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
70075	5.33	0	469.35	3.28
70100	14.51	0	220.67	0.00
70125	9.65	0	279.91	0.00
70150	0.79	15	8.97	184.30
70175	0.73	14.43	16.15	360.18
70200	7.84	0	97.05	185.82
70225	100.09	0	1473.59	0.00
70250	105.73	0	2464.19	0.00
70275	219	0	3775.04	0.00
70300	242.62	0	5832.76	0.00
70325	47.5	0	3659.50	0.00
70350	6.83	131.36	637.78	1565.97
70375	5.52	115.62	143.51	3087.18
70400	14.53	0	225.60	1683.31
70425	163.3	0	1848.26	0.00
70450	47.58	0	2276.61	0.00
70475	42.02	0	894.83	0.00
70500	85.11	0	1477.92	0.00
70525	75.27	0	1896.74	0.00
70550	170.26	0	2892.10	0.00
70575	132.46	0	3519.12	0.00
70600	156.62	0	3411.72	0.00
70625	17.17	0	2094.88	0.00
70650	11.17	45.73	326.59	610.17
70675	12.78	0	134.46	0.00
70700	13.86	0	271.03	0.00
70725	19.31	0	371.96	0.00
70750	19.42	0	460.02	0.00
70775	70.31	0	1165.22	0.00
70800	173.1	0	3446.26	0.00
70825	110.12	0	4206.51	0.00
70850	216.82	0	4334.68	0.00
70875	165.42	0	4443.62	0.00
70900	93.35	0.21	3200.19	2.62
70925	94.59	0	2310.31	2.62
70950	63.26	0	1834.97	0.00
70975	42.7	0	1125.52	0.00
71000	77.09	0	1211.05	0.00
71025	17.71	2.88	1060.04	37.06
71050	136.33	0	1941.93	33.62
71075	65.67	0	2729.69	0.00
71100	132.36	0	2617.46	0.00
71125	168.84	0	4044.52	0.00
71150	34.66	0.03	2584.56	0.44
71175	56.31	0	1057.53	0.42
71200	34.7	0	1001.41	0.00
71225	77.18	0	1157.67	0.00
71250	37.41	0	1246.05	0.00
71275	83.03	14.3	1400.17	178.80
71300	57.66	0	1635.54	178.80
71325	62.02	0	1391.22	0.00
71350	83.89	0	897.85	0.00
71375	33.97	0	1041.66	0.03



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
71400	12.21	0	452.59	0.03
71425	9.41	0	250.96	0.00
71450	9.19	0	216.05	0.00
71475	8.01	0	200.07	0.00
71500	43.88	0	603.22	0.00
71525	58.22	0	1186.95	0.00
71550	147.72	0	2255.46	0.00
71575	316.58	0	4952.50	0.00
71600	228.84	0	6536.06	0.00
71625	249.64	0	7236.13	0.00
71650	7.04	9.25	71.60	131.42
71675	59.19	0	869.62	131.35
71700	271.27	0	4317.72	0.00
71725	135.98	0	4685.44	0.00
71750	48.74	0	1741.26	0.00
71775	11.84	0	693.88	0.00
71800	45.34	0	773.01	0.00
71825	147.74	0	2961.63	0.00
71850	93.67	0	2840.28	0.00
71875	64.15	0	1532.06	0.00
71900	77.78	0	1534.79	0.00
71925	513.67	0	8731.74	0.00
71950	694.98	0	15509.91	0.00
71975	925.83	0	19435.87	0.00
72000	522.12	0	18913.36	0.00
72025	413.29	0	11195.93	0.00
72050	101.17	0	5621.84	0.00
72075	114.73	0	2382.20	0.00
72100	92.63	0	2401.22	0.00
72125	197.9	0	3377.47	0.00
72150	164.45	0	4244.38	0.00
72175	99.46	0	3136.48	0.00
72200	97.23	0	2286.54	0.00
72225	94.8	0	2212.27	0.00
72250	81.04	0	858.13	0.00
72275	58.22	0	1442.32	0.00
72300	22.92	0	930.30	0.00
72325	38.56	0	750.28	0.00
72350	47.99	0	1110.55	0.00
72375	3.9	151.39	610.12	1853.34
72400	6.82	0	124.61	1892.40
72425	54.98	40.21	718.39	502.59
72450	166.85	0.44	2011.92	5.49
72475	191.75	3.29	3488.86	48.23
72500	42.68	20.25	2460.74	325.22
72525	130.92	0.01	1951.17	0.15
72550	168.43	0	4165.96	0.15
72575	57.52	0	2689.03	0.00
72600	13.31	0	773.50	0.00
72625	9.14	67.87	249.84	1072.70
72650	18.31	0.13	310.37	1.56
72675	155.77	0	2257.16	1.54
72700	223.44	0	5055.84	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
72725	136.55	0	1623.50	0.00
72750	50.86	0	2178.58	0.00
72775	119.23	0	1823.78	0.00
72800	112.93	0	1040.15	0.00
72825	15.1	0.13	1178.03	1.70
72850	81.62	1.05	1268.78	14.81
72875	20.61	0.27	1141.31	16.48
72900	27.29	0	556.78	3.38
72925	18.2	92.42	505.56	1267.46
72950	38.5	2.81	614.61	1395.70
72975	214.62	0	2942.59	35.16
73000	319.42	0	8101.96	0.00
73025	111.45	0	7476.12	0.00
73050	210.7	0	4557.07	0.00
73075	68.7	0.14	2891.84	1.80
73100	7.22	0	739.97	1.88
73125	22.46	0	345.05	0.00
73150	236.59	0	3122.85	0.00
73175	299.4	0	6230.79	0.00
73200	189.84	0	6204.83	0.00
73225	52.04	0	810.41	0.00
73250	117.52	0	2403.15	0.00
73275	80.01	0	2245.81	0.00
73300	26.68	6.59	1023.22	118.01
73325	30.99	0	601.48	108.67
73350	211.28	0	2816.37	0.00
73375	249.45	0	5356.01	0.00
73400	89.41	0	4095.08	0.00
73425	6.03	0.04	1144.82	0.53
73450	15.99	0	254.00	0.51
73475	16.79	0	349.59	0.00
73500	54.77	0	690.26	0.00
73525	155.09	0	2376.30	0.00
73550	161.4	0	4117.44	0.00
73575	329.76	0	6030.85	0.00
73600	478.17	0	9858.01	0.00
73625	583	0	17753.58	0.00
73650	2.75	19.24	32.42	250.91
73675	225.6	0	4258.79	250.56
73700	337.19	0	7650.00	0.00
73725	107.62	0	4476.08	0.00
73750	35.26	0	1324.48	0.00
73775	72.2	0	1188.60	0.00
73800	434.76	0	7183.42	0.00
73825	347.2	0	11595.41	0.00
73850	140.73	0	5814.10	0.00
73875	181.25	0	3783.32	0.00
73900	112.94	0	3813.60	0.00
73925	40.36	0	1834.81	0.00
73950	35.55	160.95	882.47	2011.86
73975	70.81	0	1221.25	2077.59
74000	15.92	384.96	830.87	6863.68
74025	45.26	0	548.02	7757.27



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
74050	42.54	0	404.23	0.00
74075	50.06	0	917.22	0.00
74100	17.28	0	765.12	0.00
74125	9.01	0	306.71	0.00
74150	9.44	0	214.47	0.00
74175	14.48	0	272.21	0.00
74200	19.7	0	379.93	0.00
74225	13.23	0	379.59	0.00
74250	27.5	0	473.51	0.00
74275	128.13	0	1869.89	0.00
74300	161.05	0	3527.81	0.00
74325	156.81	0	3909.37	0.00
74350	8.11	0.18	2026.05	2.35
74375	10.28	0	214.79	2.35
74400	8.54	0	218.88	0.00
74425	5.56	0	163.91	0.00
74450	40.97	0	540.83	0.00
74475	47.55	0	1029.05	0.00
74500	42.73	0	1029.19	0.00
74525	35.29	0	890.96	0.00
74550	76.18	0	1278.30	0.00
74575	64.13	0	1631.12	0.00
74600	67.67	0	1575.61	0.00
74625	9.15	0	1045.11	0.00
74650	13	0	261.93	0.00
74675	85.74	0	1083.99	0.00
74700	59.82	0	1300.22	0.00
74725	9.06	0	706.62	0.00
74750	118.51	0	1482.97	0.00
74775	243.35	0	4206.57	0.00
74800	113.96	0	4153.66	0.00
74825	4.09	5.4	1504.27	69.67
74850	70.56	0	936.35	70.93
74875	29.45	0	1172.34	0.00
74900	6.51	0	405.90	0.00
74925	9.77	0	187.67	0.00
74950	9.48	0	223.56	0.00
74975	7.89	0	202.53	0.00
75000	27.42	0	400.47	0.00
75025	57.07	0.19	982.20	2.38
75050	14.67	0	847.14	2.36
75075	6.76	0	263.52	0.00
75100	322.92	0	5514.42	0.00
75125	276.46	0	8223.61	0.00
75150	114.07	0	4539.85	0.00
75175	171.25	0	3316.88	0.00
75200	148.58	0	3845.00	0.00
75225	88.14	0	2799.67	0.00
75250	28.01	0	1213.07	0.00
75275	12.77	0	431.51	0.00
75300	11.71	0	277.32	0.00
75325	29.54	0	479.56	0.00
75350	26.36	0	666.14	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
75375	12.19	0	459.97	0.00
75400	25.94	0	441.84	0.00
75425	22.58	0	536.03	0.00
75450	9.38	0	355.37	0.00
75475	14.94	0	282.52	0.00
75500	16.51	0	365.61	0.00
75525	12.91	0	344.34	0.00
75550	6.83	0	235.18	0.00
75575	0.16	2.28	84.58	29.47
75600	12.82	0	151.51	28.98
75625	58.11	0	824.65	0.00
75650	61.2	0	1387.02	0.00
75675	22.49	0	961.42	0.00
75700	38.23	0	654.79	0.00
75725	16.01	0	574.73	0.00
75750	23.07	0	430.26	0.00
75775	19.65	0	471.80	0.00
75800	16	0	399.83	0.00
75825	16.98	0	380.69	0.00
75850	8.35	0	294.38	0.00
75875	27.34	0	422.49	0.00
75900	75.78	0	1297.71	0.00
75925	104.82	0	2317.86	0.00
75950	147.77	0	2976.16	0.00
75975	70.25	0	2399.86	0.07
76000	12.51	0	900.48	0.07
76025	8.79	0	247.36	0.00
76050	25.11	0	398.22	0.00
76075	8.27	0	416.36	0.00
76100	44.83	0	777.68	0.00
76125	37.64	0	1005.30	0.00
76150	6.89	0	416.42	0.00
76175	9.47	0	191.13	0.00
76200	6.97	0	192.43	0.00
76225	30.96	0	492.80	0.00
76250	24.01	0	645.55	0.00
76275	8.96	0	383.27	0.00
76300	9.29	1.73	213.07	20.97
76325	15.94	0	295.55	21.01
76350	5.45	0	243.59	0.02
76375	8.66	0	163.01	0.02
76400	15.42	0	280.36	0.00
76425	29.6	0	524.59	0.00
76450	6.29	0.01	463.13	0.17
76475	24.58	0	446.73	0.17
76500	15.27	0	466.00	0.00
76525	18.54	0	186.07	0.00
76550	16.16	0	375.38	0.00
76575	11.71	0	325.92	0.00
76600	15.25	0	187.88	0.00
76625	8.73	0	283.30	0.04
76650	6.18	1.1	164.06	16.18
76675	7.85	0	159.06	14.71



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
76700	3.72	0.02	134.72	0.22
76725	8.73	0	146.04	0.23
76750	60.22	0	824.99	0.00
76775	4.88	0.05	756.78	0.61
76800	6.04	27.24	126.77	354.91
76825	9.44	0.11	179.91	359.74
76850	11.23	0	240.47	1.29
76875	8.48	0	101.25	0.00
76900	8.5	0	200.10	0.00
76925	10.76	0	222.91	0.00
76950	8.92	0	228.71	0.00
76975	5.16	263.67	162.35	3526.99
77000	11.06	0	186.73	3751.83
77025	14.18	0	289.15	0.00
77050	12.99	0	311.22	0.00
77075	19.01	0	375.00	0.00
77100	68.66	0	1077.51	0.00
77125	112.44	0	2276.73	0.00
77150	108.77	0	2642.17	0.00
77175	244.72	0	4109.32	0.00
77200	326.35	0	7010.70	0.00
77225	10.73	0	5232.36	0.00
77250	18.42	0	366.75	0.00
77275	21.23	0	472.60	0.00
77300	28.07	0	556.87	0.00
77325	0.96	1.42	306.54	17.84
77350	3.12	0.08	44.33	18.69
77375	6.46	0	109.28	0.84
77400	26.58	0	359.24	0.00
77425	8.56	0	401.81	0.00
77450	8.61	0	199.58	0.00
77475	26.99	0.22	451.29	2.85
77500	2.62	1.85	412.05	23.01
77525	31.21	0	434.38	21.50
77550	13.54	0	512.80	0.00
77575	8.03	0	231.17	0.00
77600	16.15	0.2	262.39	2.74
77625	19.01	0	408.80	2.47
77650	26.68	0	538.37	0.00
77675	28.11	0	650.88	0.00
77700	42.35	0	819.10	0.00
77725	55.78	0.1	0.00	0.00
77750	44.4	0.17	1164.58	3.30
77775	171.52	0	2510.09	2.09
77800	194.79	0	5509.71	0.00
77825	106.33	0	4589.40	0.00
77850	33.2	0.04	1646.31	0.53
77875	44.61	0.06	904.52	1.30
77900	71.93	0.25	1263.65	3.98
77925	88.87	0	1852.90	3.10
77950	19.84	0	1444.31	0.00
77975	14.8	0.11	391.08	1.40
78000	84.71	0.09	817.49	2.32



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
78025	14.88	0	836.56	1.04
78050	32.8	0	533.97	0.00
78075	190.37	0	2734.03	0.00
78100	224.36	0	6212.58	0.00
78125	158.73	0.08	5520.50	0.92
78150	6.08	0.53	2217.14	6.81
78175	9.6	18.73	201.13	174.19
78200	6.2	0.01	177.08	261.37
78225	185.8	62.64	1777.73	1432.97
78250	17.21	0	1879.35	1431.36
78275	17.82	49.23	389.65	696.35
78300	41.81	0	693.13	615.32
78325	139.83	0	2280.82	0.00
78350	3.47	33.32	2357.53	294.54
78375	229.74	0	3690.61	290.67
78400	99.34	0	4154.91	0.00
78425	40.18	0	1621.90	0.00
78450	17.28	0	642.02	0.00
78475	4.79	0	249.07	0.00
78500	14.11	0.02	207.95	0.22
78525	10.01	0	264.43	0.22
78550	8.33	0	207.06	0.00
78575	9.98	0	212.83	0.00
78600	28.33	0	454.58	0.00
78625	14.15	0	497.89	0.00
78650	8.68	1.13	245.55	15.22
78675	7.34	0	160.85	16.00
78700	6.24	0	154.43	0.00
78725	40.89	0	547.86	0.00
78750	51.64	0	1075.67	0.00
78775	10.77	0	725.58	0.00
78800	8.91	0	230.76	0.00
78825	15.15	0	294.08	0.00
78850	10.52	0	319.17	0.00
78875	14.6	0.36	286.73	4.54
78900	28.24	0	377.98	4.94
78925	90.11	0	941.09	0.06
78950	38.76	0	1231.34	0.00
78975	77.6	201.17	1352.72	2514.64
79000	5.45	198.2	1005.43	4593.27
79025	76.33	0	1003.75	1976.59
79050	7.98	4.34	1026.99	57.01
79075	117.4	0	1468.10	54.51
79100	103.46	0	2567.56	0.00
79125	282.02	0	4481.23	0.00
79150	78.02	0	4185.47	0.00
79175	25.61	1.52	1204.68	18.96
79200	175.23	0	2258.67	18.83
79225	99.37	0	3014.90	0.00
79250	200.95	0	3460.73	0.00
79275	94.64	123.88	3436.15	1548.54
79300	0.94	15.91	1111.05	1747.41
79325	104.84	0	1229.62	198.88



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
79350	16.62	0.15	1463.79	1.86
79375	3.22	1.42	245.79	20.40
79400	260.9	0	3175.06	17.91
79425	212.92	0	5508.20	0.00
79450	204.03	0	4847.13	0.00
79475	65.48	0	3297.63	0.00
79500	32.03	0	1181.27	0.00
79525	46.02	1.17	937.40	14.80
79550	77.31	1.93	1287.72	40.24
79575	24.37	0	1023.98	27.06
79600	70.58	0	1049.91	0.00
79625	3.68	0.12	863.27	1.45
79650	30.84	0	401.27	1.45
79675	19.18	0	567.82	0.00
79700	143.83	0	1727.91	0.00
79725	294.54	0	5011.08	0.00
79750	110.79	0	5893.21	0.00
79775	3.26	11.63	2317.54	162.24
79800	105.47	0	1842.00	159.35
79825	137.69	0	2911.60	0.00
79850	43.21	0	2103.02	0.00
79875	143.22	0.28	2345.62	3.61
79900	83.93	0	3152.24	3.69
79925	108.3	0	2457.30	0.00
79950	68.74	0	2058.04	0.00
79975	117.29	0	2114.16	0.07
80000	164.38	0	2699.27	0.08
80025	125.55	0	2588.09	0.00
80050	266.2	0	3995.44	0.00
80075	535.01	0	9314.04	0.00
80100	642.23	0	15462.36	0.00
80125	871.45	0	24179.47	0.00
80150	117.23	7.58	15971.83	68.23
80175	528.04	0	10825.09	68.54
80200	134.95	0	9075.81	0.00
80225	134.7	22.97	3134.61	287.07
80250	62.53	154.51	1904.53	2832.26
80275	203.31	1.22	2421.33	2672.92
80300	58.54	0	2397.06	16.33
80325	137.98	0	2114.07	0.00
80350	79.12	0	2523.85	0.00
80375	35.18	1.99	1328.73	24.92
80400	46.68	0	951.55	24.92
80425	47.56	0	1095.54	0.00
80450	33.26	0	955.71	0.00
80475	86.98	0	1469.03	0.00
80500	16.83	0	1206.86	0.00
80525	69.88	1.27	1008.05	15.93
80550	32.84	0	1194.07	15.93
80575	36.13	0	801.71	0.00
80600	34.86	0	825.27	0.00
80625	27.99	0	730.66	0.00
80650	29.29	0	640.60	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
80675	32.42	0	637.13	0.00
80700	8.27	0	482.91	0.00
80725	35.49	0	578.94	0.00
80750	108.58	0	1547.27	0.00
80775	147.87	0	2248.96	0.00
80800	124.23	11.86	3064.46	169.01
80825	133.14	1.21	2889.26	182.92
80850	134.62	0	2421.25	16.79
80875	36.11	0.08	1849.27	1.05
80900	13.3	34.82	574.34	436.29
80925	39.41	1.29	612.71	451.46
80950	59.73	0.66	1152.47	24.38
80975	46.98	0.62	1240.44	15.97
81000	51.94	4.44	583.55	55.19
81025	58.23	0.41	1313.06	60.43
81050	134.25	0	2183.67	5.09
81075	9.24	122.08	1503.60	1886.86
81100	48	0.01	647.10	1661.99
81125	147.18	0	2268.96	0.17
81150	142.46	0	3367.12	0.00
81175	20.83	0	256.54	0.00
81200	389.68	0	5479.22	0.00
81225	266.03	74.98	8074.64	867.82
81250	218.28	2.82	5390.46	1063.44
81275	362.2	1.18	2987.14	15.56
81300	443.96	0	8819.39	14.92
81325	429.09	0	12176.80	0.00
81350	333.25	0	9256.57	0.00
81375	72.57	0	4406.07	0.00
81400	131.16	0	1860.45	0.00
81425	69.99	0	2260.32	0.00
81450	210.18	0	3775.86	0.00
81475	468.55	0	9706.31	0.00
81500	138.76	1.54	7464.76	18.92
81525	43.74	46.92	2159.22	685.73
81550	18.52	0.02	706.34	714.70
81575	24.21	0	473.59	0.30
81600	41.73	0	735.12	0.00
81625	25.14	0	752.15	0.00
81650	27.53	0	599.43	0.00
81675	10.46	0	441.61	0.00
81700	33.8	0.4	527.63	4.98
81725	0.31	160.5	396.54	2011.23
81750	15.38	41	209.65	3217.27
81775	17.65	0.03	423.60	866.21
81800	9.09	0	292.43	0.37
81825	12.23	0	247.94	0.00
81850	8.95	0	246.67	0.00
81875	10.97	0	228.29	0.00
81900	6.07	3.78	194.75	49.46
81925	90.24	0	1119.60	47.20
81950	137.59	0	2648.52	0.00
81975	93.95	0	2691.66	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
82000	1.77	17.74	1124.55	232.18
82025	59.97	0	896.96	259.75
82050	175.37	0	3186.74	0.00
82075	247.48	0	4915.63	0.00
82100	17.77	0.19	3083.43	2.35
82125	51.51	1.04	719.09	16.29
82150	10.82	0.14	603.87	16.13
82175	7.72	0.43	193.01	7.62
82200	91.54	0	1146.74	5.43
82225	66.56	0	1837.96	0.00
82250	58.58	0	1483.27	0.00
82275	7.89	5.95	860.65	51.88
82300	15.18	0.1	278.55	64.34
82325	61.33	0.01	882.46	1.46
82350	14.09	0	845.28	0.19
82375	17.94	0	366.92	0.00
82400	47.08	0	755.89	0.00
82425	28.68	0	898.68	0.00
82450	37.94	0	808.24	0.00
82475	76.5	0	1428.12	0.00
82500	97.84	0	2074.63	0.00
82525	99.98	0	2299.69	0.00
82550	20.6	0	1541.49	0.00
82575	31.91	0	445.92	0.00
82600	17.34	0	642.45	0.00
82625	7.96	0	295.87	0.00
82650	5.26	0.15	153.65	1.84
82675	5.87	0	125.48	1.85
82700	7.1	0	146.01	0.00
82725	13.83	0	243.75	0.00
82750	86.29	0	1163.88	0.00
82775	40.64	0	1475.52	0.00
82800	16.18	0	598.04	0.00
82825	15.07	0	351.56	0.00
82850	22.2	0	414.19	0.00
82875	64.23	0.84	1217.48	11.79
82900	16.3	0	1078.52	11.44
82925	4.91	0	265.32	0.00
82950	20.59	0	319.73	0.00
82975	25.33	0	533.85	0.00
83000	24.45	0	578.77	0.00
83025	21.54	0	578.10	0.00
83050	41.43	0	831.52	0.00
83075	113.07	0	1837.25	0.00
83100	132.5	0	2854.84	0.00
83125	92.87	0.03	2620.00	0.39
83150	168.05	0	3250.33	0.39
83175	197.21	0	4246.16	0.00
83200	297.36	0	5749.41	0.00
83225	164.29	0	5366.61	0.00
83250	32.19	0	2681.38	0.00
83275	37.93	0	927.79	0.00
83300	32.93	0	905.40	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
83325	111.470	0.000	1509.64	0.00
83350	12.760	83.390	1161.76	1682.43
83375	47.760	26.730	690.77	1447.26
83400	12.710	28.090	834.13	371.33
83425	34.110	0.000	546.51	347.19
83450	50.870	0.080	682.77	1.12
83475	64.710	0.000	652.94	1.16
83500	5.520	0.000	695.95	0.00
83525	48.650	0.000	629.76	0.00
83550	10.860	0.000	691.79	0.00
83575	9.050	0.000	224.13	0.00
83600	3.880	0.530	140.52	6.51
83625	7.910	0.000	137.71	6.70
83650	10.110	0.000	208.97	0.00
83675	35.200	0.000	541.62	0.00
83700	19.180	0.630	581.22	8.19
83725	4.380	0.050	251.38	8.77
83800	5.440	36.250	114.26	453.67
83825	39.910	0.030	0.00	0.00
83850	6.220	1.310	619.04	17.11
83875	41.770	0.000	647.79	16.70
83900	36.460	0.000	1044.68	0.00
83925	35.330	0.000	904.35	0.00
83950	27.340	0.000	783.34	0.00
83975	3.870	0.000	370.57	0.00
84000	12.420	0.780	174.75	10.77
84025	26.350	13.880	425.31	268.57
84050	40.990	0.000	826.88	183.62
84075	36.040	0.000	962.90	0.00
84100	60.380	0.000	1251.54	0.00
84125	46.690	0.000	1366.54	0.00
84150	20.000	0.000	833.58	0.00
84175	25.210	66.420	565.09	830.19
84200	8.500	87.050	408.84	2296.73
84225	12.780	0.000	252.14	1422.69
84250	22.000	0.000	434.70	0.00
84275	20.710	0.000	551.12	0.00
84300	60.090	0.000	1081.13	0.00
84325	23.680	0.000	1132.20	0.00
84350	53.730	0.000	1051.95	0.00
84375	15.150	0.000	839.57	0.00
84400	28.810	0.000	504.13	0.00
84425	77.920	0.000	1142.50	0.00
84450	65.020	0.000	1521.51	0.00
84475	208.170	0.000	3332.22	0.00
84500	154.680	0.000	5279.81	0.00
84525	41.230	0.000	2735.28	0.00
84550	19.010	24.170	754.75	297.60
84575	7.890	0.170	336.18	304.23
84600	4.010	4.820	148.73	62.39
84625	72.410	0.000	970.78	59.14
84650	407.860	0.000	7114.87	0.00
84675	155.780	0.000	8220.14	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
84700	11.900	0.000	2226.90	0.00
84725	211.340	0.000	3596.63	0.00
84750	160.800	0.000	5782.98	0.00
84775	149.400	0.000	3663.32	0.00
84800	164.050	0.000	3249.65	0.00
84825	85.430	7.990	2642.20	101.59
84850	4.150	10.910	1268.05	232.77
84875	100.400	7.370	1523.04	222.43
84900	56.950	3.180	1966.84	131.90
84925	66.530	0.630	1543.50	47.73
84950	38.990	0.000	1319.03	8.02
84975	10.240	0.000	629.47	0.09
85000	67.740	0.000	1007.60	0.00
85025	56.560	0.000	1611.39	0.00
85050	52.540	0.000	1409.51	0.00
85075	25.590	0.000	943.69	0.00
85100	12.060	0.150	422.61	2.20
85125	17.810	0.150	343.42	4.03
85150	16.400	0.000	430.43	1.82
85175	9.960	0.000	352.27	0.00
85200	82.730	0.000	1256.43	0.00
85225	106.000	0.000	2359.13	0.00
85250	154.720	0.000	3258.98	0.00
85275	101.460	0.000	3202.18	0.00
85300	100.720	0.000	2527.18	0.00
85325	26.450	2.920	1524.76	38.03
85350	9.990	2.020	416.95	65.82
85375	53.590	0.750	721.20	36.88
85400	170.790	0.000	2668.06	9.96
85425	124.320	0.000	3480.95	0.00
85450	26.170	0.000	1729.78	0.00
85475	43.300	0.000	836.68	0.00
85500	3.750	0.450	588.17	5.58
85525	22.310	0.000	327.07	5.63
85550	45.650	0.000	877.98	0.00
85575	17.380	0.000	811.32	0.00
85600	69.830	0.000	1090.22	0.00
85625	172.350	0.000	2789.39	0.00
85650	23.490	0.150	2266.64	1.77
85675	16.430	7.200	492.70	93.32
85700	149.200	0.040	2151.04	88.09
85725	161.640	0.060	4535.99	1.36
85750	15.950	11.170	2590.34	111.95
85775	156.720	0.160	2400.93	115.06
85800	41.030	0.500	2526.18	8.18
85825	48.860	67.530	1123.57	850.33
85850	231.060	0.000	3412.56	873.79
85875	215.850	0.000	4540.44	0.00
85900	301.160	0.000	6597.85	0.00
85925	82.420	0.000	6434.51	0.00
85950	95.430	0.000	2825.62	0.00
85975	37.630	0.000	1890.91	0.00
86000	44.980	1.310	972.29	16.89



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
86025	68.450	2.520	1552.74	51.51
86050	6.240	1.370	1126.29	51.52
86075	2.440	0.000	107.54	17.22
86100	9.760	0.000	152.53	0.03
86125	69.210	0.000	987.19	0.00
86150	148.120	0.000	2731.34	0.00
86175	317.760	0.000	6677.77	0.00
86200	82.960	0.000	5991.56	0.00
86225	88.900	0.000	2472.05	0.00
86250	168.900	0.000	3930.84	0.00
86275	149.240	0.010	4160.76	0.14
86300	81.880	0.000	2506.95	0.18
86325	9.920	0.000	907.71	0.01
86350	7.300	0.000	215.13	0.00
86375	7.840	0.000	189.28	0.00
86400	148.990	0.140	1960.38	1.70
86425	218.590	0.950	4594.78	13.63
86450	227.910	1.940	5581.27	36.19
86475	210.780	2.200	5483.71	51.77
86500	73.490	1.720	3553.50	49.06
86525	17.310	0.720	1144.66	30.50
86550	24.190	0.000	565.20	8.84
86575	23.110	0.000	591.30	0.00
86600	48.450	0.000	834.64	0.00
86625	46.930	0.000	1100.15	0.00
86650	17.130	0.000	746.70	0.00
86675	19.800	21.230	499.56	349.53
86700	63.830	0.060	973.15	312.55
86725	79.400	0.000	1790.34	0.76
86750	18.270	0.280	1220.78	3.45
86775	4.700	0.580	287.13	0.00
86800	19.080	0.000	305.82	7.90
86825	15.250	0.580	457.52	7.28
86850	2.430	1.760	221.05	29.20
86875	51.150	73.890	642.85	1043.88
86900	43.530	0.000	1066.62	1207.24
86925	154.700	0.000	2376.31	0.00
86950	15.710	0.130	2174.17	1.60
86975	11.740	0.000	342.92	1.71
87000	38.620	70.010	596.10	1054.28
87025	27.470	0.070	738.74	1182.80
87050	125.700	0.000	1993.82	0.87
87075	224.500	0.000	5617.14	0.00
87100	248.680	0.000	7721.38	0.00
87125	59.870	0.000	4234.52	0.00
87150	147.110	0.000	2439.18	0.00
87175	138.640	0.000	3571.88	0.00
87200	73.330	141.440	2318.85	2248.74
87250	169.640	143.570	6074.25	0.00
87275	363.980	0.000	5555.12	2401.36
87300	168.170	0.000	6651.88	0.00
87325	137.670	0.000	4026.97	0.00
87350	239.970	0.000	5040.17	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
87375	231.470	0.000	5016.20	0.00
87400	193.890	0.000	4362.01	0.00
87425	244.410	0.000	5478.67	0.00
87450	546.380	0.000	11376.00	0.11
87475	712.700	0.350	20173.76	4.32
87500	601.240	0.000	17839.29	4.36
87525	485.710	0.000	13586.81	0.00
87550	252.620	0.000	9229.14	0.00
87575	140.530	42.020	4518.59	574.44
87600	190.820	0.150	3650.81	603.20
87625	224.770	4.890	4557.52	64.98
87650	438.760	3.410	8125.90	104.29
87675	435.050	4.050	10922.64	93.25
87700	434.570	3.980	10870.25	100.36
87725	648.960	5.260	13544.06	115.44
87750	387.610	3.500	15425.20	101.74
87775	313.600	3.920	12864.23	75.54
87800	2.720	11.520	5608.96	156.00
87825	125.120	0.300	1891.31	125.48
87850	296.280	0.000	5404.69	3.64
87875	251.670	0.000	6849.43	0.00
87900	5.550	2.040	3215.31	25.49
87925	0.000	14.760	69.39	210.04
87950	1.310	2.170	17.28	208.55
87975	20.690	0.500	294.14	34.38
88000	20.430	0.370	519.26	10.81
88025	11.470	1.020	398.81	17.39
88050	2.330	3.450	159.78	56.22
88075	151.040	0.000	1597.02	44.07
88100	46.860	0.190	2079.70	2.79
88125	2.810	1.190	600.74	17.34
88150	13.720	0.000	214.45	14.68
88175	154.800	0.000	2238.82	0.00
88200	168.680	0.000	4305.97	0.00
88225	157.600	0.070	4078.54	0.84
88250	187.350	0.040	4311.86	1.33
88275	222.530	0.000	5123.54	0.49
88300	346.510	0.000	7113.01	0.00
88325	148.760	0.000	6190.87	0.00
88350	253.950	0.000	5559.64	0.00
88375	239.240	0.150	8624.70	1.78
88400	621.300	0.000	15791.08	1.78
88425	251.350	0.000	13695.15	0.00
88450	108.670	0.000	4500.24	0.00
88475	170.180	0.000	3485.65	0.00
88500	99.900	0.000	3321.29	0.00
88525	34.840	1.900	1514.13	27.16
88550	57.420	1.640	1007.46	50.61
88575	136.140	1.000	2469.58	33.34
88600	49.210	1.020	2227.02	25.10
88625	76.960	0.000	1764.94	13.22
88650	181.300	0.000	3601.94	0.00
88675	29.380	0.000	0.00	0.00



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
88700	33.080	0.000	780.70	0.00
88725	53.340	48.860	1006.30	739.75
88750	10.210	0.000	716.05	784.29
88775	30.700	0.000	472.53	0.00
88800	15.420	0.000	532.78	0.00
88825	12.350	0.000	342.79	0.03
88850	32.140	0.060	574.47	0.78
88875	23.710	0.130	748.98	2.48
88900	78.250	0.000	1415.47	1.72
88925	80.050	0.000	2181.69	0.00
88950	76.920	0.000	2128.75	0.00
88975	50.270	0.000	1649.83	0.00
89000	16.610	0.840	835.98	10.51
89025	16.470	7.230	413.41	100.85
89050	9.110	10.430	308.24	235.30
89075	20.990	2.270	334.50	194.74
89100	22.510	0.400	527.35	34.48
89125	3.810	1.300	345.53	19.58
89150	6.400	0.000	132.25	14.50
89175	11.840	0.120	228.05	1.49
89200	10.880	8.600	284.02	108.98
89225	6.500	0.000	217.17	107.49
89250	15.340	0.000	255.10	0.00
89275	9.320	0.000	229.56	0.00
89300	5.690	0.000	160.79	0.00
89325	22.200	0.070	345.74	0.91
89350	96.220	0.010	1480.21	1.06
89375	195.520	0.000	3646.78	0.15
89400	89.060	0.000	3557.37	0.00
89425	39.100	0.000	1602.04	0.00
89500	122.500	1.130	6060.00	0.00
89525	55.380	4.570	2055.48	72.03
89550	30.800	5.770	891.03	134.54
89575	35.700	232.600	746.92	3729.80
89600	56.040	0.000	1146.75	0.00
89625	49.370	0.000	1358.91	0.00
89650	203.510	0.000	3844.17	0.00
89675	222.040	0.000	5518.66	0.00
89700	54.730	0.000	3114.92	0.00
89725	15.250	0.000	772.89	0.00
89750	69.200	0.000	1029.47	0.00
89775	17.970	0.010	1089.59	0.17
89800	8.800	0.000	334.59	0.17
89825	4.090	1.210	161.56	15.10
89850	49.980	0.000	729.47	13.89
89875	83.390	0.000	1864.14	0.00
89900	105.770	0.000	2719.91	0.00
89925	121.060	0.000	3087.62	0.00
89950	215.780	0.000	4122.13	0.00
89975	103.450	0.000	3938.73	0.00
90000	8.880	0.540	1576.44	6.80
90025	3.150	3.420	165.50	49.26
90050	23.060	3.880	303.86	92.91



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
90075	12.690	7.590	352.30	159.44
90100	1.640	4.940	144.86	172.54
90125	19.790	0.240	252.62	66.07
90175	13.620	0.000	835.25	0.00
90200	100.930	2.200	1296.04	29.42
90225	7.140	0.000	1179.68	30.04
90250	9.110	0.000	203.29	0.00
90275	2.170	1.310	140.28	16.59
90300	0.000	6.060	27.17	92.18
90325	6.560	2.850	79.41	111.95
90350	9.870	0.000	184.48	37.94
90375	8.230	0.000	219.14	0.04
90400	35.750	0.000	569.87	0.00
90425	5.530	0.360	611.04	3.52
90450	29.350	0.000	457.85	3.51
90475	24.030	68.740	677.36	744.50
90500	24.200	0.000	590.77	967.74
90525	49.420	7.110	1014.36	158.98
90550	24.990	0.000	1040.31	161.07
90575	18.410	0.000	533.56	0.00
90600	30.940	126.770	616.95	1584.60
90625	37.300	0.000	852.99	1584.60
90650	89.930	0.000	1590.35	0.00
90675	127.770	0.000	2721.34	0.00
90700	11.890	0.150	1772.34	1.88
90725	13.250	0.000	339.30	1.64
90750	173.860	0.000	3027.86	0.00
90775	225.670	0.000	5561.10	0.00
90800	348.310	0.000	7174.77	0.00
90825	147.340	0.000	6195.61	0.00
90850	66.820	0.000	2677.030	0.000
90875	176.090	0.000	3036.360	0.000
90900	365.370	0.000	6768.160	0.000
90925	269.900	0.000	7940.830	0.000
90950	92.240	0.000	4336.580	0.000
90975	6.430	0.060	1159.410	0.790
91000	2.470	286.780	104.950	4444.690
91025	67.810	8.320	1016.620	4587.700
91050	122.470	0.000	2390.510	143.800
91075	82.320	0.960	2335.230	12.840
91100	22.510	0.000	1274.560	12.220
91125	10.380	50.860	414.340	611.390
91150	13.060	1.460	288.900	498.760
91175	765.850	1.370	12431.060	35.340
91200	636.620	0.000	21840.700	15.290
91225	335.260	0.350	14937.920	4.000
91250	213.360	0.110	8445.830	5.450
91275	144.060	0.000	4707.340	1.350
91300	131.740	0.000	3447.570	0.000
91325	169.580	0.000	3766.600	0.000
91350	88.940	0.000	3216.960	0.000
91375	55.160	3.780	1771.710	49.490
91400	127.310	0.090	2206.870	51.270



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
91425	48.830	0.000	2101.870	1.160
91450	35.230	0.000	1050.740	0.000
91475	128.960	0.000	2052.290	0.000
91500	312.430	0.000	5517.340	0.000
91525	106.940	0.000	5242.130	0.080
91550	51.440	0.000	1979.790	0.080
91575	196.590	0.000	3100.360	0.000
91600	68.540	0.000	3167.600	0.000
91625	108.620	0.000	2019.730	0.000
91650	35.730	1.360	1656.110	19.420
91675	8.360	77.110	513.330	1263.060
91700	157.650	2.210	1931.610	1080.730
91725	273.100	0.000	5384.410	27.580
91750	475.170	0.000	9353.370	0.000
91775	27.520	0.000	6337.430	0.000
91800	47.400	0.010	936.500	0.000
91825	142.690	0.000	2376.120	0.130
91850	24.400	28.720	1763.630	547.130
91875	128.260	0.000	1512.900	550.880
91900	89.240	0.410	2718.690	5.110
91925	118.010	0.000	3127.630	5.380
91950	251.100	0.000	4707.460	0.000
91975	119.050	0.520	4626.960	6.510
92000	0.530	9.140	1494.760	120.760
92025	293.180	0.000	3532.500	120.600
92050	372.810	0.000	7560.400	0.000
92075	84.050	57.800	5928.340	632.140
92100	5.830	0.000	1283.200	345.230
92125	103.870	0.000	1523.950	0.000
92150	51.530	0.000	1857.370	0.000
92175	71.010	0.000	1446.230	0.000
92200	165.810	0.000	2960.210	0.000
92225	438.990	0.000	7559.970	0.000
92250	173.860	0.900	8252.360	11.460
92275	2.790	14.370	2653.000	175.810
92300	20.420	0.000	298.960	166.680
92325	18.590	0.000	489.900	0.000
92350	7.760	0.000	329.370	0.000
92375	0.710	62.730	105.900	784.070
92400	1.570	115.250	28.470	2224.740
92425	5.870	61.050	93.030	2203.800
92450	336.540	0.000	4555.670	683.930
92475	174.630	0.000	6996.350	0.000
92500	32.560	0.000	2775.020	0.000
92525	91.540	0.000	1632.240	0.000
92550	62.320	0.970	1927.930	11.430
92575	168.470	46.810	2884.900	597.220
92600	28.740	163.770	2329.800	2850.970
92625	4.970	40.900	418.420	2600.620
92650	16.590	0.480	269.490	517.250
92675	62.790	0.000	1103.430	6.020
92700	37.740	0.000	1448.060	0.000
92725	147.860	33.160	2248.430	440.860



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
92750	43.550	0.080	1822.000	615.260
92775	3.990	0.000	547.240	1.010
92800	9.590	0.000	171.730	0.000
92825	119.780	0.000	1964.960	0.000
92850	574.320	0.000	8883.800	0.000
92875	191.030	0.000	9397.160	0.000
92900	77.290	0.000	3242.640	0.000
92925	213.670	0.000	3495.950	0.000
92950	629.300	0.000	10537.060	0.000
92975	142.910	0.000	9652.580	0.000
93000	65.880	13.400	2609.900	167.470
93025	80.200	0.000	1826.070	167.470
93050	55.010	0.000	1521.510	0.000
93075	25.130	57.470	840.620	1012.640
93100	258.270	0.040	3190.500	837.500
93125	246.170	0.000	6305.510	0.500
93150	114.850	0.000	4512.760	0.000
93175	9.310	0.000	1558.560	0.000
93200	6.010	0.740	199.340	7.840
93225	151.010	0.000	2302.860	7.990
93250	147.530	0.000	3575.640	0.000
93275	36.030	1.700	1955.010	23.700
93300	35.480	0.850	795.010	34.340
93325	23.230	0.000	742.460	10.510
93350	85.370	0.000	1367.070	0.000
93375	63.340	0.000	1858.880	0.000
93400	78.050	0.000	1767.420	0.000
93425	64.620	0.000	1733.910	0.000
93450	25.200	0.000	1069.300	0.000
93475	41.140	0.000	794.350	0.000
93500	144.380	0.000	2301.220	0.000
93525	46.270	0.000	2383.140	0.000
93550	69.740	0.000	1450.150	0.000
93575	117.850	0.080	2440.730	1.020
93600	46.580	107.560	2055.400	1345.520
93625	81.240	143.370	1403.580	3580.050
93650	371.790	20.270	5156.970	2283.370
93675	761.970	0.000	14391.540	249.000
93700	775.380	0.000	22719.240	0.000
93725	274.830	0.000	15674.470	0.000
93750	0.000	119.140	3759.980	1265.420
93775	0.000	653.640	0.000	9659.780
93800	0.000	906.340	0.000	19499.780
93825	0.000	769.180	0.000	20944.020
93850	0.000	312.900	0.000	13525.930
93875	0.000	71.770	0.000	4808.310
93900	208.410	0.000	2637.750	944.820
93925	478.680	0.000	9008.980	0.000
93950	58.080	0.000	6874.430	0.000
93975	14.660	0.000	1103.900	0.000
94000	38.140	0.000	728.090	0.000
94025	1.210	53.090	481.800	700.570
94050	61.590	3.820	560.610	1115.740



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
94075	69.940	0.000	1276.350	55.020
94100	12.250	0.000	1126.820	0.000
94125	22.500	0.000	470.580	0.000
94150	21.420	0.000	493.250	0.000
94175	8.640	2.580	365.290	33.500
94200	37.180	0.000	612.580	29.120
94225	40.840	0.000	866.110	0.000
94250	11.020	8.750	580.500	131.050
94275	272.470	0.030	3847.580	103.210
94300	289.070	0.000	8140.570	0.320
94325	227.470	1.140	5490.780	14.850
94350	353.360	0.000	6400.090	14.710
94375	377.200	0.000	11529.930	0.000
94400	51.230	0.000	9266.520	0.000
94425	217.240	0.000	4802.020	0.000
94450	234.510	0.000	5603.690	0.000
94475	250.960	0.000	5381.640	0.000
94500	21.840	0.000	3202.450	0.000
94525	34.010	0.000	605.180	0.000
94550	76.880	0.000	1188.110	0.000
94575	73.040	0.000	1860.480	0.000
94600	11.060	0.000	1146.590	0.000
94625	127.100	0.000	1788.450	0.000
94650	191.530	0.000	4283.830	0.000
94675	59.110	0.000	3449.810	0.000
94700	8.490	5.160	902.730	58.350
94725	14.210	74.810	280.490	1028.130
94750	146.460	5.390	1904.280	1212.580
94775	118.990	2.440	3245.930	99.960
94800	46.730	0.000	2099.710	30.180
94825	398.140	0.000	5928.200	0.000
94850	238.040	0.000	8641.990	0.000
94875	132.440	0.000	5217.840	0.000
94900	176.320	0.000	4210.740	0.000
94925	93.030	0.000	3366.900	0.000
94950	21.920	71.730	1436.830	896.610
94975	33.880	29.570	697.500	1266.220
95000	60.800	0.310	1183.570	373.520
95025	50.710	0.680	1393.960	12.430
95050	91.580	0.000	1778.640	8.520
95075	51.020	0.000	1759.770	0.000
95100	53.310	0.000	1224.540	0.000
95125	34.370	0.000	1074.980	0.000
95150	47.280	0.000	1040.220	0.000
95175	1.780	12.600	632.350	161.940
95200	115.630	0.000	1501.140	160.810
95225	29.000	0.000	1807.875	0.000
95250	92.840	21.280	1523.040	265.980
95275	151.110	0.030	3049.400	266.390
95300	55.380	108.730	2457.000	1469.490
95325	171.560	0.000	2305.350	2139.150
95350	64.900	0.000	2382.970	0.000
95375	8.730	0.590	861.320	7.700



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
95400	99.520	2.300	1466.190	35.510
95425	123.980	3.300	2701.910	70.500
95450	283.200	0.000	3835.630	44.230
95475	109.710	0.000	4590.530	0.000
95500	37.910	0.000	1879.680	0.000
95525	241.460	0.130	3492.150	1.570
95550	333.050	3.180	5627.260	45.090
95575	456.910	1.240	9091.920	56.770
95600	230.910	0.540	9874.800	21.300
95625	331.190	4.750	7309.740	65.410
95650	245.470	1.970	6844.610	85.250
95675	510.940	0.440	9262.340	30.360
95700	294.350	0.100	13060.130	5.660
95725	1.440	5.320	5340.900	81.820
95750	95.960	0.000	1585.740	80.750
95775	84.130	0.000	2847.620	0.000
95800	110.230	0.400	2497.750	4.950
95825	64.520	0.000	2184.370	5.020
95850	221.240	0.000	3339.300	0.000
95875	135.890	0.000	3875.080	0.000
95900	152.450	9.770	3604.280	122.190
95925	40.170	3.960	2407.760	171.630
95950	321.690	0.000	3948.710	59.020
95975	176.440	0.000	5186.190	0.000
96000	151.900	0.000	3647.540	0.000
96025	49.210	0.000	2501.270	0.000
96050	23.800	0.000	912.570	0.000
96075	78.090	0.220	1273.550	2.740
96100	15.040	0.000	1164.140	2.740
96125	4.280	0.000	241.520	0.000
96150	36.350	0.000	507.800	0.000
96175	252.410	0.000	3744.070	0.000
96200	329.980	0.000	8800.630	0.000
96225	88.130	0.000	6850.470	0.000
96250	80.980	0.000	2404.440	0.000
96275	98.070	0.000	2238.120	0.000
96300	201.360	0.000	3742.820	0.000
96325	284.920	0.000	6078.570	0.000
96350	96.100	0.000	4762.770	0.000
96375	36.280	0.000	1521.770	0.000
96400	166.210	0.400	3189.250	5.830
96425	33.960	12.880	3224.040	243.980
96450	16.800	0.520	630.520	183.620
96475	93.870	0.000	1383.375	0.000
96500	335.900	0.000	7071.250	0.000
96525	195.090	0.000	6862.800	0.000
96550	366.910	1.130	6585.570	14.620
96575	117.330	0.000	5630.160	14.800
96600	75.240	5.270	2140.060	77.390
96625	128.670	0.000	2256.460	75.830
96650	309.380	0.370	5475.560	4.690
96675	138.050	0.000	5592.890	4.690
96700	12.520	0.000	1882.230	0.000



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
96725	11.310	0.010	303.570	0.140
96750	27.510	0.000	488.690	0.140
96775	35.500	0.000	776.090	0.000
96800	10.050	366.760	533.390	5682.500
96825	7.290	313.560	204.940	10115.300
96850	51.870	103.340	734.450	5285.530
96875	64.640	0.320	1456.410	1295.720
96900	306.230	0.000	4956.410	3.930
96925	87.970	0.000	5261.490	0.000
96950	40.350	0.000	1610.380	0.000
96975	17.260	7.080	720.070	88.470
97000	63.860	0.000	1014.010	88.470
97025	145.430	0.000	2616.120	0.000
97050	25.990	0.550	2040.890	7.200
97075	53.610	0.000	942.530	7.140
97100	21.430	0.060	938.040	0.810
97125	123.370	0.000	1913.560	0.800
97150	227.560	0.000	5790.920	0.000
97175	133.770	0.000	5396.420	0.000
97200	32.160	0.000	2074.060	0.000
97225	7.570	0.670	496.660	8.400
97250	31.340	1.260	486.390	24.150
97275	24.970	2.720	659.600	52.170
97300	17.470	114.630	445.640	2265.380
97325	93.900	0.000	1295.760	1661.120
97350	14.290	0.080	1552.760	0.810
97375	82.720	0.000	1452.610	0.730
97400	53.200	0.000	1839.330	0.000
97425	20.630	0.000	875.150	0.000
97450	14.100	92.140	389.560	1784.560
97475	27.000	0.000	480.550	1548.320
97500	20.390	0.000	592.430	0.000
97525	37.850	0.000	728.000	0.000
97550	33.550	0.000	937.030	0.000
97575	22.920	0.000	772.600	0.000
97600	22.260	0.000	569.270	0.000
97625	4.060	4.440	310.810	60.400
97650	6.820	0.570	121.500	70.030
97675	1.680	70.190	101.510	1056.540
97700	6.320	0.000	100.530	805.330
97725	8.870	0.000	193.780	0.000
97750	6.420	0.000	187.690	0.000
97775	23.940	0.000	363.120	0.000
97800	39.580	0.000	786.670	0.000
97825	45.380	0.000	1082.660	0.000
97850	15.060	0.000	757.100	0.000
97875	7.530	0.000	280.300	0.000
97900	6.620	0.120	158.170	2.010
97925	191.950	0.000	3218.370	1.900
97950	181.100	0.000	4663.160	0.000
97975	153.780	0.000	3788.750	0.000
98000	219.630	0.880	4510.350	11.220
98025	101.360	0.000	4320.010	10.610



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
98050	145.020	0.000	2982.230	0.000
98075	335.160	0.000	5485.260	0.000
98100	205.810	0.000	6226.570	0.000
98125	57.010	0.900	3035.100	11.750
98150	100.390	3.390	2034.900	55.400
98175	110.340	0.000	2684.170	43.660
98200	188.400	0.000	3531.490	0.000
98225	133.160	0.000	4019.540	0.000
98250	24.000	0.000	2118.530	0.000
98275	170.090	0.000	2793.870	0.000
98300	15.400	0.000	2383.830	0.000
98325	21.390	17.170	459.870	214.680
98350	32.080	0.420	641.450	234.810
98375	5.830	0.560	438.590	12.720
98400	21.040	0.000	334.530	7.060
98425	86.930	0.000	1349.650	0.000
98450	79.610	0.000	2081.730	0.000
98475	166.540	0.000	3076.790	0.000
98500	444.640	0.000	7639.760	0.000
98525	644.820	0.000	13618.360	0.000
98550	616.420	0.000	14881.210	0.000
98575	595.640	0.000	13906.940	0.000
98600	372.670	0.000	11939.710	0.000
98625	101.470	0.000	5926.830	0.000
98650	33.960	0.000	1692.910	0.000
98675	0.610	2.250	442.820	27.490
98700	55.700	0.000	747.260	25.180
98725	23.840	0.000	1057.820	0.000
98750	3.040	0.000	356.960	0.000
98775	3.170	28.840	79.650	285.510
98800	76.470	0.310	1066.810	300.030
98825	311.280	0.000	4864.820	3.880
98850	265.070	0.000	7204.380	0.000
98875	185.950	0.000	5637.820	0.000
98900	64.300	0.000	3128.150	0.000
98925	0.000	7.970	803.720	99.590
98950	107.390	3.150	1319.680	141.410
98975	0.000	4.340	1296.470	104.090
99000	0.000	3.770	0.000	99.690
99025	0.540	32.110	6.790	423.330
99050	20.680	0.500	271.270	426.600
99075	35.730	0.000	746.950	6.240
99100	10.830	0.020	613.030	0.230
99125	8.050	0.130	245.980	1.740
99150	134.410	0.010	1780.730	1.770
99175	29.270	0.000	2045.930	0.150
99200	9.410	86.730	475.960	1123.120
99225	6.050	0.560	179.120	1326.090
99250	12.140	0.000	207.360	7.480
99275	10.630	0.000	263.970	0.000
99300	7.510	0.000	217.390	0.000
99325	53.130	0.200	739.090	2.530
99350	397.700	0.000	5635.460	2.480



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
99375	473.910	0.000	10895.110	0.000
99400	316.510	0.680	10119.860	8.330
99425	2.500	4.580	4924.180	65.380
99450	33.800	0.000	497.010	58.450
99475	109.020	0.000	2086.650	0.000
99500	8.890	0.000	1716.110	0.000
99525	122.430	0.000	1695.060	0.000
99550	40.690	2.250	2039.050	28.100
99575	2.670	4.300	542.000	81.820
99600	177.070	0.000	2246.740	53.720
99625	112.480	0.000	3619.400	0.000
99650	25.220	0.000	1721.180	0.000
99675	87.580	0.070	1289.630	0.910
99700	29.580	0.000	1242.380	0.940
99725	23.660	0.000	639.950	0.000
99750	4.290	1.320	362.950	17.220
99775	8.690	0.160	167.810	19.370
99800	94.920	1.830	1231.160	26.480
99825	9.540	1.990	1188.190	53.030
99850	8.060	8.540	198.000	160.330
99875	50.430	0.650	617.510	141.860
99900	166.250	0.000	2458.980	8.690
99925	129.880	0.000	3746.070	0.000
99950	198.100	0.000	5060.890	0.000
99975	160.770	0.000	5959.350	0.000
100000	169.400	0.000	4454.380	0.000
100025	371.180	0.000	6757.250	0.000
100050	65.170	1.790	5454.360	22.390
100075	3.450	8.480	770.050	131.770
100100	102.400	1.040	1085.760	127.440
100125	15.860	0.000	1266.310	15.440
100150	12.990	13.990	356.660	178.260
100175	26.200	3.730	526.740	205.610
100200	0.240	15.150	313.980	250.460
100225	13.080	0.920	142.450	263.370
100250	52.710	0.000	773.260	12.030
100275	8.720	0.000	767.910	0.020
100300	16.880	0.000	320.070	0.020
100325	16.000	0.000	411.040	0.000
100350	75.650	0.000	1196.840	0.000
100375	24.720	0.000	1410.330	0.000
100400	1.640	0.210	354.580	2.940
100425	85.020	0.000	1196.830	2.790
100450	70.120	0.000	1879.910	0.000
100475	59.790	0.000	1442.340	0.000
100500	17.920	0.000	907.230	0.000
100525	15.310	0.580	417.370	7.270
100550	74.020	4.170	1035.830	62.000
100575	35.400	2.400	1185.600	88.170
100600	137.950	0.010	1764.050	32.290
100625	160.920	0.000	3570.510	0.140
100650	186.430	0.000	4496.410	0.000
100675	14.750	0.000	2989.500	0.000



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
100700	12.350	0.000	346.070	0.000
100725	139.920	0.000	2344.190	0.000
100750	49.260	0.000	2364.710	0.000
100775	0.020	13.100	647.890	156.050
100800	57.810	0.010	761.000	154.890
100825	31.160	0.000	1164.710	0.120
100850	3.510	0.020	448.800	0.230
100875	11.480	0.000	189.660	0.240
100900	17.850	0.000	365.610	0.000
100925	9.030	0.000	326.570	0.000
100950	10.100	0.000	232.340	0.000
100975	28.290	0.000	462.790	0.000
101050	7.430	120.590	1339.500	0.000
101075	16.800	0.000	295.700	2814.080
101100	11.320	0.000	351.570	0.000
101125	9.060	27.030	244.020	477.770
101150	12.600	0.000	255.360	428.260
101175	40.420	0.000	700.990	0.000
101200	32.540	2.450	1011.650	27.980
101225	26.610	6.300	714.390	112.830
101250	21.560	0.000	558.240	86.190
101275	151.320	0.000	2161.070	0.000
Total =			31,50,636	3,15,983

Scarified Bituminous and Granular Material(A)=	61732	cum
Total Earthwork in cutting(C) =	3150636	cum
Actual earthwork in soil(C-A-B)=	30,88,903	cum

Assume 20% total cutting Volume for Ordinary Rock Cu	6,17,781	cum
Earthwork In soil =	24,71,123	cum
Earthwork in filling =	3,15,983	cum
Total Earthwork in filling =	3,15,983	cum

Using 40% of cutting material for filling earthworks in embankment
 Earthwork used from Roadway Cutting Material= 1235561 cum
 So no Earthwork required for embankment const from borrowpit ::



Variable Declaration

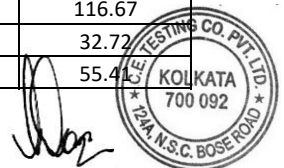
Earthwork

Sl No	Variable Description	Variable	Dimension	Unit
1	Total Earthwork In Cutting	tot_cut	3088903.000	cum
2	Total Earthwork In Filling (Consider Only Embankment)	tot_fill	315983.000	cum
3	Percentage of Rock	per_rock	20.000	percent

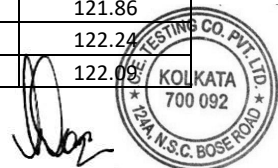
 

Calculation of Extra Widening

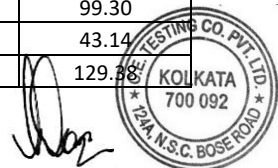
	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	66150.174	66181.769	31.595	0.9	25	28.44	22.5	50.94
Arc	66239.017	66288.878	49.861	1.5	30	74.79	45	119.79
Arc	66393.461	66411.392	17.931	1.5	30	26.90	45	71.90
Arc	66541.497	66563.074	21.577	0.9	15	19.42	13.5	32.92
Arc	66606.549	66615.525	8.976	0.9	15	8.08	13.5	21.58
Arc	66646.602	66653.472	6.87	0.9	15	6.18	13.5	19.68
Arc	66736.216	66795.396	59.18	1.5	30	88.77	45	133.77
Arc	66847.863	66856.882	9.019	0.6	15	5.41	9	14.41
Arc	66895.607	66911.031	15.424	0.6	15	9.25	9	18.25
Arc	66995.342	67055.954	60.612	1.5	30	90.92	45	135.92
Arc	67196.226	67210.743	14.517	0.9	25	13.07	22.5	35.57
Arc	67272.744	67279.955	7.211	1.2	35	8.65	42	50.65
Arc	67350.226	67389.497	39.271	1.2	35	47.13	42	89.13
Arc	67509.074	67573.746	64.672	1.5	25	97.01	37.5	134.51
Arc	67633.798	67667.684	33.886	1.2	20	40.66	24	64.66
Arc	67821.09	67889.183	68.093	1.2	20	81.71	24	105.71
Arc	68003.789	68013.776	9.987	0.6	15	5.99	9	14.99
Arc	68122.559	68162.974	40.415	1.2	20	48.50	24	72.50
Arc	68211.83	68283.531	71.701	1.2	20	86.04	24	110.04
Arc	68466.702	68476.15	9.448	1.5	30	14.17	45	59.17
Arc	68544.28	68552.261	7.981	1.2	35	9.58	42	51.58
Arc	68682.248	68692.034	9.786	1.2	20	11.74	24	35.74
Arc	68735.55	68798.822	63.272	1.2	20	75.93	24	99.93
Arc	68846.514	68857.054	10.54	0.6	15	6.32	9	15.32
Arc	68911.122	68935.656	24.534	1.5	30	36.80	45	81.80
Arc	69099.329	69130.859	31.53	0.9	30	28.38	27	55.38
Arc	69186.819	69200.012	13.193	0.9	20	11.87	18	29.87
Arc	69269.349	69328.531	59.182	1.5	30	88.77	45	133.77
Arc	69422.739	69458.638	35.899	1.2	15	43.08	18	61.08
Arc	69630.131	69637.037	6.906	1.5	30	10.36	45	55.36
Arc	69687.434	69740.087	52.653	0.9	15	47.39	13.5	60.89
Arc	69792.012	69810.204	18.192	1.5	30	27.29	45	72.29
Arc	69879.239	69889.688	10.449	1.5	30	15.67	45	60.67
Arc	69983.979	69989.829	5.85	1.5	25	8.77	37.5	46.27
Arc	70040.663	70049.812	9.149	1.5	25	13.72	37.5	51.22
Arc	70111.657	70197.892	86.235	1.2	20	103.48	24	127.48
Arc	70374.826	70405.102	30.276	1.5	30	45.41	45	90.41
Arc	70453.894	70470.463	16.569	0.6	15	9.94	9	18.94
Arc	70593.228	70600.478	7.25	1.5	30	10.88	45	55.88
Arc	70704.42	70735.918	31.498	1.2	40	37.80	48	85.80
Arc	70897.773	70920.129	22.356	0.9	20	20.12	18	38.12
Arc	70977.544	71036.11	58.566	1.2	35	70.28	42	112.28
Arc	71102.585	71120.12	17.535	0.9	30	15.78	27	42.78
Arc	71265.156	71301.538	36.382	1.5	30	54.57	45	99.57
Arc	71533.049	71580.83	47.781	1.5	30	71.67	45	116.67
Arc	71642.956	71650.22	7.264	1.2	20	8.72	24	32.72
Arc	71700.994	71707.936	6.942	1.5	30	10.41	45	55.41



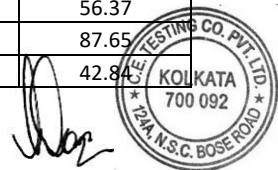
	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	71771.581	71782.427	10.846	0.9	25	9.76	22.5	32.26
Arc	71837.887	71880.602	42.715	0.9	25	38.44	22.5	60.94
Arc	71953.294	71972.548	19.254	0.9	20	17.33	18	35.33
Arc	72022.353	72044.751	22.398	0.6	15	13.44	9	22.44
Arc	72152.476	72183.993	31.517	1.5	20	47.28	30	77.28
Arc	72226.775	72398.7	171.925	0.6	15	103.16	9	112.16
Arc	72441.681	72459.444	17.763	0.9	20	15.99	18	33.99
Arc	72520.756	72531.274	10.518	1.2	40	12.62	48	60.62
Arc	72602.348	72619.818	17.47	0.9	30	15.72	27	42.72
Arc	72694.406	72715.059	20.653	0.9	30	18.59	27	45.59
Arc	72811.879	72845.583	33.704	1.5	30	50.56	45	95.56
Arc	72882.093	72919.728	37.635	0.6		22.58	0	22.58
Arc	72954.28	72978.418	24.138	0.9	20	21.72	18	39.72
Arc	73030.878	73055.81	24.932	1.5	30	37.40	45	82.40
Arc	73111.884	73117.072	5.188	1.5	25	7.78	37.5	45.28
Arc	73246.239	73265.304	19.065	1.5	30	28.60	45	73.60
Arc	73330.198	73342.19	11.992	1.5	30	17.99	45	62.99
Arc	73414.067	73445.284	31.217	0.6	15	18.73	9	27.73
Arc	73497.105	73503.262	6.157	1.5	30	9.24	45	54.24
Arc	73650.909	73703.56	52.651	1.5	30	78.98	45	123.98
Arc	73765.51	73769.752	4.242	1.5	30	6.36	45	51.36
Arc	73824.869	73915.796	90.927	0.9	25	81.83	22.5	104.33
Arc	74032.566	74095.461	62.895	1.5	30	94.34	45	139.34
Arc	74143.326	74156.882	13.556	0.6	15	8.13	9	17.13
Arc	74207.444	74220.811	13.367	1.2	35	16.04	42	58.04
Arc	74293.388	74398.075	104.687	0.6	20	62.81	12	74.81
Arc	74646.485	74662.513	16.028	1.5	25	24.04	37.5	61.54
Arc	74716.787	74736.35	19.563	1.5	25	29.34	37.5	66.84
Arc	74858.032	74871.807	13.775	0.9	25	12.40	22.5	34.90
Arc	74914.878	75022.238	107.36	0.6	15	64.42	9	73.42
Arc	75106.333	75133.057	26.724	1.5	30	40.09	45	85.09
Arc	75288.295	75310.25	21.955	0.9	30	19.76	27	46.76
Arc	75393.348	75400.624	7.276	0.9	20	6.55	18	24.55
Arc	75461.476	75472.625	11.149	1.2	35	13.38	42	55.38
Arc	75551.665	75613.964	62.299	0.9	30	56.07	27	83.07
Arc	75735.366	75823.464	88.098	1.2	35	105.72	42	147.72
Arc	75918.996	75948.166	29.17	0.9	30	26.25	27	53.25
Arc	76012.129	76032.87	20.741	0.9	20	18.67	18	36.67
Arc	76108.841	76127.268	18.427	1.5	30	27.64	45	72.64
Arc	76182.279	76200.605	18.326	1.5	20	27.49	30	57.49
Arc	76243.844	76259.508	15.664	1.5	20	23.50	30	53.50
Arc	76407.551	76431.707	24.156	1.5	25	36.23	37.5	73.73
Arc	76480.039	76509.449	29.41	1.5	20	44.11	30	74.11
Arc	76549.688	76575.049	25.361	1.5	20	38.04	30	68.04
Arc	76616.457	76635.745	19.288	1.5	20	28.93	30	58.93
Arc	76680.375	76691.287	10.912	1.5	15	16.37	22.5	38.87
Arc	76746.96	76770.509	23.549	0.6	15	14.13	9	23.13
Arc	76886.208	76937.45	51.242	1.5	30	76.86	45	121.86
Arc	77207.093	77268.959	61.866	1.2	40	74.24	48	122.24
Arc	77354.569	77416.309	61.74	1.2	40	74.09	48	122.09



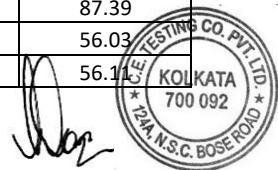
	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	77508.339	77532.019	23.68	1.5	30	35.52	45	80.52
Arc	77595.516	77611.518	16.002	1.5	25	24.00	37.5	61.50
Arc	77649.591	77700.835	51.244	0.6		30.75	0	30.75
Arc	77833.641	77836.707	3.066	1.5	30	4.60	45	49.60
Arc	77918.086	77929.22	11.134	0.9	15	10.02	13.5	23.52
Arc	77960.118	77976.414	16.296	0.9	15	14.67	13.5	28.17
Arc	78018.391	78048.753	30.362	1.5	25	45.54	37.5	83.04
Arc	78125.984	78182.357	56.373	1.5	25	84.56	37.5	122.06
Arc	78241.421	78274.647	33.226	1.5	30	49.84	45	94.84
Arc	78369.363	78395.243	25.88	1.5	30	38.82	45	83.82
Arc	78467.004	78563.199	96.195	0.9	15	86.58	13.5	100.08
Arc	78625.465	78630.105	4.64	0.6	15	2.78	9	11.78
Arc	78680.001	78699.48	19.479	1.5	30	29.22	45	74.22
Arc	78807.468	78869.217	61.749	0.9	15	55.57	13.5	69.07
Arc	78919.053	78955.569	36.516	1.5	30	54.77	45	99.77
Arc	79030.549	79073.09	42.541	0.9	20	38.29	18	56.29
Arc	79224.382	79281.706	57.324	0.6	15	34.39	9	43.39
Arc	79337.554	79369.508	31.954	0.9	25	28.76	22.5	51.26
Arc	79520.679	79548.761	28.082	0.6	15	16.85	9	25.85
Arc	79589.242	79605.863	16.621	1.5	25	24.93	37.5	62.43
Arc	79730.732	79740.56	9.828	1.2	15	11.79	18	29.79
Arc	79781.64	79817.779	36.139	1.5	20	54.21	30	84.21
Arc	79943.707	79965.323	21.616	1.2	20	25.94	24	49.94
Arc	80022.191	80058.373	36.182	1.2	35	43.42	42	85.42
Arc	80143.157	80205.288	62.131	1.5	30	93.20	45	138.20
Arc	80275.208	80334.954	59.746	1.2	20	71.70	24	95.70
Arc	80482.831	80500.084	17.253	0.6	15	10.35	9	19.35
Arc	80645.145	80680.306	35.161	0.9	20	31.64	18	49.64
Arc	80725.608	80736.216	10.608	0.9	25	9.55	22.5	32.05
Arc	80802.841	80865.276	62.435	1.2	20	74.92	24	98.92
Arc	81017.876	81029.262	11.386	0.9	25	10.25	22.5	32.75
Arc	81084.792	81097.115	12.323	0.9	25	11.09	22.5	33.59
Arc	81198.156	81217.252	19.096	0.9	30	17.19	27	44.19
Arc	81275.494	81298.176	22.682	1.2	15	27.22	18	45.22
Arc	81340.227	81348.48	8.253	1.2	15	9.90	18	27.90
Arc	81410.639	81418.311	7.672	1.5	25	11.51	37.5	49.01
Arc	81462.657	81505.924	43.267	0.9	15	38.94	13.5	52.44
Arc	81547.091	81666.728	119.637	0.9	20	107.67	18	125.67
Arc	81694.561	81731.834	37.273	0.6		22.36	0	22.36
Arc	81782.688	81802.51	19.822	1.5	30	29.73	45	74.73
Arc	81883.329	81910.412	27.083	0.9	25	24.37	22.5	46.87
Arc	81960.582	81988.357	27.775	0.6	15	16.67	9	25.67
Arc	82034.392	82051.585	17.193	1.5	30	25.79	45	70.79
Arc	82144.969	82181.576	36.607	1.5	25	54.91	37.5	92.41
Arc	82287.67	82294.33	6.66	1.5	30	9.99	45	54.99
Arc	82339.722	82374.28	34.558	1.2	15	41.47	18	59.47
Arc	82409.251	82452.179	42.928	1.2	15	51.51	18	69.51
Arc	82583.344	82619.543	36.199	1.5	30	54.30	45	99.30
Arc	82688.834	82704.783	15.949	1.2	20	19.14	24	43.14
Arc	82840.618	82896.87	56.252	1.5	30	84.38	45	129.38



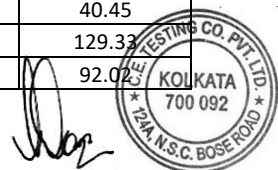
	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	82947.386	82962.373	14.987	1.2	20	17.98	24	41.98
Arc	82995.182	83032.85	37.668	0.6		22.60	0	22.60
Arc	83064.991	83079.671	14.68	1.5	30	22.02	45	67.02
Arc	83288.2	83316.196	27.996	1.5	30	41.99	45	86.99
Arc	83372.52	83392.269	19.749	1.5	25	29.62	37.5	67.12
Arc	83434.468	83443.867	9.399	1.5	15	14.10	22.5	36.60
Arc	83483.366	83518.805	35.439	1.5	20	53.16	30	83.16
Arc	83646.268	83651.469	5.201	1.2	20	6.24	24	30.24
Arc	83687.985	83706.534	18.549	1.2	15	22.26	18	40.26
Arc	83749.236	83764.995	15.759	0.9	15	14.18	13.5	27.68
Arc	83826.689m	83891.557m	63.736	0.9	20	57.36	18	75.36
Arc	83982.471m	84006.868m	23.731	1.5	30	35.60	45	80.60
Arc	84091.644m	84099.569m	7.923	0.9	20	7.13	18	25.13
Arc	84198.577m	84209.253m	10.655	1.2	20	12.79	24	36.79
Arc	84262.069m	84337.614m	70.653	1.2	15	84.78	18	102.78
Arc	84377.086m	84446.322m	65.458	1.2	15	78.55	18	96.55
Arc	84484.262m	84516.674m	32.019	1.2	15	38.42	18	56.42
Arc	84630.458m	84740.052m	82.249	1.5	15	123.37	22.5	145.87
Arc	84786.711m	84796.926m	10.166	1.5	30	15.25	45	60.25
Arc	84845.666m	84862.701m	16.978	1.2	15	20.37	18	38.37
Arc	84961.325m	85051.327m	89.244	0.6	10	53.55	6	59.55
Arc	85086.859m	85093.728m	6.853	1.5	30	10.28	45	55.28
Arc	85172.571m	85172.725m	0.155	1.5	30	0.23	45	45.23
Arc	85323.469m	85449.657m	109.783	0.9	30	98.80	27	125.80
Arc	85532.946m	85568.283m	35.153	0.9	20	31.64	18	49.64
Arc	85622.544m	85628.502m	5.948	1.5	30	8.92	45	53.92
Arc	85708.467m	85765.813m	56.126	0.9	25	50.51	22.5	73.01
Arc	85859.641m	85864.884m	5.241	1.2	20	6.29	24	30.29
Arc	85917.410m	85948.399m	29.63	1.5	30	44.45	45	89.45
Arc	85998.572m	86040.365m	40.587	1.2	20	48.70	24	72.70
Arc	86153.159m	86245.885m	78.403	1.2	20	94.08	24	118.08
Arc	86301.393m	86318.638m	17.008	1.5	30	25.51	45	70.51
Arc	86533.400m	86545.891m	12.468	1.2	15	14.96	18	32.96
Arc	86588.042m	86676.329m	71.426	1.5	25	107.14	37.5	144.64
Arc	86770.729m	86808.676m	37.042	1.2	20	44.45	24	68.45
Arc	86882.896m	86894.639m	11.73	0.9	30	10.56	27	37.56
Arc	86953.175m	86962.648m	9.463	1.2	15	11.36	18	29.36
Arc	86998.209m	87010.654m	12.413	1.2	20	14.90	24	38.90
Arc	87055.029m	87098.986m	42.556	1.2	20	51.07	24	75.07
Arc	87157.115m	87175.483m	18.207	1.5	25	27.31	37.5	64.81
Arc	87216.878m	87228.005m	11.11	1.2	15	13.33	18	31.33
Arc	87268.172m	87280.299m	12.08	1.5	25	18.12	37.5	55.62
Arc	87322.782m	87327.808m	5.025	1.2	15	6.03	18	24.03
Arc	87371.379m	87381.165m	9.762	1.5	25	14.64	37.5	52.14
Arc	87456.848m	87457.282m	0.434	1.2	40	0.52	48	48.52
Arc	87566.324m	87620.239m	53.498	0.6	15	32.10	9	41.10
Arc	87755.678m	87806.514m	44.969	1.5	30	67.45	45	112.45
Arc	87937.719m	87970.084m	31.974	1.2	15	38.37	18	56.37
Arc	88056.161m	88085.785m	28.435	1.5	30	42.65	45	87.65
Arc	88131.385m	88188.266m	56.392	0.6	15	33.84	9	42.84



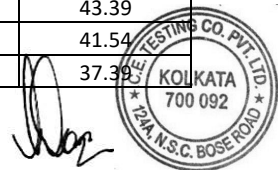
	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	88355.360m	88398.963m	39.865	1.5	30	59.80	45	104.80
Arc	88518.931m	88530.701m	11.694	1.5	30	17.54	45	62.54
Arc	88601.087m	88649.262m	47.45	0.9	25	42.71	22.5	65.21
Arc	88717.910m	88791.185m	70.74	0.9	25	63.67	22.5	86.17
Arc	88850.044m	88947.670m	92.91	0.9	25	83.62	22.5	106.12
Arc	89058.289m	89068.228m	9.914	1.5	25	14.87	37.5	52.37
Arc	89120.655m	89131.935m	11.256	1.2	20	13.51	24	37.51
Arc	89251.659m	89285.751m	30.112	1.5	20	45.17	30	75.17
Arc	89453.656m	89463.339m	9.673	1.2	35	11.61	42	53.61
Arc	89534.460m	89552.492m	17.964	1.2	35	21.56	42	63.56
Arc	89634.811m	89639.744m	4.93	1.5	25	7.40	37.5	44.90
Arc	89691.675m	89718.276m	26.289	1.2	20	31.55	24	55.55
Arc	89842.789m	89900.198m	52.607	1.5	25	78.91	37.5	116.41
Arc	89927.989m	89963.578m	35.568	0.6	10	21.34	6	27.34
Arc	89997.660m	90003.125m	5.461	1.5	25	8.19	37.5	45.69
Arc	90058.135m	90091.214m	31.429	1.5	30	47.14	45	92.14
Arc	90151.165m	90157.798m	6.632	0.6	15	3.98	9	12.98
Arc	90197.850m	90208.048m	10.17	1.5	25	15.26	37.5	52.76
Arc	90252.622m	90259.894m	7.268	1.2	15	8.72	18	26.72
Arc	90328.041m	90348.304m	20.124	1.2	20	24.15	24	48.15
Arc	90414.294m	90436.306m	21.522	1.5	30	32.28	45	77.28
Arc	90514.139m	90537.304m	22.593	1.5	30	33.89	45	78.89
Arc	90718.562m	90744.508m	25.145	1.5	30	37.72	45	82.72
Arc	90956.128m	91065.793m	98.789	0.9	30	88.91	27	115.91
Arc	91150.513m	91229.815m	71.247	1.2	40	85.50	48	133.50
Arc	91366.080m	91402.561m	36.166	0.9	25	32.55	22.5	55.05
Arc	91615.183m	91658.330m	41.821	1.2	40	50.19	48	98.19
Arc	91780.982m	91793.331m	12.333	0.9	15	11.10	13.5	24.60
Arc	91845.984m	91854.526m	8.521	1.5	30	12.78	45	57.78
Arc	91910.124m	91915.479m	5.353	1.2	20	6.42	24	30.42
Arc	92024.954m	92035.408m	10.434	1.2	20	12.52	24	36.52
Arc	92082.225m	92099.858m	17.491	1.5	25	26.24	37.5	63.74
Arc	92142.263m	92162.603m	20.318	0.6	15	12.19	9	21.19
Arc	92256.400m	92282.906m	26.348	0.9	30	23.71	27	50.71
Arc	92441.706m	92534.902m	91.052	0.6	15	54.63	9	63.63
Arc	92589.372m	92595.854m	6.481	0.6	15	3.89	9	12.89
Arc	92670.989m	92687.120m	16.062	1.2	20	19.27	24	43.27
Arc	92735.860m	92749.275m	13.353	1.5	25	20.03	37.5	57.53
Arc	92804.557m	92807.785m	3.227	1.5	30	4.84	45	49.84
Arc	92855.780m	92929.080m	73.118	0.6	10	43.87	6	49.87
Arc	93044.860m	93075.074m	29.757	1.2	20	35.71	24	59.71
Arc	93198.763m	93199.298m	0.535	1.5	30	0.80	45	45.80
Arc	93263.273m	93271.212m	7.916	1.5	30	11.87	45	56.87
Arc	93308.704m	93335.542m	26.83	0.6	10	16.10	6	22.10
Arc	93427.193m	93453.873m	26.519	0.9	30	23.87	27	50.87
Arc	93550.760m	93578.673m	27.903	0.6	10	16.74	6	22.74
Arc	93605.064m	93642.276m	36.998	0.9	10	33.30	9	42.30
Arc	93687.497m	93727.976m	38.261	1.5	20	57.39	30	87.39
Arc	93893.801m	93920.898m	26.69	1.2	20	32.03	24	56.03
Arc	93963.921m	93981.933m	17.409	1.5	20	26.11	30	56.11



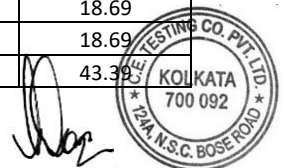
	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	94035.712m	94059.041m	22.028	1.5	20	33.04	30	63.04
Arc	94099.259m	94105.590m	6.305	1.5	20	9.46	30	39.46
Arc	94141.174m	94149.852m	8.648	1.5	15	12.97	22.5	35.47
Arc	94180.332m	94185.867m	5.53	1.5	15	8.30	22.5	30.80
Arc	94221.153m	94227.913m	6.739	1.5	20	10.11	30	40.11
Arc	94273.303m	94283.586m	10.271	1.2	15	12.33	18	30.33
Arc	94313.624m	94331.930m	18.266	0.9	15	16.44	13.5	29.94
Arc	94376.786m	94411.520m	30.531	1.5	20	45.80	30	75.80
Arc	94462.893m	94535.369m	62.961	1.5	25	94.44	37.5	131.94
Arc	94593.421m	94677.216m	78.881	0.9	30	70.99	27	97.99
Arc	94735.889m	94747.763m	11.863	0.9	25	10.68	22.5	33.18
Arc	94809.078m	94882.211m	70.613	0.9	25	63.55	22.5	86.05
Arc	95085.815m	95097.414m	11.573	1.2	20	13.89	24	37.89
Arc	95141.018m	95186.097m	44.835	0.6	15	26.90	9	35.90
Arc	95316.923m	95341.476m	23.874	1.5	30	35.81	45	80.81
Arc	95387.778m	95395.120m	7.34	0.9	15	6.61	13.5	20.11
Arc	95435.501m	95442.674m	7.163	1.5	25	10.74	37.5	48.24
Arc	95535.518m	95547.156m	11.612	1.2	20	13.93	24	37.93
Arc	95587.183m	95597.166m	9.976	0.9	15	8.98	13.5	22.48
Arc	95635.696m	95656.783m	21.073	0.6	10	12.64	6	18.64
Arc	95690.319m	95767.848m	57.686	1.5	15	86.53	22.5	109.03
Arc	95843.139m	95871.004m	27.615	1.2	15	33.14	18	51.14
Arc	95889.168m	95905.036m	15.863	0.6	10	9.52	6	15.52
Arc	95947.902m	95976.275m	27.327	1.5	30	40.99	45	85.99
Arc	96194.276m	96216.120m	21.671	1.2	40	26.01	48	74.01
Arc	96385.109m	96412.349m	26.314	1.5	30	39.47	45	84.47
Arc	96475.033m	96481.443m	6.398	1.5	30	9.60	45	54.60
Arc	96540.813m	96613.336m	70.944	0.9	20	63.85	18	81.85
Arc	96712.703m	96725.881m	13.172	0.6	15	7.90	9	16.90
Arc	96781.231m	96808.667m	27.302	0.9	25	24.57	22.5	47.07
Arc	96890.231m	96914.009m	23.722	0.9	20	21.35	18	39.35
Arc	97042.250m	97055.020m	12.746	1.2	15	15.30	18	33.30
Arc	97131.491m	97156.762m	25.002	1.2	20	30.00	24	54.00
Arc	97283.590m	97290.138m	6.536	1.5	30	9.80	45	54.80
Arc	97350.216m	97369.202m	18.67	1.5	30	28.01	45	73.01
Arc	97432.851m	97450.533m	17.495	1.5	30	26.24	45	71.24
Arc	97547.653m	97564.553m	16.82	1.2	20	20.18	24	44.18
Arc	97618.702m	97652.218m	32.893	1.2	20	39.47	24	63.47
Arc	97694.727m	97711.452m	16.712	0.6	15	10.03	9	19.03
Arc	97754.230m	97767.698m	13.453	0.9	25	12.11	22.5	34.61
Arc	97811.865m	97818.394m	6.529	0.6	15	3.92	9	12.92
Arc	97875.650m	97909.061m	29.659	1.5	20	44.49	30	74.49
Arc	97963.968m	97970.527m	6.558	0.9	20	5.90	18	23.90
Arc	98012.074m	98015.177m	3.103	0.6	15	1.86	9	10.86
Arc	98048.628m	98194.320m	137.585	0.6	15	82.55	9	91.55
Arc	98247.564m	98255.719m	8.15	1.2	35	9.78	42	51.78
Arc	98351.397m	98360.165m	8.764	0.9	25	7.89	22.5	30.39
Arc	98542.973m	98562.969m	19.944	0.9	25	17.95	22.5	40.45
Arc	98680.732m	98787.848m	87.776	1.2	20	105.33	24	129.33
Arc	98952.756m	98985.740m	31.348	1.5	30	47.02	45	92.02



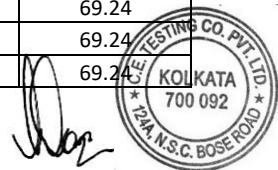
	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	99054.382m	99106.690m	51.382	0.9	25	46.24	22.5	68.74
Arc	99220.030m	99286.161m	62.834	1.2	35	75.40	42	117.40
Arc	99418.606m	99488.394m	58.788	1.5	30	88.18	45	133.18
Arc	99670.554m	99698.210m	27.304	1.2	20	32.76	24	56.76
Arc	99749.386m	99753.940m	4.553	1.2	20	5.46	24	29.46
Arc	99796.255m	99881.664m	75.398	1.2	20	90.48	24	114.48
Arc	99946.075m	99968.527m	21.931	1.5	30	32.90	45	77.90
Arc	100080.707m	100109.040m	27.292	1.5	30	40.94	45	85.94
Arc	100154.668m	100165.220m	10.544	0.9	15	9.49	13.5	22.99
Arc	100212.721m	100217.701m	4.974	1.5	30	7.46	45	52.46
Arc	100351.304m	100401.247m	42.043	1.5	20	63.06	30	93.06
Arc	100454.125m	100481.981m	27.414	1.2	20	32.90	24	56.90
Arc	100507.964m	100513.804m	5.84	0.6	20	3.50	12	15.50
Arc	100543.203m	100598.505m	53.365	1.2	15	64.04	18	82.04
Arc	100666.465m	100705.343m	36.214	1.5	30	54.32	45	99.32
Arc	100735.739m	100744.751m	9.011	0.6	10	5.41	6	11.41
Arc	100760.305m	100858.206m	94.038	0.9	15	84.63	13.5	98.13
Arc	100905.532m	100970.317m	64.062	0.6	15	38.44	9	47.44
Arc	101007.822m	101018.690m	10.808	1.5	15	16.21	22.5	38.71
Arc	101056.645m	101063.942m	7.257	1.5	20	10.89	30	40.89
Arc	101117.848m	101122.697m	4.844	1.5	30	7.27	45	52.27
Arc	101168.043m	101190.693m	22.575	0.9	15	20.32	13.5	33.82
Arc	101223.887m	101240.073m	16.158	0.9	15	14.54	13.5	28.04
Arc	83826.689m	83891.557m	16.158	0.9	20	14.54	18	32.54
Arc	83982.471m	84006.868m	16.158	1.5	30	24.24	45	69.24
Arc	84091.644m	84099.569m	16.158	0.9	20	14.54	18	32.54
Arc	84198.577m	84209.253m	16.158	1.2	20	19.39	24	43.39
Arc	84262.069m	84337.614m	16.158	1.2	15	19.39	18	37.39
Arc	84377.086m	84446.322m	16.158	1.2	15	19.39	18	37.39
Arc	84484.262m	84516.674m	16.158	1.2	15	19.39	18	37.39
Arc	84630.458m	84740.052m	16.158	1.5	15	24.24	22.5	46.74
Arc	84786.711m	84796.926m	16.158	1.5	30	24.24	45	69.24
Arc	84845.666m	84862.701m	16.158	1.2	15	19.39	18	37.39
Arc	84961.325m	85051.327m	16.158	0.6	0	9.69	0	9.69
Arc	85086.859m	85093.728m	16.158	1.5	30	24.24	45	69.24
Arc	85172.571m	85172.725m	16.158	1.5	30	24.24	45	69.24
Arc	85323.469m	85449.657m	16.158	0.9	30	14.54	27	41.54
Arc	85532.946m	85568.283m	16.158	0.9	20	14.54	18	32.54
Arc	85622.544m	85628.502m	16.158	1.5	30	24.24	45	69.24
Arc	85708.467m	85765.813m	16.158	0.9	25	14.54	22.5	37.04
Arc	85859.641m	85864.884m	16.158	1.2	20	19.39	24	43.39
Arc	85917.410m	85948.399m	16.158	1.5	30	24.24	45	69.24
Arc	85998.572m	86040.365m	16.158	1.2	20	19.39	24	43.39
Arc	86153.159m	86245.885m	16.158	1.2	20	19.39	24	43.39
Arc	86301.393m	86318.638m	16.158	1.5	30	24.24	45	69.24
Arc	86533.400m	86545.891m	16.158	1.2	15	19.39	18	37.39
Arc	86588.042m	86676.329m	16.158	1.5	25	24.24	37.5	61.74
Arc	86770.729m	86808.676m	16.158	1.2	20	19.39	24	43.39
Arc	86882.896m	86894.639m	16.158	0.9	30	14.54	27	41.54
Arc	86953.175m	86962.648m	16.158	1.2	15	19.39	18	37.39



	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	86998.209m	87010.654m	16.158	1.2	20	19.39	24	43.39
Arc	87055.029m	87098.986m	16.158	1.2	20	19.39	24	43.39
Arc	87157.115m	87175.483m	16.158	1.5	25	24.24	37.5	61.74
Arc	87216.878m	87228.005m	16.158	1.2	15	19.39	18	37.39
Arc	87268.172m	87280.299m	16.158	1.5	25	24.24	37.5	61.74
Arc	87322.782m	87327.808m	16.158	1.2	15	19.39	18	37.39
Arc	87371.379m	87381.165m	16.158	1.5	25	24.24	37.5	61.74
Arc	87456.848m	87457.282m	16.158	1.2	40	19.39	48	67.39
Arc	87566.324m	87620.239m	16.158	0.6	15	9.69	9	18.69
Arc	87755.678m	87806.514m	16.158	1.5	30	24.24	45	69.24
Arc	87937.719m	87970.084m	16.158	1.2	15	19.39	18	37.39
Arc	88056.161m	88085.785m	16.158	1.5	30	24.24	45	69.24
Arc	88131.385m	88188.266m	16.158	0.6	15	9.69	9	18.69
Arc	88355.360m	88398.963m	16.158	1.5	30	24.24	45	69.24
Arc	88518.931m	88530.701m	16.158	1.5	30	24.24	45	69.24
Arc	88601.087m	88649.262m	16.158	0.9	25	14.54	22.5	37.04
Arc	88717.910m	88791.185m	16.158	0.9	25	14.54	22.5	37.04
Arc	88850.044m	88947.670m	16.158	0.9	25	14.54	22.5	37.04
Arc	89058.289m	89068.228m	16.158	1.5	25	24.24	37.5	61.74
Arc	89120.655m	89131.935m	16.158	1.2	20	19.39	24	43.39
Arc	89251.659m	89285.751m	16.158	1.5	20	24.24	30	54.24
Arc	89453.656m	89463.339m	16.158	1.2	35	19.39	42	61.39
Arc	89534.460m	89552.492m	16.158	1.2	35	19.39	42	61.39
Arc	89634.811m	89639.744m	16.158	1.5	25	24.24	37.5	61.74
Arc	89691.675m	89718.276m	16.158	1.2	20	19.39	24	43.39
Arc	89842.789m	89900.198m	16.158	1.5	25	24.24	37.5	61.74
Arc	89927.989m	89963.578m	16.158	0.6	0	9.69	0	9.69
Arc	89997.660m	90003.125m	16.158	1.5	25	24.24	37.5	61.74
Arc	90058.135m	90091.214m	16.158	1.5	30	24.24	45	69.24
Arc	90151.165m	90157.798m	16.158	0.6	15	9.69	9	18.69
Arc	90197.850m	90208.048m	16.158	1.5	25	24.24	37.5	61.74
Arc	90252.622m	90259.894m	16.158	1.2	15	19.39	18	37.39
Arc	90328.041m	90348.304m	16.158	1.2	20	19.39	24	43.39
Arc	90414.294m	90436.306m	16.158	1.5	30	24.24	45	69.24
Arc	90514.139m	90537.304m	16.158	1.5	30	24.24	45	69.24
Arc	90718.562m	90744.508m	16.158	1.5	30	24.24	45	69.24
Arc	90956.128m	91065.793m	16.158	0.9	30	14.54	27	41.54
Arc	91150.513m	91229.815m	16.158	1.2	40	19.39	48	67.39
Arc	91366.080m	91402.561m	16.158	0.9	25	14.54	22.5	37.04
Arc	91615.183m	91658.330m	16.158	1.2	40	19.39	48	67.39
Arc	91780.982m	91793.331m	16.158	0.9	15	14.54	13.5	28.04
Arc	91845.984m	91854.526m	16.158	1.5	30	24.24	45	69.24
Arc	91910.124m	91915.479m	16.158	1.2	20	19.39	24	43.39
Arc	92024.954m	92035.408m	16.158	1.2	20	19.39	24	43.39
Arc	92082.225m	92099.858m	16.158	1.5	25	24.24	37.5	61.74
Arc	92142.263m	92162.603m	16.158	0.6	15	9.69	9	18.69
Arc	92256.400m	92282.906m	16.158	0.9	30	14.54	27	41.54
Arc	92441.706m	92534.902m	16.158	0.6	15	9.69	9	18.69
Arc	92589.372m	92595.854m	16.158	0.6	15	9.69	9	18.69
Arc	92670.989m	92687.120m	16.158	1.2	20	19.39	24	43.39



	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	92735.860m	92749.275m	16.158	1.5	25	24.24	37.5	61.74
Arc	92804.557m	92807.785m	16.158	1.5	30	24.24	45	69.24
Arc	92855.780m	92929.080m	16.158	0.6	0	9.69	0	9.69
Arc	93044.860m	93075.074m	16.158	1.2	20	19.39	24	43.39
Arc	93198.763m	93199.298m	16.158	1.5	30	24.24	45	69.24
Arc	93263.273m	93271.212m	16.158	1.5	30	24.24	45	69.24
Arc	93308.704m	93335.542m	16.158	0.6	0	9.69	0	9.69
Arc	93427.193m	93453.873m	16.158	0.9	30	14.54	27	41.54
Arc	93550.760m	93578.673m	16.158	0.6	0	9.69	0	9.69
Arc	93605.064m	93642.276m	16.158	0.9	0	14.54	0	14.54
Arc	93687.497m	93727.976m	16.158	1.5	20	24.24	30	54.24
Arc	93893.801m	93920.898m	16.158	1.2	20	19.39	24	43.39
Arc	93963.921m	93981.933m	16.158	1.5	20	24.24	30	54.24
Arc	94035.712m	94059.041m	16.158	1.5	20	24.24	30	54.24
Arc	94099.259m	94105.590m	16.158	1.5	20	24.24	30	54.24
Arc	94141.174m	94149.852m	16.158	1.5	15	24.24	22.5	46.74
Arc	94180.332m	94185.867m	16.158	1.5	15	24.24	22.5	46.74
Arc	94221.153m	94227.913m	16.158	1.5	20	24.24	30	54.24
Arc	94273.303m	94283.586m	16.158	1.2	15	19.39	18	37.39
Arc	94313.624m	94331.930m	16.158	0.9	15	14.54	13.5	28.04
Arc	94376.786m	94411.520m	16.158	1.5	20	24.24	30	54.24
Arc	94462.893m	94535.369m	16.158	1.5	25	24.24	37.5	61.74
Arc	94593.421m	94677.216m	16.158	0.9	30	14.54	27	41.54
Arc	94735.889m	94747.763m	16.158	0.9	25	14.54	22.5	37.04
Arc	94809.078m	94882.211m	16.158	0.9	25	14.54	22.5	37.04
Arc	95085.815m	95097.414m	16.158	1.2	20	19.39	24	43.39
Arc	95141.018m	95186.097m	16.158	0.6	15	9.69	9	18.69
Arc	95316.923m	95341.476m	16.158	1.5	30	24.24	45	69.24
Arc	95387.778m	95395.120m	16.158	0.9	15	14.54	13.5	28.04
Arc	95435.501m	95442.674m	16.158	1.5	25	24.24	37.5	61.74
Arc	95472.204m	95515.216m	16.158	0	20	0.00	0	0.00
Arc	95535.518m	95547.156m	16.158	1.2	20	19.39	24	43.39
Arc	95587.183m	95597.166m	16.158	0.9	15	14.54	13.5	28.04
Arc	95635.696m	95656.783m	16.158	0.6	20	9.69	12	21.69
Arc	95690.319m	95767.848m	16.158	1.5	15	24.24	22.5	46.74
Arc	95843.139m	95871.004m	16.158	1.2	15	19.39	18	37.39
Arc	95889.168m	95905.036m	16.158	0.6	20	9.69	12	21.69
Arc	95947.902m	95976.275m	16.158	1.5	30	24.24	45	69.24
Arc	96194.276m	96216.120m	16.158	1.2	40	19.39	48	67.39
Arc	96385.109m	96412.349m	16.158	1.5	30	24.24	45	69.24
Arc	96475.033m	96481.443m	16.158	1.5	30	24.24	45	69.24
Arc	96540.813m	96613.336m	16.158	0.9	20	14.54	18	32.54
Arc	96712.703m	96725.881m	16.158	0.6	15	9.69	9	18.69
Arc	96781.231m	96808.667m	16.158	0.9	25	14.54	22.5	37.04
Arc	96890.231m	96914.009m	16.158	0.9	20	14.54	18	32.54
Arc	97042.250m	97055.020m	16.158	1.2	15	19.39	18	37.39
Arc	97131.491m	97156.762m	16.158	1.2	20	19.39	24	43.39
Arc	97283.590m	97290.138m	16.158	1.5	30	24.24	45	69.24
Arc	97350.216m	97369.202m	16.158	1.5	30	24.24	45	69.24
Arc	97432.851m	97450.533m	16.158	1.5	30	24.24	45	69.24



	Start chainage of arc	End chainage of arc	Chord length (m)	Width	Transition length	Total area for extra-widening (in Arc Portion) (sqm.)	Total area for extra-widening (in Transition Portion)	Total area for extra-widening (Sqm.)
Arc	97547.653m	97564.553m	16.158	1.2	20	19.39	24	43.39
Arc	97618.702m	97652.218m	16.158	1.2	20	19.39	24	43.39
Arc	97694.727m	97711.452m	16.158	0.6	15	9.69	9	18.69
Arc	97754.230m	97767.698m	16.158	0.9	25	14.54	22.5	37.04
Arc	97811.865m	97818.394m	16.158	0.6	15	9.69	9	18.69
Arc	97875.650m	97909.061m	16.158	1.5	20	24.24	30	54.24
Arc	97963.968m	97970.527m	16.158	0.9	20	14.54	18	32.54
Arc	98012.074m	98015.177m	16.158	0.6	15	9.69	9	18.69
Arc	98048.628m	98194.320m	16.158	0.6	15	9.69	9	18.69
Arc	98247.564m	98255.719m	16.158	1.2	35	19.39	42	61.39
Arc	98351.397m	98360.165m	16.158	0.9	25	14.54	22.5	37.04
Arc	98542.973m	98562.969m	16.158	0.9	25	14.54	22.5	37.04
Arc	98680.732m	98787.848m	16.158	1.2	20	19.39	24	43.39
Arc	98952.756m	98985.740m	16.158	1.5	30	24.24	45	69.24
Arc	99054.382m	99106.690m	16.158	0.9	25	14.54	22.5	37.04
Arc	99220.030m	99286.161m	16.158	1.2	35	19.39	42	61.39
Arc	99418.606m	99488.394m	16.158	1.5	30	24.24	45	69.24
Arc	99670.554m	99698.210m	16.158	1.2	20	19.39	24	43.39
Arc	99749.386m	99753.940m	16.158	1.2	20	19.39	24	43.39
Arc	99796.255m	99881.664m	16.158	1.2	20	19.39	24	43.39
Arc	99946.075m	99968.527m	16.158	1.5	30	24.24	45	69.24
Arc	100080.707m	100109.040m	16.158	1.5	30	24.24	45	69.24
Arc	100154.668m	100165.220m	16.158	0.9	15	14.54	13.5	28.04
Arc	100212.721m	100217.701m	16.158	1.5	30	24.24	45	69.24
Arc	100351.304m	100401.247m	16.158	1.5	20	24.24	30	54.24
Arc	100454.125m	100481.981m	16.158	1.2	20	19.39	24	43.39
Arc	100507.964m	100513.804m	16.158	0.6	20	9.69	12	21.69
Arc	100543.203m	100598.505m	16.158	1.2	15	19.39	18	37.39
Arc	100666.465m	100705.343m	16.158	1.5	30	24.24	45	69.24
Arc	100735.739m	100744.751m	16.158	0.6	20	9.69	12	21.69
Arc	100760.305m	100858.206m	16.158	0.9	15	14.54	13.5	28.04
Arc	100905.532m	100970.317m	16.158	0.6	15	9.69	9	18.69
Arc	101007.822m	101018.690m	16.158	1.5	15	24.24	22.5	46.74
Arc	101056.645m	101063.942m	16.158	1.5	20	24.24	30	54.24
Arc	101117.848m	101122.697m	16.158	1.5	30	24.24	45	69.24
Arc	101168.043m	101190.693m	16.158	0.9	15	14.54	13.5	28.04
Arc	101223.887m	101240.073m	16.158	0.9	15	14.54	13.5	28.04
								27183.47

Total Area of Extra Widening=

27183 sqm



Variable Declaration

Extra Widening on Flexible Pavement

Sl No	Variable Description	Variable	Dimension	Unit
1	Total Area of Extra Widening	ew_area	27183.000	m
2	BC	bc	0.040	m
3	DBM	dbm	0.070	m
4	WMM-I	wmm1	0.125	m
5	WMM-II	wmm2	0.125	m
6	GSB	gsb	0.200	m
7	Reuseble GSB percentage	gsb_per	0.000	percentage



Errosion Control

Hydroseeding

Chainage (m)		Length of CD	Net Length (m)	TCS No.
From	To			
66650	66860		210	TCS-5A
67410	67480		70	TCS-5
67690	67745	8	47	TCS-3A
68055	68105		50	TCS-5
68105	68155		50	TCS-5A
68155	68205		50	TCS-5
69280	69520	8	232	TCS-5A
69570	69670		100	TCS-5A
69720	69820	2.6	97.4	TCS-5
70240	70355		115	TCS-5
70420	70630		210	TCS-5A
70805	70955		150	TCS-5
71105	71155		50	TCS-5
71555	71750	5	190	TCS-5A
71930	72055		125	TCS-5A
72055	72305		250	TCS-3A
72510	72655	3.84	141.16	TCS-5
72900	72950	2.6	47.4	TCS-3A
73080	73200	3.96	116.04	TCS-5
73465	73520		55	TCS-5
73700	73830	14.06	115.94	TCS-5
73910	74010		100	TCS-5A
75230	75355	2.6	122.4	TCS-5
77295	77450		155	TCS-5A
77880	77960		80	TCS-5
79210	79295		85	TCS-3A
79345	79395		50	TCS-3A
79510	79590		80	TCS-5
79820	79890		70	TCS-5
80190	80330	5.26	134.74	TCS-5A
81315	81630	2.7	312.3	TCS-5
82040	82120		80	TCS-3A
82620	82670		50	TCS-3A
83180	83300		120	TCS-5
83300	83380		80	TCS-3A
84600	84675		75	TCS-5A
84750	84830		80	TCS-3A
85175	85320		145	TCS-3A
85370	85420		50	TCS-3A
85575	85630		55	TCS-3A
85680	85780		100	TCS-5
85840	85900		60	TCS-5
86100	86300		200	TCS-3A



86600	86650		50	TCS-3A
87400	87650		250	TCS-5
87650	87700		50	TCS-5A
87700	87775		75	TCS-5
87820	87880		60	TCS-3A
88060	88100		40	TCS-3A
88270	88350		80	TCS-3A
88350	88450		100	TCS-5
88450	88550		100	TCS-3A
89850	89970		120	TCS-3A
90510	90560		50	TCS-3A
90630	90970		340	TCS-3A
91015	91110		95	TCS-3A
91150	91240		90	TCS-5A
91240	91280		40	TCS-5
91280	91400		120	TCS-3A
91460	91770		310	TCS-3A
92010	92080		70	TCS-3A
92180	92240		60	TCS-5
92420	92500		80	TCS-3A
92820	92980		160	TCS-3A
93090	93270		180	TCS-3A
93630	93880		250	TCS-3A
94275	94375		100	TCS-5
94430	94490		60	TCS-3A
94610	94660		50	TCS-3A
94800	94850		50	TCS-3A
95550	95640		90	TCS-5
95640	95700		60	TCS-5A
95940	96020		80	TCS-3A
96475	96560		85	TCS-5
96630	96690		60	TCS-3A
96880	96930		50	TCS-3A
97120	97165		45	TCS-5
98790	98900		110	TCS-3A
99350	99400		50	TCS-5A
99400	99650		250	TCS-3A
99970	100120		150	TCS-3A

Total =	8816.38	

Avg. Height of Hydroseeding =

8 m

Area of Hydroseeding =

70531.04 sqm



RCC Covered Drain

Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
66180	66280	0	200.0	TCS-6	Both
75880	77030	21.92	2256.2	TCS-6	Both
98600	98700	2.6	97.4	TCS-7	Valley
98700	98790	0	180.0	TCS-6	Both
100840	101280	10.28	859.4	TCS-6	Both
Total =			3593		

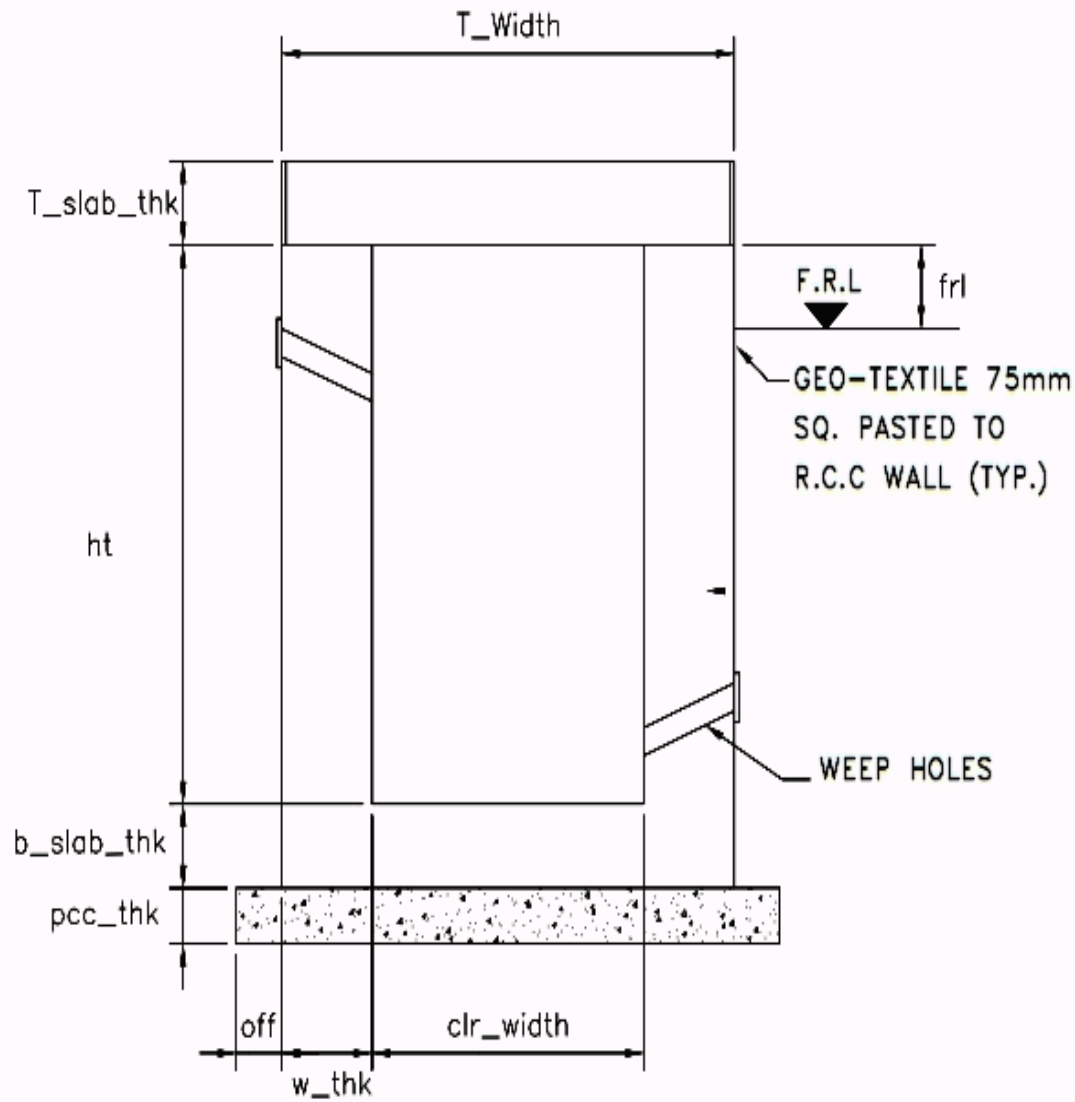


Variable Declaration

RCC Cover Drain 1.0m

Sl No	Variable Description	Variable	Dimension	Unit
1	Top Width	t_width	1.750	m
2	Top Slab Thickness	t_slab_thk	0.125	m
3	Height of Drain	ht	0.900	m
4	Bottom Slab Thickness	b_slab_thk	0.150	m
5	Side Wall Thickness	w_thk	0.200	m
6	Foundation PCC thickness	pcc_thk	0.100	m
7	Foundation PCC Offset	off	0.100	m
8	Length	l	3593.000	m
9	Reinforcement Per Cum RCC	s	0.050	MT/Cum RCC
10	Finished Road Level	frl	0.300	m

Variable Declaration



Trapezoidal Drain

Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
66110	66180	0	70.0	TCS-3	Hill
66280	66550	3.84	266.2	TCS-3	Hill
66550	66600	2.6	47.4	TCS-4	Hill
66600	66650	3.96	46.0	TCS-3	Hill
66860	67010	2.6	147.4	TCS-3	Hill
67010	67090	0	80.0	TCS-4	Hill
67090	67310	2.6	217.4	TCS-3	Hill
67310	67360	0	50.0	TCS-4	Hill
67360	67410	0	50.0	TCS-3	Hill
67480	67690	5.2	204.8	TCS-3	Hill
67690	67745	8	47.0	TCS-3A	Hill
67745	68055	7.8	302.2	TCS-3	Hill
68205	68265	0	60.0	TCS-4	Hill
68265	68850	7.8	577.2	TCS-3	Hill
68850	68910	0	60.0	TCS-4	Hill
68910	69010	2.6	97.4	TCS-3	Hill
69010	69140	0	130.0	TCS-4	Hill
69140	69280	5.3	134.7	TCS-3	Hill
69520	69570	0	50.0	TCS-3	Hill
69670	69720	2.7	47.3	TCS-3	Hill
69820	70240	16.56	403.4	TCS-3	Hill
70355	70420	0	65.0	TCS-4	Hill
70630	70805	2.6	172.4	TCS-3	Hill
70955	71105	2.6	147.4	TCS-3	Hill
71155	71555	7.8	392.2	TCS-3	Hill
71750	71930	2.7	177.3	TCS-3	Hill
72055	72305	0	250.0	TCS-3A	Hill
72305	72380	0	75.0	TCS-3	Hill
72380	72510	2.6	127.4	TCS-4	Hill
72655	72715	0	60.0	TCS-3	Hill
72715	72765	2.6	47.4	TCS-4	Hill
72765	72900	0	135.0	TCS-3	Hill
72900	72950	2.6	47.4	TCS-3A	Hill
72950	73030	0	80.0	TCS-3	Hill
73030	73080	2.6	47.4	TCS-4	Hill
73200	73465	2.6	262.4	TCS-3	Hill
73520	73700	0	180.0	TCS-3	Hill
73830	73910	0	80.0	TCS-3	Hill
74010	74070	0	60.0	TCS-3	Hill
74070	74180	2.6	107.4	TCS-4	Hill
74180	75230	25.58	1024.4	TCS-3	Hill
75355	75880	7.86	517.1	TCS-3	Hill
77030	77100	0	70.0	TCS-3	Hill
77100	77150	2.6	47.4	TCS-4	Hill
77150	77295	0	145.0	TCS-3	Hill
77450	77880	5.2	424.8	TCS-3	Hill
77960	78280	5.3	314.7	TCS-3	Hill
78280	78480	5.3	194.7	TCS-4	Hill
78480	79080	7.9	592.1	TCS-3	Hill
79080	79150	0	70.0	TCS-4	Hill
79150	79210	0	60.0	TCS-3	Hill
79210	79295	0	85.0	TCS-3A	Hill
79295	79345	2.7	47.3	TCS-3	Hill



Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
79345	79395	0	50.0	TCS-3A	Hill
79395	79445	3.84	46.2	TCS-4	Hill
79445	79510	5.26	59.7	TCS-3	Hill
79590	79820	6.14	223.9	TCS-3	Hill
79890	80190	11.84	288.2	TCS-3	Hill
80330	81315	13.2	971.8	TCS-3	Hill
81630	82040	2.6	407.4	TCS-3	Hill
82040	82120	0	80.0	TCS-3A	Hill
82120	82620	5.3	494.7	TCS-3	Hill
82620	82670	0	50.0	TCS-3A	Hill
82670	83180	5.2	504.8	TCS-3	Hill
83300	83380	0	80.0	TCS-3A	Hill
83380	83730	5.2	344.8	TCS-3	Hill
83730	83800	6.54	63.5	TCS-4	Hill
83800	84600	9.04	791.0	TCS-3	Hill
84675	84750	5	70.0	TCS-3	Hill
84750	84830	0	80.0	TCS-3A	Hill
84830	85175	9.16	335.8	TCS-3	Hill
85175	85320	0	145.0	TCS-3A	Hill
85320	85370	2.6	47.4	TCS-3	Hill
85370	85420	0	50.0	TCS-3A	Hill
85420	85575	0	155.0	TCS-3	Hill
85575	85630	2.6	52.4	TCS-3A	Hill
85630	85680	0	50.0	TCS-3	Hill
85780	85840	0	60.0	TCS-4	Hill
85900	86100	2.6	197.4	TCS-3	Hill
86100	86300	5.2	194.8	TCS-3A	Hill
86300	86600	2.6	297.4	TCS-3	Hill
86600	86650	6.14	43.9	TCS-3A	Hill
86650	87180	11.34	518.7	TCS-3	Hill
87180	87250	0	70.0	TCS-4	Hill
87250	87400	0	150.0	TCS-3	Hill
87775	87820	5.12	39.9	TCS-3	Hill
87820	87880	0	60.0	TCS-3A	Hill
87880	88060	2.6	177.4	TCS-3	Hill
88060	88100	0	40.0	TCS-3A	Hill
88100	88270	2.6	167.4	TCS-3	Hill
88270	88350	0	80.0	TCS-3A	Hill
88450	88550	0	100.0	TCS-3A	Hill
88550	89850	18.3	1281.7	TCS-3	Hill
89850	89970	0	120.0	TCS-3A	Hill
89970	90510	9.04	531.0	TCS-3	Hill
90510	90560	0	50.0	TCS-3A	Hill
90560	90630	0	70.0	TCS-3	Hill
90630	90970	5	335.0	TCS-3A	Hill
91015	91110	0	95.0	TCS-3A	Hill
91280	91400	0	120.0	TCS-3A	Hill
91400	91460	2.6	57.4	TCS-3	Hill
91460	91770	0	310.0	TCS-3A	Hill
91770	92010	5.3	234.7	TCS-3	Hill
92010	92080	0	70.0	TCS-3A	Hill
92080	92180	2.6	97.4	TCS-3	Hill
92240	92390	0	150.0	TCS-3	Hill
92390	92420	2.6	27.4	TCS-4	Hill



Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
92420	92500	0	80.0	TCS-3A	Hill
92500	92575	2.6	72.4	TCS-3	Hill
92575	92625	0	50.0	TCS-4	Hill
92625	92820	5.2	189.8	TCS-3	Hill
92820	92980	2.6	157.4	TCS-3A	Hill
92980	93060	5.26	74.7	TCS-3	Hill
93060	93090	0	30.0	TCS-4	Hill
93090	93270	2.6	177.4	TCS-3A	Hill
93270	93580	0	310.0	TCS-3	Hill
93580	93630	2.6	47.4	TCS-4	Hill
93630	93880	123	127.0	TCS-3A	Hill
93880	93940	0	60.0	TCS-7A	Hill
93940	94275	9.14	325.9	TCS-3	Hill
94375	94430	2.6	52.4	TCS-3	Hill
94430	94490	0	60.0	TCS-3A	Hill
94490	94610	2.6	117.4	TCS-3	Hill
94610	94660	0	50.0	TCS-3A	Hill
94660	94800	2.7	137.3	TCS-3	Hill
94800	94850	0	50.0	TCS-3A	Hill
94850	94930	0	80.0	TCS-3	Hill
94930	94970	0	40.0	TCS-4	Hill
94970	95550	10.6	569.4	TCS-3	Hill
95700	95940	8.84	231.2	TCS-3	Hill
95940	96020	0	80.0	TCS-3A	Hill
96020	96475	10.46	444.5	TCS-3	Hill
96560	96630	2.6	67.4	TCS-3	Hill
96630	96690	0	60.0	TCS-3A	Hill
96690	96880	2.6	187.4	TCS-3	Hill
96880	96930	0	50.0	TCS-3A	Hill
96930	97120	2.6	187.4	TCS-3	Hill
97165	98460	11.64	1283.4	TCS-3	Hill
98460	98600	0	140.0	TCS-7A	Hill
98790	98900	0	110.0	TCS-3A	Hill
99025	99350	2.7	322.3	TCS-3	Hill
99400	99650	5.2	244.8	TCS-3A	Hill
99650	99970	5.3	314.7	TCS-3	Hill
99970	100120	2.6	147.4	TCS-3A	Hill
100120	100840	22.38	697.6	TCS-3	Hill
Total =			27809		



Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				

Catchwater Drain

Chainage (m)		Length of CD	Net Length (m)
From	To		
66650	66860	0	210.0
67410	67480	0	70.0
68055	68105	0	50.0
68105	68155	0	50.0
68155	68205	0	50.0
69280	69520	8	232.0
69570	69670	0	100.0
69720	69820	2.6	97.4
70240	70355	0	115.0
70420	70630	0	210.0
70805	70955	0	150.0
71105	71155	0	50.0
71555	71750	5	190.0
71930	72055	0	125.0
72510	72655	3.84	141.2
73080	73200	3.96	116.0
73465	73520	0	55.0
73700	73830	14.06	115.9
73910	74010	0	100.0
75230	75355	2.6	122.4
77295	77450	0	155.0
77880	77960	0	80.0
79510	79590	0	80.0
79820	79890	0	70.0
80190	80330	5.26	134.7
81315	81630	2.7	312.3
83180	83300	0	120.0
84600	84675	2.7	72.3
85680	85780	2.6	97.4
85840	85900	0	60.0
87400	87650	2.6	247.4
87650	87700	0	50.0
87700	87775	0	75.0
88350	88450	5.12	94.9
91150	91240	0	90.0
91240	91280	0	40.0
92180	92240	0	60.0
93880	93940	0	60.0
94275	94375	0	100.0
95550	95640	0	90.0
95640	95700	0	60.0
96475	96560	0	85.0
97120	97165	2.6	42.4
98460	98600	0	140.0
99350	99400	0	50.0
Total =			4816

Total Length of Trapezoidal Drain =
Chute Drain (of avg 8 m height @ 50m
Interval) =

32625 m
771 m



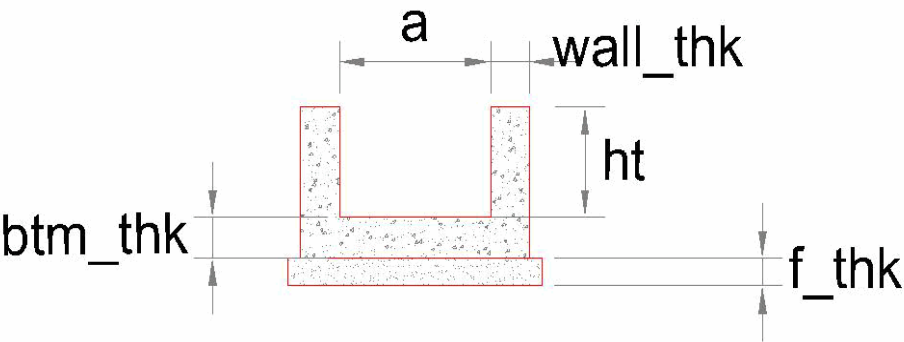
Variable Declaration

PCC Chut Drain

Sl No	Variable Description	Variable	Dimension	Unit
1	Ref Drawing	a	0.600	m
2	Ref Drawing	wall_thk	0.150	m
3	Ref Drawing	btm_thk	0.150	m
4	Ref Drawing	f_thk	0.100	m
5	Ref Drawing	ht	0.400	m
6	Length	l	771.000	m



Variable Declaration



CHUT DRAIN

Trapezoidal Drain

Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
66110	66180	0	70.0	TCS-3	Hill
66280	66550	3.84	266.2	TCS-3	Hill
66550	66600	2.6	47.4	TCS-4	Hill
66600	66650	3.96	46.0	TCS-3	Hill
66860	67010	2.6	147.4	TCS-3	Hill
67010	67090	0	80.0	TCS-4	Hill
67090	67310	2.6	217.4	TCS-3	Hill
67310	67360	0	50.0	TCS-4	Hill
67360	67410	0	50.0	TCS-3	Hill
67480	67690	5.2	204.8	TCS-3	Hill
67690	67745	8	47.0	TCS-3A	Hill
67745	68055	7.8	302.2	TCS-3	Hill
68205	68265	0	60.0	TCS-4	Hill
68265	68850	7.8	577.2	TCS-3	Hill
68850	68910	0	60.0	TCS-4	Hill
68910	69010	2.6	97.4	TCS-3	Hill
69010	69140	0	130.0	TCS-4	Hill
69140	69280	5.3	134.7	TCS-3	Hill
69520	69570	0	50.0	TCS-3	Hill
69670	69720	2.7	47.3	TCS-3	Hill
69820	70240	16.56	403.4	TCS-3	Hill
70355	70420	0	65.0	TCS-4	Hill
70630	70805	2.6	172.4	TCS-3	Hill
70955	71105	2.6	147.4	TCS-3	Hill
71155	71555	7.8	392.2	TCS-3	Hill
71750	71930	2.7	177.3	TCS-3	Hill
72055	72305	0	250.0	TCS-3A	Hill
72305	72380	0	75.0	TCS-3	Hill
72380	72510	2.6	127.4	TCS-4	Hill
72655	72715	0	60.0	TCS-3	Hill
72715	72765	2.6	47.4	TCS-4	Hill
72765	72900	0	135.0	TCS-3	Hill
72900	72950	2.6	47.4	TCS-3A	Hill
72950	73030	0	80.0	TCS-3	Hill
73030	73080	2.6	47.4	TCS-4	Hill
73200	73465	2.6	262.4	TCS-3	Hill
73520	73700	0	180.0	TCS-3	Hill
73830	73910	0	80.0	TCS-3	Hill
74010	74070	0	60.0	TCS-3	Hill
74070	74180	2.6	107.4	TCS-4	Hill
74180	75230	25.58	1024.4	TCS-3	Hill
75355	75880	7.86	517.1	TCS-3	Hill
77030	77100	0	70.0	TCS-3	Hill
77100	77150	2.6	47.4	TCS-4	Hill
77150	77295	0	145.0	TCS-3	Hill
77450	77880	5.2	424.8	TCS-3	Hill
77960	78280	5.3	314.7	TCS-3	Hill
78280	78480	5.3	194.7	TCS-4	Hill
78480	79080	7.9	592.1	TCS-3	Hill
79080	79150	0	70.0	TCS-4	Hill
79150	79210	0	60.0	TCS-3	Hill
79210	79295	0	85.0	TCS-3A	Hill
79295	79345	2.7	47.3	TCS-3	Hill



Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
79345	79395	0	50.0	TCS-3A	Hill
79395	79445	3.84	46.2	TCS-4	Hill
79445	79510	5.26	59.7	TCS-3	Hill
79590	79820	6.14	223.9	TCS-3	Hill
79890	80190	11.84	288.2	TCS-3	Hill
80330	81315	13.2	971.8	TCS-3	Hill
81630	82040	2.6	407.4	TCS-3	Hill
82040	82120	0	80.0	TCS-3A	Hill
82120	82620	5.3	494.7	TCS-3	Hill
82620	82670	0	50.0	TCS-3A	Hill
82670	83180	5.2	504.8	TCS-3	Hill
83300	83380	0	80.0	TCS-3A	Hill
83380	83730	5.2	344.8	TCS-3	Hill
83730	83800	6.54	63.5	TCS-4	Hill
83800	84600	9.04	791.0	TCS-3	Hill
84675	84750	5	70.0	TCS-3	Hill
84750	84830	0	80.0	TCS-3A	Hill
84830	85175	9.16	335.8	TCS-3	Hill
85175	85320	0	145.0	TCS-3A	Hill
85320	85370	2.6	47.4	TCS-3	Hill
85370	85420	0	50.0	TCS-3A	Hill
85420	85575	0	155.0	TCS-3	Hill
85575	85630	2.6	52.4	TCS-3A	Hill
85630	85680	0	50.0	TCS-3	Hill
85780	85840	0	60.0	TCS-4	Hill
85900	86100	2.6	197.4	TCS-3	Hill
86100	86300	5.2	194.8	TCS-3A	Hill
86300	86600	2.6	297.4	TCS-3	Hill
86600	86650	6.14	43.9	TCS-3A	Hill
86650	87180	11.34	518.7	TCS-3	Hill
87180	87250	0	70.0	TCS-4	Hill
87250	87400	0	150.0	TCS-3	Hill
87775	87820	5.12	39.9	TCS-3	Hill
87820	87880	0	60.0	TCS-3A	Hill
87880	88060	2.6	177.4	TCS-3	Hill
88060	88100	0	40.0	TCS-3A	Hill
88100	88270	2.6	167.4	TCS-3	Hill
88270	88350	0	80.0	TCS-3A	Hill
88450	88550	0	100.0	TCS-3A	Hill
88550	89850	18.3	1281.7	TCS-3	Hill
89850	89970	0	120.0	TCS-3A	Hill
89970	90510	9.04	531.0	TCS-3	Hill
90510	90560	0	50.0	TCS-3A	Hill
90560	90630	0	70.0	TCS-3	Hill
90630	90970	5	335.0	TCS-3A	Hill
91015	91110	0	95.0	TCS-3A	Hill
91280	91400	0	120.0	TCS-3A	Hill
91400	91460	2.6	57.4	TCS-3	Hill
91460	91770	0	310.0	TCS-3A	Hill
91770	92010	5.3	234.7	TCS-3	Hill
92010	92080	0	70.0	TCS-3A	Hill
92080	92180	2.6	97.4	TCS-3	Hill
92240	92390	0	150.0	TCS-3	Hill
92390	92420	2.6	27.4	TCS-4	Hill



Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
92420	92500	0	80.0	TCS-3A	Hill
92500	92575	2.6	72.4	TCS-3	Hill
92575	92625	0	50.0	TCS-4	Hill
92625	92820	5.2	189.8	TCS-3	Hill
92820	92980	2.6	157.4	TCS-3A	Hill
92980	93060	5.26	74.7	TCS-3	Hill
93060	93090	0	30.0	TCS-4	Hill
93090	93270	2.6	177.4	TCS-3A	Hill
93270	93580	0	310.0	TCS-3	Hill
93580	93630	2.6	47.4	TCS-4	Hill
93630	93880	123	127.0	TCS-3A	Hill
93880	93940	0	60.0	TCS-7A	Hill
93940	94275	9.14	325.9	TCS-3	Hill
94375	94430	2.6	52.4	TCS-3	Hill
94430	94490	0	60.0	TCS-3A	Hill
94490	94610	2.6	117.4	TCS-3	Hill
94610	94660	0	50.0	TCS-3A	Hill
94660	94800	2.7	137.3	TCS-3	Hill
94800	94850	0	50.0	TCS-3A	Hill
94850	94930	0	80.0	TCS-3	Hill
94930	94970	0	40.0	TCS-4	Hill
94970	95550	10.6	569.4	TCS-3	Hill
95700	95940	8.84	231.2	TCS-3	Hill
95940	96020	0	80.0	TCS-3A	Hill
96020	96475	10.46	444.5	TCS-3	Hill
96560	96630	2.6	67.4	TCS-3	Hill
96630	96690	0	60.0	TCS-3A	Hill
96690	96880	2.6	187.4	TCS-3	Hill
96880	96930	0	50.0	TCS-3A	Hill
96930	97120	2.6	187.4	TCS-3	Hill
97165	98460	11.64	1283.4	TCS-3	Hill
98460	98600	0	140.0	TCS-7A	Hill
98790	98900	0	110.0	TCS-3A	Hill
99025	99350	2.7	322.3	TCS-3	Hill
99400	99650	5.2	244.8	TCS-3A	Hill
99650	99970	5.3	314.7	TCS-3	Hill
99970	100120	2.6	147.4	TCS-3A	Hill
100120	100840	22.38	697.6	TCS-3	Hill
Total =			27809		



Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				

Catchwater Drain

Chainage (m)		Length of CD	Net Length (m)
From	To		
66650	66860	0	210.0
67410	67480	0	70.0
68055	68105	0	50.0
68105	68155	0	50.0
68155	68205	0	50.0
69280	69520	8	232.0
69570	69670	0	100.0
69720	69820	2.6	97.4
70240	70355	0	115.0
70420	70630	0	210.0
70805	70955	0	150.0
71105	71155	0	50.0
71555	71750	5	190.0
71930	72055	0	125.0
72510	72655	3.84	141.2
73080	73200	3.96	116.0
73465	73520	0	55.0
73700	73830	14.06	115.9
73910	74010	0	100.0
75230	75355	2.6	122.4
77295	77450	0	155.0
77880	77960	0	80.0
79510	79590	0	80.0
79820	79890	0	70.0
80190	80330	5.26	134.7
81315	81630	2.7	312.3
83180	83300	0	120.0
84600	84675	2.7	72.3
85680	85780	2.6	97.4
85840	85900	0	60.0
87400	87650	2.6	247.4
87650	87700	0	50.0
87700	87775	0	75.0
88350	88450	5.12	94.9
91150	91240	0	90.0
91240	91280	0	40.0
92180	92240	0	60.0
93880	93940	0	60.0
94275	94375	0	100.0
95550	95640	0	90.0
95640	95700	0	60.0
96475	96560	0	85.0
97120	97165	2.6	42.4
98460	98600	0	140.0
99350	99400	0	50.0
Total =			4816

Total Length of Trapezoidal Drain =
Chute Drain (of avg 8 m height @ 50m
Interval) =

32625 m
771 m



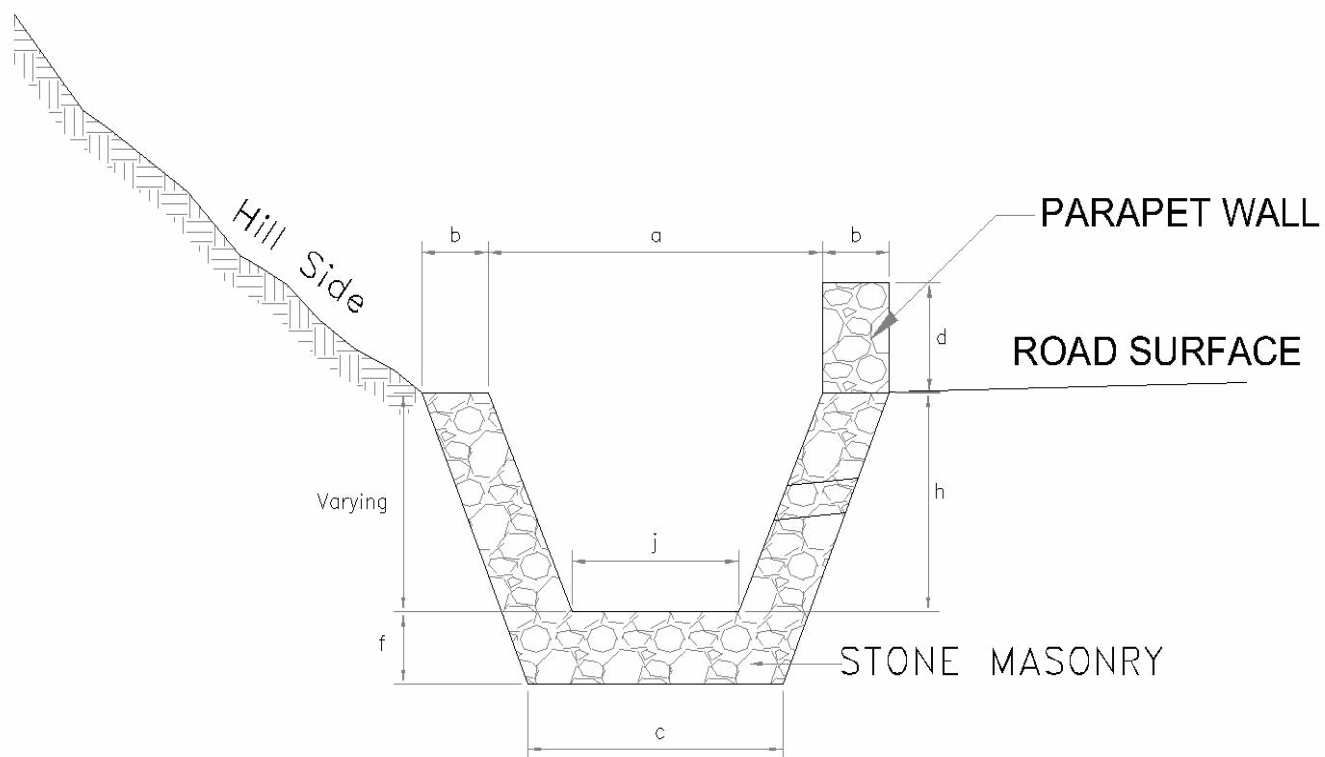
Variable Declaration

RR Masonry Trapezoidal Drain

Sl No	Variable Description	Variable	Dimension	Unit
1	Ref Drawing	a	1.000	m
2	Ref Drawing	b	0.200	m
3	Ref Drawing	d	0.300	m
4	Ref Drawing	h	0.850	m
5	Ref Drawing	c	0.765	m
6	Ref Drawing	j	0.500	m
7	Ref Drawing	f	0.200	m
8	Length	l	32625.000	m



Variable Declaration

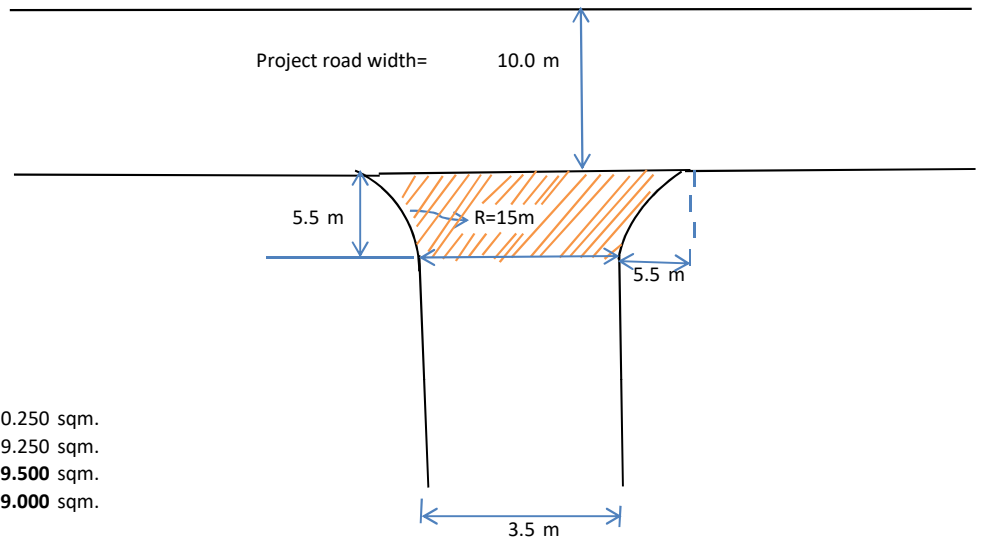


SECTION OF STONE MASONRY TRAPEZOIDAL DRAIN

Minor Junction

Sl No	Survey ch.	Design ch	Type
1	67.633	66.247	3-Legged
2	75.759	74.163	3-Legged
3	77.883	76.280	3-Legged
4	78.880	77.269	3-Legged
5	85.654	83.970	3-Legged
6	87.055	85.350	3-Legged
7	90.257	88.465	3-Legged
8	90.783	88.945	3-Legged
9	103.365	101.090	3-Legged

Pavement Layer	Thickness (m)
GSB =	0.200
WMM-II =	0.125
WMM-I =	0.125
DBM=	0.070
BC =	0.040



For triangular portion area = 30.250 sqm.
 For rectangular portion area = 19.250 sqm.
 Total area of 3 legged Junction = 49.500 sqm.
 Total area of 4 legged Junction = 99.000 sqm.

Quantity Calculation for Minor Junction

Type	No	Each Avg. area	Total Area (sqm)							
3 legged	9	49.50	446							
		Total =	446							

HP Culvert in cross road= 90



Variable Declaration

Minor Junction

SI No	Variable Description	Variable	Dimension	Unit
1	Total_area	tot_area	446.000	area
2	BC	bc	0.040	m
3	DBM	dbm	0.070	m
4	WMM1	wmm1	0.125	m
5	WMM2	wmm2	0.125	m
6	GSB Thickness	gsb	0.200	m
7	GSB Reuse	gsb_per	0.000	



RR Masonry Retaining Wall

Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side	Avg. Height (m)
From	To					
66550	66600	2.6	47.4	TCS-4	Valley	2
67010	67090	0	80.0	TCS-4	Valley	2
67310	67360	0	50.0	TCS-4	Valley	3
68205	68265	0	60.0	TCS-4	Valley	2
68850	68910	0	60.0	TCS-4	Valley	2
69010	69140	0	130.0	TCS-4	Valley	2
70355	70420	0	65.0	TCS-4	Valley	2
72380	72510	2.6	127.4	TCS-4	Valley	3
72715	72765	2.6	47.4	TCS-4	Valley	2
73030	73080	2.6	47.4	TCS-4	Valley	2
74070	74180	2.6	107.4	TCS-4	Valley	2
77100	77150	2.6	47.4	TCS-4	Valley	2
78280	78480	5.3	194.7	TCS-4	Valley	2
79080	79150	0	70.0	TCS-4	Valley	2
79395	79445	3.84	46.2	TCS-4	Valley	2
83730	83800	6.54	63.5	TCS-4	Valley	2
85780	85840	0	60.0	TCS-4	Valley	2
87180	87250	0	70.0	TCS-4	Valley	2
90970	91015	2.7	42.3	TCS-4A	Valley	4
91110	91150	0	40.0	TCS-4A	Valley	2
92390	92420	2.6	27.4	TCS-4	Valley	2
92575	92625	0	50.0	TCS-4	Valley	2
93060	93090	0	30.0	TCS-4	Valley	2
93580	93630	2.6	47.4	TCS-4	Valley	2
94930	94970	0	40.0	TCS-4	Valley	2
Total =			1651			

Length of 2.0 m Retaining Wall = 1431 m
 Length of 3.0 m Retaining Wall = 177 m
 Length of 4.0 m Retaining Wall = 42 m

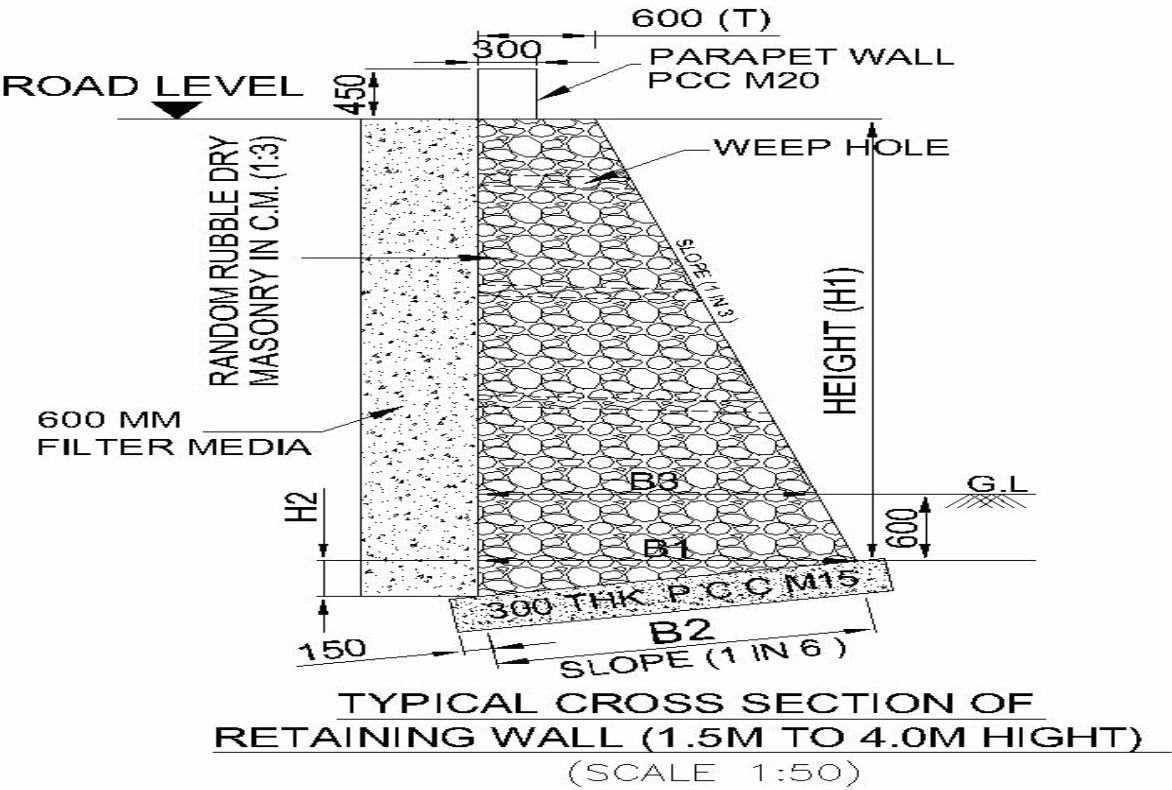


Variable Declaration

Retaining Wall 2.0m

Sl No	Variable Description	Variable	Dimension	Unit
1	Top Width (T)	T	0.600	m
2	Height	H1	2.000	m
3	Slope at Base(1 In 6)	Z	9.462	degree
4	$B1 = (T+H1/3)$	B1	1.270	m
5	$B2 = B1/\cos Z$	B2	1.284	m
6	$H2 = B1.\tan Z$	H2	0.211	m
7	EGL to PCC top Height	d	0.600	m
8	Slope of Wall(1 in 3)	Y	18.435	degree
9	$B3 = T + (H1-d)\tan Y$	e	1.067	m
10	Thickness PCC	pcc_thk	0.300	m
11	Offset at PCC	o	0.150	m
12	Filter Media Width	mw	0.600	m
13	length	l	1431.000	m
14	No of weephole along slope of 1m gap $m = ((H1 - d) / \cos Y) / 1$	n	2.000	nos
15	Avg Length of Weephole $q = (B3 + T) / 2$	weep_len	0.834	m
16	percentage of rock cutting	p_c	0.200	
17	Taking gap every 10m length	gap	0.300	m
18	Width of parapet wall	para_w	0.300	m
19	height of parapet wall	para_ht	0.450	m

Variable Declaration

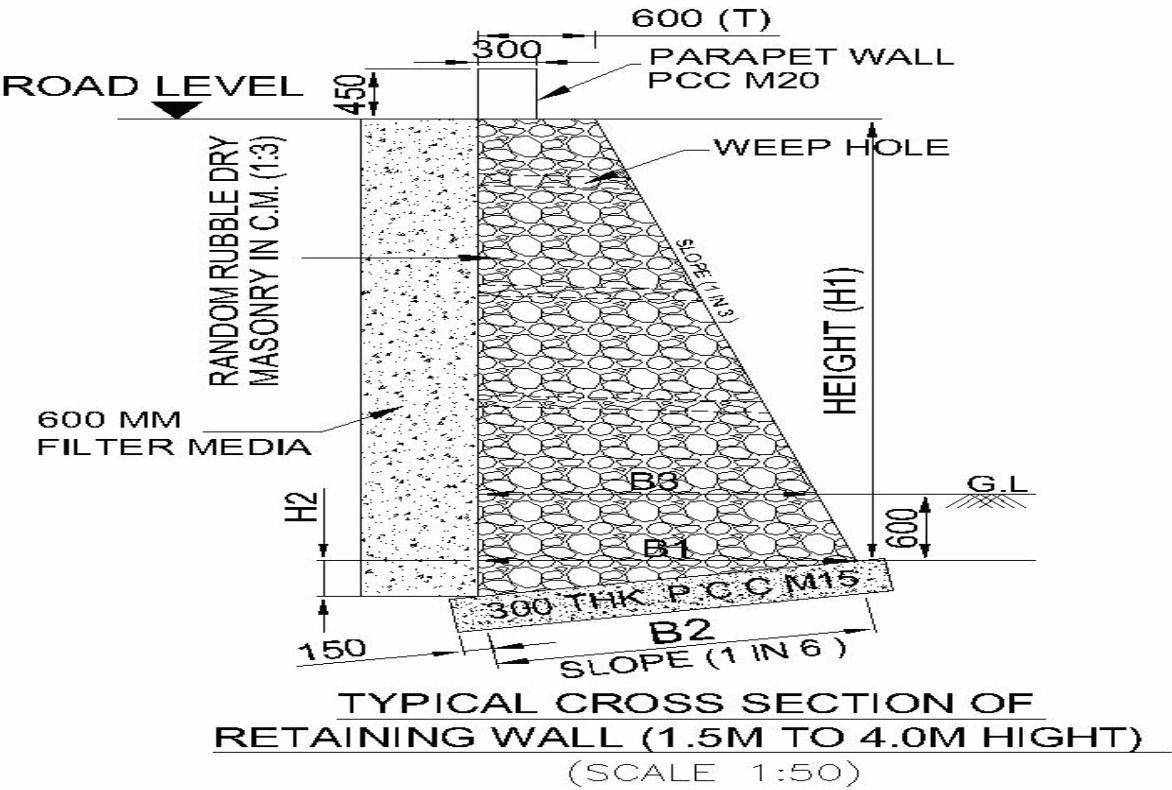


Variable Declaration

Retaining Wall 3.0m

Sl No	Variable Description	Variable	Dimension	Unit
1	Top Width (T)	T	0.600	m
2	Height (H1)	H1	3.000	m
3	Slope at Base(1 In 6)	Z	9.462	degree
4	$B1 = (T+H1/3)$	B1	1.600	m
5	$B2 = B1/\cos Z$	B2	1.622	m
6	$H2 = B1.\tan Z$	H2	0.267	m
7	EGL to PCC top Height	d	0.600	m
8	Slope of Wall(1 in 3)	Y	18.435	degree
9	$B3 = T + (H1-d)\tan Y$	B3	1.400	m
10	Thickness PCC	pcc_th1k	0.300	m
11	Offset at PCC	o	0.150	m
12	Filter Media Width	mw	0.600	m
13	length	l	177.000	m
14	No of weephole along slope of 1m gap $m = ((H1 - d) / \cos Y) / 1$	n	3.000	nos
15	Avg Length of Weephole $q = (B3 + T) / 2$	weep_len	1.000	m
16	percentage of rock cutting	p_c	0.200	
17	height of parapet wall	para_ht	0.450	m
18	width of parapet wall	para_w	0.300	m
19	Taking gap every 10m length	gap	0.300	m

Variable Declaration

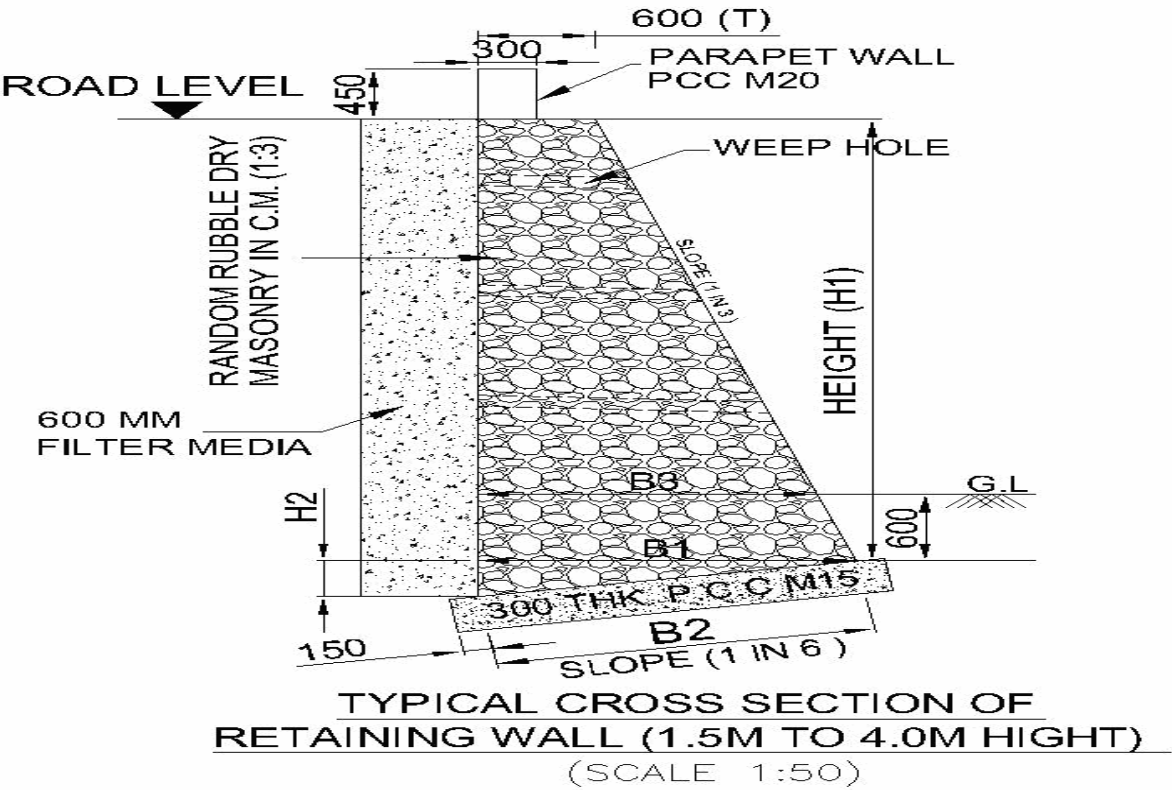


Variable Declaration

Retaining Wall 4.0m

SI No	Variable Description	Variable	Dimension	Unit
1	Top Width (T)	T	0.600	m
2	Height (H1)	H1	4.000	m
3	Slope at Base(1 In 6)	Z	9.462	degree
4	$B1 = (T+H1/3)$	B1	1.933	m
5	$B2 = B1/\cos Z$	B2	1.960	m
6	$H2 = B1.\tan Z$	H2	0.322	m
7	EGL to PCC top Height	d	0.600	m
8	Slope of Wall(1 in 3)	Y	18.435	degree
9	$B3 = T + (H1-d)\tan Y$	B3	1.733	m
10	Thickness PCC	pcc_thk	0.300	m
11	Offset at PCC	o	0.150	m
12	Filter Media Width	mw	0.600	m
13	length	l	42.000	m
14	No of weephole along slope of 1m gap $m = ((H1 - d) / \cos Y) / 1$	n	4.000	nos
15	Avg Length of Weephole $q = (B3 + T) / 2$	weep_len	1.667	m
16	percentage of rock cutting	p_c	0.200	
17	Taking gap every 10m length	gap	0.300	m
18	Width of parapet wall	para_w	0.300	m
19	height of parapet wall	para_ht	0.450	m

Variable Declaration



Breast Wall						
Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side	Avg. Height (m)
From	To					
66650	66860	0	210.0	TCS-5A	Hill	3
67410	67480	0	70.0	TCS-5	Hill	3
68055	68105	0	50.0	TCS-5	Hill	3
68105	68155	0	50.0	TCS-5A	Hill	3
68155	68205	0	50.0	TCS-5	Hill	3
69280	69520	8	232.0	TCS-5A	Hill	3
69570	69670	0	100.0	TCS-5A	Hill	3
69720	69820	2.6	97.4	TCS-5	Hill	3
70240	70355	0	115.0	TCS-5	Hill	3
70420	70630	0	210.0	TCS-5A	Hill	3
70805	70955	0	150.0	TCS-5	Hill	3
71105	71155	0	50.0	TCS-5	Hill	3
71555	71750	5	190.0	TCS-5A	Hill	3
71930	72055	0	125.0	TCS-5A	Hill	3
72510	72655	3.84	141.2	TCS-5	Hill	3
73080	73200	3.96	116.0	TCS-5	Hill	3
73465	73520	0	55.0	TCS-5	Hill	3
73700	73830	14.06	115.9	TCS-5	Hill	3
73910	74010	0	100.0	TCS-5A	Hill	3
75230	75355	2.6	122.4	TCS-5	Hill	3
77295	77450	0	155.0	TCS-5A	Hill	3
77880	77960	0	80.0	TCS-5	Hill	3
79510	79590	0	80.0	TCS-5	Hill	3
79820	79890	0	70.0	TCS-5	Hill	3
80190	80330	5.26	134.7	TCS-5A	Hill	3
81315	81630	2.7	312.3	TCS-5	Hill	3
83180	83300	0	120.0	TCS-5	Hill	3
84600	84675	2.7	72.3	TCS-5A	Hill	3
85680	85780	2.6	97.4	TCS-5	Hill	3
85840	85900	0	60.0	TCS-5	Hill	3
87400	87650	2.6	247.4	TCS-5	Hill	3
87650	87700	0	50.0	TCS-5A	Hill	3
87700	87775	0	75.0	TCS-5	Hill	3
88350	88450	5.12	94.9	TCS-5	Hill	3
91150	91240	0	90.0	TCS-5A	Hill	3
91240	91280	0	40.0	TCS-5	Hill	3
92180	92240	0	60.0	TCS-5	Hill	3
93880	93940	0	60.0	TCS-7A	Hill	3
94275	94375	0	100.0	TCS-5	Hill	3
95550	95640	0	90.0	TCS-5	Hill	3
95640	95700	0	60.0	TCS-5A	Hill	3
96475	96560	0	85.0	TCS-5	Hill	3
97120	97165	2.6	42.4	TCS-5	Hill	3
98460	98600	0	140.0	TCS-7A	Hill	3
99350	99400	0	50.0	TCS-5A	Hill	3
Total =			4816			



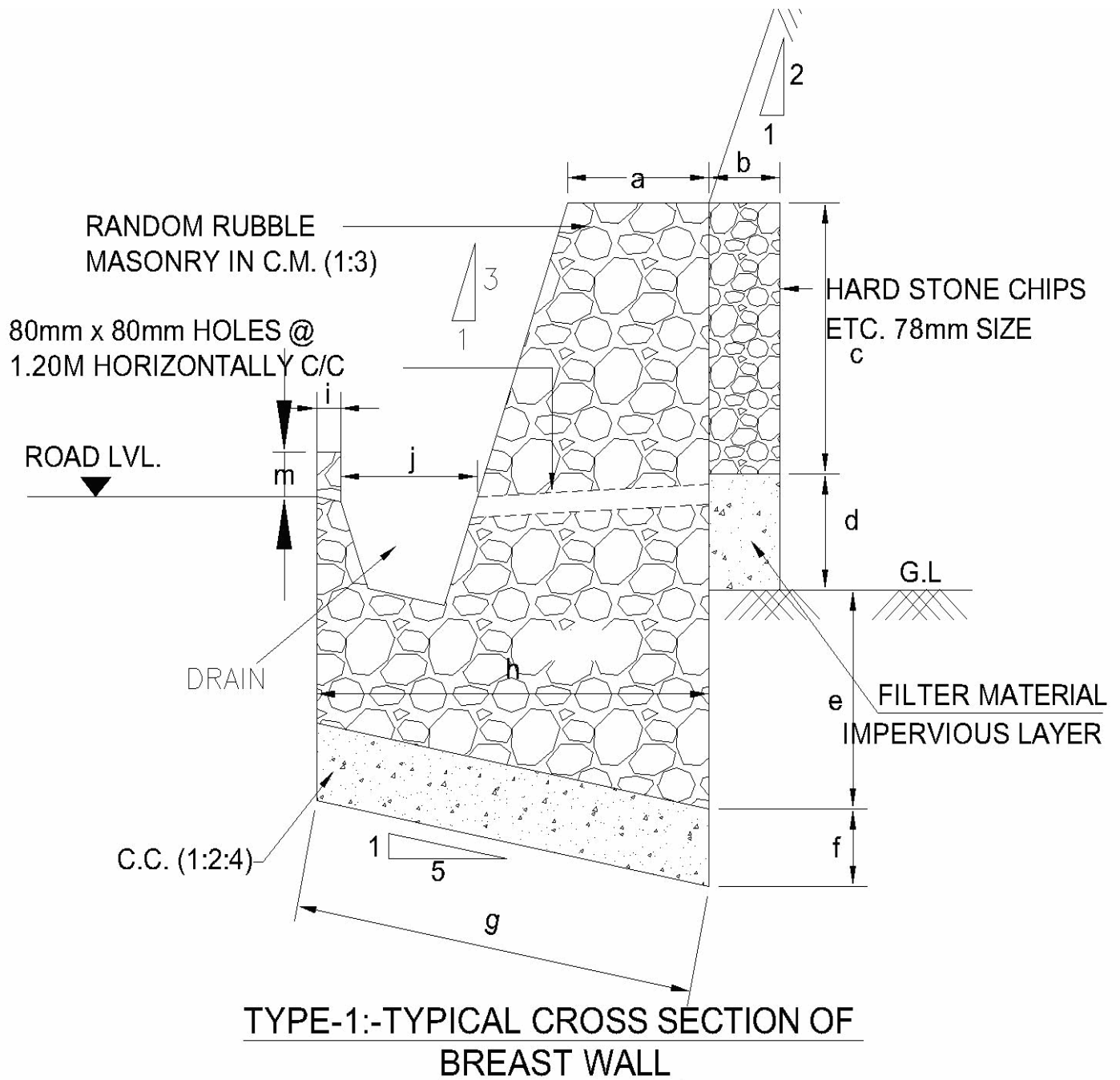
Variable Declaration

Breast Wall 3.0m Ht

Sl No	Variable Description	Variable	Dimension	Unit
1	From Diagram	a	0.600	m
2	From Diagram	b	0.300	m
3	From Diagram	c	2.550	m
4	From Diagram	d	0.450	m
5	From Diagram	e	0.850	m
6	From Diagram	f	0.300	m
7	PCC Width $g = \sqrt{h^2 + (h/5)^5}$	g	2.225	m
8	From Diagram	h	2.225	m
9	From Diagram	i	0.100	m
10	From Diagram	j	0.600	m
11	length	l	4816.000	m
12	Percentage of Earthwork in Ordinary Rock(20%)	p	0.200	
13	From Diagram	m	0.000	m



Variable Declaration



Bus bay and Passenger Shelter

Chainage	Side	Name of Place
66+300	Both Side	Rangkhung
77+010	Both Side	Avangkhul
93+515	Both Side	IRANG
98+620	Both Side	Khungsang
100+300	Both Side	Khungsang

Nos

10 Nos



Variable Declaration

Passenger Shelter

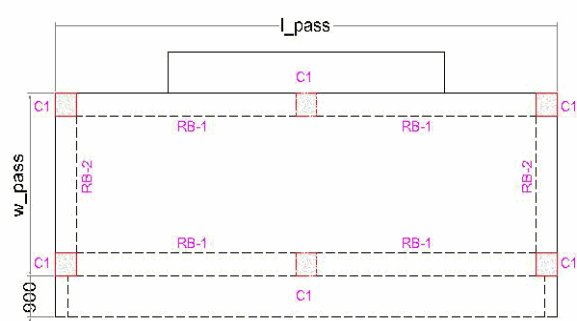
SI No	Variable Description	Variable	Dimension	Unit
1	No of Passenger Shelter	n	10.000	nos
2	Foundation Length for column	a	0.750	m
3	Foundation Width for column	b	0.750	m
4	Foundation Depth for column	df	0.750	m
5	Nos of column	col_n	6.000	Nos
6	Foundation length for Brick work	l	13.500	m
7	Foundation width for Brick work	w	0.500	m
8	Foundation depth for Brick work	db	0.300	m
9	Each column length	col_l	0.250	m
10	Each column width	col_w	0.250	m
11	Thickness of foundation at bottom	btm_thk	0.100	m
12	Thickness of foundation at top	top_thk	0.100	m
13	Foundation reinforcement	rf	120.000	kg/cum
14	Width of brick wall	w_wall	0.125	m
15	Thickness of pcc	pcc_thk	0.100	m
16	Length of Passenger shelter	l_pass	6.000	m
17	Width of Passenger shelter	w_pass	2.000	m
18	Foundation brick wall top thickness	wtop_thk	0.150	m
19	Foundation brick wall btm thickness	wbtm_thk	0.150	m
20	Side wall & back wall lower portion height	wall_h	0.550	m
21	Side wall upper portion length	sw_l	1.500	m
22	Side wall upper portion height	sw_h	2.130	m
23	Back wall upper portion Length	bw_l	2.650	m
24	Back wall upper portion height	bw_h	0.950	m
25	Seating bench length	bch_l	5.000	m
26	Seating bench width	bch_w	0.500	m
27	Seating bench thickness	bch_thk	0.075	m
28	Nos of window	win_n	2.000	nos
29	Length of window	win_l	1.250	m
30	Height of window	win_h	0.900	m
31	Front column height	fcol_h	2.650	m
32	Back column height	bcol_h	2.100	m
33	Side beam length (RB2)	sb_l	1.530	m
34	Side beam width	sb_w	0.250	m
35	Side beam thickness	sb_thk	0.350	m
36	Side beam length (RB1)	sb_a	3.000	m

Variable Declaration

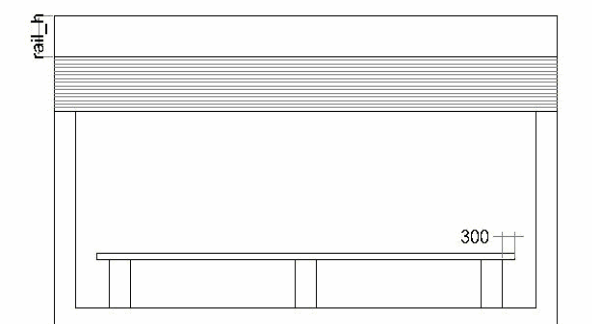
37	Thickness of Roof slab	roof_thk	0.110	m
38	Width of front Chajja	fchj_w	0.680	m
39	Width of back Chajja	bchj_w	0.450	m
40	Length of railing	rail_l	9.500	m
41	Height of railing	rail_h	0.450	m
42	Width of roof slab	roof_w	1.530	m
43	Superstructure reinforcement	srf	100.000	kg/cum
44	Side wall inner side length	sw_in	1.875	m
45	Back wall inner side length	bw_in	5.800	m
46	Side wall height (plastering &painting)	sw_ht	3.830	m
47	Back wall height (plastering &painting)	bw_ht	2.350	m
48	top width of wall in foundation	fw_wall	0.250	m



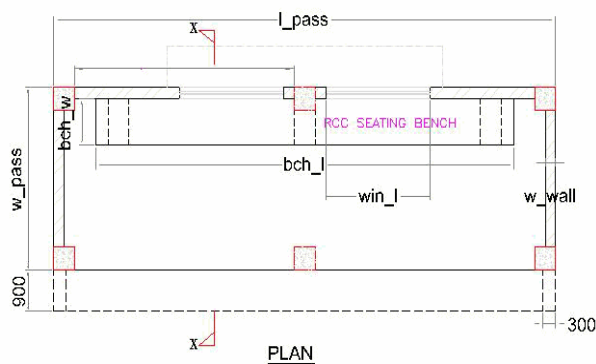
Variable Declaration



STRUCTURAL ARRANGEMENT PLAN

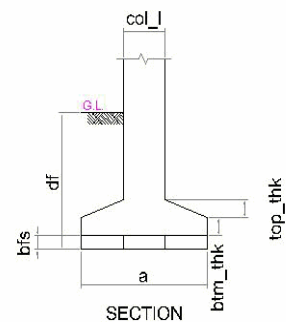


FRONT ELEVATION

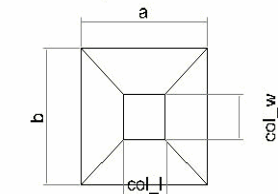


PLAN

PASSENGER SHELTER

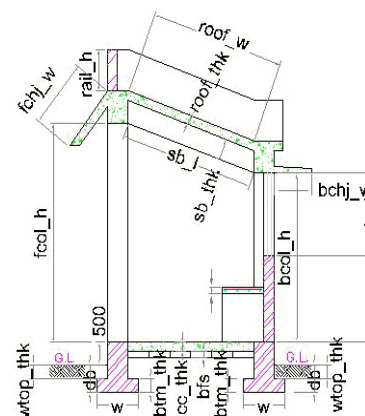


SECTION



PLAN

COLUMN FOUNDATION DETAILS



SECTION X-X

Bus bay and Passenger Shelter

Chainage	Side	Name of Place
66+300	Both Side	Rangkhung
77+010	Both Side	Avangkhul
93+515	Both Side	IRANG
98+620	Both Side	Khungsang
100+300	Both Side	Khungsang

Nos

10 Nos



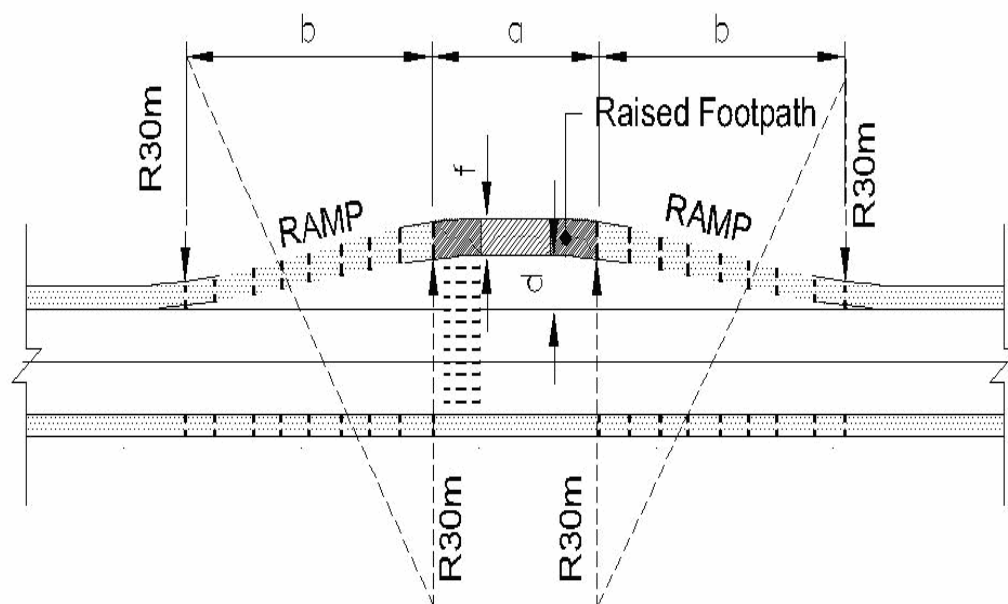
Variable Declaration

Busbay (2 Lane)

Sl No	Variable Description	Variable	Dimension	Unit
1	BC Thickness	bc	0.040	m
2	DBM Thickness	dbm	0.070	m
3	WMM-I Thickness	wmm1	0.125	m
4	WMM-II Thickness	wmm2	0.125	m
5	GSB Thickness	gsb	0.200	m
6	SG Thickness	sg	0.500	m
7	Nos of Bus Bay	n	10.000	nos
8	Width Foothpath	f	2.500	m
9	Ref Drawing	a	15.000	m
10	Ref Drawing	b	22.000	m
11	Ref Drawing	d	3.500	m
12	GSB percentage Re-use	gsb_per	0.000	percentage



Variable Declaration



TYPICAL LAYOUT OF PICK-UP BUS STOP ON HILLY AREA

Traffic Signs and Other Appurtenance

Summary Of Traffic Signs

Total No of Street Light=

Kilometer stones=

5th Kilometer stones=

Boundary Stones=

Delineators (100 cm long and circular shaped)+Hazard marker =

Road Stud=

900 mm Octagonal

600 mm circular

900 mm Triangular

800 mm x 600 mm rectangular

Convex Mirror for Blind Curve

Rumble Strip=

126	Nos	Bill No- 06, Sl. No- 10
28	Nos	Bill No- 06, Sl. No- 2
7	Nos	Bill No- 06, Sl. No- 1
354	Nos	Bill No- 06, Sl. No- 3
3717	Nos	Bill No- 06, Sl. No- 8
19344	Nos	Bill No- 06, Sl. No- 9
24	Nos	Bill No- 06, Sl. No- 8
84	Nos	Bill No- 06, Sl. No- 5
480	Nos	Bill No- 06, Sl. No- 5
4	Nos	Bill No- 06, Sl. No- 6
0	Nos	Bill No- 06, Sl. No- 16
760	sqm	Bill No- 06, Sl. No- 13



CALCULATION FOR ROAD STUD

SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		66150.174	66181.769	25	66105.174	66226.769	121.60	50	6	21	42
		66239.017	66288.878	30	66189.017	66338.878	149.86	51	6	25	50
		66393.461	66411.392	30	66343.461	66461.392	117.93	52	6	20	40
		66541.497	66563.074	15	66506.497	66598.074	91.58	53	6	16	32
		66606.549	66615.525	15	66571.549	66650.525	78.98	54	6	14	28
		66646.602	66653.472	15	66611.602	66688.472	76.87	55	6	13	26
		66736.216	66795.396	30	66686.216	66845.396	159.18	56	6	27	54
		66847.863	66856.882	15	66812.863	66891.882	79.02	57	6	14	28
		66895.607	66911.031	15	66860.607	66946.031	85.42	58	6	15	30
		66995.342	67055.954	30	66945.342	67105.954	160.61	59	6	27	54
		67196.226	67210.743	25	67151.226	67255.743	104.52	60	6	18	36
		67272.744	67279.955	35	67217.744	67334.955	117.21	61	6	20	40
		67350.226	67389.497	35	67295.226	67444.497	149.27	62	6	25	50
		67509.074	67573.746	25	67464.074	67618.746	154.67	63	6	26	52
		67633.798	67667.684	20	67593.798	67707.684	113.89	64	6	19	38
		67821.09	67889.183	20	67781.090	67929.183	148.09	65	6	25	50
		68003.789	68013.776	15	67968.789	68048.776	79.99	66	6	14	28
		68122.559	68162.974	20	68082.559	68202.974	120.42	67	6	21	42
		68211.83	68283.531	20	68171.830	68323.531	151.70	68	6	26	52
		68466.702	68476.15	30	68416.702	68526.15	109.45	69	6	19	38
		68544.28	68552.261	35	68489.280	68607.261	117.98	70	6	20	40
		68682.248	68692.034	20	68642.248	68732.034	89.79	71	6	15	30
		68735.55	68798.822	20	68695.550	68838.822	143.27	72	6	24	48
		68846.514	68857.054	15	68811.514	68892.054	80.54	73	6	14	28
		68911.122	68935.656	30	68861.122	68985.656	124.53	74	6	21	42
		69099.329	69130.859	30	69049.329	69180.859	131.53	75	6	22	44
		69186.819	69200.012	20	69146.819	69240.012	93.19	76	6	16	32
		69269.349	69328.531	30	69219.349	69378.531	159.18	77	6	27	54
		69422.739	69458.638	15	69387.739	69493.638	105.90	78	6	18	36
		69630.131	69637.037	30	69580.131	69687.037	106.91	79	6	18	36
		69687.434	69740.087	15	69652.434	69775.087	122.65	80	6	21	42
		69792.012	69810.204	30	69742.012	69860.204	118.19	81	6	20	40
		69879.239	69889.688	30	69829.239	69939.688	110.45	82	6	19	38
		69983.979	69989.829	25	69938.979	70034.829	95.85	83	6	16	32
		70040.663	70049.812	25	69995.663	70094.812	99.15	84	6	17	34



SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		70111.657	70197.892	20	70071.657	70237.892	166.24	85	6	28	56
		70374.826	70405.102	30	70324.826	70455.102	130.28	86	6	22	44
		70453.894	70470.463	15	70418.894	70505.463	86.57	87	6	15	30
		70593.228	70600.478	30	70543.228	70650.478	107.25	88	6	18	36
		70704.42	70735.918	40	70644.420	70795.918	151.50	89	6	26	52
		70897.773	70920.129	20	70857.773	70960.129	102.36	90	6	18	36
		70977.544	71036.11	35	70922.544	71091.11	168.57	91	6	29	58
		71102.585	71120.12	30	71052.585	71170.12	117.53	92	6	20	40
		71265.156	71301.538	30	71215.156	71351.538	136.38	93	6	23	46
		71533.049	71580.83	30	71483.049	71630.83	147.78	94	6	25	50
		71642.956	71650.22	20	71602.956	71690.22	87.26	95	6	15	30
		71700.994	71707.936	30	71650.994	71757.936	106.94	96	6	18	36
		71771.581	71782.427	25	71726.581	71827.427	100.85	97	6	17	34
		71837.887	71880.602	25	71792.887	71925.602	132.71	98	6	23	46
		71953.294	71972.548	20	71913.294	72012.548	99.25	99	6	17	34
		72022.353	72044.751	15	71987.353	72079.751	92.40	100	6	16	32
		72152.476	72183.993	20	72112.476	72223.993	111.52	101	6	19	38
		72226.775	72398.7	15	72191.775	72433.7	241.93	102	6	41	82
		72441.681	72459.444	20	72401.681	72499.444	97.76	103	6	17	34
		72520.756	72531.274	40	72460.756	72591.274	130.52	104	6	22	44
		72602.348	72619.818	30	72552.348	72669.818	117.47	105	6	20	40
		72694.406	72715.059	30	72644.406	72765.059	120.65	106	6	21	42
		72811.879	72845.583	30	72761.879	72895.583	133.70	107	6	23	46
		72882.093	72919.728		72862.093	72939.728	77.64	108	6	13	26
		72954.28	72978.418	20	72914.280	73018.418	104.14	109	6	18	36
		73030.878	73055.81	30	72980.878	73105.81	124.93	110	6	21	42
		73111.884	73117.072	25	73066.884	73162.072	95.19	111	6	16	32
		73246.239	73265.304	30	73196.239	73315.304	119.07	112	6	20	40
		73330.198	73342.19	30	73280.198	73392.19	111.99	113	6	19	38
		73414.067	73445.284	15	73379.067	73480.284	101.22	114	6	17	34
		73497.105	73503.262	30	73447.105	73553.262	106.16	115	6	18	36
		73650.909	73703.56	30	73600.909	73753.56	152.65	116	6	26	52
		73765.51	73769.752	30	73715.510	73819.752	104.24	117	6	18	36
		73824.869	73915.796	25	73779.869	73960.796	180.93	118	6	31	62
		74032.566	74095.461	30	73982.566	74145.461	162.89	119	6	28	56
		74143.326	74156.882	15	74108.326	74191.882	83.56	120	6	14	28
		74207.444	74220.811	35	74152.444	74275.811	123.37	121	6	21	42
		74293.388	74398.075	20	74253.388	74438.075	184.69	122	6	31	62



SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		74508.889	74578.13		74488.889	74598.13	109.24	123	6	19	38
		74646.485	74662.513	25	74601.485	74707.513	106.03	124	6	18	36
		74716.787	74736.35	25	74671.787	74781.35	109.56	125	6	19	38
		74858.032	74871.807	25	74813.032	74916.807	103.77	126	6	18	36
		74914.878	75022.238	15	74879.878	75057.238	177.36	127	6	30	60
		75106.333	75133.057	30	75056.333	75183.057	126.72	128	6	22	44
		75288.295	75310.25	30	75238.295	75360.25	121.96	129	6	21	42
		75393.348	75400.624	20	75353.348	75440.624	87.28	130	6	15	30
		75461.476	75472.625	35	75406.476	75527.625	121.15	131	6	21	42
		75551.665	75613.964	30	75501.665	75663.964	162.30	132	6	28	56
		75735.366	75823.464	35	75680.366	75878.464	198.10	133	6	34	68
		75918.996	75948.166	30	75868.996	75998.166	129.17	134	6	22	44
		76012.129	76032.87	20	75972.129	76072.87	100.74	135	6	17	34
		76108.841	76127.268	30	76058.841	76177.268	118.43	136	6	20	40
		76182.279	76200.605	20	76142.279	76240.605	98.33	137	6	17	34
		76243.844	76259.508	20	76203.844	76299.508	95.66	138	6	16	32
		76407.551	76431.707	25	76362.551	76476.707	114.16	139	6	20	40
		76480.039	76509.449	20	76440.039	76549.449	109.41	140	6	19	38
		76549.688	76575.049	20	76509.688	76615.049	105.36	141	6	18	36
		76616.457	76635.745	20	76576.457	76675.745	99.29	142	6	17	34
		76680.375	76691.287	15	76645.375	76726.287	80.91	143	6	14	28
		76746.96	76770.509	15	76711.960	76805.509	93.55	144	6	16	32
		76886.208	76937.45	30	76836.208	76987.45	151.24	145	6	26	52
		77207.093	77268.959	40	77147.093	77328.959	181.87	146	6	31	62
		77354.569	77416.309	40	77294.569	77476.309	181.74	147	6	31	62
		77508.339	77532.019	30	77458.339	77582.019	123.68	148	6	21	42
		77595.516	77611.518	25	77550.516	77656.518	106.00	149	6	18	36
		77649.591	77700.835		77629.591	77720.835	91.24	150	6	16	32
		77833.641	77836.707	30	77783.641	77886.707	103.07	151	6	18	36
		77918.086	77929.22	15	77883.086	77964.22	81.13	152	6	14	28
		77960.118	77976.414	15	77925.118	78011.414	86.30	153	6	15	30
		78018.391	78048.753	25	77973.391	78093.753	120.36	154	6	21	42
		78125.984	78182.357	25	78080.984	78227.357	146.37	155	6	25	50
		78241.421	78274.647	30	78191.421	78324.647	133.23	156	6	23	46
		78369.363	78395.243	30	78319.363	78445.243	125.88	157	6	21	42
		78467.004	78563.199	15	78432.004	78598.199	166.19	158	6	28	56
		78625.465	78630.105	15	78590.465	78665.105	74.64	159	6	13	26
		78680.001	78699.48	30	78630.001	78749.48	119.48	160	6	20	40



SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		78807.468	78869.217	15	78772.468	78904.217	131.75	161	6	22	44
		78919.053	78955.569	30	78869.053	79005.569	136.52	162	6	23	46
		79030.549	79073.09	20	78990.549	79113.09	122.54	163	6	21	42
		79224.382	79281.706	15	79189.382	79316.706	127.32	164	6	22	44
		79337.554	79369.508	25	79292.554	79414.508	121.95	165	6	21	42
		79520.679	79548.761	15	79485.679	79583.761	98.08	166	6	17	34
		79589.242	79605.863	25	79544.242	79650.863	106.62	167	6	18	36
		79730.732	79740.56	15	79695.732	79775.56	79.83	168	6	14	28
		79781.64	79817.779	20	79741.640	79857.779	116.14	169	6	20	40
		79943.707	79965.323	20	79903.707	80005.323	101.62	170	6	17	34
		80022.191	80058.373	35	79967.191	80113.373	146.18	171	6	25	50
		80143.157	80205.288	30	80093.157	80255.288	162.13	172	6	28	56
		80275.208	80334.954	20	80235.208	80374.954	139.75	173	6	24	48
		80482.831	80500.084	15	80447.831	80535.084	87.25	174	6	15	30
		80645.145	80680.306	20	80605.145	80720.306	115.16	175	6	20	40
		80725.608	80736.216	25	80680.608	80781.216	100.61	176	6	17	34
		80802.841	80865.276	20	80762.841	80905.276	142.43	177	6	24	48
		81017.876	81029.262	25	80972.876	81074.262	101.39	178	6	17	34
		81084.792	81097.115	25	81039.792	81142.115	102.32	179	6	18	36
		81198.156	81217.252	30	81148.156	81267.252	119.10	180	6	20	40
		81275.494	81298.176	15	81240.494	81333.176	92.68	181	6	16	32
		81340.227	81348.48	15	81305.227	81383.48	78.25	182	6	14	28
		81410.639	81418.311	25	81365.639	81463.311	97.67	183	6	17	34
		81462.657	81505.924	15	81427.657	81540.924	113.27	184	6	19	38
		81547.091	81666.728	20	81507.091	81706.728	199.64	185	6	34	68
		81694.561	81731.834		81674.561	81751.834	77.27	186	6	13	26
		81782.688	81802.51	30	81732.688	81852.51	119.82	187	6	20	40
		81883.329	81910.412	25	81838.329	81955.412	117.08	188	6	20	40
		81960.582	81988.357	15	81925.582	82023.357	97.78	189	6	17	34
		82034.392	82051.585	30	81984.392	82101.585	117.19	190	6	20	40
		82144.969	82181.576	25	82099.969	82226.576	126.61	191	6	22	44
		82287.67	82294.33	30	82237.670	82344.33	106.66	192	6	18	36
		82339.722	82374.28	15	82304.722	82409.28	104.56	193	6	18	36
		82409.251	82452.179	15	82374.251	82487.179	112.93	194	6	19	38
		82583.344	82619.543	30	82533.344	82669.543	136.20	195	6	23	46
		82688.834	82704.783	20	82648.834	82744.783	95.95	196	6	16	32
		82840.618	82896.87	30	82790.618	82946.87	156.25	197	6	27	54
		82947.386	82962.373	20	82907.386	83002.373	94.99	198	6	16	32



SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		82995.182	83032.85		82975.182	83052.85	77.67	199	6	13	26
		83064.991	83079.671	30	83014.991	83129.671	114.68	200	6	20	40
		83288.2	83316.196	30	83238.200	83366.196	128.00	201	6	22	44
		83372.52	83392.269	25	83327.520	83437.269	109.75	202	6	19	38
		83434.468	83443.867	15	83399.468	83478.867	79.40	203	6	14	28
		83483.366	83518.805	20	83443.366	83558.805	115.44	204	6	20	40
		83646.268	83651.469	20	83606.268	83691.469	85.20	205	6	15	30
		83687.985	83706.534	15	83652.985	83741.534	88.55	206	6	15	30
		83749.236	83764.995	15	83714.236	83799.995	85.76	207	6	15	30
		83826.689	83891.557	20	83786.689	83931.557	144.87	208	6	25	50
		83982.471	84006.868	30	83932.471	84056.868	124.40	209	6	21	42
		84091.644	84099.569	20	84051.644	84139.569	87.93	210	6	15	30
		84198.577	84209.253	20	84158.577	84249.253	90.68	211	6	16	32
		84262.069	84337.614	15	84227.069	84372.614	145.54	212	6	25	50
		84377.086	84446.322	15	84342.086	84481.322	139.24	213	6	24	48
		84484.262	84516.674	15	84449.262	84551.674	102.41	214	6	18	36
		84630.458	84740.052	15	84595.458	84775.052	179.59	215	6	30	60
		84786.711	84796.926	30	84736.711	84846.926	110.22	216	6	19	38
		84845.666	84862.701	15	84810.666	84897.701	87.04	217	6	15	30
		84961.325	85051.327	15	84926.325	85086.327	160.00	218	6	27	54
		85086.859	85093.728	30	85036.859	85143.728	106.87	219	6	18	36
		85172.571	85172.725	30	85122.571	85222.725	100.15	220	6	17	34
		85323.469	85449.657	30	85273.469	85499.657	226.19	221	6	38	76
		85532.946	85568.283	20	85492.946	85608.283	115.34	222	6	20	40
		85622.544	85628.502	30	85572.544	85678.502	105.96	223	6	18	36
		85708.467	85765.813	25	85663.467	85810.813	147.35	224	6	25	50
		85859.641	85864.884	20	85819.641	85904.884	85.24	225	6	15	30
		85917.41	85948.399	30	85867.410	85998.399	130.99	226	6	22	44
		85998.572	86040.365	20	85958.572	86080.365	121.79	227	6	21	42
		86153.159	86245.885	20	86113.159	86285.885	172.73	228	6	29	58
		86301.393	86318.638	30	86251.393	86368.638	117.25	229	6	20	40
		86533.4	86545.891	15	86498.400	86580.891	82.49	230	6	14	28
		86588.042	86676.329	25	86543.042	86721.329	178.29	231	6	30	60
		86770.729	86808.676	20	86730.729	86848.676	117.95	232	6	20	40
		86882.896	86894.639	30	86832.896	86944.639	111.74	233	6	19	38
		86953.175	86962.648	15	86918.175	86997.648	79.47	234	6	14	28
		86998.209	87010.654	20	86958.209	87050.654	92.44	235	6	16	32
		87055.029	87098.986	20	87015.029	87138.986	123.96	236	6	21	42



SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		87157.115	87175.483	25	87112.115	87220.483	108.37	237	6	19	38
		87216.878	87228.005	15	87181.878	87263.005	81.13	238	6	14	28
		87268.172	87280.299	25	87223.172	87325.299	102.13	239	6	18	36
		87322.782	87327.808	15	87287.782	87362.808	75.03	240	6	13	26
		87371.379	87381.165	25	87326.379	87426.165	99.79	241	6	17	34
		87456.848	87457.282	40	87396.848	87517.282	120.43	242	6	21	42
		87566.324	87620.239	15	87531.324	87655.239	123.92	243	6	21	42
		87755.678	87806.514	30	87705.678	87856.514	150.84	244	6	26	52
		87937.719	87970.084	15	87902.719	88005.084	102.37	245	6	18	36
		88056.161	88085.785	30	88006.161	88135.785	129.62	246	6	22	44
		88131.385	88188.266	15	88096.385	88223.266	126.88	247	6	22	44
		88355.36	88398.963	30	88305.360	88448.963	143.60	248	6	24	48
		88518.931	88530.701	30	88468.931	88580.701	111.77	249	6	19	38
		88601.087	88649.262	25	88556.087	88694.262	138.18	250	6	24	48
		88717.91	88791.185	25	88672.910	88836.185	163.27	251	6	28	56
		88850.044	88947.67	25	88805.044	88992.67	187.63	252	6	32	64
		89058.289	89068.228	25	89013.289	89113.228	99.94	253	6	17	34
		89120.655	89131.935	20	89080.655	89171.935	91.28	254	6	16	32
		89251.659	89285.751	20	89211.659	89325.751	114.09	255	6	20	40
		89453.656	89463.339	35	89398.656	89518.339	119.68	256	6	20	40
		89534.46	89552.492	35	89479.460	89607.492	128.03	257	6	22	44
		89634.811	89639.744	25	89589.811	89684.744	94.93	258	6	16	32
		89691.675	89718.276	20	89651.675	89758.276	106.60	259	6	18	36
		89842.789	89900.198	25	89797.789	89945.198	147.41	260	6	25	50
		89927.989	89963.578	15	89892.989	89998.578	105.59	261	6	18	36
		89997.66	90003.125	25	89952.660	90048.125	95.46	262	6	16	32
		90058.135	90091.214	30	90008.135	90141.214	133.08	263	6	23	46
		90151.165	90157.798	15	90116.165	90192.798	76.63	264	6	13	26
		90197.85	90208.048	25	90152.850	90253.048	100.20	265	6	17	34
		90252.622	90259.894	15	90217.622	90294.894	77.27	266	6	13	26
		90328.041	90348.304	20	90288.041	90388.304	100.26	267	6	17	34
		90414.294	90436.306	30	90364.294	90486.306	122.01	268	6	21	42
		90514.139	90537.304	30	90464.139	90587.304	123.17	269	6	21	42
		90718.562	90744.508	30	90668.562	90794.508	125.95	270	6	21	42
		90956.128	91065.793	30	90906.128	91115.793	209.67	271	6	35	70
		91150.513	91229.815	40	91090.513	91289.815	199.30	272	6	34	68
		91366.08	91402.561	25	91321.080	91447.561	126.48	273	6	22	44
		91615.183	91658.33	40	91555.183	91718.33	163.15	274	6	28	56



SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		91780.982	91793.331	15	91745.982	91828.331	82.35	275	6	14	28
		91845.984	91854.526	30	91795.984	91904.526	108.54	276	6	19	38
		91910.124	91915.479	20	91870.124	91955.479	85.36	277	6	15	30
		92024.954	92035.408	20	91984.954	92075.408	90.45	278	6	16	32
		92082.225	92099.858	25	92037.225	92144.858	107.63	279	6	18	36
		92142.263	92162.603	15	92107.263	92197.603	90.34	280	6	16	32
		92256.4	92282.906	30	92206.400	92332.906	126.51	281	6	22	44
		92441.706	92534.902	15	92406.706	92569.902	163.20	282	6	28	56
		92589.372	92595.854	15	92554.372	92630.854	76.48	283	6	13	26
		92670.989	92687.12	20	92630.989	92727.12	96.13	284	6	17	34
		92735.86	92749.275	25	92690.860	92794.275	103.41	285	6	18	36
		92804.557	92807.785	30	92754.557	92857.785	103.23	286	6	18	36
		92855.78	92929.08	15	92820.780	92964.08	143.30	287	6	24	48
		93044.86	93075.074	20	93004.860	93115.074	110.21	288	6	19	38
		93198.763	93199.298	30	93148.763	93249.298	100.53	289	6	17	34
		93263.273	93271.212	30	93213.273	93321.212	107.94	290	6	18	36
		93308.704	93335.542	15	93273.704	93370.542	96.84	291	6	17	34
		93427.193	93453.873	30	93377.193	93503.873	126.68	292	6	22	44
		93550.76	93578.673	15	93515.760	93613.673	97.91	293	6	17	34
		93605.064	93642.276	15	93570.064	93677.276	107.21	294	6	18	36
		93687.497	93727.976	20	93647.497	93767.976	120.48	295	6	21	42
		93893.801	93920.898	20	93853.801	93960.898	107.10	296	6	18	36
		93963.921	93981.933	20	93923.921	94021.933	98.01	297	6	17	34
		94035.712	94059.041	20	93995.712	94099.041	103.33	298	6	18	36
		94099.259	94105.59	20	94059.259	94145.59	86.33	299	6	15	30
		94141.174	94149.852	15	94106.174	94184.852	78.68	300	6	14	28
		94180.332	94185.867	15	94145.332	94220.867	75.54	301	6	13	26
		94221.153	94227.913	20	94181.153	94267.913	86.76	302	6	15	30
		94273.303	94283.586	15	94238.303	94318.586	80.28	303	6	14	28
		94313.624	94331.93	15	94278.624	94366.93	88.31	304	6	15	30
		94376.786	94411.52	20	94336.786	94451.52	114.73	305	6	20	40
		94462.893	94535.369	25	94417.893	94580.369	162.48	306	6	28	56
		94593.421	94677.216	30	94543.421	94727.216	183.79	307	6	31	62
		94735.889	94747.763	25	94690.889	94792.763	101.87	308	6	17	34
		94809.078	94882.211	25	94764.078	94927.211	163.13	309	6	28	56
		95085.815	95097.414	20	95045.815	95137.414	91.60	310	6	16	32
		95141.018	95186.097	15	95106.018	95221.097	115.08	311	6	20	40
		95316.923	95341.476	30	95266.923	95391.476	124.55	312	6	21	42



SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		95387.778	95395.12	15	95352.778	95430.12	77.34	313	6	13	26
		95435.501	95442.674	25	95390.501	95487.674	97.17	314	6	17	34
		95472.204	95515.216	15	95437.204	95550.216	113.01	315	6	19	38
		95535.518	95547.156	20	95495.518	95587.156	91.64	316	6	16	32
		95587.183	95597.166	15	95552.183	95632.166	79.98	317	6	14	28
		95635.696	95656.783	15	95600.696	95691.783	91.09	318	6	16	32
		95690.319	95767.848	15	95655.319	95802.848	147.53	319	6	25	50
		95843.139	95871.004	15	95808.139	95906.004	97.87	320	6	17	34
		95889.168	95905.036	15	95854.168	95940.036	85.87	321	6	15	30
		95947.902	95976.275	30	95897.902	96026.275	128.37	322	6	22	44
		96194.276	96216.12	40	96134.276	96276.12	141.84	323	6	24	48
		96385.109	96412.349	30	96335.109	96462.349	127.24	324	6	22	44
		96475.033	96481.443	30	96425.033	96531.443	106.41	325	6	18	36
		96540.813	96613.336	20	96500.813	96653.336	152.52	326	6	26	52
		96712.703	96725.881	15	96677.703	96760.881	83.18	327	6	14	28
		96781.231	96808.667	25	96736.231	96853.667	117.44	328	6	20	40
		96890.231	96914.009	20	96850.231	96954.009	103.78	329	6	18	36
		97042.25	97055.02	15	97007.250	97090.02	82.77	330	6	14	28
		97131.491	97156.762	20	97091.491	97196.762	105.27	331	6	18	36
		97283.59	97290.138	30	97233.590	97340.138	106.55	332	6	18	36
		97350.216	97369.202	30	97300.216	97419.202	118.99	333	6	20	40
		97432.851	97450.533	30	97382.851	97500.533	117.68	334	6	20	40
		97547.653	97564.553	20	97507.653	97604.553	96.90	335	6	17	34
		97618.702	97652.218	20	97578.702	97692.218	113.52	336	6	19	38
		97694.727	97711.452	15	97659.727	97746.452	86.73	337	6	15	30
		97754.23	97767.698	25	97709.230	97812.698	103.47	338	6	18	36
		97811.865	97818.394	15	97776.865	97853.394	76.53	339	6	13	26
		97875.65	97909.061	20	97835.650	97949.061	113.41	340	6	19	38
		97963.968	97970.527	20	97923.968	98010.527	86.56	341	6	15	30
		98012.074	98015.177	15	97977.074	98050.177	73.10	342	6	13	26
		98048.628	98194.32	15	98013.628	98229.32	215.69	343	6	36	72
		98247.564	98255.719	35	98192.564	98310.719	118.15	344	6	20	40
		98351.397	98360.165	25	98306.397	98405.165	98.77	345	6	17	34
		98542.973	98562.969	25	98497.973	98607.969	110.00	346	6	19	38
		98680.732	98787.848	20	98640.732	98827.848	187.12	347	6	32	64
		98952.756	98985.74	30	98902.756	99035.74	132.98	348	6	23	46
		99054.382	99106.69	25	99009.382	99151.69	142.31	349	6	24	48
		99220.03	99286.161	35	99165.030	99341.161	176.13	350	6	30	60



SL. No.	Description of section	START	END	Transition length	START CH.	END CH.	Length	Radius	Spacing on Curve (S)	Total On centreline (nos)	Total On shoulder (nos)
		CHAINAGE (m)	CHAINAGE (m)		Road Stud	Road stud					
		99418.606	99488.394	30	99368.606	99538.394	169.79	351	6	29	58
		99670.554	99698.21	20	99630.554	99738.21	107.66	352	6	18	36
		99749.386	99753.94	20	99709.386	99793.94	84.55	353	6	15	30
		99796.255	99881.664	20	99756.255	99921.664	165.41	354	6	28	56
		99946.075	99968.527	30	99896.075	100018.527	122.45	355	6	21	42
		100080.707	100109.04	30	100030.707	100159.04	128.33	356	6	22	44
		100154.668	100165.22	15	100119.668	100200.22	80.55	357	6	14	28
		100212.721	100217.701	30	100162.721	100267.701	104.98	358	6	18	36
		100351.304	100401.247	20	100311.304	100441.247	129.94	359	6	22	44
		100454.125	100481.981	20	100414.125	100521.981	107.86	360	6	18	36
		100507.964	100513.804	15	100472.964	100548.804	75.84	361	6	13	26
		100543.203	100598.505	15	100508.203	100633.505	125.30	362	6	21	42
		100666.465	100705.343	30	100616.465	100755.343	138.88	363	6	24	48
		100735.739	100744.751	15	100700.739	100779.751	79.01	364	6	14	28
		100760.305	100858.206	15	100725.305	100893.206	167.90	365	6	28	56
		100905.532	100970.317	15	100870.532	101005.317	134.78	366	6	23	46
		101007.822	101018.69	15	100972.822	101053.69	80.87	367	6	14	28
		101056.645	101063.942	20	101016.645	101103.942	87.30	368	6	15	30
		101117.848	101122.697	30	101067.848	101172.697	104.85	369	6	18	36
		101168.043	101190.693	15	101133.043	101225.693	92.65	370	6	16	32
		101223.887	101240.073	15	101188.887	101275.073	86.19	371	6	15	30
Total=										6448	12896

Total no. of Road stud = 19344 nos.



CALCULATION FOR DELINEATOR														
In Horizontal Curves (radius 300 m or less)														
HIP / CURVE NO.	ELEMENT	START	END	RADIUS (m)	Spacing on Curve (S)	Length	Nos in outside curve (s)	Nos in inner curve (2s)	1.8s beginning of curve	1.8s end of curve	3s beginning of curve	3s end of curve	6s beginning of curve	6s end of curve
		CHAINAGE (m)	CHAINAGE (m)											
7	Arc	66150.174	66181.769	80	8	31.595	4	2	1	1	1	0	1	0
9	Arc	66239.017	66288.878	32	6	49.861	8	4	1	1	1	1	0	0
10	Arc	66393.461	66411.392	30	6	17.931	3	1	1	1	1	1	0	1
11	Arc	66541.497	66563.074	70	8	21.577	3	1	1	1	1	0	0	0
18	Arc	66606.549	66615.525	70	8	8.976	1	1	1	1	1	0	0	0
19	Arc	66646.602	66653.472	90	8	6.870	1	0	1	1	1	1	0	0
20	Arc	66736.216	66795.396	30	6	59.180	10	5	1	1	1	0	0	0
21	Arc	66847.863	66856.882	130	12	9.019	1	0	1	0	1	0	0	0
22	Arc	66895.607	66911.031	125	12	15.424	1	1	0	1	1	0	0	0
23	Arc	66995.342	67055.954	30	6	60.612	10	5	1	1	1	1	0	1
24	Arc	67196.226	67210.743	90	8	14.517	2	1	1	1	1	0	0	0
25	Arc	67272.744	67279.955	60	8	7.211	1	0	1	1	1	0	0	0
26	Arc	67350.226	67389.497	60	8	39.271	5	2	1	1	1	1	0	0
27	Arc	67509.074	67573.746	40	6	64.672	11	5	1	1	1	1	0	0
28	Arc	67633.798	67667.684	50	8	33.886	4	2	1	1	1	1	0	0
29	Arc	67821.09	67889.183	50	8	68.093	9	4	1	1	1	1	0	0
30	Arc	68003.789	68013.776	200	20	9.987	1	0	1	1	1	0	0	0
31	Arc	68122.559	68162.974	50	8	40.415	5	3	1	1	1	0	0	0
32	Arc	68211.83	68283.531	50	8	71.701	9	4	1	1	1	1	0	1
33	Arc	68466.702	68476.15	35	6	9.448	2	1	1	1	1	1	1	0
34	Arc	68544.28	68552.261	60	8	7.981	1	0	1	1	1	1	0	0
35	Arc	68682.248	68692.034	50	8	9.786	1	1	1	1	1	0	0	0
36	Arc	68735.55	68798.822	45	6	63.272	11	5	1	1	1	0	0	0
37	Arc	68846.514	68857.054	150	12	10.540	1	0	1	1	1	0	0	0
38	Arc	68911.122	68935.656	30	6	24.534	4	2	1	1	1	1	0	1
39	Arc	69099.329	69130.859	70	8	31.530	4	2	1	1	1	0	0	0
40	Arc	69186.819	69200.012	100	12	13.193	1	1	1	1	1	0	0	0
41	Arc	69269.349	69328.531	30	6	59.182	10	5	1	1	1	1	0	0
42	Arc	69422.739	69458.638	60	8	35.899	4	2	1	1	1	1	0	0
43	Arc	69630.131	69637.037	30	6	6.906	1	1	1	1	1	0	1	0
44	Arc	69687.434	69740.087	80	8	52.653	7	3	1	1	1	0	0	0
45	Arc	69792.012	69810.204	35	6	18.192	3	2	1	1	1	1	0	0
46	Arc	69879.239	69889.688	30	6	10.449	2	1	1	1	1	1	0	0
47	Arc	69983.979	69989.829	40	6	5.850	1	0	1	1	1	0	0	0
48	Arc	70040.663	70049.812	40	6	9.149	2	1	1	1	1	1	0	0
49	Arc	70111.657	70197.892	45	6	86.235	14	7	1	1	1	1	0	1
50	Arc	70374.826	70405.102	30	6	30.276	5	3	1	1	1	0	1	0
51	Arc	70453.894	70470.463	200	20	16.569	1	0	0	1	1	0	0	0
52	Arc	70593.228	70600.478	30	6	7.250	1	1	1	1	1	1	0	0



HIP / CURVE NO.	ELEMENT	START	END	RADIUS (m)	Spacing on Curve (S)	Length	Nos in outside curve (s)	Nos in inner curve (2s)	1.8s beginning of curve	1.8s end of curve	3s beginning of curve	3s end of curve	6s beginning of curve	6s end of curve
		CHAINAGE (m)	CHAINAGE (m)											
53	Arc	70704.42	70735.918	50	8	31.498	4	2	1	1	1	1	0	0
54	Arc	70897.773	70920.129	100	12	22.356	2	1	1	1	1	0	0	0
55	Arc	70977.544	71036.11	60	8	58.566	7	4	1	1	1	0	0	0
56	Arc	71102.585	71120.12	70	8	17.535	2	1	1	1	1	1	0	0
57	Arc	71265.156	71301.538	30	6	36.382	6	3	1	1	1	1	1	1
58	Arc	71533.049	71580.83	30	6	47.781	8	4	1	1	1	1	1	0
59	Arc	71642.956	71650.22	45	6	7.264	1	1	1	1	1	0	0	0
60	Arc	71700.994	71707.936	30	6	6.942	1	1	1	1	1	1	0	0
61	Arc	71771.581	71782.427	80	8	10.846	1	1	1	1	1	0	0	0
62	Arc	71837.887	71880.602	90	8	42.715	5	3	1	1	1	0	0	0
63	Arc	71953.294	71972.548	100	12	19.254	2	1	1	1	1	0	0	0
64	Arc	72022.353	72044.751	200	20	22.398	1	1	0	1	1	0	0	0
65	Arc	72152.476	72183.993	20	6	31.517	5	3	1	1	1	0	0	0
66	Arc	72226.775	72398.7	170	12	171.925	14	7	0	0	1	0	0	0
67	Arc	72441.681	72459.444	100	12	17.763	1	1	0	1	1	0	0	0
68	Arc	72520.756	72531.274	50	8	10.518	1	1	1	1	1	0	0	0
69	Arc	72602.348	72619.818	70	8	17.470	2	1	1	1	1	0	0	0
70	Arc	72694.406	72715.059	70	8	20.653	3	1	1	1	1	1	0	0
71	Arc	72811.879	72845.583	30	6	33.704	6	3	1	1	1	0	0	0
72	Arc	72882.093	72919.728	300	25	37.635	2	1	0	0	1	0	0	0
73	Arc	72954.28	72978.418	100	12	24.138	2	1	0	1	1	0	0	0
74	Arc	73030.878	73055.81	30	6	24.932	4	2	1	1	1	0	0	0
75	Arc	73111.884	73117.072	40	6	5.188	1	0	1	1	1	1	0	0
76	Arc	73246.239	73265.304	30	6	19.065	3	2	1	1	1	1	0	0
77	Arc	73330.198	73342.19	35	6	11.992	2	1	1	1	1	1	0	0
78	Arc	73414.067	73445.284	170	12	31.217	3	1	1	1	1	0	0	0
79	Arc	73497.105	73503.262	30	6	6.157	1	1	1	1	1	1	0	1
80	Arc	73650.909	73703.56	30	6	52.651	9	4	1	1	1	1	1	0
81	Arc	73765.51	73769.752	36	6	4.242	1	0	1	1	1	0	0	0
82	Arc	73824.869	73915.796	85	8	90.927	11	6	1	1	1	1	0	0
83	Arc	74032.566	74095.461	32	6	62.895	10	5	1	1	1	0	0	0
84	Arc	74143.326	74156.882	125	12	13.556	1	1	1	1	1	0	0	0
85	Arc	74207.444	74220.811	60	8	13.367	2	1	1	1	1	0	0	0
86	Arc	74293.388	74398.075	250	20	104.687	5	3	1	1	1	1	0	0
87	Arc	74646.485	74662.513	40	6	16.028	3	1	1	1	1	0	1	0
88	Arc	74716.787	74736.35	40	6	19.563	3	2	1	1	1	1	0	0
89	Arc	74858.032	74871.807	80	8	13.775	2	1	1	1	1	0	0	0
90	Arc	74914.878	75022.238	150	12	107.360	9	4	0	1	1	0	0	0
91	Arc	75106.333	75133.057	30	6	26.724	4	2	1	1	1	1	0	1
92	Arc	75288.295	75310.25	70	8	21.955	3	1	1	1	1	1	0	0
93	Arc	75393.348	75400.624	100	12	7.276	1	0	1	1	1	0	0	0
94	Arc	75461.476	75472.625	60	8	11.149	1	1	1	1	1	1	0	0
95	Arc	75551.665	75613.964	70	8	62.299	8	4	1	1	1	1	0	0
96	Arc	75735.366	75823.464	66	8	88.098	11	6	1	1	1	1	0	0
97	Arc	75918.996	75948.166	70	8	29.170	4	2	1	1	1	0	0	0



HIP / CURVE NO.	ELEMENT	START	END	RADIUS (m)	Spacing on Curve (S)	Length	Nos in outside curve (s)	Nos in inner curve (2s)	1.8s beginning of curve	1.8s end of curve	3s beginning of curve	3s end of curve	6s beginning of curve	6s end of curve
		CHAINAGE (m)	CHAINAGE (m)											
98	Arc	76012.129	76032.87	100	12	20.741	2	1	1	1	1	0	0	0
99	Arc	76108.841	76127.268	30	6	18.427	3	2	1	1	1	0	0	0
100	Arc	76182.279	76200.605	25	6	18.326	3	2	1	1	1	0	0	0
101	Arc	76243.844	76259.508	25	6	15.664	3	1	1	1	1	1	0	1
102	Arc	76407.551	76431.707	40	6	24.156	4	2	1	1	1	0	1	0
103	Arc	76480.039	76509.449	20	6	29.410	5	2	1	1	1	0	0	0
104	Arc	76549.688	76575.049	20	6	25.361	4	2	1	1	1	0	0	0
105	Arc	76616.457	76635.745	20	6	19.288	3	2	1	1	1	0	0	0
106	Arc	76680.375	76691.287	30	6	10.912	2	1	1	1	1	0	0	0
107	Arc	76746.96	76770.509	170	12	23.549	2	1	1	1	1	1	0	0
108	Arc	76886.208	76937.45	30	6	51.242	9	4	1	1	1	1	0	1
109	Arc	77207.093	77268.959	50	8	61.866	8	4	1	1	1	1	1	0
110	Arc	77354.569	77416.309	50	8	61.740	8	4	1	1	1	1	0	0
111	Arc	77508.339	77532.019	30	6	23.680	4	2	1	1	1	1	0	0
112	Arc	77595.516	77611.518	40	6	16.002	3	1	1	1	1	0	0	0
113	Arc	77649.591	77700.835	300	25	51.244	2	1	0	1	1	0	0	0
114	Arc	77833.641	77836.707	30	6	3.066	1	0	1	1	1	1	1	0
115	Arc	77918.086	77929.22	90	8	11.134	1	1	1	1	1	0	0	0
116	Arc	77960.118	77976.414	70	8	16.296	2	1	1	1	1	0	0	0
117	Arc	78018.391	78048.753	40	6	30.362	5	3	1	1	1	1	0	0
118	Arc	78125.984	78182.357	40	6	56.373	9	5	1	1	1	1	0	0
119	Arc	78241.421	78274.647	30	6	33.226	6	3	1	1	1	1	0	0
120	Arc	78369.363	78395.243	30	6	25.880	4	2	1	1	1	1	0	0
121	Arc	78467.004	78563.199	90	8	96.195	12	6	1	1	1	0	0	0
122	Arc	78625.465	78630.105	150	12	4.640	1	0	1	1	1	0	0	0
123	Arc	78680.001	78699.48	30	6	19.479	3	2	1	1	1	1	0	0
124	Arc	78807.468	78869.217	80	8	61.749	8	4	1	1	1	0	0	0
125	Arc	78919.053	78955.569	30	6	36.516	6	3	1	1	1	1	0	0
126	Arc	79030.549	79073.09	100	12	42.541	4	2	1	1	1	1	0	0
127	Arc	79224.382	79281.706	125	12	57.324	5	2	1	1	1	0	0	0
128	Arc	79337.554	79369.508	80	8	31.954	4	2	1	1	1	1	0	0
129	Arc	79520.679	79548.761	125	12	28.082	2	1	1	0	1	0	0	0
130	Arc	79589.242	79605.863	40	6	16.621	3	1	1	1	1	1	0	0
131	Arc	79730.732	79740.56	60	8	9.828	1	1	1	1	1	0	0	0
132	Arc	79781.64	79817.779	20	6	36.139	6	3	1	1	1	1	0	0
133	Arc	79943.707	79965.323	50	8	21.616	3	1	1	1	1	0	0	0
134	Arc	80022.191	80058.373	60	8	36.182	5	2	1	1	1	1	0	0
135	Arc	80143.157	80205.288	34	6	62.131	10	5	1	1	1	1	0	0
136	Arc	80275.208	80334.954	50	8	59.746	7	4	1	1	1	1	0	0
137	Arc	80482.831	80500.084	125	12	17.253	1	1	1	1	1	1	0	0
138	Arc	80645.145	80680.306	100	12	35.161	3	1	1	1	1	0	0	0
139	Arc	80725.608	80736.216	80	8	10.608	1	1	1	1	1	0	0	0
140	Arc	80802.841	80865.276	50	8	62.435	8	4	1	1	1	1	0	0
141	Arc	81017.876	81029.262	80	8	11.386	1	1	1	1	1	0	0	0
142	Arc	81084.792	81097.115	80	8	12.323	2	1	1	1	1	1	0	0



HIP / CURVE NO.	ELEMENT	START	END	RADIUS (m)	Spacing on Curve (S)	Length	Nos in outside curve (s)	Nos in inner curve (2s)	1.8s beginning of curve	1.8s end of curve	3s beginning of curve	3s end of curve	6s beginning of curve	6s end of curve
		CHAINAGE (m)	CHAINAGE (m)											
143	Arc	81198.156	81217.252	70	8	19.096	2	1	1	1	1	0	0	0
144	Arc	81275.494	81298.176	60	8	22.682	3	1	1	1	1	0	0	0
145	Arc	81340.227	81348.48	60	8	8.253	1	1	1	1	1	0	0	0
146	Arc	81410.639	81418.311	40	6	7.672	1	1	1	1	1	0	0	0
147	Arc	81462.657	81505.924	70	8	43.267	5	3	1	1	1	0	0	0
148	Arc	81547.091	81666.728	110	12	119.637	10	5	0	0	1	0	0	0
149	Arc	81694.561	81731.834	300	25	37.273	1	1	0	0	1	0	0	0
150	Arc	81782.688	81802.51	30	6	19.822	3	2	1	1	1	1	0	0
151	Arc	81883.329	81910.412	80	8	27.083	3	2	1	1	1	0	0	0
152	Arc	81960.582	81988.357	170	12	27.775	2	1	1	1	1	0	0	0
153	Arc	82034.392	82051.585	30	6	17.193	3	1	1	1	1	1	0	0
154	Arc	82144.969	82181.576	40	6	36.607	6	3	1	1	1	1	0	0
155	Arc	82287.67	82294.33	30	6	6.660	1	1	1	1	1	0	0	0
156	Arc	82339.722	82374.28	60	8	34.558	4	2	1	1	1	0	0	0
157	Arc	82409.251	82452.179	60	8	42.928	5	3	1	1	1	1	0	0
158	Arc	82583.344	82619.543	30	6	36.199	6	3	1	1	1	1	1	0
159	Arc	82688.834	82704.783	50	8	15.949	2	1	1	1	1	1	0	0
160	Arc	82840.618	82896.87	35	6	56.252	9	5	1	1	1	0	1	0
161	Arc	82947.386	82962.373	50	8	14.987	2	1	1	1	1	0	0	0
162	Arc	82995.182	83032.85	170	12	37.668	3	2	0	0	1	0	0	0
163	Arc	83064.991	83079.671	30	6	14.680	2	1	1	1	1	1	0	1
164	Arc	83288.2	83316.196	30	6	27.996	5	2	1	1	1	0	1	0
165	Arc	83372.52	83392.269	40	6	19.749	3	2	1	1	1	0	0	0
166	Arc	83434.468	83443.867	30	6	9.399	2	1	1	1	1	0	0	0
167	Arc	83483.366	83518.805	22	6	35.439	6	3	1	1	1	1	0	0
168	Arc	83646.268	83651.469	50	8	5.201	1	0	1	1	1	0	0	0
169	Arc	83687.985	83706.534	60	8	18.549	2	1	1	1	1	0	0	0
170	Arc	83749.236	83764.995	70	8	15.759	2	1	1	1	1	0	0	0
639	Arc	83826.689	83891.557	100	12	64.868	5	3	1	1	1	0	0	0
640	Arc	83982.471	84006.868	30	6	24.397	4	2	1	1	1	1	0	0
641	Arc	84091.644	84099.569	100	12	7.925	1	0	1	1	1	0	0	0
642	Arc	84198.577	84209.253	50	8	10.676	1	1	1	1	1	0	0	0
643	Arc	84262.069	84337.614	60	8	75.545	9	5	1	1	1	0	0	0
644	Arc	84377.086	84446.322	60	8	69.236	9	4	1	1	1	0	0	0
645	Arc	84484.262	84516.674	60	8	32.412	4	2	1	1	1	1	0	0
646	Arc	84630.458	84740.052	43	6	109.594	18	9	1	1	1	0	0	0
647	Arc	84786.711	84796.926	30	6	10.215	2	1	1	1	1	0	0	0
648	Arc	84845.666	84862.701	60	8	17.035	2	1	1	1	1	1	0	0
649	Arc	84961.325	85051.327	200	20	90.002	5	2	1	0	1	0	0	0
650	Arc	85086.859	85093.728	30	6	6.869	1	1	1	1	1	1	0	0
651	Arc	85172.571	85172.725	30	6	0.154	1	0	1	1	1	1	0	1
652	Arc	85323.469	85449.657	70	8	126.188	16	8	1	1	1	1	0	0
653	Arc	85532.946	85568.283	100	12	35.337	3	1	1	1	1	0	0	0
654	Arc	85622.544	85628.502	30	6	5.958	1	0	1	1	1	1	0	0
655	Arc	85708.467	85765.813	80	8	57.346	7	4	1	1	1	1	0	0



HIP / CURVE NO.	ELEMENT	START	END	RADIUS (m)	Spacing on Curve (S)	Length	Nos in outside curve (s)	Nos in inner curve (2s)	1.8s beginning of curve	1.8s end of curve	3s beginning of curve	3s end of curve	6s beginning of curve	6s end of curve
		CHAINAGE (m)	CHAINAGE (m)											
656	Arc	85859.641	85864.884	50	8	5.243	1	0	1	1	1	0	0	0
657	Arc	85917.41	85948.399	30	6	30.989	5	3	1	1	1	0	0	0
658	Arc	85998.572	86040.365	50	8	41.793	5	3	1	1	1	1	0	0
659	Arc	86153.159	86245.885	47	6	92.726	15	8	1	1	1	0	0	0
660	Arc	86301.393	86318.638	30	6	17.245	3	1	1	1	1	1	0	1
661	Arc	86533.4	86545.891	60	8	12.491	2	1	1	1	1	0	1	0
662	Arc	86588.042	86676.329	40	6	88.287	15	7	1	1	1	1	0	0
663	Arc	86770.729	86808.676	50	8	37.947	5	2	1	1	1	0	0	0
664	Arc	86882.896	86894.639	70	8	11.743	1	1	1	1	1	0	0	0
665	Arc	86953.175	86962.648	60	8	9.473	1	1	1	1	1	0	0	0
666	Arc	86998.209	87010.654	50	8	12.445	2	1	1	1	1	0	0	0
667	Arc	87055.029	87098.986	50	8	43.957	5	3	1	1	1	0	0	0
668	Arc	87157.115	87175.483	40	6	18.368	3	2	1	1	1	0	0	0
669	Arc	87216.878	87228.005	60	8	11.127	1	1	1	1	1	0	0	0
670	Arc	87268.172	87280.299	40	6	12.127	2	1	1	1	1	0	0	0
671	Arc	87322.782	87327.808	60	8	5.026	1	0	1	1	1	0	0	0
672	Arc	87371.379	87381.165	40	6	9.786	2	1	1	1	1	1	0	0
673	Arc	87456.848	87457.282	50	8	0.434	1	0	1	1	1	1	0	0
674	Arc	87566.324	87620.239	125	12	53.915	4	2	1	1	1	1	0	0
675	Arc	87755.678	87806.514	30	6	50.836	8	4	1	1	1	1	1	1
676	Arc	87937.719	87970.084	60	8	32.365	4	2	1	1	1	1	0	0
677	Arc	88056.161	88085.785	30	6	29.624	5	2	1	1	1	0	0	0
678	Arc	88131.385	88188.266	125	12	56.881	5	2	1	1	1	1	0	0
679	Arc	88355.36	88398.963	30	6	43.603	7	4	1	1	1	1	1	0
680	Arc	88518.931	88530.701	30	6	11.770	2	1	1	1	1	1	0	0
681	Arc	88601.087	88649.262	80	8	48.175	6	3	1	1	1	0	0	0
682	Arc	88717.91	88791.185	80	8	73.275	9	5	1	1	1	0	0	0
683	Arc	88850.044	88947.67	90	8	97.626	12	6	1	1	1	1	0	0
684	Arc	89058.289	89068.228	40	6	9.939	2	1	1	1	1	0	0	0
685	Arc	89120.655	89131.935	50	8	11.280	1	1	1	1	1	1	0	0
686	Arc	89251.659	89285.751	20	6	34.092	6	3	1	1	1	1	0	1
687	Arc	89453.656	89463.339	60	8	9.683	1	1	1	1	1	0	0	0
688	Arc	89534.46	89552.492	60	8	18.032	2	1	1	1	1	1	0	0
689	Arc	89634.811	89639.744	40	6	4.933	1	0	1	1	1	0	0	0
690	Arc	89691.675	89718.276	50	8	26.601	3	2	1	1	1	1	0	0
691	Arc	89842.789	89900.198	40	6	57.409	10	5	1	1	1	0	0	0
692	Arc	89927.989	89963.578	300	25	35.589	1	1	0	0	1	0	0	0
693	Arc	89997.66	90003.125	40	6	5.465	1	0	1	1	1	0	0	0
694	Arc	90058.135	90091.214	30	6	33.079	6	3	1	1	1	1	0	0
695	Arc	90151.165	90157.798	125	12	6.633	1	0	1	0	1	0	0	0
696	Arc	90197.85	90208.048	40	6	10.198	2	1	1	1	1	0	0	0
697	Arc	90252.622	90259.894	60	8	7.272	1	0	1	1	1	0	0	0
698	Arc	90328.041	90348.304	50	8	20.263	3	1	1	1	1	0	0	0
699	Arc	90414.294	90436.306	30	6	22.012	4	2	1	1	1	1	0	0
700	Arc	90514.139	90537.304	30	6	23.165	4	2	1	1	1	1	0	1



HIP / CURVE NO.	ELEMENT	START	END	RADIUS (m)	Spacing on Curve (S)	Length	Nos in outside curve (s)	Nos in inner curve (2s)	1.8s beginning of curve	1.8s end of curve	3s beginning of curve	3s end of curve	6s beginning of curve	6s end of curve
		CHAINAGE (m)	CHAINAGE (m)											
701	Arc	90718.562	90744.508	30	6	25.946	4	2	1	1	1	1	1	1
702	Arc	90956.128	91065.793	70	8	109.665	14	7	1	1	1	1	1	0
703	Arc	91150.513	91229.815	50	8	79.302	10	5	1	1	1	1	0	0
704	Arc	91366.08	91402.561	80	8	36.481	5	2	1	1	1	1	0	1
705	Arc	91615.183	91658.33	50	8	43.147	5	3	1	1	1	1	1	0
706	Arc	91780.982	91793.331	70	8	12.349	2	1	1	1	1	0	0	0
707	Arc	91845.984	91854.526	35	6	8.542	1	1	1	1	1	0	0	0
708	Arc	91910.124	91915.479	55	8	5.355	1	0	1	1	1	1	0	0
709	Arc	92024.954	92035.408	50	8	10.454	1	1	1	1	1	0	0	0
710	Arc	92082.225	92099.858	40	6	17.633	3	1	1	1	1	0	0	0
711	Arc	92142.263	92162.603	125	12	20.340	2	1	0	1	1	0	0	0
712	Arc	92256.4	92282.906	70	8	26.506	3	2	1	1	1	1	0	0
713	Arc	92441.706	92534.902	125	12	93.196	8	4	1	1	1	0	0	0
714	Arc	92589.372	92595.854	170	12	6.482	1	0	1	1	1	0	0	0
715	Arc	92670.989	92687.12	50	8	16.131	2	1	1	1	1	0	0	0
716	Arc	92735.86	92749.275	40	6	13.415	2	1	1	1	1	0	0	0
717	Arc	92804.557	92807.785	30	6	3.228	1	0	1	1	1	0	0	0
718	Arc	92855.78	92929.08	300	25	73.300	3	1	0	1	1	0	0	0
719	Arc	93044.86	93075.074	50	8	30.214	4	2	1	1	1	1	0	0
720	Arc	93198.763	93199.298	30	6	0.535	1	0	1	1	1	1	0	0
721	Arc	93263.273	93271.212	30	6	7.939	1	1	1	1	1	0	0	0
722	Arc	93308.704	93335.542	300	25	26.838	1	1	0	1	1	0	0	0
723	Arc	93427.193	93453.873	70	8	26.680	3	2	1	1	1	1	0	0
724	Arc	93550.76	93578.673	300	25	27.913	1	1	1	0	1	0	0	0
725	Arc	93605.064	93642.276	100	12	37.212	3	2	0	1	1	0	0	0
726	Arc	93687.497	93727.976	35	6	40.479	7	3	1	1	1	1	0	1
727	Arc	93893.801	93920.898	45	6	27.097	5	2	1	1	1	0	1	0
728	Arc	93963.921	93981.933	20	6	18.012	3	2	1	1	1	0	0	0
729	Arc	94035.712	94059.041	20	6	23.329	4	2	1	1	1	0	0	0
730	Arc	94099.259	94105.59	20	6	6.331	1	1	1	1	1	0	0	0
731	Arc	94141.174	94149.852	30	6	8.678	1	1	1	1	1	0	0	0
732	Arc	94180.332	94185.867	40	6	5.535	1	0	1	1	1	0	0	0
733	Arc	94221.153	94227.913	25	6	6.760	1	1	1	1	1	0	0	0
734	Arc	94273.303	94283.586	60	8	10.283	1	1	1	1	1	0	0	0
735	Arc	94313.624	94331.93	80	8	18.306	2	1	1	1	1	0	0	0
736	Arc	94376.786	94411.52	20	6	34.734	6	3	1	1	1	0	0	0
737	Arc	94462.893	94535.369	40	6	72.476	12	6	1	1	1	1	0	0
738	Arc	94593.421	94677.216	70	8	83.795	10	5	1	1	1	0	0	0
739	Arc	94735.889	94747.763	80	8	11.874	1	1	1	1	1	0	0	0
740	Arc	94809.078	94882.211	80	8	73.133	9	5	1	1	1	1	0	1
741	Arc	95085.815	95097.414	50	8	11.599	1	1	1	1	1	0	1	0
742	Arc	95141.018	95186.097	125	12	45.079	4	2	1	1	1	1	0	0
743	Arc	95316.923	95341.476	30	6	24.553	4	2	1	1	1	0	1	0
744	Arc	95387.778	95395.12	100	12	7.342	1	0	1	0	1	0	0	0
745	Arc	95435.501	95442.674	40	6	7.173	1	1	1	1	1	1	0	0



HIP / CURVE NO.	ELEMENT	START	END	RADIUS (m)	Spacing on Curve (S)	Length	Nos in outside curve (s)	Nos in inner curve (2s)	1.8s beginning of curve	1.8s end of curve	3s beginning of curve	3s end of curve	6s beginning of curve	6s end of curve
		CHAINAGE (m)	CHAINAGE (m)											
747	Arc	95535.518	95547.156	50	8	11.638	1	1	1	1	1	0	0	0
748	Arc	95587.183	95597.166	80	8	9.983	1	1	1	1	1	0	0	0
749	Arc	95635.696	95656.783	170	12	21.087	2	1	0	0	1	0	0	0
750	Arc	95690.319	95767.848	30	6	77.529	13	6	1	1	1	1	0	0
751	Arc	95843.139	95871.004	60	8	27.865	3	2	1	0	1	0	0	0
752	Arc	95889.168	95905.036	170	12	15.868	1	1	0	0	1	0	0	0
753	Arc	95947.902	95976.275	30	6	28.373	5	2	1	1	1	1	0	1
754	Arc	96194.276	96216.12	50	8	21.844	3	1	1	1	1	1	1	0
755	Arc	96385.109	96412.349	30	6	27.240	5	2	1	1	1	1	1	0
756	Arc	96475.033	96481.443	30	6	6.410	1	1	1	1	1	1	0	0
757	Arc	96540.813	96613.336	100	12	72.523	6	3	1	1	1	0	0	0
758	Arc	96712.703	96725.881	125	12	13.178	1	1	1	1	1	0	0	0
759	Arc	96781.231	96808.667	80	8	27.436	3	2	1	1	1	1	0	0
760	Arc	96890.231	96914.009	100	12	23.778	2	1	1	1	1	1	0	0
761	Arc	97042.25	97055.02	60	8	12.770	2	1	1	1	1	0	0	0
762	Arc	97131.491	97156.762	50	8	25.271	3	2	1	1	1	1	0	0
763	Arc	97283.59	97290.138	30	6	6.548	1	1	1	1	1	1	0	0
764	Arc	97350.216	97369.202	30	6	18.986	3	2	1	1	1	1	0	0



HIP / CURVE NO.	ELEMENT	START	END	RADIUS (m)	Spacing on Curve (S)	Length	Nos in outside curve (s)	Nos in inner curve (2s)	1.8s beginning of curve	1.8s end of curve	3s beginning of curve	3s end of curve	6s beginning of curve	6s end of curve
		CHAINAGE (m)	CHAINAGE (m)											
765	Arc	97432.851	97450.533	35	6	17.682	3	1	1	1	1	1	0	0
766	Arc	97547.653	97564.553	50	8	16.900	2	1	1	1	1	0	0	0
767	Arc	97618.702	97652.218	50	8	33.516	4	2	1	1	1	0	0	0
768	Arc	97694.727	97711.452	125	12	16.725	1	1	0	0	1	0	0	0
769	Arc	97754.23	97767.698	80	8	13.468	2	1	1	1	1	0	0	0
770	Arc	97811.865	97818.394	125	12	6.529	1	0	1	1	1	0	0	0
771	Arc	97875.65	97909.061	20	6	33.411	6	3	1	1	1	0	0	0
772	Arc	97963.968	97970.527	100	12	6.559	1	0	1	0	1	0	0	0
773	Arc	98012.074	98015.177	125	12	3.103	1	0	0	0	1	0	0	0
774	Arc	98048.628	98194.32	125	12	145.692	12	6	0	1	1	0	0	0
775	Arc	98247.564	98255.719	60	8	8.155	1	1	1	1	1	1	0	0
776	Arc	98351.397	98360.165	80	8	8.768	1	1	1	1	1	1	0	1
777	Arc	98542.973	98562.969	80	8	19.996	2	1	1	1	1	1	1	0
778	Arc	98680.732	98787.848	50	8	107.116	13	7	1	1	1	1	0	0
779	Arc	98952.756	98985.74	30	6	32.984	5	3	1	1	1	1	1	0
780	Arc	99054.382	99106.69	80	8	52.308	7	3	1	1	1	1	0	0
781	Arc	99220.03	99286.161	60	8	66.131	8	4	1	1	1	1	0	0
782	Arc	99418.606	99488.394	35	6	69.788	12	6	1	1	1	1	1	1
783	Arc	99670.554	99698.21	50	8	27.656	3	2	1	1	1	0	1	0
784	Arc	99749.386	99753.94	50	8	4.554	1	0	1	1	1	0	0	0
785	Arc	99796.255	99881.664	50	8	85.409	11	5	1	1	1	0	0	0
786	Arc	99946.075	99968.527	30	6	22.452	4	2	1	1	1	1	0	0
787	Arc	100080.707	100109.04	30	6	28.333	5	2	1	1	1	0	0	0
788	Arc	100154.668	100165.22	80	8	10.552	1	1	1	1	1	0	0	0
789	Arc	100212.721	100217.701	30	6	4.980	1	0	1	1	1	1	0	1
790	Arc	100351.304	100401.247	25	6	49.943	8	4	1	1	1	0	1	0
791	Arc	100454.125	100481.981	45	6	27.856	5	2	1	1	1	0	0	0
792	Arc	100507.964	100513.804	180	12	5.840	1	0	0	0	1	0	0	0
793	Arc	100543.203	100598.505	60	8	55.302	7	3	1	1	1	0	0	0
794	Arc	100666.465	100705.343	30	6	38.878	6	3	1	1	1	0	0	0
795	Arc	100735.739	100744.751	180	12	9.012	1	0	0	0	1	0	0	0
796	Arc	100760.305	100858.206	100	12	97.901	8	4	0	1	1	0	0	0
797	Arc	100905.532	100970.317	125	12	64.785	5	3	1	0	1	0	0	0
798	Arc	101007.822	101018.69	30	6	10.868	2	1	1	1	1	0	0	0
799	Arc	101056.645	101063.942	20	6	7.297	1	1	1	1	1	0	0	0
800	Arc	101117.848	101122.697	30	6	4.849	1	0	1	1	1	0	0	0
801	Arc	101168.043	101190.693	80	8	22.650	3	1	1	1	1	0	0	0
802	Arc	101223.887	101240.073	80	8	16.186	2	1	1	0	1	0	0	0
				TOTAL =		9905.5	1268	642	295	298	320	132	30	24

Total no. of delineator = 3009 nos.



Traffic sign Calculation

Sl No	Type	IRC-67 2012 Specification	Dimension	Chainage / Location	No	Remarks
1	Right Hand Side Curve	fig 15.02	900 mm Tringular		157	@ 2per location
2	Left Hand Side Curve	fig 15.01	900 mm Tringular		157	@ 2per location
3	Zig-Zag Curve	fig 15.07	900 mm Tringular		6	@ 1per location
4	Reverse Curve	fig 15.06 & 15.05	900 mm Tringular		28	@ 1per location
5	Built-up area	fig 15.35	900 mm Tringular		26	@ 2per location
6	Side road	fig 15.09 & 15.10	900 mm Tringular		24	@ 2per location
7	Pedestain Crossing		900 mm Tringular	side road, bus bay	28	@ 2per location
8	Bus Stop	fig 17.35	800x600 rectangular		4	@ 2per location
9	Direction Sign		<.0.9 sqm	Side road & cross road	0	@ 2per location
10	Direction Sign		>0.9 sqm	bridge	0	@ 2per location
11	Hazard Marker	fig 15.76 & fig 15.77	900x300 mm rectangular	Culvert, Bridge Location	708	@ 4 per structure
12	Stop Sign	fig 14.01	900 mm Octagonal	Side road & cross road	24	@ 1 per location
13	Speed limit	fig 14.37	600mm Cicular		84	@ 2per location
14	Rumble strip	fig 15.50	900 Tringular		38	@ 2per location in Built Up Area & @ 1per location in Side Road
15	Hair pin Bend	fig 15.03 & 15.04	900 mm Tringular		16	@ 2per location
16	Convex Mirror for Blind Curve				0	@ 1per location





SUMMARY		
90 cm equilateral triangle	480	nos
Stop Sign (90 cm high octagon)	24	nos
60 cm circular	84	nos
80 cm x 60 cm rectangular	4	nos
Direction Sign	<.0.9 sqm	0 nos
Direction Sign	>0.9 sqm	0 nos
Hazard Marker		708 nos
Convex Mirror for Blind Curve		0 nos
Rumble Strip		38 nos

Calculation of km Stone, Hectometer Stone and Boundary Stone

Item	Remarks	Nos
Kilometer stones	Total KM Stone No. of 5th KM stone	28
5th Kilometer stones	(km stone 5th, 10th , 15th, 20th etc)	7
Boundary stones	(Total Lengthx5x2) + 2x1	354



CALCULATION FOR STREET LIGHTING

Street light in Built Up Location:

TCS Type	Length	Length (m)
TCS-6	1780	3560.00
TCS-7	100	200.00
	Total =	3760.00

Total length = 3760 m

Assuming , street lights @= 50m interval

for 3760 m 76 nos

At Busbay location=
(@ 5 nos per Busbay) 50 nos

Total nos of street light= 126 nos



Crash Barrier

Chainage (m)		Net Length (m)	Side
From	To		
66950	67100	150.0	Valley
67230	67310	80.0	Valley
68700	68950	250.0	Valley
69850	69900	50.0	Valley
70000	70100	100.0	Valley
71200	71350	150.0	Valley
72100	72250	150.0	Valley
63200	63250	50.0	Valley
72550	72630	80.0	Valley
72765	72850	85.0	Valley
73300	73550	250.0	Valley
77950	78300	350.0	Valley
78650	78750	100.0	Valley
78900	79000	100.0	Valley
79950	80100	150.0	Valley
80250	80350	100.0	Valley
80800	80900	100.0	Valley
81250	81550	300.0	Valley
82100	82200	100.0	Valley
82300	82400	100.0	Valley
82800	82950	150.0	Valley
83350	83450	100.0	Valley
83850	83950	100.0	Valley
85050	85150	100.0	Valley
85350	85450	100.0	Valley
86550	86700	150.0	Valley
88030	88130	100.0	Valley
89200	89350	150.0	Valley
90000	90100	100.0	Valley
91570	91700	130.0	Valley
91150	91300	150.0	Valley
94400	94500	100.0	Valley
95300	95400	100.0	Valley
96350	96450	100.0	Valley
97200	97450	250.0	Valley
98950	99100	150.0	Valley
100050	100150	100.0	Valley
Total =		4925.0	

Total no. of Bridges on the project= 4 nos.
 Approach length on valley side for each bridge (25 m 50 m
 Hence, Crash barrier length for 4 bridges = 400 m
Therefore, total length of crash barrier = 5325 m



Reusable Sub-base Base Calculation
GSB Calculation

	Required GSB Qty	Reusable GSB Quantity	
Busbay (2 Lane)	708	189.036	Cum
Diversion Work	720	192.240	Cum
Extra Widening on Flexible Pavement	5436.6	1451.572	Cum
Major Junction	840.247	224.346	Cum
Minor Junction	118.8	31.720	Cum
TCS-02A	230.142	61.448	Cum
TCS-03	57232	15280.944	Cum
TCS-03A	10718.225	2861.766	Cum
TCS-04	4100.775	1094.907	Cum
TCS-04A	217.175	57.986	
TCS-05	7230.65	1930.584	
TCS-05A	4726.75	1262.042	
TCS-06	3560	950.520	
TCS-07	200	53.400	
TCS-07A	400	106.800	
	96439	25749	

Reuseable GSB Quantity= 26.70%

Total Dismantle Granular Quantity(cum)= **42898**
use 60% of Total Dismantle Granular Quantity for GSB (cum)= **25739**

Total Required GSB Qty (Cum)= **96439**
26.7 % of this required quantity will be bought from dismantle material i.e **25749**

Re Useable Quantity of GSB Material(cum)= **25749**
Remaining Quantity of GSB(cum) = **70690**



VOLUME VIII
BILL OF QUANTITY



BILL OF QUANTITY (ROAD PART)



Bill No : 01. Site Clearance and Dismantling

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	02.01/i	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth from 300 mm to 600 mm	Each	4.00		
2	02.01/ii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 600 mm to 900 mm	Each	48.00		
3	02.01/iii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 900 mm to 1800 mm	Each	110.00		
4	02.01/iv	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 1800 mm to 2700 mm	Each	4.00		
5	02.01/v	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 2700 mm	Each	4.00		
6	02.03/b	Clearing and grubbing road land including uprooting rank vegetation, grass, brush shrubs, saplings and trees of girth upto 300 mm, removal of stumps, disposal of unserviceable materials and stacking of serviceable materials and stacking of serviceable materials upto 100m. from road boundary. (by mechanical means)	Ha	30.08		



Bill No : 01. Site Clearance and Dismantling

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
7	02.04/i/c	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. c)Pre- stressed/ Reinforced Cement Concrete grade M20 & above	cum	299.00		
8	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar	Cum	674.00		
9	02.04/vii/a	Removing hume pipes class NP-3 a) 300mm to 600mm dia	rm	72.00		
10	02.04/vii/b	Removing hume pipes class NP-4 b) Above 600mm to 900mm dia	rm	108.00		
11	02.04/vii/c	Removing hume pipes class NP-5 c) Above 900mm dia	rm	192.00		
12	02.04/viii/e	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m e)Kandar/Gravel metal crust upto 150 mm thick with power Roller with scarifier	sqm	285,987.00		
13	02.04/viii/f/ii	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m f)Bituminous coarses 50-70mm along with premix Carpet and Surface dressing but without disturbing the base ii)With road roller attached with scarifier	sqm	251,121.00		
Total of Bill 01. Site Clearance and Dismantling						



Bill No : 02. Earth work,Subgrade and Erosion control

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	02/nsc/1	Supplying and laying Hydro Seeding on cutting Surface	sqm	70,531.04		
2	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2	cum	315,983.00		
3	03.14	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum	57,960.58		
4	03.15	Compacting original ground supporting subgrade Loosening of the ground upto a level of 500 mm below the subgrade level, watered, graded and compacted in layers to meet requirement of table 300-2 for subgrade construction.	cum	77,934.75		
5	03.31	Excavation in Hill Area in Soil by Mechanical Means Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres	cum	2,471,122.40		
6	03.32	Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting. Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material with all lift and lead upto 1000 metres	cum	617,780.60		
Total of Bill 02. Earth work,Subgrade and Erosion control						



Bill No : 03. Sub-Base & Base Courses

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	04.01/Nsc1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	69,037.73		
2	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	24,510.59		
3	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)	Cum	96,277.70		
Total of Bill 03. Sub-Base & Base Courses						



Bill No : 04. Bituminous Courses

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm	sqm	378,883.00		
2	06.02/ii	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. ii) On granular Surface Pre treated with prime Coat @ 0.25 - 0.30 kg/sqm	sqm	351,700.00		
3	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	26,534.31		



Bill No : 04. Bituminous Courses

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
4	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	15,155.32		
		Total of Bill 04. Bituminous Courses				



Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2	cum	201.18		
2	04.01/Nsc1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	758.66		
3	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	276.35		
4	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)	Cum	1,185.13		



Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
5	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm	sqm	4,740.50		
6	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm	sqm	4,740.50		
7	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	331.84		



Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
8	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	189.62		
9	08.01	Precast Cement concrete M20 Kerb including fixing at site	rm	413.00		
		Total of Bill 05. Junction Improvement (Major & Minor)				



Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	08.02/a	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. a) 5th KM stone	each	7.00		
2	08.02/b	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. b) Ordinary kilometer stone	each	28.00		
3	08.04	Reinforced Cement Concrete M15 Boundary pillars of standard design, fixed in position including finishing but excluding painting	each	354.00		
4	08.11/i	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm equilateral triangle	each	465.00		
5	08.11/iii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 60 cm circular	each	84.00		



Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
6	08.11/iv	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 80 mm x 60 mm rectangular	each	4.00		
7	08.11/vii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm high octagon	each	18.00		
8	08.14	Road Marking with Hot Applied Thermoplastic Compound with Reflectorisng Glass Beads on Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorisng glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.)	sqm	11,725.73		



Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	08.15/c/v	Road Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming to IRC-79 and the drawings.) 120x120 -Road Delineator	each	3,717.00		
10	08.18/A/b	Metal Beam Crash Barrier Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fittings to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810) For post Height of 1.5 m	Rm	5,325.00		
11	08.20/ii	Road Markers/Road stud with lense reflector Providing & fixing of road stud 100x100 mm, die-cast in aluminium, resistance to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30mm upto a depth of 60mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973 Light Reflecting Lense Type	nos	19,344.00		
12	08.22	Lighting on Bridges Providing & fixing lighting on Bridges, mounted on steel hollow circular poles of standard specification, 5 m high fixed on parapets with cement concrete, 20 m apart and fitted with sodium vapour lamp	nos	61.00		



Bill No : 06. Traffic signs, Road marking & other road appurtenances

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
13	08/nsc/6	Rumble Strips Provision of 15 nos rumble strips covered with premix bituminous carpet, 15-20 mm high at center, 250 mm wide placed at 1 m center to center at approved locations to control speed, marked with white strips of road marking paint.	sqm	700.00		
Total of Bill 06. Traffic signs, Road marking & other road appurtenances						



Bill No : 07. Passenger Shelter

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	660.68		
2	10.16	Cement Plaster 12mm Thick in Cement Mortar 1:3	sqm	660.68		
3	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	99.08		
4	14.01	Brick masonry work in cement mortar 1:3 in foundation complete excluding pointing and plastering, as per drawing and technical specifications	cum	15.19		
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	10.06		
6	14.03/e/l	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M25Grade	cum	6.94		
7	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	0.83		
8	14/nsc2	Brick Flat Soling at Foundation	Sqm	134.38		
9	15.01	Brick masonry work in cement mortar 1:3 in Sub-structure complete excluding pointing and plastering, as per drawing and technical specifications	cum	32.39		



Bill No : 07. Passenger Shelter

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
10	16.01/a/i	cement concrete Reinforced concrete in super-structure as per drawing and Technical Specification i/c form work complete as per drawing and technical specification RCC Grade M25 For solid slab super-structure Upto 5m Upto 5m	cum	41.52		
11	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	4.15		
		Total of Bill 07. Passenger Shelter				



Bill No : 08. Bus Bay

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	03.14/Nsc	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from Roadway Cutting with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	cum	1,770.00		
2	04.01/Nsc1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	518.96		
3	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401	Cum	189.04		
4	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)	Cum	885.00		



Bill No : 08. Bus Bay

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
5	05.03	Construction of footpath/separator by providing a 150 mm compacted granular sub base as per clause 401 and 25 mm thick cement concrete grade M15, over laid with pre-cast concrete tiles in cement mortar including provision of all drainage arrangements but excluding kerb channel.	sqm	1,475.00		
6	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm	sqm	3,540.00		
7	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm	sqm	3,540.00		
8	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	247.80		



Bill No : 08. Bus Bay

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	141.60		
		Total of Bill 08. Bus Bay				



Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	51,721.89		
2	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	16,994.39		
3	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	700.64		
4	14.03/b	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M20 Grade	cum	84.81		
5	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	1,879.20		
6	15.03/b/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade Upto 5m	cum	196.61		
7	15.03/f/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M25 Grade upto 5m height	cum	3,022.61		



Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
8	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	151.13		
9	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	1,797.50		
10	24/i/b	Galvanised Mild steel J /L hook	kg	287.44		
11	40	Gextextile material (fine net)	sqm	323.37		
Total of Bill 09. Longitudinal Drains						



Bill No : 10. Retaining wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	2,651.86		
2	13.01/b/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary rock if blasting is not resorted to	cum	642.79		
3	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	2,354.23		
4	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	1,451.38		
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	810.55		
6	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	2,261.21		
7	15.03/b/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade Upto 5m	cum	210.57		
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	3,561.00		




		Total of Bill	10. Retaining wall	




Bill No : 11. Breast wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	14,289.07		
2	13.01/b/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary rock if blasting is not resorted to	cum	3,572.27		
3	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	3,684.24		
4	13.03/b	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Good Sandy Soil free from organic material	cum	650.16		
5	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	6,724.04		
6	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	3,214.68		
7	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification Random Rubble Masonry (coursed/uncoursed)	cum	16,109.52		
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	6,120.33		
		Total of Bill 11. Breast wall				




QUANTITY CALCULATION (ROAD PART)



Quantity Backup Calculation For Bill :

01. Site Clearance and Dismantling

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	02.01/i	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth from 300 mm to 600 mm			
		Refer: Site Clearance and Dismantling Formula: 2*2	2*2	4.00	Each
			Total :	4.00	Each
2	02.01/ii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 600 mm to 900 mm			
		Refer: Site Clearance and Dismantling Formula: 24*2	24*2	48.00	Each
			Total :	48.00	Each
3	02.01/iii	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 900 mm to 1800 mm			
		Refer: Site Clearance and Dismantling Formula: 55*2	55*2	110.00	Each
			Total :	110.00	Each
4	02.01/iv	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 1800 mm to 2700 mm			
		Refer: Site Clearance and Dismantling Formula: 2*2	2*2	4.00	Each
			Total :	4.00	Each



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
5	02.01/v	Cutting of Trees, including cutting of trunks, branches and removal of stumps including stacking of serviceable materials within a lead of 100 m. and earth filling in the depression/pit. Girth above 2700 mm			
		Refer: Site Clearance and Dismantling Formula: 2*2	2*2	4.00	Each
			Total :	4.00	Each
6	02.03/b	Clearing and grubbing road land including uprooting rank vegetation, grass, brush shrubs, saplings and trees of girth upto 300 mm, removal of stumps, disposal of unserviceable materials and stacking of serviceable materials and stacking of serviceable materials upto 100m. from road boundary. (by mechanical means)			
		Refer: Site Clearance and Dismantling Formula: 30.08	30.08	30.08	Ha
			Total :	30.08	Ha
7	02.04/i/c	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. c)Pre- stressed/ Reinforced Cement Concrete grade M20 & above			
		Refer: Site Clearance and Dismantling Formula: 299	299	299.00	cum
			Total :	299.00	cum
8	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar			
		Refer: Site Clearance and Dismantling Formula: 674	674	674.00	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	674.00	Cum
9	02.04/vii/a	Removing hume pipes class NP-3 a) 300mm to 600mm dia			
		Refer: Site Clearance and Dismantling Formula: 72	72	72.00	rm
			Total :	72.00	rm
10	02.04/vii/b	Removing hume pipes class NP-4 b) Above 600mm to 900mm dia			
		Refer: Site Clearance and Dismantling Formula: 108	108	108.00	rm
			Total :	108.00	rm
11	02.04/vii/c	Removing hume pipes class NP-5 c) Above 900mm dia			
		Refer: Site Clearance and Dismantling Formula: 192	192	192.00	rm
			Total :	192.00	rm
12	02.04/viii/e	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m e)Kandar/Gravel metal crust upto 150 mm thick with power Roller with scarifier			
		Refer: Site Clearance and Dismantling Formula: 285987	285987	285,987.00	sqm
			Total :	285,987.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
13	12.04/viii/f/i	Scarifying including picking up scarified material and stacking of old serviceable material within a lead of 100m f)Bituminous coarses 50-70mm along with premix Carpet and Surface dressing but without disturbing the base ii)With road roller attached with scarifier			
		Refer: Site Clearance and Dismantling Formula: 251121	251121	251,121.00	sqm
			Total :	251,121.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	02/nsc/1	Supplying and laying Hydro Seeding on cutting Surface			
		Refer: Errosion Control Formula: 70531.04	70531.04	70,531.04	sqm
			Total :	70,531.04	sqm
2	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2			
		Refer: Earthwork Formula: tot_fill	315983.000	315,983.00	cum
			Total :	315,983.00	cum
3	03.14	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2			
		Refer: TCS-02A Formula: (cw+2*ps+2*es-ext_pav+(bc+dbm+wmm1+wmm2+gsb+0.5*sg)*1*2)*I*sg+es_area*2*I	(7.000+2*1.500+2*1.000-6.700+(0.040+0.080+0.125+0.125+0.200+0.5*0.500)*1*2)*125.000*0.500+0.343*2*125.000	519.50	cum
		Refer: TCS-03 Formula: es_area*1*I	0.315*1*22400.000	7,056.00	cum
		Refer: TCS-03A Formula: (cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb+0.5*sg)*1*2)*I*sg+es_area*1*I	(7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200+0.5*0.500)*1*2)*4195.000*0.500+0.315*1*4195.000	27,791.88	cum
		Refer: TCS-04 Formula: es_area*1*I	0.315*1*1605.000	505.58	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-04A Formula: $(cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb+0.5*sg)*1*2)*1*sg+es\_area*1*I$	$(7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200+0.5*0.500)*1*2)*85.000*0.500+0.315*1*85.000$	563.13	cum
		Refer: TCS-05 Formula: $(cw+2*ps+1*es-ext\_pav+(bc+dbm+wmm1+wmm2+gsb+0.5*sg)*1*2)*1*sg+es\_area*1*I$	$(7.000+2*1.500+1*1.000-6.700+(0.040+0.070+0.125+0.125+0.200+0.5*0.500)*1*2)*2830.000*0.500+0.315*1*2830.000$	9,268.25	cum
		Refer: TCS-05A Formula: $(cw+2*ps+1*es-ext\_pav+(bc+dbm+wmm1+wmm2+gsb+0.5*sg)*1*2)*1*sg+es\_area*1*I$	$(7.000+2*1.500+1*1.000-0.000+(0.040+0.070+0.125+0.125+0.200+0.5*0.500)*1*2)*1850.000*0.500+0.315*1*1850.000$	12,256.25	cum
		Total :		57,960.58	cum
4	03.15	Compacting original ground supporting subgrade Loosening of the ground upto a level of 500 mm below the subgrade level, watered, graded and compacted in layers to meet requirement of table 300-2 for subgrade construction.			
		Refer: TCS-03 Formula: $(cw+2*ps-ext\_pav)*sg*I$	$(7.000+2*1.500-6.700)*0.500*22400.000$	36,960.00	cum
		Refer: TCS-03A Formula: $(cw+2*ps-ext\_pav)*sg*I$	$(7.000+2*1.500-0.000)*0.500*4195.000$	20,975.00	cum
		Refer: TCS-04 Formula: $(cw+2*ps-ext\_pav)*sg*I$	$(7.000+2*1.500-6.700)*0.500*1605.000$	2,648.25	cum
		Refer: TCS-05 Formula: $(cw+2*ps-ext\_pav)*sg*I$	$(7.000+2*1.500-6.700)*0.500*2830.000$	4,669.50	cum
		Refer: TCS-05A Formula: $(cw+2*ps-ext\_pav)*sg*I$	$(7.000+2*1.500-0.000)*0.500*1850.000$	9,250.00	cum
		Refer: TCS-06 Formula: $(cw+2*ps-ext\_pav)*sg*I$	$(7.000+2*1.500-6.700)*0.500*1780.000$	2,937.00	cum
		Refer: TCS-07 Formula: $(cw+2*ps-ext\_pav)*sg*I$	$(7.000+2*1.500-6.700)*0.500*100.000$	165.00	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-07A Formula: (cw+2*ps-ext_pav)*sg*I	$(7.000+2*1.500-6.700)*0.500*200.000$	330.00	cum
			Total :	77,934.75	cum
5	03.31	Excavation in Hill Area in Soil by Mechanical Means Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres			
		Refer: Earthwork Formula: tot_cut*(1-per_rock/100)	$3088903.000*(1-20.000/100)$	2,471,122.40	cum
			Total :	2,471,122.40	cum
6	03.32	Excavation in Hilly Area in Ordinary Rock by Mechanical Means not Requiring Blasting. Excavation in hilly area in ordinary rock not requiring ballasting by mechanical means including cutting and trimming of slopes and disposal of cut material with all lift and lead upto 1000 metres			
		Refer: Earthwork Formula: tot_cut*(per_rock/100)	$3088903.000*(20.000/100)$	617,780.60	cum
			Total :	617,780.60	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	04.01/Nsc1	Sub-base with Close Graded Material (Table: - 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material			
		Refer: Extra Widening on Flexible Formula: Pavement $ew\_area * gsb * (1 - gsb\_per / 100)$	$27183.000 * 0.200 * (1 - 0.000 / 100)$	5,436.60	Cum
		Refer: TCS-02A Formula: $((cw + 2 * ps + 2 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 1 * 2) * 1 * gsb + es\_gsb * 2 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 2 * 1.000 + (0.040 + 0.080 + 0.125 + 0.125 + 0.200 * 0.5) * 1 * 2) * 125.000 * 0.200 + 0.158 * 2 * 125.000) * (1 - 36.600 / 100)$	230.14	Cum
		Refer: TCS-03 Formula: $((cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 2 * 1) * 1 * gsb + es\_gsb * 1 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 2 * 1) * 22400.000 * 0.200 + 0.171 * 1 * 22400.000) * (1 - 0.000 / 100)$	57,232.00	Cum
		Refer: TCS-03A Formula: $((cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 2 * 1) * 1 * gsb + es\_gsb * 1 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 2 * 1) * 4195.000 * 0.200 + 0.171 * 1 * 4195.000) * (1 - 0.000 / 100)$	10,718.23	Cum
		Refer: TCS-04 Formula: $((cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 2 * 1) * 1 * gsb + es\_gsb * 1 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 2 * 1) * 1605.000 * 0.200 + 0.171 * 1 * 1605.000) * (1 - 0.000 / 100)$	4,100.78	Cum
		Refer: TCS-04A Formula: $((cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 2 * 1) * 1 * gsb + es\_gsb * 1 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 2 * 1) * 85.000 * 0.200 + 0.171 * 1 * 85.000) * (1 - 0.000 / 100)$	217.18	Cum
		Refer: TCS-05 Formula: $((cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 2 * 1) * 1 * gsb + es\_gsb * 1 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 2 * 1) * 2830.000 * 0.200 + 0.171 * 1 * 2830.000) * (1 - 0.000 / 100)$	7,230.65	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-05A Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*1*gsb+es\_gsb*1*1)*(1-gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*1850.000*0.200+0.171*1*1850.000)*(1-0.000/100)$	4,726.75	Cum
		Refer: TCS-06 Formula: $(cw+2*ps)*gsb*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*1780.000*(1-0.000/100)$	3,560.00	Cum
		Refer: TCS-07 Formula: $(cw+2*ps)*gsb*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*100.000*(1-0.000/100)$	200.00	Cum
		Refer: TCS-07A Formula: $(cw+2*ps)*gsb*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*200.000*(1-0.000/100)$	400.00	Cum
			Total :	94,052.32	Cum
2	04/nsc1	Plant Mix Method (material Reuse) Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401			
		Refer: TCS-02A Formula: $((cw+2*ps+2*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*1*2)*1*gsb+es\_gsb*2*1)*(gsb\_per/100)$	$((7.000+2*1.500+2*1.000+(0.040+0.080+0.125+0.125+0.200*0.5)*1*2)*125.000*0.200+0.158*2*125.000)*(36.600/100)$	132.86	Cum
			Total :	132.86	Cum
3	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)			
		Refer: Extra Widening on Flexible Pavement Formula: $ew\_area*(wmm1+wmm2)$	$27183.000*(0.125+0.125)$	6,795.75	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-02A Formula: $((((cw+2*ps+0.125*2)*wmm1)+((cw+2*ps+0.250*2)*wmm2))*I)$	$((((7.000+2*1.500+0.125*2)*0.125)+((7.000+2*1.500+0.250*2)*0.125))*125.000)$	324.22	Cum
		Refer: TCS-03 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*22400.000)$	57,050.00	Cum
		Refer: TCS-03A Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*4195.000)$	10,684.14	Cum
		Refer: TCS-04 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*1605.000)$	4,087.73	Cum
		Refer: TCS-04A Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*85.000)$	216.48	Cum
		Refer: TCS-05 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*2830.000)$	7,207.66	Cum
		Refer: TCS-05A Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*1850.000)$	4,711.72	Cum
		Refer: TCS-06 Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*1780.000)$	4,450.00	Cum
		Refer: TCS-07 Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*100.000)$	250.00	Cum
		Refer: TCS-07A Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*200.000)$	500.00	Cum
			Total :	96,277.70	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm			
		Refer: Extra Widening on Flexible Formula: Pavement ew_area	27183.000	27,183.00	sqm
		Refer: TCS-02A Formula: (cw+2*ps)*l	(7.000+2*1.500)*125.000	1,250.00	sqm
		Refer: TCS-03 Formula: (cw+2*ps)*l	(7.000+2*1.500)*22400.000	224,000.00	sqm
		Refer: TCS-03A Formula: (cw+2*ps)*l	(7.000+2*1.500)*4195.000	41,950.00	sqm
		Refer: TCS-04 Formula: (cw+2*ps)*l	(7.000+2*1.500)*1605.000	16,050.00	sqm
		Refer: TCS-04A Formula: (cw+2*ps)*l	(7.000+2*1.500)*85.000	850.00	sqm
		Refer: TCS-05 Formula: (cw+2*ps)*l	(7.000+2*1.500)*2830.000	28,300.00	sqm
		Refer: TCS-05A Formula: (cw+2*ps)*l	(7.000+2*1.500)*1850.000	18,500.00	sqm
		Refer: TCS-06 Formula: (cw+2*ps)*l	(7.000+2*1.500)*1780.000	17,800.00	sqm
		Refer: TCS-07 Formula: (cw+2*ps)*l	(7.000+2*1.500)*100.000	1,000.00	sqm
		Refer: TCS-07A Formula: (cw+2*ps)*l	(7.000+2*1.500)*200.000	2,000.00	sqm
			Total :	378,883.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
2	06.02/ii	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. ii) On granular Surface Pre treated with prime Coat @ 0.25 - 0.30 kg/sqm			
		Refer: TCS-02A Formula: (cw+2*ps)*l	(7.000+2*1.500)*125.000	1,250.00	sqm
		Refer: TCS-03 Formula: (cw+2*ps)*l	(7.000+2*1.500)*22400.000	224,000.00	sqm
		Refer: TCS-03A Formula: (cw+2*ps)*l	(7.000+2*1.500)*4195.000	41,950.00	sqm
		Refer: TCS-04 Formula: (cw+2*ps)*l	(7.000+2*1.500)*1605.000	16,050.00	sqm
		Refer: TCS-04A Formula: (cw+2*ps)*l	(7.000+2*1.500)*85.000	850.00	sqm
		Refer: TCS-05 Formula: (cw+2*ps)*l	(7.000+2*1.500)*2830.000	28,300.00	sqm
		Refer: TCS-05A Formula: (cw+2*ps)*l	(7.000+2*1.500)*1850.000	18,500.00	sqm
		Refer: TCS-06 Formula: (cw+2*ps)*l	(7.000+2*1.500)*1780.000	17,800.00	sqm
		Refer: TCS-07 Formula: (cw+2*ps)*l	(7.000+2*1.500)*100.000	1,000.00	sqm
		Refer: TCS-07A Formula: (cw+2*ps)*l	(7.000+2*1.500)*200.000	2,000.00	sqm
			Total :	351,700.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
3	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40			
		Refer: Extra Widening on Flexible Formula: Pavement $ew\_area*dbm$	$27183.000*0.070$	1,902.81	cum
		Refer: TCS-02A Formula: $(cw+2*ps)*dbm*I$	$(7.000+2*1.500)*0.080*125.000$	100.00	cum
		Refer: TCS-03 Formula: $(cw+2*ps)*dbm*I$	$(7.000+2*1.500)*0.070*22400.000$	15,680.00	cum
		Refer: TCS-03A Formula: $(cw+2*ps)*dbm*I$	$(7.000+2*1.500)*0.070*4195.000$	2,936.50	cum
		Refer: TCS-04 Formula: $(cw+2*ps)*dbm*I$	$(7.000+2*1.500)*0.070*1605.000$	1,123.50	cum
		Refer: TCS-04A Formula: $(cw+2*ps)*dbm*I$	$(7.000+2*1.500)*0.070*85.000$	59.50	cum
		Refer: TCS-05 Formula: $(cw+2*ps)*dbm*I$	$(7.000+2*1.500)*0.070*2830.000$	1,981.00	cum
		Refer: TCS-05A Formula: $(cw+2*ps)*dbm*I$	$(7.000+2*1.500)*0.070*1850.000$	1,295.00	cum
		Refer: TCS-06 Formula: $(cw+2*ps)*dbm*I$	$(7.000+2*1.500)*0.070*1780.000$	1,246.00	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-07 Formula: (cw+2*ps)*dbm*I	(7.000+2*1.500)*0.070*100.000	70.00	cum
		Refer: TCS-07A Formula: (cw+2*ps)*dbm*I	(7.000+2*1.500)*0.070*200.000	140.00	cum
			Total :	26,534.31	cum
4	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40			
		Refer: Extra Widening on Flexible Formula:Pavement ew_area*bc	27183.000*0.040	1,087.32	cum
		Refer: TCS-02A Formula: (cw+2*ps)*bc*I	(7.000+2*1.500)*0.040*125.000	50.00	cum
		Refer: TCS-03 Formula: (cw+2*ps)*bc*I	(7.000+2*1.500)*0.040*22400.000	8,960.00	cum
		Refer: TCS-03A Formula: (cw+2*ps)*bc*I	(7.000+2*1.500)*0.040*4195.000	1,678.00	cum
		Refer: TCS-04 Formula: (cw+2*ps)*bc*I	(7.000+2*1.500)*0.040*1605.000	642.00	cum
		Refer: TCS-04A Formula: (cw+2*ps)*bc*I	(7.000+2*1.500)*0.040*85.000	34.00	cum
		Refer: TCS-05 Formula: (cw+2*ps)*bc*I	(7.000+2*1.500)*0.040*2830.000	1,132.00	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-05A Formula: $(cw+2*ps)*bc*I$	$(7.000+2*1.500)*0.040*1850.000$	740.00	cum
		Refer: TCS-06 Formula: $(cw+2*ps)*bc*I$	$(7.000+2*1.500)*0.040*1780.000$	712.00	cum
		Refer: TCS-07 Formula: $(cw+2*ps)*bc*I$	$(7.000+2*1.500)*0.040*100.000$	40.00	cum
		Refer: TCS-07A Formula: $(cw+2*ps)*bc*I$	$(7.000+2*1.500)*0.040*200.000$	80.00	cum
			Total :	15,155.32	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	04.01/Nsc1	Sub-base with Close Graded Material (Table: - 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material			
		Refer: Minor Junction Formula: $\text{tot\_area} * \text{gsb} * (1 - \text{gsb\_per} / 100)$	$446.000 * 0.200 * (1 - 0.000 / 100)$	89.20	Cum
			Total :	89.20	Cum
2	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)			
		Refer: Minor Junction Formula: $\text{tot\_area} * (\text{wmm1} + \text{wmm2})$	$446.000 * (0.125 + 0.125)$	111.50	Cum
			Total :	111.50	Cum
3	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm			
		Refer: Minor Junction Formula: tot_area	446.000	446.00	sqm
			Total :	446.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
4	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm			
		Refer: Minor Junction Formula: tot_area	446.000	446.00	sqm
			Total :	446.00	sqm
5	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40			
		Refer: Minor Junction Formula: tot_area*dbm	446.000*0.070	31.22	cum
			Total :	31.22	cum
6	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Minor Junction Formula: tot_area*bc	446.000*0.040	17.84	cum
			Total :	17.84	cum





SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	08.02/a	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. a) 5th KM stone			
		Refer: Traffic Signs Formula: 7	7	7.00	each
			Total :	7.00	each
2	08.02/b	Reinforced cement concrete M15 kilometer stone of standard design fixed in Position including painting and painting letters etc. b) Ordinary kilometer stone			
		Refer: Traffic Signs Formula: 28	28	28.00	each
			Total :	28.00	each
3	08.04	Reinforced Cement Concrete M15 Boundary pillars of standard design, fixed in position including finishing but excluding painting			
		Refer: Traffic Signs Formula: 354	354	354.00	each
			Total :	354.00	each
4	08.11/i	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informative sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm equilateral triangle			
		Refer: Traffic Signs Formula: 465	465	465.00	each
			Total :	465.00	each




SI No	SOR Ref No	Description	Calculation	Quantity	Unit
5	08.11/iii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 60 cm circular			
		Refer: Traffic Signs Formula: 84	84	84.00	each
			Total :	84.00	each
6	08.11/iv	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 80 mm x 60 mm rectangular			
		Refer: Traffic Signs Formula: 4	4	4.00	each
			Total :	4.00	each



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
7	08.11/vii	Retro- reflectorised Traffic signs Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) 90 cm high octagon			
		Refer: Traffic Signs Formula: 18	18	18.00	each
			Total :	18.00	each
8	08.14	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads on Bituminous Surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35 .The finished surface to be level, uniform and free from streaks and holes.)			
		Refer: TCS-02A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((125.000+6)/9)*3.000*0.100)+ (2.000*125.000*0.150)$	41.87	sqm
		Refer: TCS-03 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((22400.000+6)/9)*3.000*0.100)+ (2.000*22400.000*0.150)$	7,466.87	sqm
		Refer: TCS-03A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((4195.000+6)/9)*3.000*0.100)+ (2.000*4195.000*0.150)$	1,398.53	sqm
		Refer: TCS-04 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((1605.000+6)/9)*3.000*0.100)+ (2.000*1605.000*0.150)$	535.20	sqm
		Refer: TCS-04A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((85.000+6)/9)*3.000*0.100)+ (2.000*85.000*0.150)$	28.53	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-05 Formula: $((l+6)/9)*l*wc+(nc*l*wid\_mar)$	$((2830.000+6)/9)*3.000*0.100)+$ $(2.000*2830.000*0.150)$	943.53	sqm
		Refer: TCS-05A Formula: $((l+6)/9)*l*wc+(nc*l*wid\_mar)$	$((1850.000+6)/9)*3.000*0.100)+$ $(2.000*1850.000*0.150)$	616.87	sqm
		Refer: TCS-06 Formula: $((l+6)/9)*l*wc+(nc*l*wid\_mar)$	$((1780.000+6)/9)*3.000*0.100)+$ $(2.000*1780.000*0.150)$	593.53	sqm
		Refer: TCS-07 Formula: $((l+6)/9)*l*wc+(nc*l*wid\_mar)$	$((100.000+6)/9)*3.000*0.100)+$ $(2.000*100.000*0.150)$	33.53	sqm
		Refer: TCS-07A Formula: $((l+6)/9)*l*wc+(nc*l*wid\_mar)$	$((200.000+6)/9)*3.000*0.100)+$ $(2.000*200.000*0.150)$	66.87	sqm
		Refer: TCS-09A Formula: $((l+6)/9)*l*wc+(nc*l*wid\_mar)$	$((0.000+6)/9)*3.000*0.100)+$ $(2.000*0.000*0.150)$	0.20	sqm
		Refer: TCS-12 Formula: $((l+6)/9)*l*wc+(nc*l*wid\_mar)$	$((0.000+6)/9)*3.000*0.100)+$ $(2.000*0.000*0.150)$	0.20	sqm
			Total :	11,725.73	sqm
9	08.15/c/v	Road Delineators (Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide stripes, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and confirming to IRC-79 and the drawings.) 120x120 -Road Delineator			
		Refer: Traffic Signs Formula: 3717	3717	3,717.00	each
			Total :	3,717.00	each



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
10	08.18/A/b	Metal Beam Crash Barrier Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 810) For post Height of 1.5 m			
		Refer: Crash Barrier Formula: 5325	5325	5,325.00	Rm
			Total :	5,325.00	Rm
11	08.20/ii	Road Markers/Road stud with lense reflector Providing & fixing of road stud 100x100 mm, die-cast in aluminium , resistance to corrosive effect of salt and grit, fitted with lense reflectors, installed in concrete or asphaltic surface by drilling hole 30mm upto a depth of 60mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973 Light Reflecting Lense Type			
		Refer: Traffic Signs Formula: 19344	19344	19,344.00	nos
			Total :	19,344.00	nos
12	08.22	Lighting on Bridges Providing & fixing lighting on Bridges, mounted on steel hollow circular poles of standard specification, 5 m high fixed on parapets with cement concrete, 20 m apart and fitted with sodium vapour lamp			
		Refer: Traffic Signs Formula: 61	61	61.00	nos
			Total :	61.00	nos



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
13	08/nsc/6	Rumble Strips Provision of 15 nos rumble strips covered with premix bituminous carpet, 15-20 mm high at center, 250 mm wide placed at 1 m center to center at approved locations to control speed, marked with white strips of road marking paint.			
		Refer: Traffic Signs Formula: 700	700	700.00	sqm
			Total :	700.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.			
		Refer: Passenger Shelter Formula: $((sw\_in*sw\_ht*2)+(w\_pass*sw\_ht*2)+(bw\_in*bw\_ht)+(l\_pass*bw\_ht)+(col\_l*col\_h*6)+(l\_pass*roof\_w)-(2*win\_n*win\_l*win\_h))*n$	$((1.875*3.830*2)+(2.000*3.830*2)+(5.800*2.350)+(6.000*2.350)+(0.250*2.650*6)+(6.000*1.530)-(2*2.000*1.250*0.900))*10.000$	660.68	sqm
			Total :	660.68	sqm
2	10.16	Cement Plaster 12mm Thick in Cement Morter 1:3			
		Refer: Passenger Shelter Formula: $((sw\_in*sw\_ht*2)+(w\_pass*sw\_ht*2)+(bw\_in*bw\_ht)+(l\_pass*bw\_ht)+(col\_l*col\_h*6)+(l\_pass*roof\_w)-(2*win\_n*win\_l*win\_h))*n$	$((1.875*3.830*2)+(2.000*3.830*2)+(5.800*2.350)+(6.000*2.350)+(0.250*2.650*6)+(6.000*1.530)-(2*2.000*1.250*0.900))*10.000$	660.68	sqm
			Total :	660.68	sqm
3	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m			
		Refer: Passenger Shelter Formula: $(((a+0.25*2)*(b+0.25*2)*df*col\_n)+((l+2*0.1)*(w+2*0.1)*db))*n$	$(((0.750+0.25*2)*(0.750+0.25*2)*0.750*6.000)+((13.500+2*0.1)*(0.500+2*0.1)*0.300))*10.000$	99.08	cum
			Total :	99.08	cum
4	14.01	Brick masonry work in cement mortar 1:3 in foundation complete excluding pointing and plastering, as per drawing and technical specifications			
		Refer: Passenger Shelter Formula: $((l*w*wbtm\_thk)+(l*fw\_wall*wtop\_thk))*n$	$((13.500*0.500*0.150)+(13.500*0.250*0.150))*10.000$	15.19	cum
			Total :	15.19	cum




SI No	SOR Ref No	Description	Calculation	Quantity	Unit
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade			
		Refer: Passenger Shelter Formula: (l_pass-2*w_wall)*(w_pass-2*w_wall) *pcc_thk*n	(6.000-2*0.125)*(2.000-2*0.125) *0.100*10.000	10.06	cum
			Total :	10.06	cum
6	14.03/e/II	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M25Grade			
		Refer: Passenger Shelter Formula: (((a*b*btm_thk)+((a+col_l)*0.5)*((b+col_w)*0.5)*top_thk)+(col_l*col_w*(df-btm_thk-top_thk)))*col_n*n	((((0.750*0.750*0.100)+((0.750+0.250)*0.5)*((0.750+0.250)*0.5)*0.100)+(0.250*0.250*(0.750-0.100-0.100)))*6.000*10.000	6.94	cum
			Total :	6.94	cum
7	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification			
		Refer: Passenger Shelter Formula: (((a*b*btm_thk)+((a+col_l)*0.5)*((b+col_w)*0.5)*top_thk)+(col_l*col_w*(df-btm_thk-top_thk)))*col_n*n)*rf/1000	(((((0.750*0.750*0.100)+((0.750+0.250)*0.5)*((0.750+0.250)*0.5)*0.100)+(0.250*0.250*(0.750-0.100-0.100)))*6.000*10.000)*120.000/1000	0.83	MT
			Total :	0.83	MT
8	14/nsc2	Brick Flat Soling at Foundation			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Passenger Shelter Formula: $((l_{pass}-2*w_{wall})*(w_{pass}-2*w_{wall}))+ (a*b*col_n)*n$	$((6.000-2*0.125)*(2.000-2*0.125))+ (0.750*0.750*6.000))*10.000$	134.38	Sqm
			Total :	134.38	Sqm
9	15.01	Brick masonry work in cement mortar 1:3 in Sub-structure complete excluding pointing and plastering, as per drawing and technical specifications			
		Refer: Passenger Shelter Formula: $((l*w_{wall}*wall_h)+(sw_l*2*w_{wall}*sw_h)+(bw_l*4*w_{wall}*bw_h)+(rail_l*w_{wall}*rail_h))*n-(win_l*w_{wall}*win_h*2*n)$	$((13.500*0.125*0.550)+(1.500*2*0.125*2.130)+(2.650*4*0.125*0.950)+(9.500*0.125*0.450))*10.000-(1.250*0.125*0.900*2*10.000)$	32.39	cum
			Total :	32.39	cum
10	16.01/a/i	cement concrete Reinforced concrete in super-structure as per drawing and Technical Specification i/c form work complet eas per drawing and technical specification RCC Grade M25 For solid slab super-structure Upto 5m Upto 5m			
		Refer: Passenger Shelter Formula: $((col_l*col_w*col_h*col_n*0.5)+(col_l*col_w*bcol_h*col_n*0.5)+(sb_l*sb_w*sb_thk*2)+(sb_a*sb_w*sb_thk*4)+(l_{pass}*roof_w*roof_thk)+(l_{pass}*fchj_w*roof_thk)+(l_{pass}*bchj_w*roof_thk)+(bch_l*bch_w*bch_thk))*n$	$((0.250*0.250*2.650*6.000*0.5)+(0.250*0.250*2.100*6.000*0.5)+(1.530*0.250*0.350*2)+(3.000*0.250*0.350*4)+(6.000*1.530*0.110)+(6.000*0.680*0.110)+(6.000*0.450*0.110)+(5.000*0.500*0.075))*10.000$	41.52	cum
			Total :	41.52	cum
11	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Passenger Shelter Formula: $((col\_l * col\_w * fcol\_h * col\_n * 0.5) +$ $(col\_l * col\_w * bcol\_h * col\_n * 0.5) +$ $(sb\_l * sb\_w * sb\_thk * 2) +$ $(sb\_a * sb\_w * sb\_thk * 4) +$ $(l\_pass * roof\_w * roof\_thk) +$ $(l\_pass * fchj\_w * roof\_thk) +$ $(l\_pass * bchj\_w * roof\_thk) +$ $(bch\_l * bch\_w * bch\_thk) * n * srf / 1000$	$((0.250 * 0.250 * 2.650 * 6.000 * 0.5) +$ $(0.250 * 0.250 * 2.100 * 6.000 * 0.5) +$ $(1.530 * 0.250 * 0.350 * 2) +$ $(3.000 * 0.250 * 0.350 * 4) +$ $(6.000 * 1.530 * 0.110) +$ $(6.000 * 0.680 * 0.110) +$ $(6.000 * 0.450 * 0.110) +$ $(5.000 * 0.500 * 0.075))$ $* 10.000 * 100.000 / 1000$	4.15	MT
			Total :	4.15	MT



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	03.14/Nsc	Construction of Subgrade and Earthen Shoulders Construction of subgrade and earthen shoulders with approved material obtained from Roadway Cutting with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*sg$	$((2*22.000+15.000)*(3.500+2.500))$ $*10.000*0.500$	1,770.00	cum
			Total :	1,770.00	cum
2	04.01/Nsc1	Sub-base with Close Graded Material (Table: - 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*gsb*(1-gsb\_per/100)$	$((2*22.000+15.000)*(3.500+2.500))$ $*10.000*0.200*(1-0.000/100)$	708.00	Cum
			Total :	708.00	Cum
3	05.02	Wet Mix Macadam (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.)			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*(wmm1+wmm2)$	$((2*22.000+15.000)*(3.500+2.500))$ $*10.000*(0.125+0.125)$	885.00	Cum
			Total :	885.00	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
4	05.03	Construction of footpath/separator by providing a 150 mm compacted granular sub base as per clause 401 and 25 mm thick cement concrete grade M15, over laid with pre-cast concrete tiles in cement mortar including provision of all drainage arrangements but excluding kerb channel.			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*f)*n$	$((2*22.000+15.000)*2.500)*10.000$	1,475.00	sqm
			Total :	1,475.00	sqm
5	06.01/a	Prime coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular Base including clearing of road surface and spraying primer using mechanical means.) A) On WBM/ WMM Surface @ 0.70-1.00 kg/sqm			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n$	$((2*22.000+15.000)*(3.500+2.500))*10.000$	3,540.00	sqm
			Total :	3,540.00	sqm
6	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n$	$((2*22.000+15.000)*(3.500+2.500))*10.000$	3,540.00	sqm
			Total :	3,540.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
7	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*dbm$	$((2*22.000+15.000)*(3.500+2.500))$ $*10.000*0.070$	247.80	cum
			Total :	247.80	cum
8	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*bc$	$((2*22.000+15.000)*(3.500+2.500))$ $*10.000*0.040$	141.60	cum
			Total :	141.60	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m			
		Refer: PCC Chut Drain Formula: $(a+2*wall\_thk+0.1*2)*f\_thk*I$	$(0.600+2*0.150+0.1*2)*0.100*771.000$	84.81	cum
		Refer: RCC Cover Drain 1.0m Formula: $(t\_width+off*2)*((ht+b\_slab\_thk)/2)*I$	$(1.750+0.100*2)*((0.900+0.150)/2)*3593.000$	3,678.33	cum
		Refer: RR Masonry Trapezoidal Drain Formula: $(a+2*b)*(h+f)*I$	$(1.000+2*0.200)*(0.850+0.200)*32625.000$	47,958.75	cum
			Total :	51,721.89	cum
2	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification R a n d o m R u b b l e M a s o n r y (coursed/uncoursed)			
		Refer: RR Masonry Trapezoidal Drain Formula: $((0.5*(c+j+2*b)*f)+(((a-j)/2)^2+h^2)^{(1/2})*b*2)*I$	$((0.5*(0.765+0.500+2*0.200)*0.200)+(((1.000-0.500)/2)^2+0.850^2)^{(1/2})*0.200*2)*32625.000$	16,994.39	cum
			Total :	16,994.39	cum
3	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade			
		Refer: RCC Cover Drain 1.0m Formula: $(t\_width+off*2)*pcc\_thk*I$	$(1.750+0.100*2)*0.100*3593.000$	700.64	cum
			Total :	700.64	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
4	14.03/b	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M20 Grade			
		Refer: PCC Chut Drain Formula: (a+2*wall_thk+0.1*2)*f_thk*I	(0.600+2*0.150+0.1*2)*0.100*771.000	84.81	cum
			Total :	84.81	cum
5	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification R a n d o m R u b b l e M a s o n r y (coursed/uncoursed)			
		Refer: RR Masonry Trapezoidal Drain Formula: (I-(I/5*0.2))*b*d	(32625.000-(32625.000/5*0.2))*0.200*0.300	1,879.20	cum
			Total :	1,879.20	cum
6	15.03/b/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade Upto 5m			
		Refer: PCC Chut Drain Formula: ((a+wall_thk*2)*btm_thk+ht*wall_thk*2)*I	((0.600+0.150*2)*0.150+0.400*0.150*2)*771.000	196.61	cum
			Total :	196.61	cum
7	15.03/f/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M25 Grade upto 5m height			
		Refer: RCC Cover Drain 1.0m Formula: (ht*w_thk*2+t_width*b_slab_thk+t_width*t_slab_thk)*I	(0.900*0.200*2+1.750*0.150+1.750*0.125)*3593.000	3,022.61	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	3,022.61	cum
8	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification			
		Refer: RCC Cover Drain 1.0m Formula: (ht*w_thk*2+t_width*b_slab_thk+t_width*t_slab_thk)*l*s	(0.900*0.200*2+1.750*0.150+1.750*0.125)*3593.000*0.050	151.13	MT
			Total :	151.13	MT
9	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications			
		Refer: RCC Cover Drain 1.0m Formula: (l/2+1)	(3593.000/2+1)	1,797.50	Rm
			Total :	1,797.50	Rm
10	24/i/b	Galvanised Mild steel J /L hook			
		Refer: RCC Cover Drain 1.0m Formula: l/15*4*.3	3593.000/15*4*.3	287.44	kg
			Total :	287.44	kg
11	40	Gextextile material (fine net)			
		Refer: RCC Cover Drain 1.0m Formula: (l/1)*4*(150*150/1000^2)	(3593.000/1)*4*(150*150/1000^2)	323.37	sqm
			Total :	323.37	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m			
		Refer: Retaining Wall 2.0m Formula: $(((0.5*((pcc\_thk+H2+d)+(pcc\_thk+d))*((0.211+0.600)*(0.600-0.150))))+(B1+2*o))+((H2+d)*(mw-o))*I*(1-p\_c)$	$(((0.5*((0.300+0.211+0.600)+(0.300+0.600))*(1.270+2*0.150))+((0.211+0.600)*(0.600-0.150)))*1431.000)*(1-0.200)$	2,225.02	cum
		Refer: Retaining Wall 3.0m Formula: $(((0.5*((pcc\_th1k+H2+d)+(pcc\_th1k+d))*((0.267+0.600)*(0.600-0.150))))+(B1+2*o))+((H2+d)*(mw-o))*I*(1-p\_c)$	$(((0.5*((0.300+0.267+0.600)+(0.300+0.600))*(1.600+2*0.150))+((0.267+0.600)*(0.600-0.150)))*177.000)*(1-0.200)$	333.30	cum
		Refer: Retaining Wall 4.0m Formula: $(((0.5*((pcc\_thk+H2+d)+(pcc\_thk+d))*((0.322+0.600)*(0.600-0.150))))+(B1+2*o))+((H2+d)*(mw-o))*I*(1-p\_c)$	$(((0.5*((0.300+0.322+0.600)+(0.300+0.600))*(1.933+2*0.150))+((0.322+0.600)*(0.600-0.150)))*42.000)*(1-0.200)$	93.55	cum
			Total :	2,651.86	cum
2	13.01/b/ii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary rock if blasting is not resorted to			
		Refer: Retaining Wall 2.0m Formula: $(((0.5*((pcc\_thk+H2+d)+(pcc\_thk+d))*((0.211+0.600)*(0.600-0.150))))+(B1+2*o))+((H2+d)*(mw-o))*I*p\_c$	$(((0.5*((0.300+0.211+0.600)+(0.300+0.600))*(1.270+2*0.150))+((0.211+0.600)*(0.600-0.150)))*1431.000)*0.200$	556.25	cum
		Refer: Retaining Wall 3.0m Formula: $(((0.5*((pcc\_thk+H2+d)+(pcc\_thk+d))*((0.267+0.600)*(0.600-0.150))))+(B1+2*o))+((H2+d)*(mw-o))*I*p\_c$	$(((0.5*((0.300+0.267+0.600)+(0.300+0.600))*(1.600+2*0.150))+((0.267+0.600)*(0.600-0.150)))*177.000)*0.200$	63.15	cum
		Refer: Retaining Wall 4.0m Formula: $(((0.5*((pcc\_thk+H2+d)+(pcc\_thk+d))*((0.322+0.600)*(0.600-0.150))))+(B1+2*o))+((H2+d)*(mw-o))*I*p\_c$	$(((0.5*((0.300+0.322+0.600)+(0.300+0.600))*(1.933+2*0.150))+((0.322+0.600)*(0.600-0.150)))*42.000)*0.200$	23.39	cum
			Total :	642.79	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
3	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .			
		Refer: Retaining Wall 2.0m Formula: $mw*(H2+H1)*l$	$0.600*(0.211+2.000)*1431.000$	1,898.37	cum
		Refer: Retaining Wall 3.0m Formula: $mw*(H2+H1)*l$	$0.600*(0.267+3.000)*177.000$	346.96	cum
		Refer: Retaining Wall 4.0m Formula: $mw*(H2+H1)*l$	$0.600*(0.322+4.000)*42.000$	108.91	cum
			Total :	2,354.23	cum
4	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification R a n d o m R u b b l e M a s o n r y (coursed/uncoursed)			
		Refer: Retaining Wall 2.0m Formula: $((0.5*(B1+e)*d)+(0.5*B1*H2))*l$	$((0.5*(1.270+1.067)*0.600)+(0.5*1.270*0.211))*1431.000$	1,195.01	cum
		Refer: Retaining Wall 3.0m Formula: $((0.5*(B1+B3)*d)+(0.5*B1*H2))*l$	$((0.5*(1.600+1.400)*0.600)+(0.5*1.600*0.267))*177.000$	197.11	cum
		Refer: Retaining Wall 4.0m Formula: $((0.5*(B1+B3)*d)+(0.5*B1*H2))*l$	$((0.5*(1.933+1.733)*0.600)+(0.5*1.933*0.322))*42.000$	59.26	cum
			Total :	1,451.38	cum
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade			
		Refer: Retaining Wall 2.0m Formula: $(B2+2*o)*pcc\_thk*l$	$(1.284+2*0.150)*0.300*1431.000$	680.01	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Retaining Wall 3.0m Formula: $(B2+2*o)*pcc\_thk*I$	$(1.622+2*0.150)*0.300*177.000$	102.06	cum
		Refer: Retaining Wall 4.0m Formula: $(B2+2*o)*pcc\_thk*I$	$(1.960+2*0.150)*0.300*42.000$	28.48	cum
			Total :	810.55	cum
6	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification R a n d o m R u b b l e M a s o n r y (coursed/uncoursed)			
		Refer: Retaining Wall 2.0m Formula: $(0.5*(T+e)*(H1-d))*I$	$(0.5*(0.600+1.067)*(2.000-0.600))$ *1431.000	1,669.83	cum
		Refer: Retaining Wall 3.0m Formula: $(0.5*(T+B3)*(H1-d))*I$	$(0.5*(0.600+1.400)*(3.000-0.600))$ *177.000	424.80	cum
		Refer: Retaining Wall 4.0m Formula: $(0.5*(T+B3)*(H1-d))*I$	$(0.5*(0.600+1.733)*(4.000-0.600))$ *42.000	166.58	cum
			Total :	2,261.21	cum
7	15.03/b/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade Upto 5m			
		Refer: Retaining Wall 2.0m Formula: $(l-(l/10*gap))*para\_ht*para\_w$	$(1431.000-(1431.000/10*0.300))$ *0.450*0.300	187.39	cum
		Refer: Retaining Wall 3.0m Formula: $(l-(l/10*gap))*para\_ht*para\_w$	$(177.000-(177.000/10*0.300))$ *0.450*0.300	23.18	cum
			Total :	210.57	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications			
		Refer: Retaining Wall 2.0m Formula: $n \times l$	2.000×1431.000	2,862.00	Rm
		Refer: Retaining Wall 3.0m Formula: $n \times l$	3.000×177.000	531.00	Rm
		Refer: Retaining Wall 4.0m Formula: $n \times l$	4.000×42.000	168.00	Rm
			Total :	3,561.00	Rm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m			
		Refer: Breast Wall 3.0m Ht Formula: $(h+2*0.5)*(e+f)*(1-p)*l$	$(2.225+2*0.5)*(0.850+0.300)*(1-0.200)$ *4816.000	14,289.07	cum
			Total :	14,289.07	cum
2	13.01/b/ii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary rock if blasting is not resorted to			
		Refer: Breast Wall 3.0m Ht Formula: $(h+2*0.5)*(e+f)*p*l$	$(2.225+2*0.5)*(0.850+0.300)$ *0.200*4816.000	3,572.27	cum
			Total :	3,572.27	cum
3	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials			
		Refer: Breast Wall 3.0m Ht Formula: $c*b*l$	$2.550*0.300*4816.000$	3,684.24	cum
			Total :	3,684.24	cum
4	13.03/b	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Good Sandy Soil free from organic material			
		Refer: Breast Wall 3.0m Ht Formula: $d*b*l$	$0.450*0.300*4816.000$	650.16	cum
			Total :	650.16	cum




SI No	SOR Ref No	Description	Calculation	Quantity	Unit
5	14.02/b	Stone masonry work in cement mortar 1:3 in foundation complete as drawing and Technical Specification R a n d o m R u b b l e M a s o n r y (coursed/uncoursed)			
		Refer: Breast Wall 3.0m Ht Formula: $0.5*(e+(e-(h/5)))*h*I$	$0.5*(0.850+(0.850-(2.225/5)))$ $*2.225*4816.000$	6,724.04	cum
			Total :	6,724.04	cum
6	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade			
		Refer: Breast Wall 3.0m Ht Formula: $g*f*I$	$2.225*0.300*4816.000$	3,214.68	cum
			Total :	3,214.68	cum
7	15.02/b	Stone masonry work in cement mortar 1:3 in Sub-structure complete as drawing and Technical Specification R a n d o m R u b b l e M a s o n r y (coursed/uncoursed)			
		Refer: Breast Wall 3.0m Ht Formula: $(0.5*((a+(c+d)/3)+a)*(d+c)+i*d+i*m)*I$	$(0.5*((0.600+(2.550+0.450)/3)+0.600)*$ $(0.450+2.550)$ $+0.100*0.450+0.100*0.000)*4816.000$	16,109.52	cum
			Total :	16,109.52	cum
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications			
		Refer: Breast Wall 3.0m Ht Formula: $(l/1.2)*(h-j-i)$	$(4816.000/1.2)*(2.225-0.600-0.100)$	6,120.33	Rm
			Total :	6,120.33	Rm



BILL OF QUANTITY (STRUCTURE PART)



Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
Foundation						
1	13.01/a/i	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth upto 3 m	cum	4,092.00		
2	13.01/a/ii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Depth 3 m to 6 m	cum	304.00		
3	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	233.00		
4	14.03/g	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M30 Grade	cum	613.00		
5	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	74.00		
Sub Total of Foundation						
Sub Structure						
6	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	203.00		
7	13.03/b	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Good Sandy Soil free from organic material	cum	3,291.00		
8	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	657.00		



Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	15.03/g/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M30 Grade upto 5m height	cum	725.00		
10	15.03/i/i	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification RCC M40 Grade upto 5m height	cum	7.00		
11	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	105.00		
12	15.09	Supplying, fitting and fixing in position true to line and level elastomeric bearing conforming to IRC: 83 (Part-II) section IX and clause 2005 of MoRTH specifications complete including all accessories as per drawing and Technical Specifications.	cc	57,810.00		
13	15.10	Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, complete assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC: 83 part-I & II respectively and other parts conforming to BS: 5400, section 9.1 & 9.2 and clause 2006 of MoRTH Specifications complete as per drawing and approved technical specifications.	Ton	2,100.00		
14	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	972.00		




Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
Sub Total of			Sub Structure			
		Super Structure				
15	06.02/i	Tack coat Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor m on the prepared bituminous/ granular surface cleaned with mechanical broom. i) On bituminous Surface @ 0.20 - 0.30 kg/sqm	sqm	1,043.00		
16	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	42.00		
17	14/nsc1/i	Filler joint i)Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.	m	128.00		
18	14/nsc1/i	Filler joint Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.	m	128.00		
19	14/nsc1/i i	Filler joint iii)Providing and fixing in position 20 mm thick premoulded joint filler in expansion joint for fixed ends of simply supported spans not exceeding 10 m to cater for a horizontal movement upto 20 mm, covered with sealant complete as per drawing and technical specifications.	m	128.00		



Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
20	14/nsc1/i v	Filler joint iv)Providing and filling joint sealing compound as per drawings and technical specifications with coarse sand and 6 per cent bitumen by weight.	m	128.00		
21	16.01/b/i /c2/ii	RCC Grade M30 For solid slab super-structure Approach Slab	cum	747.00		
22	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	134.00		
23	16.05	Cement concrete wearing coat M-30 grade including reinforcement complete as per drawing and Technical Specifications	cum	8.00		
24	16.08	Reinforced concrete railing of M30 Grade complete as per approved drawings and technical specification	Rm	287.00		
25	16.11	Drainage Spouts complete as per drawing and Technical specification	each	36.00		
26	16.12/Ns c	Reinforced cement concrete approach slab M-30 including reinforcement and formwork complete as per drawing and Technical specification	cum	209.00		
27	16.13	PCC M15 ordinary Grade leveling course below approach slab complete as per drawing and Technical specification Below Approach Slab	cum	91.00		
28	16.16	Providing single gap(unitary) strip/seal type of expansion joint of movement capacity of 80 mm with fatigue tested structure section at the nosing and ancourage assembly complete as per approved drawing and standard specification to be installed under supervision of a specialist manufacture	Rm	32.00		



Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
29	16.17	Mastic asphalt (providing and laying 12mm thick mastic asphalt wearing courses on top of deck slab excluding prime coat with paving grade bitumen meeting the requirement given in table 500-29, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine grained hard stone chipping of 9.5 mm nominal size at the rate of 0.005cum per 10sqm and at an approximate spacing of 10cm centre in both direction ,pressed into surface not less than 100 deg. C. protruding 1mm to 4mm over mastic surface ,all complete as per clause 515) using Bitumen VG-40 (3/40)	sqm	1,043.00		
Sub Total of			Super Structure			
		Protection Work				
30	08/nsc/5	Reinforced Cement Concrete Crash Barrier-Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with M-40 grade concrete with HYSD reinforcement conforming to IRC:21 and dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified	m	125.00		
31	16/nsc	For Protection Work - cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications i/c work complete as per drawing and technical specification PCC M20 Grade upto 5m height	cum	188.00		
32	17.01/a	laying apron complete as per drawing and Technical specification. Boulder				



Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			cum	362.00		
33	17.02	Filter material underneath pitching in slopes complete as per drawing and Technical specification	cum	181.00		
34	17/nsc1	Flexible Apron - Construction of flexible apron 750mm thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.	cum	208.00		
Sub Total of			Protection Work			
		Miscellananeous Work				
35	02.04/i/c	Dismantling upto 1.5m in foundation and/or 1.5m above ground level including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of un-serviceable materials and stacking the serviceable materials within a lead of 100m. c)Pre- stressed/ Reinforced Cement Concrete grade M20 & above	cum	1,810.00		
36	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	1,197.00		
37	08.12	Direction and Place Identification signs upto 0.9 sqm size board. (Providing and erecting direction and place identification retro-reflectorised sign asper IRC:67 made of high intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75 x 75 x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing)	sqm	6.00		
38	13/nsc1	Confirmatory Boring in Soil	cum	12.00		
39	13/nsc2	Confirmatory Boring in Hard Rock	cum	20.00		
Sub Total of			Miscellananeous Work			




Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
		Diversion Work				
40	03.13	Construction of Embankment with Material Deposited from Roadway Cutting Construction of embankment with approved materials deposited at site from roadway cutting and excavation from drain and foundation of other structures graded and compacted to meet requirement of table 300-2	cum	12,800.00		
41	03.31	Excavation in Hill Area in Soil by Mechanical Means Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres	cum	14,400.00		
42	04.01/Ns c1	Sub-base with Close Graded Material (Table:- 400-1) Plant Mix Method Construction of granular sub-base by providing close graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading- V Material	Cum	720.00		
43	05.01/b/a	WBM/Providing, laying, spreading and compacting stone aggregate of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with power roller 8-10 tones in stages to proper grade and camber, applying and brooming requisite type of screening & binding materials to fill up the interstices of coarse aggregates, watering and rolling making necessary earthen bund to protect edges, lighting, guarding, barricading and maintenance of diversion etc.	cum	1,200.00		



Bill No : 13. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
44	06/Nsc1	Providing and laying dense bituminous macadam with 40-60 TPH batch type HMP producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 4.25 % by weight of total mix of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 507 complete in all respects. B) GradingII(19 mm nominal size) iii)Using bitumen 30/40	cum	240.00		
45	06/Nsc2	Providing and laying bituminous concrete with 40-600 TPH batch type hot mix plant producing an average output of 35 tonnes per hour using crushed aggregates of specified grading, premixed with bituminous binder @ 5.5 % of mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher with sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause No. 509 complete in all respects B) Grading-II (13 mm nominal size) iii)Using bitumen 30/40	cum	120.00		
46	09.01/nsc1	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row . B)1200 mm dia	Rm	130.00		
Sub Total of			Diversion Work			
Total of Bill			13. Minor Bridge			



Summary of Quantity Estimate



Summary sheet of Minor Bridges (Quantities)

		CHAINAGE	66.765	69.308	70.112	75.110	79.806	92.270	97.891	98.767	Total Quantity
		Span(m) x Height(m)=	1 x 10m RCC SLAB Bridge	1 x 10m RCC SLAB Bridge	1 x 16m RCC T_BEAM	1 x 8m RCC SLAB Bridge	1 x 8m RCC SLAB Bridge	1 x 8m RCC SLAB Bridge	1 x 8m RCC SLAB Bridge	1 x 8m RCC SLAB Bridge	
ITEM NO.	Description	Unit									
	A. Foundation										
Item no 1(a)	Excavation (upto 3 m depth)	cum	502.29	502.29	560.770	438.31	438.31	538.90	515.67	595.80	4092
Item no 1(b)	Excavation (3 m to 6 m depth in soil)	cum	135.89	135.89	0.000	0.00	0.00	0.00	0.00	31.78	304
Item no 2	R.C.C M30 (Foundation)	cum	71.04	71.04	136.740	66.84	66.84	66.84	66.84	66.84	613
Item no 3	P.C.C (M-15)	cum	51.78	51.78	13.120	23.30	23.30	23.30	23.30	23.30	233
Item no 4	Pile cap(M30)	cum									0
Item no 5	Bored cast-in-situ M35 grade R.C.C. Piles	m			0.000						0
Item no 6	steel liner 6mm thick	ton									0
Item no 4	Steel (Foundation)	ton	8.53	8.53	16.409	8.02	8.02	8.02	8.02	8.02	74
	B. SubStructure						0.00				
Item no 1(a)	R.C.C M30 (Substructure) upto 5m	cum	94.31	94.31	209.260	72.03	72.03	57.12	62.74	62.74	725
Item no 1(b)	R.C.C M30 (Substructure) from 5m to 10m	cum	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0
Item no 1(c)	R.C.C M30 (Substructure) above 10m	cum	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0
Item no 2	R.C.C. M35 for Pedestals	cum	0.00	0.00	6.890	0.00	0.00	0.00	0.00	0.00	7
Item no 2	Steel (Substructure)	ton	13.20	13.20	32.725	10.08	10.08	8.00	8.78	8.78	105
Item no 3	Weep Holes	Rm	98.00	98.00	156.000	124.00	124.00	124.00	124.00	124.00	972
Item no 4	Backfilling - Granular Material	cum	26.20	26.20	44.000	21.38	21.38	21.38	21.38	21.38	203
Item no 5	Backfilling - Sandy Material	cum	406.29	406.29	416.150	431.73	431.73	380.99	408.74	408.74	3291
Item no 6	Filter Media	cum	80.02	80.02	129.150	79.58	79.58	65.54	71.54	71.54	657
Item no 8	Pot cum PTFE type Bearing	Ton		0.00	2100.000						2100
Item no 10	Elastomeric Bearing	cucm		0.00	57810.000						57810
	C. Super Structure										
Item no 1(a)	R.C.C M30 (Superstructure)	cum	122.84	122.84	148.490	70.56	70.56	70.56	70.56	70.56	747
Item no 2	Steel (Superstructure)	ton	22.11	22.11	26.728	12.70	12.70	12.70	12.70	12.70	134
Item no 3(a)	Bituminous Concrete Wearing Coat(65mm)	cum	8.17	8.17	11.150	7.13	7.13	0.00	0.00	0.00	42
Item no 3(b)	Mastic Asphalt	sqm	204.16	204.16	278.740	178.20	178.20	0.00	0.00	0.00	1043
Item no 3(c)	Tack Coat	sqm	204.16	204.16	278.740	178.20	178.20	0.00	0.00	0.00	1043
Item no 3(d)	Cement Concrete Wearing Course	cum	1.39	1.39	5.700	0.00	0.00	0.00	0.00	0.00	8
Item no 4	RCC railing	metre	37.12	37.12	50.680	0.00	0.00	0.00	0.00	0.00	125
Item no 5	Crash Barrier	metre	37.12	37.12	50.680	32.40	32.40	32.40	32.40	32.40	287
Item no 6	Drainage Spout	each	4.00	4.00	8.000	4.00	4.00	4.00	4.00	4.00	36
Item no 7	PCC below approach slab	cum	10.75	10.75	15.330	10.75	10.75	10.94	10.94	10.94	91
Item no 18	R.C.C. Approach Slab with steel (M30)	cum	28.93	28.93	31.840	23.52	23.52	23.94	23.94	23.94	209
Item no 13	Strip Seal Expansion Joint	metre		0.00	32.000						32
Item no 9	Filler Joint										
	(i) copper plate	metre	24.00	24.00	32.000	24.00	24.00	0.00	0.00	0.00	128
	(ii) fibar board	metre	24.00	24.00	32.000	24.00	24.00	0.00	0.00	0.00	128
	(iii) 20mm thick premoulded joint filler	metre	24.00	24.00	32.000	24.00	24.00	0.00	0.00	0.00	128
	(iv) joint sealing compound	metre	24.00	24.00	32.000	24.00	24.00	0.00	0.00	0.00	128



Summary sheet of Minor Bridges (Quantities)

		CHAINAGE	66.765	69.308	70.112	75.110	79.806	92.270	97.891	98.767	Total Quantity
		Span(m) x Height(m)=	1 x 10m RCC SLAB Bridge	1 x 10m RCC SLAB Bridge	1 x 16m RCC T_BEAM	1 x 8m RCC SLAB Bridge	1 x 8m RCC SLAB Bridge	1 x 8m RCC SLAB Bridge	1 x 8m RCC SLAB Bridge	1 x 8m RCC SLAB Bridge	
ITEM NO.	Description	Unit									
	D. Protection Work										
Item no 1a	Boulder Pitching	cum	2.71	2.71	191.540	56.56	56.56	15.98	28.46	7.40	362
Item no 1b	Filter Blanket	cum	1.36	1.36	95.770	28.28	28.28	7.99	14.23	3.70	181
Item no 2	Falling Apron on River Bed	cum	25.90	25.90		34.81	34.81	28.56	30.66	26.93	208
Item no 3	Toe Wall	cum	15.16	15.16	51.960	25.34	25.34	18.21	20.61	16.35	188
	E. Miscellaneous			0.00							
Item no 1	Painting	sqm	253.94	253.94	331.930	71.41	71.41	71.41	71.41	71.41	1197
Item no 2	Citizen information board	no.	2.00	2.00	2.000	0.00	0.00	0.00	0.00	0.00	6
Item no 3	Confirmatory Boring in soil	m	6.00	6.00		0.00	0.00	0.00	0.00	0.00	12
Item no 4	Confirmatory Boring in Hard rock	m	10.00	10.00		0.00	0.00	0.00	0.00	0.00	20
Item no 5	Dismantle of Existing Bridge										
5.1	Foundation	cum	122.82	122.82		90.14	90.14	90.14	90.14	90.14	696
5.2	RCC	cum	217.15	217.15		142.59	142.59	127.68	133.30	133.30	1114
	F. Diversion Work										
Item no 1	Earth cutting for Approach Road	cum	3600.00	3600.00		3600.00	3600.00	0.00	0.00	0.00	14400
Item no 2	GRANULAR MATERIAL	cum	3200.00	3200.00		3200.00	3200.00	0.00	0.00	0.00	12800
Item no 3	Hume Pipe	m	40.00	40.00		40.00	40.00	0.00	0.00	0.00	160
Item no 4	Pavement Composition										
4.1	BC	cum	30.00	30.00		30.00	30.00	0.00	0.00	0.00	120
4.2	DBM	cum	60.00	60.00		60.00	60.00	0.00	0.00	0.00	240
4.3	WBM	cum	300.00	300.00		300.00	300.00	0.00	0.00	0.00	1200
4.4	GSB	cum	180.00	180.00		180.00	180.00	0.00	0.00	0.00	720



***Quantity Estimate
of
1 x 10m RCC Slab Bridge
at Ch. 66.765 KM***



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **66.765 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

Item no 1(a)	Excavation (up to 3m) in Soil						
	Foundation A1	cum	1	13.000	4.000	3.000	156.000
	Foundation A2	cum	1	13.000	4.000	3.000	156.000
	Return Wall II at A1	cum	2	5.500	3.400	2.544	95.146
	Return Wall II at A2	cum	2	5.500	3.400	2.544	95.146
Total							502.292

Item no 2	Foundation Slab RCC-M30						
	Abutment Foundation Slab	cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	0.800	0.800	15.360
	Return Wall II	cum	4	5.000	2.400	0.500	24.000
Total							71.040

Item no 3	Levelling Course M15						
	Foundation Slab	cum	2	12.300	3.300	0.150	12.177
Total							51.777

Item no 4	Steel Reinforcement (HYSD) for Foundation Slab						
	@120 kg/cum	ton		8.525			8.525
						Total	8.525



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **66.765 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

Item no 1(a)	RCC-M30(up to 5m)						
	Abutment	cum	2	12.000	0.800	1.250	24.000
	Abutment Cap	cum	2	12.000	0.800	0.800	15.360
	Return wall II	cum	4	5.000	2.200		44.000
	Dirt wall	cum	2	12.000	0.400	0.988	9.485
	Bracket	cum	2	12.000	0.0612		1.469
Total=							94.314

Item no 1(b)	RCC-M30(5m to 10m)						
	Dirt wall	cum	2	12.000	0.400	0.988	9.485
Total=							

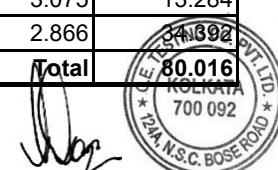
Item no 2	Steel reinforcement (HYSD Bars) for substructure						
	@ 140 kg/cum	ton			13.204		13.204
Total							13.204

Item no 3	Weep holes						
	Spacing for weep holes = 2 m in horizontal and 1 m in vertical direction						
	No of weep holes in horizontal direction per abutment = $11/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $1.3/1 +1 =$					1	
	No of weep holes in vertical direction per return wall-I = $-0.3/1+1 =$					1	
	No of weep holes in horizontal direction per return wall-I = $2.4/2+1 =$					3	
	No of weep holes in vertical direction per return wall-II = $2.9/1+1 =$					3	
	No of weep holes in horizontal direction per return wall-II = $5/2+1 =$					6	
	Total no of Weep holes per abutment = 7×1					7	
	Total no of Weep holes per return wall-I = 1×3					3	
	Total no of Weep holes per return wall-II = 3×6					18	
	Total no of weep holes = $7 \times 2 + 3 \times 4 + 18 \times 4$						98

Item no 4	Backfilling(Granular Material)						
	Foundation	cum	2	16.000		0.400	12.800
	Return Wall-II	cum	4	6.700		0.500	13.400
Total							26.200

Item no 5	Backfilling(Sandy Material)						
	Behind Abutment & Return wall-I	cum	2	2.400	11.200	3.075	165.312
	Behind Return wall-II	cum	2	5.000	11.200	2.866	320.992
	Deduct for filter media	cum					80.016
Total							406.288

Item no 6	Filter media						
	Behind Abutment	cum	2	11.000	0.600	2.450	32.340
	Behind Return Wall-I	cum	4	1.800	0.600	3.075	13.284
	Behind Return Wall-II	cum	4	5.000	0.600	2.866	80.016
Total							80.016



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **66.765 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

C. SUPERSTRUCTURE

Item no 1	RCC-M30(Up to 5M)						
	Superstructure Slab supported part	cum	1	10.760	12.000	0.919	118.661
	Kerb	cum	2	18.560	0.500	0.225	4.176
Total							122.837

Item no 2	Superstructure Steel (HYSD Bars)						
	@ 180 kg/cum	Ton			22.111		22.111
Total							22.111

Item no 3(a)	Wearing Course (Bituminus Concrete)						
		cum	1	18.560	11.000	0.040	8.166
Total=							8.166

Item no 3(b)	Wearing Course (Mastic Asphalt)						
		sqm	1	18.560	11.000		204.160
Total=							204.160

Item no 3(c)	Tack Coat						
		sqm	1	18.560	11.000		204.160
Total=							204.160

Item no 3(d)	Cement wearing Course (75 mm thick on footpath)						
	PCC M30	cum	2	18.560	0.500	0.075	1.392
Total=							1.392

Item no 4	RCC Railing	m	2	18.560			37.120
Total							37.120

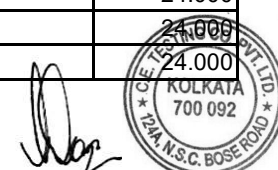
Item no 5	Crash Barrier	m	2	18.560			37.120
Total							37.120

Item no 6	Drainage Spout	nos.	4			Total	4

Item no 7	PCC below Approach Slab						
		cum	2	11.200	3.200	0.150	10.752
Total							10.752

Item no 8	Approach Slab						
		cum	2	11.200	3.500	0.369	28.930
Total							28.930

Item no 9	Filler Joint						
	(i) copper plate	m	2	12.000			24.000
	(ii) fibar board	m	2	12.000			24.000
	(iii) 20mm thick premoulded joint filler	m	2	12.000			24.000
	(iv) joint sealing compound	m	2	12.000			24.000



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **66.765 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

D. MISCELLANEOUS

Item no 1	Painting						
	Kerb below railing.	sqm	2	0.950		18.56	35.26
	Railing(Post)	sqm	26	1.050		1.10	30.03
	Railing(Beam)	sqm	6	0.69		18.56	76.84
	Crash Barrier	sqm	2	2.204		18.56	81.81
	Flood Level Marking	sqm	1	30			30.00
Total							253.940

Item no 2	Confirmatory Boring						
	Confirmatory Boring in soil	m	2	3.00			6
	Confirmatory Boring in Hard rock	m	2	5.00			10
Total							16

Item no 3	Citizen information board	no.	2				2.00

Item no 4	Dismantle of Existing Bridge						
4.1	Foundation	cum	1				122.82
4.2	RCC	cum	1				217.15

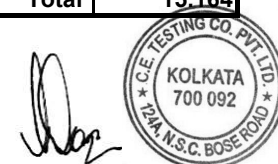
E.PROTECTION WORK

Item no 1a	Boulder Pitching						
	A1 side	cum	2	2.117		0.300	1.270
	A2 side	cum	2	2.402		0.300	1.441
Total							2.711

Item no 1b	Filter Blanket						
	In slope pitching A1 side	cum	2	2.117		0.150	0.635
	In slope pitching A2 side	cum	2	2.402		0.150	0.721
Total							1.356

Item no 2	Falling Apron						
	Infront of abutment	cum	2	12.000	1.052		25.248
	Parabollic part A1 side	cum	2	0.289	0.526		0.304
	Parabollic part A2 side	cum	2	0.327	0.526		0.344
Total							25.896

Item no 3	PCC(M15) Toe Wall						
	Infront of abutment	cum	2	12.000	0.601		14.424
	Parabollic part A1 side	cum	2	0.289	0.601		0.347
	Parabollic part A2 side	cum	2	0.327	0.601		0.393
Total							15.164



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **66.765 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

F. Diversion Work

Item Sl No.	Description	Unit	nos	Length	Breadth	Height	Quantity
Item no 1	Earth cutting for Approach Road						
		cum	1	150	3.00	8.00	3600.00
Item no 2	EARTH FILLING UNDER ROAD						
	GRANULAR MATERIAL	cum	1	100	8	4.00	3200
Item no 3	Hume Pipe	m	4	10			40.00
Item no 4	Pavement Composition						
4.1	BC	cum	1	150	8	0.025	30.000
4.2	DBM	cum	1	150	8	0.05	60.000
4.3	WBM	cum	1	150	8	0.25	300.000
4.4	GSB	cum	1	150	8	0.15	180.000



***Quantity Estimate
of
1 x 10m RCC Slab Bridge
at Ch. 69.308 KM***



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **69.308 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

Item no 1(a)	Excavation (up to 3m) in Soil						
	Foundation A1	cum	1	13.000	4.000	3.000	156.000
	Foundation A2	cum	1	13.000	4.000	3.000	156.000
	Return Wall II at A1	cum	2	5.500	3.400	2.544	95.146
	Return Wall II at A2	cum	2	5.500	3.400	2.544	95.146
Total							502.292

Item no 2	Foundation Slab RCC-M30						
	Abutment Foundation Slab	cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	0.800	0.800	15.360
	Return Wall II	cum	4	5.000	2.400	0.500	24.000
Total							71.040

Item no 3	Levelling Course M15						
	Foundation Slab	cum	2	12.300	3.300	0.150	12.177
Total							51.777

Item no 4	Steel Reinforcement (HYSD) for Foundation Slab						
	@120 kg/cum	ton		8.525			8.525
	Total						8.525



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 69.308 Km

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

Item no 1(a)	RCC-M30(up to 5m)						
	Abutment	cum	2	12.000	0.800	1.250	24.000
	Abutment Cap	cum	2	12.000	0.800	0.800	15.360
	Return wall II	cum	4	5.000	2.200		44.000
	Dirt wall	cum	2	12.000	0.400	0.988	9.485
	Bracket	cum	2	12.000	0.0612		1.469
Total=							94.314

Item no 1(b)	RCC-M30(5m to 10m)						
	Dirt wall	cum	2	12.000	0.400	0.988	9.485
Total=							

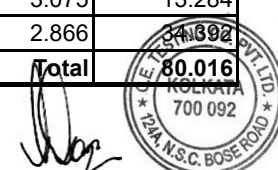
Item no 2	Steel reinforcement (HYSD Bars) for substructure						
	@ 140 kg/cum	ton			13.204		13.204
Total							13.204

Item no 3	Weep holes						
	Spacing for weep holes = 2 m in horizontal and 1 m in vertical direction						
	No of weep holes in horizontal direction per abutment = $11/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $1.3/1 +1 =$					1	
	No of weep holes in vertical direction per return wall-I = $-0.3/1+1 =$					1	
	No of weep holes in horizontal direction per return wall-I = $2.4/2+1 =$					3	
	No of weep holes in vertical direction per return wall-II = $2.9/1+1 =$					3	
	No of weep holes in horizontal direction per return wall-II = $5/2+1 =$					6	
	Total no of Weep holes per abutment = 7×1					7	
	Total no of Weep holes per return wall-I = 1×3					3	
	Total no of Weep holes per return wall-II = 3×6					18	
	Total no of weep holes = $7 \times 2 + 3 \times 4 + 18 \times 4$						98

Item no 4	Backfilling(Granular Material)						
	Foundation	cum	2	16.000		0.400	12.800
	Return Wall-II	cum	4	6.700		0.500	13.400
Total							26.200

Item no 5	Backfilling(Sandy Material)						
	Behind Abutment & Return wall-I	cum	2	2.400	11.200	3.075	165.312
	Behind Return wall-II	cum	2	5.000	11.200	2.866	320.992
	Deduct for filter media	cum					80.016
Total							406.288

Item no 6	Filter media						
	Behind Abutment	cum	2	11.000	0.600	2.450	32.340
	Behind Return Wall-I	cum	4	1.800	0.600	3.075	13.284
	Behind Return Wall-II	cum	4	5.000	0.600	2.866	80.016
Total							80.016



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **69.308 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

C. SUPERSTRUCTURE

Item no 1	RCC-M30(Up to 5M)						
	Superstructure Slab supported part	cum	1	10.760	12.000	0.919	118.661
	Kerb	cum	2	18.560	0.500	0.225	4.176
Total							122.837

Item no 2	Superstructure Steel (HYSD Bars)						
	@ 180 kg/cum	Ton			22.111		22.111
Total							22.111

Item no 3(a)	Wearing Course (Bituminus Concrete)						
		cum	1	18.560	11.000	0.040	8.166
Total=							8.166

Item no 3(b)	Wearing Course (Mastic Asphalt)						
		sqm	1	18.560	11.000		204.160
Total=							204.160

Item no 3(c)	Tack Coat						
		sqm	1	18.560	11.000		204.160
Total=							204.160

Item no 3(d)	Cement wearing Course (75 mm thick on footpath)						
	PCC M30	cum	2	18.560	0.500	0.075	1.392
Total=							1.392

Item no 4	RCC Railing	m	2	18.560			37.120
Total							37.120

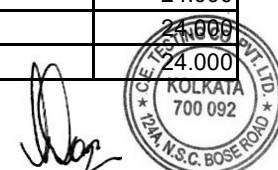
Item no 5	Crash Barrier	m	2	18.560			37.120
Total							37.120

Item no 6	Drainage Spout	nos.	4			Total	4

Item no 7	PCC below Approach Slab						
		cum	2	11.200	3.200	0.150	10.752
Total							10.752

Item no 8	Approach Slab						
		cum	2	11.200	3.500	0.369	28.930
Total							28.930

Item no 9	Filler Joint						
	(i) copper plate	m	2	12.000			24.000
	(ii) fibar board	m	2	12.000			24.000
	(iii) 20mm thick premoulded joint filler	m	2	12.000			24.000
	(iv) joint sealing compound	m	2	12.000			24.000



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **69.308 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

D. MISCELLANNEOUS

Item no 1	Painting						
	Kerb below railing.	sqm	2	0.950		18.56	35.26
	Railing(Post)	sqm	26	1.050		1.10	30.03
	Railing(Beam)	sqm	6	0.69		18.56	76.84
	Crash Barrier	sqm	2	2.204		18.56	81.81
	Flood Level Marking	sqm	1	30			30.00
Total							253.940

Item no 2	Confirmatory Boring						
	Confirmatory Boring in soil	m	2	3.00			6
	Confirmatory Boring in Hard rock	m	2	5.00			10
Total							16

Item no 3	Citizen information board	no.	2				2.00

Item no 4	Dismantle of Existing Bridge						
4.1	Foundation	cum	1				122.82
4.2	RCC	cum	1				217.15

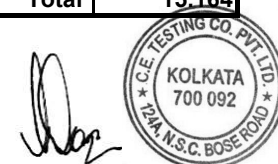
E.PROTECTION WORK

Item no 1a	Boulder Pitching						
	A1 side	cum	2	2.117		0.300	1.270
	A2 side	cum	2	2.402		0.300	1.441
Total							2.711

Item no 1b	Filter Blanket						
	In slope pitching A1 side	cum	2	2.117		0.150	0.635
	In slope pitching A2 side	cum	2	2.402		0.150	0.721
Total							1.356

Item no 2	Falling Apron						
	Infront of abutment	cum	2	12.000	1.052		25.248
	Parabollic part A1 side	cum	2	0.289	0.526		0.304
	Parabollic part A2 side	cum	2	0.327	0.526		0.344
Total							25.896

Item no 3	PCC(M15) Toe Wall						
	Infront of abutment	cum	2	12.000	0.601		14.424
	Parabollic part A1 side	cum	2	0.289	0.601		0.347
	Parabollic part A2 side	cum	2	0.327	0.601		0.393
Total							15.164



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **69.308 Km**

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

F. Diversion Work

Item Sl No.	Description	Unit	nos	Length	Breadth	Height	Quantity
Item no 1	Earth cutting for Approach Road						
		cum	1	150	3.00	8.00	3600.00
Item no 2	EARTH FILLING UNDER ROAD						
	GRANULAR MATERIAL	cum	1	100	8	4.00	3200
Item no 3	Hume Pipe	m	4	10			40.00
Item no 4	Pavement Composition						
4.1	BC	cum	1	150	8	0.025	30.000
4.2	DBM	cum	1	150	8	0.05	60.000
4.3	WBM	cum	1	150	8	0.25	300.000
4.4	GSB	cum	1	150	8	0.15	180.000



***Quantity Estimate
of
1 x 16m RCC T Beam Bridge
at Ch. 70.112 KM***



DETAIL QUANTITY CALCULATION OF RCC T-GIRDER BRIDGE

1 No. X 16 M SPAN

Item Sl No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1.0	Excavation upto 3m depth						
	Abutment-1	cum	1	16.90	6.10	2.70	278.34
	Abutment-2	cum	1	16.90	6.10	2.61	269.06
	Return wall-I at Abutment-1	cum	2	1.55	1.400	1.56	6.77
	Return wall-I at Abutment-2	cum	2	1.55	1.400	1.52	6.60
	Total						560.77

2	RCC M30						
	Abutment trapezoidal portion	cum	2	15.90	3.100	1.00	98.58
	Abutment rectangular portion	cum	2	15.90	1.200	1.00	38.16
	Total=						136.74

4	PCC M-15						
	Below abutment Foundation	cum	1	16.20	5.40	0.15	13.12
	Total=						13.12

5	HYSD Bars						
	120kg/cum for pile cap & @ 150kg/m for pile	Ton					
	Total=						16.409

SUBSTRUCTURE

6	RCC M-30 upto 5.0m height						
	Abutment wall	cum	2	16.00	1.200	3.000	115.20
	Abutment cap	cum	2	16.00	1.790	0.800	45.82
	Dirt Wall	cum	2	16.00	0.400	1.200	15.36
	Bracket	cum	2	15.20	0.180		5.47
	Return Wall-I upto abutment cap	cum	4	3.50	0.400	2.975	16.66
	Return Wall-I	cum	4	2.91	0.400	2.025	9.43
	Return Wall extra fins rectangular part	cum	4	0.610	0.300	1.000	0.73
	Return Wall extra fins triangular part	cum	4	0.61	0.300	1.600	0.59
	Total=						209.26

7	RCC M-35 for Pedestal & Seismic Arrestor Blocks						
	Pedestal at Abutment for Pot cum PTFE bearing	cum	5	0.800	0.800	0.150	0.48
		cum	5	0.800	0.800	0.150	0.48
						Total=	0.96
	Block RB2	cum	10	0.340	0.700	1.000	2.38
	Block RB1	cum	4	1.000	0.8875		3.55
	Total=						6.89

8	HYSD Bars						
	@ 140 kg/cum	Ton					32.725
	Total=						32.725



DETAIL QUANTITY CALCULATION OF RCC T-GIRDER BRIDGE

1 No. X 16 M SPAN

Item Sl No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Weep holes						
	Spacing for weep holes = 2 m in horizontal and 1 m in vertical direction						
	No of weep holes in horizontal direction per abutment = $15.2/2+1 =$					9	
	No of weep holes in vertical direction per abutment = $3+1 =$					4	
	No of weep holes in horizontal direction per return wall I = $(3.5)/2+1 =$					3	
	No of weep holes in vertical direction per return wall I = $(5.575-0.3-0.15)/1+1 =$					7	
	Total no of Weep holes per abutment = 9×4					36	
	Total no of Weep holes per return wall I = 3×7					21	
	Total no of weep holes = $36 \times 2 + 21 \times 4$					Total	156.00
10	Backfilling - Granular Material						
	Behind Abutment	cum	2	22.00		1.000	44.00
						Total	44.00
11	Backfilling - Sandy Material						
	Behind Abutment & Return wall-I	cum	2	15.20	3.50	5.125	545.30
	Deduct for filter media	cum					129.15
						Total	416.15
12	Filter media						
	Behind Abutment	cum	2	15.200	0.60	5.125	93.48
	Behind Return wall-I	cum	4	2.900	0.60	5.125	35.67
						Total	129.15
13	Pot cum PTFE Bearing						
		ton	10	210.00			2100.00
						Total	2100.00
14	Elastomeric Bearing						
	Bearing B3	cum	10	25.00	30.00	3.90	29250
	Bearing B2	cum	4	35.00	42.50	4.80	28560
						Total	57810
<u>SUPERSTRUCTURE</u>							
15	RCC M-30						
	For T-Girder & Slab						
	Long Girder middle portion With Deck slab	cum	1	12.260	7.578		92.91
	Long Girder straight portion with Deck slab	cum	2	1.000	8.818		17.64
	Long Girder varying portion With Deck slab	cum	2	1.200	8.198		19.68
	Cantilever portion of Deck Slab	cum	2	0.420	16.000	0.400	5.38
	End Cross Girder	cum	2	0.300	7.688		4.61
	Intermediate Cross Girder	cum	1	0.300	8.576		2.57
	Kerb	cum	2	25.34	0.500	0.225	5.70
						Total	148.49



DETAIL QUANTITY CALCULATION OF RCC T-GIRDER BRIDGE

1 No. X 16 M SPAN

Item Sl No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
16	HYSD Bars						
	@ 180 kg/cum	T					26.728
						Total=	26.728
17	RCC M30 Railing						
		m	2	25.34			50.68
						Total=	50.68
18	RCC M40 Crash Barrier						
		m	2	25.34			50.68
						Total=	50.68
19	Drainage Spout	nos.	8			Total	8.00
20	M15 PCC below Approach Slab						
		cum	2	3.370	15.160	0.15	15.33
						Total	15.33
21	Approach Slab(M30)						
	Approach Slab	cum	2	3.500	15.160	0.300	31.84
						Total	31.84
22	Bituminus concrete wearing course						
		cum	1	25.34	11.00	0.040	11.15
						Total=	11.15
23	Cemnet concrete wearing course						
		cum	2	25.34	1.50	0.075	5.70
						Total=	5.70
24	Mastic asphalt						
		sqm	1	25.34	11.00		278.74
						Total=	278.74
25	Tack coat						
		sqm	1	25.34	11.00		278.74
						Total=	278.74
26	Filler joint						
	Providing & fixing 2 mm thick corrugated copper plate in expansion joint	m	2	16.00			32.00
	Providing & fixing 20 mm thick compressible fibre board in expansion joint	m	2	16.00			32.00
	Providing and fixing in position 20 mm thick premoulded joint filler	m	2	16.00			32.00
	Providing and filling joint sealing compound	m	2	16.00			32.00



DETAIL QUANTITY CALCULATION OF RCC T-GIRDER BRIDGE

1 No. X 16 M SPAN

Item Sl No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
27	Strip Seal Expansion Joint						
		m	2	16.000			32.00
Total							32.00

PROTECTION WORK

28	Pitching with Stone Blanket						
	A1 side	cum	2	157.15		0.300	94.290
	A 2 side	cum	2	162.08		0.300	97.248
Total							191.54

29	Toe Wall						
	A1 side & A2 side	cum	4	22.00	0.433		38.104
	Infront of the abutment	cum	2	16.00	0.433		13.856
Total							51.96

30	Filter Blanket PCC(M15) below pitching						
	A1 side	cum	2	157.15		0.15	47.145
	A2 side	cum	2	162.08		0.15	48.624
Total=							95.769

MISCELLANNEOUS

31	Painting						
	Kerb below railing.	sqm	2	0.950		25.34	48.15
	Railing(Post)	sqm	36	1.050		1.10	41.58
	Railing(Beam)	sqm	6	0.69		25.34	104.91
	Crash Barrier	sqm	2	2.709		25.34	137.29
Total							331.93

32	Citizen information Board NH Project	no				Total	2.000



***Quantity Estimate
of
1 x 8m RCC Slab Bridge
at Ch. 76.705 KM***



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **76.705 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

Item no 1(a)	Excavation (up to 3m) in Soil						
	Foundation A1	cum	1	13.000	4.000	2.083	108.316
	Foundation A2	cum	1	13.000	4.000	2.331	121.212
	Return Wall II at A1	cum	2	5.500	4.300	2.083	98.526
	Return Wall II at A2	cum	2	5.500	4.300	2.331	110.256
Total							438.310

Item no 2	Foundation Slab RCC-M30						
	Abutment Foundation Slab	cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	0.800	0.800	15.360
	Return Wall II	cum	4	5.000	3.300	0.300	19.800
Total							66.840

Item no 3	Levelling Course M15						
	Foundation Slab	cum	2	12.300	3.300	0.150	12.177
	Return Wall II	cum	4	5.150	3.600	0.150	11.124
Total							23.301

Item no 4	Steel Reinforcement (HYSD) for Foundation Slab						
	@120 kg/cum	ton			8.021		8.021
Total							8.021



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **76.705 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

Item no 1(a)	RCC-M30(up to 5m)						
	Abutment-1	cum	1	12.000	0.800	1.138	10.925
	Abutment-2	cum	1	12.000	0.800	0.898	8.621
	Abutment Cap	cum	2	12.000	0.800	0.800	15.360
	Return wall-I at A-1 side	cum	2	2.400	0.400	2.838	5.449
	Return wall-I at A-2 side	cum	2	2.400	0.400	2.598	4.988
	Return wall II at A-1 side	cum	2	5.000	0.300	3.203	9.609
	Return wall II at A-2 side	cum	2	5.000	0.300	2.963	8.889
	Dirt wall	cum	2	12.000	0.400	0.700	6.720
	Bracket	cum	2	12.000	0.0612		1.469
Total=							72.030

Item no 2	Steel reinforcement (HYSD Bars) for substructure						
	@ 140 kg/cum	ton		10.084			10.084
Total							10.084

Item no 3	Weep holes						
	Spacing for weep holes = 2 m in horizontal and 1 m in vertical direction						
	No of weep holes in horizontal direction per abutment = $11/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $1/1 +1 =$					2	
	No of weep holes in vertical direction per return wall-I = $2.4/1+1 =$					2	
	No of weep holes in horizontal direction per return wall-I = $2.4/2+1 =$					3	
	No of weep holes in vertical direction per return wall-II = $3.1/1+1 =$					3	
	No of weep holes in horizontal direction per return wall-II = $5/2+1 =$					6	
	Total no of Weep holes per abutment = 7×2					14	
	Total no of Weep holes per return wall-I = 2×3					6	
	Total no of Weep holes per return wall-II = 3×6					18	
	Total no of weep holes = $14 \times 2 + 6 \times 4 + 18 \times 4$						124

Item no 4	Backfilling(Granular Material)						
	Foundation	cum	2	16.000		0.400	12.800
	Return Wall-II	cum	4	7.150		0.300	8.580
Total							21.380

Item no 5	Backfilling(Sandy Material)						
	Behind Abutment & Return wall-I	cum	2	2.400	11.200	2.838	152.571
	Behind Return wall-II	cum	2	5.000	11.200	3.203	358.736
	Deduct for filter media	cum					79.578
Total							431.729

Item no 6	Filter media						
	Behind Abutment	cum	2	11.000	0.600	2.188	28.882
	Behind Return Wall-I	cum	4	1.800	0.600	2.838	12.260
	Behind Return Wall-II	cum	4	5.000	0.600	3.203	38.436
Total							79.578



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **76.705 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

C. SUPERSTRUCTURE

Item no 1	RCC-M30(Up to 5M)						
	Superstructure Slab supported part	cum	1	8.400	12.000	0.700	70.560
Total							70.560

Item no 2	Superstructure Steel (HYSD Bars)						
	@ 180 kg/cum	Ton			12.701		12.701
Total							12.701

Item no 3(a)	Wearing Course (Bituminus Concrete)						
		cum	1	16.200	11.000	0.040	7.128
Total=							7.128

Item no 3(b)	Wearing Course (Mastic Asphalt)						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 3(c)	Tack Coat						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 5	Crash Barrier	m	2	16.200			32.400
Total							32.400

Item no 6	Drainage Spout	nos.	4				4

Item no 7	PCC below Approach Slab						
		cum	2	11.200	3.200	0.150	10.752
Total							10.752

Item no 8	Approach Slab						
		cum	2	11.200	3.500	0.300	23.520
Total							23.520

Item no 9	Strip Seal Expansion Joint						
		m	2	12.000			24.000
Total							24.000

Item no 10	Filler Joint						
	(i) copper plate	m	2	12.000			24.000
	(ii) fibar board	m	2	12.000			24.000
	(iii) 20mm thick premoulded joint filler	m	2	12.000			24.000
	(iv) joint sealing compound	m	2	12.000			24.000



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **76.705 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

D. MISCELLANEOUS

Item no 1	Painting						
	Crash Barrier	sqm	2	2.204		16.20	71.41
Total							71.410

Item no 2	Dismantle of Existing Bridge						
2.1	Foundation	cum	1				90.14
2.2	RCC Superstructure & substructure	cum	1				142.59

E.PROTECTION WORK

Item no 1a	Boulder Pitching						
	A1 side	cum	2	52.421		0.300	31.453
	A2 side	cum	2	41.837		0.300	25.102
Total							56.555

Item no 1b	Filter Blanket						
	In slope pitching A1 side	cum	2	52.421		0.150	15.726
	In slope pitching A2 side	cum	2	41.837		0.150	12.551
Total							28.277

Item no 2	Falling Apron						
	Infront of abutment	cum	2	12.000	1.052		25.248
	Parabollic part A1 side	cum	2	4.932	0.526		5.188
	Parabollic part A2 side	cum	2	4.153	0.526		4.369
Total							34.805

Item no 3	PCC(M15) Toe Wall						
	Infront of abutment	cum	2	12.000	0.601		14.424
	Parabollic part A1 side	cum	2	4.932	0.601		5.928
	Parabollic part A2 side	cum	2	4.153	0.601		4.992
Total							25.344



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **76.705 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

F. Diversion Work

Item Sl No.	Description	Unit	nos	Length	Breadth	Height	Quantity
Item no 1	Earth cutting for Approach Road						
		cum	1	150	3.00	8.00	3600
Item no 2	EARTH FILLING UNDER ROAD						
	GRANULAR MATERIAL	cum	1	100	8	4.00	3200
Item no 3	Hume Pipe	m	4	10			40.00
Item no 4	Pavement Composition						
4.1	BC	cum	1	150	8	0.025	30.000
4.2	DBM	cum	1	150	8	0.05	60.000
4.3	WBM	cum	1	150	8	0.25	300.000
4.4	GSB	cum	1	150	8	0.15	180.000



***Quantity Estimate
of
1 x 8m RCC Slab Bridge
at Ch. 81.550 KM***



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **81.550 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

Item no 1(a)	Excavation (up to 3m) in Soil						
	Foundation A1	cum	1	13.000	4.000	2.083	108.316
	Foundation A2	cum	1	13.000	4.000	2.331	121.212
	Return Wall II at A1	cum	2	5.500	4.300	2.083	98.526
	Return Wall II at A2	cum	2	5.500	4.300	2.331	110.256
Total							438.310

Item no 2	Foundation Slab RCC-M30						
	Abutment Foundation Slab	cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	0.800	0.800	15.360
	Return Wall II	cum	4	5.000	3.300	0.300	19.800
Total							66.840

Item no 3	Levelling Course M15						
	Foundation Slab	cum	2	12.300	3.300	0.150	12.177
	Return Wall II	cum	4	5.150	3.600	0.150	11.124
Total							23.301

Item no 4	Steel Reinforcement (HYSD) for Foundation Slab						
	@120 kg/cum	ton		8.021			8.021
Total							8.021



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **81.550 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

Item no 1(a)	RCC-M30(up to 5m)						
	Abutment-1	cum	1	12.000	0.800	1.138	10.925
	Abutment-2	cum	1	12.000	0.800	0.898	8.621
	Abutment Cap	cum	2	12.000	0.800	0.800	15.360
	Return wall-I at A-1 side	cum	2	2.400	0.400	2.838	5.449
	Return wall-I at A-2 side	cum	2	2.400	0.400	2.598	4.988
	Return wall II at A-1 side	cum	2	5.000	0.300	3.203	9.609
	Return wall II at A-2 side	cum	2	5.000	0.300	2.963	8.889
	Dirt wall	cum	2	12.000	0.400	0.700	6.720
	Bracket	cum	2	12.000	0.0612		1.469
Total=							72.030

Item no 2	Steel reinforcement (HYSD Bars) for substructure						
	@ 140 kg/cum	ton		10.084			10.084
Total							10.084

Item no 3	Weep holes						
	Spacing for weep holes = 2 m in horizontal and 1 m in vertical direction						
	No of weep holes in horizontal direction per abutment = $11/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $1/1 +1 =$					2	
	No of weep holes in vertical direction per return wall-I = $2.4/1+1 =$					2	
	No of weep holes in horizontal direction per return wall-I = $2.4/2+1 =$					3	
	No of weep holes in vertical direction per return wall-II = $3.1/1+1 =$					3	
	No of weep holes in horizontal direction per return wall-II = $5/2+1 =$					6	
	Total no of Weep holes per abutment = 7×2					14	
	Total no of Weep holes per return wall-I = 2×3					6	
	Total no of Weep holes per return wall-II = 3×6					18	
	Total no of weep holes = $14 \times 2 + 6 \times 4 + 18 \times 4$						124

Item no 4	Backfilling(Granular Material)						
	Foundation	cum	2	16.000		0.400	12.800
	Return Wall-II	cum	4	7.150		0.300	8.580
Total							21.380

Item no 5	Backfilling(Sandy Material)						
	Behind Abutment & Return wall-I	cum	2	2.400	11.200	2.838	152.571
	Behind Return wall-II	cum	2	5.000	11.200	3.203	358.736
	Deduct for filter media	cum					79.578
Total							431.729

Item no 6	Filter media						
	Behind Abutment	cum	2	11.000	0.600	2.188	28.882
	Behind Return Wall-I	cum	4	1.800	0.600	2.838	12.260
	Behind Return Wall-II	cum	4	5.000	0.600	3.203	38.436
Total							79.578



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **81.550 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

C. SUPERSTRUCTURE

Item no 1	RCC-M30(Up to 5M)						
	Superstructure Slab supported part	cum	1	8.400	12.000	0.700	70.560
Total							70.560

Item no 2	Superstructure Steel (HYSD Bars)						
	@ 180 kg/cum	Ton			12.701		12.701
Total							12.701

Item no 3(a)	Wearing Course (Bituminus Concrete)						
		cum	1	16.200	11.000	0.040	7.128
Total=							7.128

Item no 3(b)	Wearing Course (Mastic Asphalt)						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 3(c)	Tack Coat						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 5	Crash Barrier	m	2	16.200			32.400
Total							32.400

Item no 6	Drainage Spout	nos.	4				4

Item no 7	PCC below Approach Slab						
		cum	2	11.200	3.200	0.150	10.752
Total							10.752

Item no 8	Approach Slab						
		cum	2	11.200	3.500	0.300	23.520
Total							23.520

Item no 9	Strip Seal Expansion Joint						
		m	2	12.000			24.000
Total							24.000

Item no 10	Filler Joint						
	(i) copper plate	m	2	12.000			24.000
	(ii) fibar board	m	2	12.000			24.000
	(iii) 20mm thick premoulded joint filler	m	2	12.000			24.000
	(iv) joint sealing compound	m	2	12.000			24.000



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **81.550 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

D. MISCELLANEOUS

Item no 1	Painting						
	Crash Barrier	sqm	2	2.204		16.20	71.41
Total							71.410

Item no 2	Dismantle of Existing Bridge						
2.1	Foundation	cum	1				90.14
2.2	RCC Superstructure & substructure	cum	1				142.59

E.PROTECTION WORK

Item no 1a	Boulder Pitching						
	A1 side	cum	2	52.421		0.300	31.453
	A2 side	cum	2	41.837		0.300	25.102
Total							56.555

Item no 1b	Filter Blanket						
	In slope pitching A1 side	cum	2	52.421		0.150	15.726
	In slope pitching A2 side	cum	2	41.837		0.150	12.551
Total							28.277

Item no 2	Falling Apron						
	Infront of abutment	cum	2	12.000	1.052		25.248
	Parabollic part A1 side	cum	2	4.932	0.526		5.188
	Parabollic part A2 side	cum	2	4.153	0.526		4.369
Total							34.805

Item no 3	PCC(M15) Toe Wall						
	Infront of abutment	cum	2	12.000	0.601		14.424
	Parabollic part A1 side	cum	2	4.932	0.601		5.928
	Parabollic part A2 side	cum	2	4.153	0.601		4.992
Total							25.344



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= **81.550 Km**

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

F. Diversion Work

Item Sl No.	Description	Unit	nos	Length	Breadth	Height	Quantity
Item no 1	Earth cutting for Approach Road						
		cum	1	150	3.00	8.00	3600
Item no 2	EARTH FILLING UNDER ROAD						
	GRANULAR MATERIAL	cum	1	100	8	4.00	3200
Item no 3	Hume Pipe	m	4	10			40.00
Item no 4	Pavement Composition						
4.1	BC	cum	1	150	8	0.025	30.000
4.2	DBM	cum	1	150	8	0.05	60.000
4.3	WBM	cum	1	150	8	0.25	300.000
4.4	GSB	cum	1	150	8	0.15	180.000



***Quantity Estimate
of
1 x 8m RCC Slab Bridge
at Ch. 92.270 KM***



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 92.270 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

Item no 1(a)	Excavation (up to 3m) in Soil						
	Foundation A1	cum	1	13.000	4.000	2.933	152.516
	Foundation A2	cum	1	13.000	4.000	2.494	129.688
	Return Wall II at A1	cum	2	5.500	4.300	2.933	138.731
	Return Wall II at A2	cum	2	5.500	4.300	2.494	117.966
Total							538.901

Item no 2	Foundation Slab RCC-M30						
	Abutment Foundation Slab	cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	0.800	0.800	15.360
	Return Wall II	cum	4	5.000	3.300	0.300	19.800
Total							66.840

Item no 3	Levelling Course M15						
	Foundation Slab	cum	2	12.300	3.300	0.150	12.177
	Return Wall II	cum	4	5.150	3.600	0.150	11.124
Total							23.301

Item no 4	Steel Reinforcement (HYSD) for Foundation Slab						
	@120 kg/cum	ton			8.021		8.021
Total							8.021



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 92.270 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

Item no 1(a)	RCC-M30(up to 5m)						
	Abutment-I	cum	1	12.000	0.800	0.900	8.640
	Abutment-II	cum	1	12.000	0.800	0.660	6.336
	Abutment Cap	cum	2	12.000	0.800	0.600	11.520
	Return wall-I at A-1 side	cum	2	2.400	0.300	2.400	3.456
	Return wall-I at A-2 side	cum	2	2.400	0.300	2.160	3.110
	Return wall II at A-1 side	cum	2	5.000	0.300	2.765	8.295
	Return wall II at A-2 side	cum	2	5.000	0.300	2.525	7.575
	Dirt wall	cum	2	12.000	0.400	0.700	6.720
	Bracket	cum	2	12.000	0.0612		1.469
Total=							57.121

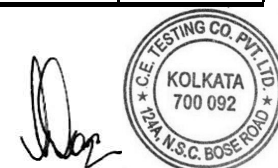
Item no 2	Steel reinforcement (HYSD Bars) for substructure						
	@ 140 kg/cum	ton		7.997			7.997
Total							7.997

Item no 3	Weep holes						
	Spacing for weep holes = 2 m in horizontal and 1 m in vertical direction						
	No of weep holes in horizontal direction per abutment = $11.4/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $0.8/1 +1=$					2	
	No of weep holes in vertical direction per return wall-I = $2/1+1 =$					2	
	No of weep holes in horizontal direction per return wall-I = $2.4/2+1 =$					3	
	No of weep holes in vertical direction per return wall-II = $2.6/1+1 =$					3	
	No of weep holes in horizontal direction per return wall-II = $5/2+1 =$					6	
	Total no of Weep holes per abutment = 7×2					14	
	Total no of Weep holes per return wall-I = 2×3					6	
	Total no of Weep holes per return wall-II = 3×6					18	
	Total no of weep holes = $14 \times 2 + 6 \times 4 + 18 \times 4$						124

Item no 4	Backfilling(Granular Material)						
	Foundation	cum	2	16.000		0.400	12.800
	Return Wall-II	cum	4	7.150		0.300	8.580
Total							21.380

Item no 5	Backfilling(Sandy Material)						
	Behind Abutment & Return wall-I	cum	2	2.400	11.400	2.400	131.328
	Behind Return wall-II	cum	2	5.000	11.400	2.765	315.210
	Deduct for filter media	cum					65.544
Total							380.994

Item no 6	Filter media						
	Behind Abutment	cum	2	11.400	0.600	1.750	23.940
	Behind Return Wall-I	cum	4	1.800	0.600	1.950	8.424
	Behind Return Wall-II	cum	4	5.000	0.600	2.765	33.180
Total							65.544



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 92.270 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

C. SUPERSTRUCTURE

Item no 1	RCC-M30(Up to 5M)						
	Superstructure Slab supported part	cum	1	8.400	12.000	0.700	70.560
Total							70.560

Item no 2	Superstructure Steel (HYSD Bars)						
	@ 180 kg/cum	Ton			12.701		12.701
Total							12.701

Item no 3(a)	Wearing Course (Bituminus Concrete)						
		cum	1	16.200	11.000	0.040	7.128
Total=							7.128

Item no 3(b)	Wearing Course (Mastic Asphalt)						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 3(c)	Tack Coat						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 5	Crash Barrier	m	2	16.200			32.400
Total							32.400

Item no 6	Drainage Spout	nos.	4				4

Item no 7	PCC below Approach Slab						
		cum	2	11.400	3.200	0.150	10.944
Total							10.944

Item no 8	Approach Slab						
		cum	2	11.400	3.500	0.300	23.940
Total							23.940

Item no 9	Strip Seal Expansion Joint						
		m	2	12.000			24.000
Total							24.000

Item no 10	Filler Joint						
	(i) copper plate	m	2	12.000			24.000
	(ii) fibar board	m	2	12.000			24.000
	(iii) 20mm thick premoulded joint filler	m	2	12.000			24.000
	(iv) joint sealing compound	m	2	12.000			24.000



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 92.270 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

D. MISCELLANNEOUS

Item no 1	Painting						
	Crash Barrier	sqm	2	2.204		16.20	71.41
Total							71.410

Item no 2	Dismantle of Existing Bridge						
2.1	Foundation	cum	1				90.14
2.2	RCC Superstructure & substructure	cum	1				127.68

E.PROTECTION WORK

Item no 1a	Boulder Pitching						
	A1 side	cum	2	6.864		0.300	4.118
	A2 side	cum	2	19.774		0.300	11.864
Total							15.982

Item no 1b	Filter Blanket						
	In slope pitching A1 side	cum	2	6.864		0.150	2.059
	In slope pitching A2 side	cum	2	19.774		0.150	5.932
Total							7.991

Item no 2	Falling Apron						
	Infront of abutment	cum	2	12.000	1.052		25.248
	Parabollic part A1 side	cum	2	0.886	0.526		0.932
	Parabollic part A2 side	cum	2	2.265	0.526		2.383
Total							28.563

Item no 3	PCC(M15) Toe Wall						
	Infront of abutment	cum	2	12.000	0.601		14.424
	Parabollic part A1 side	cum	2	0.886	0.601		1.065
	Parabollic part A2 side	cum	2	2.265	0.601		2.723
Total							18.212



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 92.270 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

F. Diversion Work

Item Sl No.	Description	Unit	nos	Length	Breadth	Height	Quantity
Item no 1	Earth cutting for Approach Road						
		cum	1	150	3.00	8.00	3600
Item no 2	EARTH FILLING UNDER ROAD						
	GRANULAR MATERIAL	cum	1	100	8	4.00	3200
Item no 3	Hume Pipe	m	4	10			40.00
Item no 4	Pavement Composition						
4.1	BC	cum	1	150	8	0.025	30.000
4.2	DBM	cum	1	150	8	0.05	60.000
4.3	WBM	cum	1	150	8	0.25	300.000
4.4	GSB	cum	1	150	8	0.15	180.000



***Quantity Estimate
of
1 x 8m RCC Slab Bridge
at Ch. 97.891 KM***



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 97.891 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

Item no 1(a)	Excavation (up to 3m) in Soil						
	Foundation A1	cum	1	13.000	4.000	2.913	151.476
	Foundation A2	cum	1	13.000	4.000	2.280	118.560
	Return Wall II at A1	cum	2	5.500	4.300	2.913	137.785
	Return Wall II at A2	cum	2	5.500	4.300	2.280	107.844
Total							515.665

Item no 2	Foundation Slab RCC-M30						
	Abutment Foundation Slab	cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	0.800	0.800	15.360
	Return Wall II	cum	4	5.000	3.300	0.300	19.800
Total							66.840

Item no 3	Levelling Course M15						
	Foundation Slab	cum	2	12.300	3.300	0.150	12.177
	Return Wall II	cum	4	5.150	3.600	0.150	11.124
Total							23.301

Item no 4	Steel Reinforcement (HYSD) for Foundation Slab						
	@120 kg/cum	ton		8.021			8.021
Total							8.021



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 97.891 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

Item no 1(a)	RCC-M30(up to 5m)						
	Abutment-I	cum	1	12.000	0.800	1.100	10.560
	Abutment-II	cum	1	12.000	0.800	0.860	8.256
	Abutment Cap	cum	2	12.000	0.800	0.600	11.520
	Return wall-I at A-1 side	cum	2	2.400	0.300	2.600	3.744
	Return wall-I at A-2 side	cum	2	2.400	0.300	2.360	3.398
	Return wall II at A-1 side	cum	2	5.000	0.300	2.965	8.895
	Return wall II at A-2 side	cum	2	5.000	0.300	2.725	8.175
	Dirt wall	cum	2	12.000	0.400	0.700	6.720
	Bracket	cum	2	12.000	0.0612		1.469
Total=							62.737

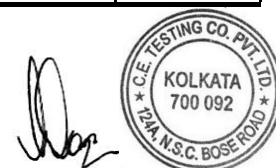
Item no 2	Steel reinforcement (HYSD Bars) for substructure						
	@ 140 kg/cum	ton		8.783			8.783
Total							8.783

Item no 3	Weep holes						
	Spacing for weep holes = 2 m in horizontal and 1 m in vertical direction						
	No of weep holes in horizontal direction per abutment = $11.4/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $1/1 +1 =$					2	
	No of weep holes in vertical direction per return wall-I = $2.2/1+1 =$					2	
	No of weep holes in horizontal direction per return wall-I = $2.4/2+1 =$					3	
	No of weep holes in vertical direction per return wall-II = $2.8/1+1 =$					3	
	No of weep holes in horizontal direction per return wall-II = $5/2+1 =$					6	
	Total no of Weep holes per abutment = 7×2					14	
	Total no of Weep holes per return wall-I = 2×3					6	
	Total no of Weep holes per return wall-II = 3×6					18	
	Total no of weep holes = $14 \times 2 + 6 \times 4 + 18 \times 4$						124

Item no 4	Backfilling(Granular Material)						
	Foundation	cum	2	16.000		0.400	12.800
	Return Wall-II	cum	4	7.150		0.300	8.580
Total							21.380

Item no 5	Backfilling(Sandy Material)						
	Behind Abutment & Return wall-I	cum	2	2.400	11.400	2.600	142.272
	Behind Return wall-II	cum	2	5.000	11.400	2.965	338.010
	Deduct for filter media	cum					71.544
Total							408.738

Item no 6	Filter media						
	Behind Abutment	cum	2	11.400	0.600	1.950	26.676
	Behind Return Wall-I	cum	4	1.800	0.600	2.150	9.288
	Behind Return Wall-II	cum	4	5.000	0.600	2.965	35.580
Total							71.544



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 97.891 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

C. SUPERSTRUCTURE

Item no 1	RCC-M30(Up to 5M)						
	Superstructure Slab supported part	cum	1	8.400	12.000	0.700	70.560
Total							70.560

Item no 2	Superstructure Steel (HYSD Bars)						
	@ 180 kg/cum	Ton			12.701		12.701
Total							12.701

Item no 3(a)	Wearing Course (Bituminus Concrete)						
		cum	1	16.200	11.000	0.040	7.128
Total=							7.128

Item no 3(b)	Wearing Course (Mastic Asphalt)						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 3(c)	Tack Coat						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 5	Crash Barrier	m	2	16.200			32.400
Total							32.400

Item no 6	Drainage Spout	nos.	4				Total 4

Item no 7	PCC below Approach Slab						
		cum	2	11.400	3.200	0.150	10.944
Total							10.944

Item no 8	Approach Slab						
		cum	2	11.400	3.500	0.300	23.940
Total							23.940

Item no 9	Strip Seal Expansion Joint						
		m	2	12.000			24.000
Total							24.000

Item no 10	Filler Joint						
	(i) copper plate	m	2	12.000			24.000
	(ii) fibar board	m	2	12.000			24.000
	(iii) 20mm thick premoulded joint filler	m	2	12.000			24.000
	(iv) joint sealing compound	m	2	12.000			24.000



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 97.891 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

D. MISCELLANNEOUS

Item no 1	Painting						
	Crash Barrier	sqm	2	2.204		16.20	71.41
Total							71.410

Item no 2	Dismantle of Existing Bridge						
2.1	Foundation	cum	1				90.14
2.2	RCC Superstructure & substructure	cum	1				133.30

E.PROTECTION WORK

Item no 1a	Boulder Pitching						
	A1 side	cum	2	12.995		0.300	7.797
	A2 side	cum	2	34.430		0.300	20.658
Total							28.455

Item no 1b	Filter Blanket						
	In slope pitching A1 side	cum	2	12.995		0.150	3.899
	In slope pitching A2 side	cum	2	34.430		0.150	10.329
Total							14.228

Item no 2	Falling Apron						
	Infront of abutment	cum	2	12.000	1.052		25.248
	Parabollic part A1 side	cum	2	1.577	0.526		1.659
	Parabollic part A2 side	cum	2	3.566	0.526		3.751
Total							30.658

Item no 3	PCC(M15) Toe Wall						
	Infront of abutment	cum	2	12.000	0.601		14.424
	Parabollic part A1 side	cum	2	1.577	0.601		1.896
	Parabollic part A2 side	cum	2	3.566	0.601		4.286
Total							20.606



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 97.891 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

F. Diversion Work

Item Sl No.	Description	Unit	nos	Length	Breadth	Height	Quantity
Item no 1	Earth cutting for Approach Road						
		cum	1	150	3.00	8.00	3600
Item no 2	EARTH FILLING UNDER ROAD						
	GRANULAR MATERIAL	cum	1	100	8	4.00	3200
Item no 3	Hume Pipe	m	4	10			40.00
Item no 4	Pavement Composition						
4.1	BC	cum	1	150	8	0.025	30.000
4.2	DBM	cum	1	150	8	0.05	60.000
4.3	WBM	cum	1	150	8	0.25	300.000
4.4	GSB	cum	1	150	8	0.15	180.000



***Quantity Estimate
of
1 x 8m RCC Slab Bridge
at Ch. 98.767 KM***



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 98.767 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

Item no 1(a)	Excavation (up to 3m) in Soil						
	Foundation A1	cum	1	13.000	4.000	3.000	156.000
	Foundation A2	cum	1	13.000	4.000	3.000	156.000
	Return Wall II at A1	cum	2	5.500	4.300	3.000	141.900
	Return Wall II at A2	cum	2	5.500	4.300	3.000	141.900
Total							595.800

Item no 1(b)	Excavation (3m to 6m) In soil						
	Foundation A1	cum	1	13.000	4.000	0.126	6.552
	Foundation A2	cum	1	13.000	4.000	0.194	10.088
	Return Wall II at A1	cum	2	5.500	4.300	0.126	5.960
	Return Wall II at A2	cum	2	5.500	4.300	0.194	9.176
Total							31.776

Item no 2	Foundation Slab RCC-M30						
	Abutment Foundation Slab	cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	1.100	0.600	15.840
		cum	2	12.000	0.800	0.800	15.360
	Return Wall II	cum	4	5.000	3.300	0.300	19.800
Total							66.840

Item no 3	Levelling Course M15						
	Foundation Slab	cum	2	12.300	3.300	0.150	12.177
	Return Wall II	cum	4	5.150	3.600	0.150	11.124
Total							23.301

Item no 4	Steel Reinforcement (HYSD) for Foundation Slab						
	@120 kg/cum	ton		8.021			8.021
Total							8.021



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 98.767 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

Item no 1(a)	RCC-M30(up to 5m)						
	Abutment-I	cum	1	12.000	0.800	1.100	10.560
	Abutment-II	cum	1	12.000	0.800	0.860	8.256
	Abutment Cap	cum	2	12.000	0.800	0.600	11.520
	Return wall-I at A-1 side	cum	2	2.400	0.300	2.600	3.744
	Return wall-I at A-2 side	cum	2	2.400	0.300	2.360	3.398
	Return wall II at A-1 side	cum	2	5.000	0.300	2.965	8.895
	Return wall II at A-2 side	cum	2	5.000	0.300	2.725	8.175
	Dirt wall	cum	2	12.000	0.400	0.700	6.720
	Bracket	cum	2	12.000	0.0612		1.469
Total=							62.737

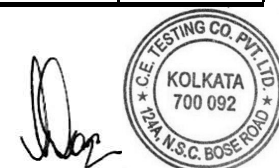
Item no 2	Steel reinforcement (HYSD Bars) for substructure						
	@ 140 kg/cum	ton		8.783			8.783
Total							8.783

Item no 3	Weep holes						
	Spacing for weep holes = 2 m in horizontal and 1 m in vertical direction						
	No of weep holes in horizontal direction per abutment = $11.4/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $1/1 +1 =$					2	
	No of weep holes in vertical direction per return wall-I = $2.2/1+1 =$					2	
	No of weep holes in horizontal direction per return wall-I = $2.4/2+1 =$					3	
	No of weep holes in vertical direction per return wall-II = $2.8/1+1 =$					3	
	No of weep holes in horizontal direction per return wall-II = $5/2+1 =$					6	
	Total no of Weep holes per abutment = 7×2					14	
	Total no of Weep holes per return wall-I = 2×3					6	
	Total no of Weep holes per return wall-II = 3×6					18	
	Total no of weep holes = $14 \times 2 + 6 \times 4 + 18 \times 4$						124

Item no 4	Backfilling(Granular Material)						
	Foundation	cum	2	16.000		0.400	12.800
	Return Wall-II	cum	4	7.150		0.300	8.580
Total							21.380

Item no 5	Backfilling(Sandy Material)						
	Behind Abutment & Return wall-I	cum	2	2.400	11.400	2.600	142.272
	Behind Return wall-II	cum	2	5.000	11.400	2.965	338.010
	Deduct for filter media	cum					71.544
Total							408.738

Item no 6	Filter media						
	Behind Abutment	cum	2	11.400	0.600	1.950	26.676
	Behind Return Wall-I	cum	4	1.800	0.600	2.150	9.288
	Behind Return Wall-II	cum	4	5.000	0.600	2.965	35.580
Total							71.544



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 98.767 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

C. SUPERSTRUCTURE

Item no 1	RCC-M30(Up to 5M)						
	Superstructure Slab supported part	cum	1	8.400	12.000	0.700	70.560
Total							70.560

Item no 2	Superstructure Steel (HYSD Bars)						
	@ 180 kg/cum	Ton			12.701		12.701
Total							12.701

Item no 3(a)	Wearing Course (Bituminus Concrete)						
		cum	1	16.200	11.000	0.040	7.128
Total=							7.128

Item no 3(b)	Wearing Course (Mastic Asphalt)						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 3(c)	Tack Coat						
		sqm	1	16.200	11.000		178.200
Total=							178.200

Item no 5	Crash Barrier	m	2	16.200			32.400
Total							32.400

Item no 6	Drainage Spout	nos.	4				Total 4

Item no 7	PCC below Approach Slab						
		cum	2	11.400	3.200	0.150	10.944
Total							10.944

Item no 8	Approach Slab						
		cum	2	11.400	3.500	0.300	23.940
Total							23.940

Item no 8	Strip Seal Expansion Joint						
		m	2	12.000			24.000
Total							24.000

Item no 9	Filler Joint						
	(i) copper plate	m	2	12.000			24.000
	(ii) fibar board	m	2	12.000			24.000
	(iii) 20mm thick premoulded joint filler	m	2	12.000			24.000
	(iv) joint sealing compound	m	2	12.000			24.000



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 98.767 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

D. MISCELLANNEOUS

Item no 1	Painting						
	Crash Barrier	sqm	2	2.204		16.20	71.41
Total							71.410

Item no 2	Dismantle of Existing Bridge						
2.1	Foundation	cum	1				90.14
2.2	RCC Superstructure & substructure	cum	1				133.30

E.PROTECTION WORK

Item no 1a	Boulder Pitching						
	A1 side	cum	2	7.049		0.300	4.229
	A2 side	cum	2	5.285		0.300	3.171
Total							7.400

Item no 1b	Filter Blanket						
	In slope pitching A1 side	cum	2	7.049		0.150	2.115
	In slope pitching A2 side	cum	2	5.285		0.150	1.586
Total							3.701

Item no 2	Falling Apron						
	Infront of abutment	cum	2	12.000	1.052		25.248
	Parabollic part A1 side	cum	2	0.908	0.526		0.955
	Parabollic part A2 side	cum	2	0.694	0.526		0.730
Total							26.933

Item no 3	PCC(M15) Toe Wall						
	Infront of abutment	cum	2	12.000	0.601		14.424
	Parabollic part A1 side	cum	2	0.908	0.601		1.091
	Parabollic part A2 side	cum	2	0.694	0.601		0.834
Total							16.349



ESTIMATE OF QUANTITY OF SLAB BRIDGE

Chainage= 98.767 Km

1 span of 8 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

F. Diversion Work

Item Sl No.	Description	Unit	nos	Length	Breadth	Height	Quantity
Item no 1	Earth cutting for Approach Road						
		cum	1	150	3.00	8.00	3600
Item no 2	EARTH FILLING UNDER ROAD						
	GRANULAR MATERIAL	cum	1	100	8	4.00	3200

Item no 3	Hume Pipe	m	4	10			40.00

Item no 4	Pavement Composition						
4.1	BC	cum	1	150	8	0.025	30.000
4.2	DBM	cum	1	150	8	0.05	60.000
4.3	WBM	cum	1	150	8	0.25	300.000
4.4	GSB	cum	1	150	8	0.15	180.000

