

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-IJ-TP/Manipur/2017)

PACKAGE – VII

DESIGN CH:

169+570 KM TO 205+974KM

SURVEY CH:

175+105 KM TO 214+289 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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Development Corporation Ltd.**

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Engineering Consultants

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CET/4047/NHIDCL/NH-37/DDPR

Rev: R0

Aug 2021

Road name- IMPHAL-JIRIBAM ROAD SECTION OF NH-37 (OLD NH-53)
PKG-VII
(FROM DESIGN CH KM 169+570 to KM 205+974)
GENERAL ABSTRACT OF COST

Length of Road (KM) : 36.404

DESCRIPTION OF WORKS		TOTAL COST (IN Cr.)	COST PER KM. OF TOTAL ROAD LENGTH	% of Cost of Civil Works (% of C)
A.	ROAD WORKS			
1	Site Clearance and Dismantling	2.47	0.07	0.71%
2	Earth work ,Subgrade and Erosion control	83.02	2.28	23.87%
3	Sub-Base & Base	69.61	1.91	20.01%
4	Bituminous Courses	55.19	1.52	15.87%
5	Junction Improvement	0.80	0.02	0.23%
6	Traffic signs, Road marking & other road appurtenances	11.99	0.33	3.45%
7	Passenger Shelter	0.30	0.01	0.09%
8	Busbay	2.00	0.05	0.57%
	Drainage and Protective Works			
9	Longitudinal Drains	27.70	0.76	7.96%
10	Retaining wall	5.44	0.15	1.56%
11	Breast wall	15.46	0.42	4.44%
12	Protection Work	2.58	0.07	0.74%
B.	BRIDGES & CULVERTS			
13	Culvert	46.73	1.28	13.43%
14	Minor Bridge	17.12	0.47	4.92%
15	Bridge Repair & Maintanance Work	5.13	0.14	1.47%
C.	Utility Shifting			
	Utility Shifting(Electrical+PHE)	2.32	0.06	0.67%
D.	COST OF CIVIL WORKS IN LAKHS (AS PER SOR 2018)	347.86	9.56	
E.	Escalation @ 3% WPI (3% of A+B Only)	10.37		
F.	Total Civil Cost (D+E)	358.23	9.84	
G.	Maintenance for 5 years, i.e 2.5% on civil cost (F-C)	8.90		
H.	GST @ 12% of (F-C)	42.71		
I.	Contingencies @ 1% over Civil Cost (F-C)	3.56		
J.	Supervision Charges @ 3% of (F-C)	10.68		
K.	Agency Charges @3% of (F-C)	10.68		
L.	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 and 2.5% for last 0.5 Years)	17.80		
M.	TOTAL CONSTRUCTION COST * (F+G+H+I+J+K+L)=M	452.56	12.43	
N.	DEPARTMENTAL COST			
a.	LA & Structure Cost(Tentative)	118.44		
b.	Forest Clearance & Environment Cost (Forest+Environmental Budget+Muck Disposal)(Tentative)	8.00		
C.	Utility Shifting Miscellaneous Cost (Agency Charge, GST etc.)	0.65		
	Sub Total (N)	127.09		
O.	TOTAL PROJECT COST (M+N)=O	579.65	15.92	

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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.

The project road stretch falls under Tamenglong and Jiribam district of Manipur.

1.2.2 District Details

Imphal West is one of the sixteen districts of Manipur state in northeastern India. As of 2011 it is the most populous district in the state. Lamphelpat city is the administrative headquarters of the district. The district occupies an area of 558 km². The district ranks first on the basis of "District Infrastructure Index" calculated under the patronage of Ministry of North East Region (DoNER).

1.2.4 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 (Bituminous)	500, 501, 502, 503, 505, 507, 509, and 516
6.	800	Traffic signs, Markings and other Road Appurtenances	801, 802, 803, 804, 805, 807 and 811



Sr. No.	Section No.	Section Title	Clause No.
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 conform 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 requirement



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 maintains a

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
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	1

S. No.	Sub No.	Item, Specifications	Nos. required
		operated with time switch assembly (As per BIS)	
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
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



B: For Soils and Aggregates			
	(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



C: For Bitumen and Bituminous Mixes			
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
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
	(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



D: For Cement, Cement Concrete and Materials			
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.
	(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 standard.



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

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 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 i



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. excluding Sub Clause (i) & (x) after the suitable material has been received as provided i



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 an



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 1st 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 color as per sign details. The sign plate shall be fixed with 6mm dia. aluminium rivet

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 i

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.

3. 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 an

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 sideway 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	20
f) Any other item	As specified by the Engineer

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/cm ³ at 23 °C
Yield Stress	:	18.0 N/mm ²
Tensile Strength	:	21.0 N/mm ²
Shore Hardness D-3 sec. Value	:	60
-15 sec. Value	:	58
Notch impact strength at 23 °C	:	10 KJ/m ²
- 40 °C	:	4 KJ/m ²

Coefficient of Thermal Expansion for

20 °C - 80 °C	:	1.50 x 10 ⁻⁴ KJ/m ²

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 c



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 $\Delta\sigma_p \text{ min} = 80 \text{ MPa}$
- 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 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 of Adoption Joint	for 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	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



		degree Celsius.		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 special conditions	For bridges having wide decks and large span length involving complex movements/ rotations in different directions/ planes, provision of special type of modular expansion joints such as Swivel joints may be made.	25 Years	Electrometric seal may need replacement 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 or 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 from 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 abroad.



- (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	22 $\pm$



@ 25°C

Operating temperature - -20°C to + 80°C

Shrinkage - Less than 1%

Permanent dynamic - $\pm 25\%$

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 m²) 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 manufacture shall certify the above requirements about solid content & grain size. In order t



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 b



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 co:



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 loses soil and benched. The width of the benches shall be at list 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 wall 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 at least 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 an



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.

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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 attatched 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



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



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



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



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 Mortar 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 Bedding 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 Bedding 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	127.79	2	129.79
2	Filling Material	Local	-	-	10.00
3	Stone Metal	Local	-	-	10.00
4	Stone Boulder	Local	-	-	10.00
5	Stone Chips, Aggregate	Local	-	-	10.00
6	Coarse Sand	Noney	127.79	2	129.79
7	Cement	Imphal	191.79	-	191.79
8	Steel	Imphal	191.79	-	191.79
9	Bitumen	Imphal	191.79	-	191.79
10	Bitumen Emulsion	Imphal	191.79	-	191.79
11	Structural Steel	Imphal	191.79	-	191.79
12	RCC Pipe	Imphal	191.79	-	191.79




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 Local
Lead Upto Site (Km)= 10.00

Sl.No.	Lead in km	Kilometer	Unit	Carriage (Km)	Rate (Rs)	Cost of Carriage (In Rs)
2	10.00	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		20.42	0.00
		for Every km beyond 20 km	per m ³		16.51	0.00
					Total	381.44

Sand

Name of Quarries Noney
Lead Upto Site (Km)= 129.79

Sl.No.	Lead in km	Kilometer	Unit	Carriage (Km)	Rate (Rs)	Cost or Carriage (In Rs)
3	129.79	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	109.79	16.51	1812.55
					Total	2398.19

Boulder

Name of Quarries Local
Lead Upto Site (Km)= 10.00



Sl.No.	Lead in km	Kilometer	Unit	Carriage	Rate (Rs)	Cost of Carriage (In Rs)
4	10.00	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		22.65	0.00
		for Every km beyond 20 km	per m ³		18.31	0.00
					Total	423.13

Cement, Steel

Name of Quarries

Imphal

Lead Upto Site (Km)=

191.79

Sl.No.	Lead in km	Kilometer	Unit	Carriage	Rate (Rs)	Cost of Carriage (In Rs)
5	191.79	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	171.79	11.84	2033.93
					Total	2454.05

Bitumen

Name of Quarries

Imphal

Lead Upto Site (Km)=

191.79

Sl.No.	Lead in km	Kilometer	Unit	Carriage	Rate (Rs)	Cost of Carriage (In Rs)
6	191.79	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	171.79	11.84	2033.93
					Total	2454.05

PIPE

300 mm Dia RCC Pipe from Imphal

Lead Upto Site (Km)=

191.79

Sl.No.	Lead in km	Kilometer	Unit	Carriage	Rate (Rs)	Cost of Carriage (In Rs)
7	192	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	172	1.21	207.86
						250.89



FINISHED RATE



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	392.30
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	723.48
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	1,373.64
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	2,576.19

**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	4,330.68
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	59,912.85
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	1,756.40
8	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar	Cum	489.32					0.00	494.21
9	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	34.33

**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
10	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	57.65
11	02/nsc/1	Supplying and laying Hydro Seeding on cutting Surface	sqm	315.00					0.00	318.15
12	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	161.80
13	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	248.74

**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
14	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	315.46
15	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	87.52
16	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	213.50
17	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	307.61

**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
18	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					1,250.79	4,290.27
					Course Sand	0.380	cum	2,398.19		
					Stone	0.250	cum	381.44		
					Chips/Aggregate					
					Stone Metal Cat1	0.640	cum	381.44		
19	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	2,083.63

**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
20	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					585.03	2,829.19
					binder	0.080	Ton	399.23		
					Stone	0.240	cum	381.44		
					Chips/Aggregate					
					Stone Metal Cat1	1.210	cum	381.44		
21	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					1,302.13	4,310.14
					Course Sand	0.396	cum	2,398.19		
					Stone Metal Cat1	0.924	cum	381.44		
22	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					251.97	1,642.74

**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
					Cement	0.012	Ton	2,454.05		
					Sand	0.064	cum	2,398.19		
					Stone	0.112	cum	381.44		
					Chips/Aggregate					
					Stone Metal Cat1	0.069	cum	381.44		
23	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	Bitumen Emulsion	0.001	Ton	2,454.05	1.72	59.85
24	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	2,454.05	0.49	16.28
25	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	2,454.05	0.61	17.95

**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
26	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					820.46	12,205.30
					Aggregate	1.440	cum	381.44		
					Bitumen 30/40	0.104	Ton	2,454.05		
					Filler	0.040	Ton	399.23		
27	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					886.38	13,389.95
					Aggregate	1.456	cum	381.44		

**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
					Bitumen 30/40	0.130	Ton	2,454.05		
					Filler	0.030	Ton	399.23		
28	08.01	Precast Cement concrete M20 Kerb including fixing at site	rm	622.79					134.48	764.84
					Cement	0.016	Ton	2,454.05		
					Course Sand	0.030	cum	2,398.19		
					Stone Chips/Aggregate	0.061	cum	381.44		
29	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					831.58	5,442.30
					Cement	0.108	Ton	2,454.05		
					Sand	0.176	cum	2,398.19		
					Steel	0.004	Ton	2,454.05		
					Stone Chips/Aggregate	0.353	cum	381.44		
30	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					568.75	3,277.44
					Cement	0.074	Ton	2,454.05		
					Sand	0.121	cum	2,398.19		
					Steel	0.002	Ton	2,454.05		
					Stone Chips/Aggregate	0.242	cum	381.44		

**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
31	08.04	Reinforced Cement Concrete M15 Boundary pillars of standard design, fixed in position including finishing but excluding painting	each	843.03	Sand	0.566	cum	2,398.19	1,992.36	2,863.74
					Steel	0.080	Ton	2,454.05		
					Stone Chips/Aggregate	1.150	cum	381.44		
32	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	94.34
33	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	each	4,931.35	Cement	0.033	Ton	2,454.05	1,463.83	6,459.13
					Sand	0.540	cum	2,398.19		
					Steel	0.019	Ton	2,454.05		
					Stone Chips/Aggregate	0.108	cum	381.44		

**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
34	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					1,463.83	5,963.68
					Cement	0.033	Ton	2,454.05		
					Sand	0.540	cum	2,398.19		
					Steel	0.019	Ton	2,454.05		
					Stone	0.108	cum	381.44		
					Chips/Aggregate					
35	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					1,463.83	7,241.76
					Cement	0.033	Ton	2,454.05		
					Sand	0.540	cum	2,398.19		
					Steel	0.019	Ton	2,454.05		

**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
					Stone Chips	0.108	cum	381.44		
36	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					1,463.83	9,725.37
					Cement	0.033	Ton	2,454.05		
					Sand	0.540	cum	2,398.19		
					Steel	0.019	Ton	2,454.05		
					Stone Chips/Aggregate	0.108	cum	381.44		
37	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	1,012.16

**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
38	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	1,073.82
39	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	3,334.08					0.00	3,367.42

**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
40	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	387.48
41	08.22	Lighting on BridgesProviding & 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	21,376.67
42	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 HYSO 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	6,996.27

**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
43	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	1,237.23
44	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 Cement Course Sand	0.400 0.006 0.007	cum Ton cum	381.44 2,454.05 2,398.19	183.59	11,939.81
45	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	2,454.05	2,576.75	76,315.94
46	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	2,454.05	2,576.75	76,315.94
47	10.16	Cement Plaster 12mm Thick in Cement Mortar 1:3	sqm	223.49					0.00	225.72
48	10.19	Dry Boulder pitching	cum	1,701.75					507.76	2,231.61

**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 Bolder	1.200	cum	423.13		
49	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	381.44	457.73	1,648.36
50	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	Stone Chips/Aggregate	1.200	cum	381.44	457.73	1,631.16
51	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	381.44	2,213.25	9,806.70
					Cement	0.330	Ton	2,454.05		
					Sand	0.450	cum	2,398.19		

**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
52	15.12/Nsc	Supply and Installation of Mechanically woven double twisted hexagonal shaped steel wire mesh gabion boxes with Zinc + PVC coating having mesh size of 100 mm x 120 mm by using mesh wire 2.7 mm (Inner dia) and 3.7 (outer dia) with sledged wire 3.4 mm(inner dia) and 4.4 mm (outer dia) and lacing with 2.2mm inner dia and 3.3 mm outer dia.placing at indicated places in dry condition at easily accessible location as per direction of Engineer including tools, plant, labour etc. complete in all respect, carrying the material from nearest approach with all leads & lifts, manpower & machinery, materials, labor etc. complete as per detailed technical specifications and as directed by Engineer-In-Charge.	cum	1,690.00					0.00	1,706.90
53	24/i/b	Galvanised Mild steel J /L hook	kg	120.00					0.00	121.20
54	40	Gextextile material (fine net)	sqm	25.50					0.00	25.76

**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	221.12
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	221.12
3	13.01/a/iii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Above 6 m depth	cum	409.42					0.00	413.51
4	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	211.31
5	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	1,007.86					457.73	1,480.25

**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
					Stone Chips/Aggregate	1.200	cum	381.44		
6	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	2,398.19	2,877.83	3,529.80
7	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	381.44	457.73	1,749.70
8	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	11,968.37
9	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	2,454.05	1,579.12	7,964.33
					Sand	0.300	cum	2,398.19		
					Stone Metal Cat1	1.160	cum	381.44		
10	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	381.44	2,213.25	10,667.07
					Cement	0.330	Ton	2,454.05		

**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	0.450	cum	2,398.19		
11	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	Aggregate	0.900	cum	381.44	2,355.02	11,805.66
					Cement	0.380	Ton	2,454.05		
					Sand	0.450	cum	2,398.19		
12	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	Aggregate	0.900	cum	381.44	2,428.64	11,620.95
					Cement	0.410	Ton	2,454.05		
					Sand	0.450	cum	2,398.19		
13	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	77,427.65	Steel	1.050	Ton	2,454.05	2,576.75	80,804.44
14	14/nsc2	Brick Flat Soling at Foundation	Sqm	1,077.89	Brick	1.000	Sqm	40.00	40.00	1,129.07
15	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	12,081.21

**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
16	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	Cement Sand Stone Metal Cat1	0.170 0.300 1.160	Ton cum cum	2,454.05 2,398.19 381.44	1,579.12	8,450.64
17	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	Cement Sand Stone Chips/Aggregate	0.344 0.450 0.900	Ton cum cum	2,454.05 2,398.19 381.44	2,266.67	11,447.34
18	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 Sand Stone Chips/Aggregate	0.403 0.450 0.900	Ton cum cum	2,454.05 2,398.19 381.44	2,411.46	12,473.21

**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	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	77,427.65	Steel	1.050	Ton	2,454.05	2,576.75	80,804.44
20	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	2,454.05	6.53	456.80
					Sand	0.002	cum	2,398.19		
21	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	Cement	0.400	Ton	2,454.05	2,408.90	12,983.81
					Course Sand	0.452	cum	2,398.19		
					Stone Chips/Aggregate	0.900	cum	381.44		
22	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	85,183.86	Steel	1.050	Ton	2,454.05	2,576.75	88,638.22
23	16.09	Mild steel railing complete as per drawing and Technical Specifications	Rm	4,559.31					105.28	4,711.24

**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	0.043	Ton	2,454.05		
24	16.11	Drainage Spouts complete as per drawing and Technical specification	each	2,158.99					9.82	2,190.50
					Structural Steel	0.004	Ton	2,454.05		
25	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					14.02	552.05
					Bitumen	0.003	Ton	2,454.05		
					Lime	0.005	Ton	399.23		
					Stone Chips/Aggregate	0.014	cum	381.44		
26	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					2,266.67	11,447.34
					Cement	0.344	Ton	2,454.05		

**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	0.450	cum	2,398.19		
					Stone Chips/Aggregate	0.900	cum	381.44		
27	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					507.76	2,167.22
					Stone Bolder	1.200	cum	423.13		

**Note: Finished Rate inclusive of 1% labour cess

Item Rate Analysis has been done considering

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	<u>2063.00</u>
			Labour Cess@1%				20.63
			Rate per cum =				<u>2083.63</u>



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	<u>36.40</u>	
							<u>36.00</u>	
		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-37 (OLD NH-53)
PKG-VII
(FROM DESIGN CH KM 169+570 to KM 205+974)
GENERAL ABSTRACT OF COST

Length of Road (KM) : 36.404

DESCRIPTION OF WORKS		TOTAL COST (IN Cr.)	COST PER KM. OF TOTAL ROAD LENGTH	% of Cost of Civil Works (% of C)
A.	ROAD WORKS			
1	Site Clearance and Dismantling	2.47	0.07	0.71%
2	Earth work ,Subgrade and Erosion control	83.02	2.28	23.87%
3	Sub-Base & Base	69.61	1.91	20.01%
4	Bituminous Courses	55.19	1.52	15.87%
5	Junction Improvement	0.80	0.02	0.23%
6	Traffic signs, Road marking & other road appurtenances	11.99	0.33	3.45%
7	Passenger Shelter	0.30	0.01	0.09%
8	Busbay	2.00	0.05	0.57%
	Drainage and Protective Works			
9	Longitudinal Drains	27.70	0.76	7.96%
10	Retaining wall	5.44	0.15	1.56%
11	Breast wall	15.46	0.42	4.44%
12	Protection Work	2.58	0.07	0.74%
B.	BRIDGES & CULVERTS			
13	Culvert	46.73	1.28	13.43%
14	Minor Bridge	17.12	0.47	4.92%
15	Bridge Repair & Maintanance Work	5.13	0.14	1.47%
C.	Utility Shifting			
	Utility Shifting(Electrical+PHE)	2.32	0.06	0.67%
D.	COST OF CIVIL WORKS IN LAKHS (AS PER SOR 2018)	347.86	9.56	
E.	Escalation @ 3% WPI (3% of A+B Only)	10.37		
F.	Total Civil Cost (D+E)	358.23	9.84	
G.	Maintenance for 5 years, i.e 2.5% on civil cost (F-C)	8.90		
H.	GST @ 12% of (F-C)	42.71		
I.	Contingencies @ 1% over Civil Cost (F-C)	3.56		
J.	Supervision Charges @ 3% of (F-C)	10.68		
K.	Agency Charges @3% of (F-C)	10.68		
L.	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 and 2.5% for last 0.5 Years)	17.80		
M.	TOTAL CONSTRUCTION COST * (F+G+H+I+J+K+L)=M	452.56	12.43	
N.	DEPARTMENTAL COST			
a.	LA & Structure Cost(Tentative)	118.44		
b.	Forest Clearance & Environment Cost (Forest+Environmental Budget+Muck Disposal)(Tentative)	8.00		
C.	Utility Shifting Miscellaneous Cost (Agency Charge, GST etc.)	0.65		
	Sub Total (N)	127.09		
O.	TOTAL PROJECT COST (M+N)=O	579.65	15.92	

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	8.00	392.30	3,138
2	02.01/ii	Cutting of Girth 600-900mm	Each	46.00	723.48	33,280
3	02.01/iii	Cutting of Girth 900-1800mm	Each	138.00	1,373.64	189,562
4	02.01/iv	Cutting of Girth 1800-2700mm	Each	15.00	2,576.19	38,643
5	02.01/v	Cutting of Girth 2700mm more	Each	17.00	4,330.68	73,622
6	02.03/b	Clearing & grubbing(Mechanical - Light Jungle)	Ha	58.02	59,912.85	3,476,144
7	02.04/i/c	Dismantling Structure RCC	cum	605.00	1,756.40	1,062,622
8	02.04/iii/b	Dismantling Structure Rubble Stone Masonry Cement	Cum	2,576.00	494.21	1,273,085
9	02.04/viii/e	Morter Dismantle Flexible Pavement Granular	sqm	390,055.00	34.33	13,390,588
10	02.04/viii/f/ii	Dismantle Flexible Pavement Bituminous(Roller & Scarifier)	sqm	90,041.00	57.65	5,190,864
Total of Bill						24,731,548

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	90,911.00	318.15	28,923,335
2	03.13	Embankment fill from Roadway Cutting	cum	206,700.00	161.80	33,444,060
3	03.14	Subgrade and Earthen Shoulder Fill From Borrow Pit	cum	77,707.64	315.46	24,513,652
4	03.15	Compacting original ground supporting sub-grade	cum	37,120.58	87.52	3,248,793
5	03.31	Excavation in Hill in Soil For Roadway	cum	2,548,434.40	213.50	544,090,744
6	03.32	Excavation for Roadway Ordinary Rock Mechanical (Without Blasting)	cum	637,108.60	307.61	195,980,976
Total of Bill						830,201,561

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	51,147.74	4,290.27	219,437,619
2	04/nsc1	GSB Reuse	Cum	34,805.50	2,083.63	72,521,786
3	05.02	WMM	Cum	93,765.69	4,310.14	404,143,242
Total of Bill						696,102,647



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	370,766.00	59.85	22,190,345
2	06.02/ii	Tack Coat(Granular Layer)	sqm	354,602.00	17.95	6,365,106
3	06/Nsc1	DBM GR II	cum	26,612.04	12,205.30	324,807,932
4	06/Nsc2	BC GR II	cum	14,830.64	13,389.95	198,581,528
Total of Bill						551,944,911

Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	04.01/Nsc1	GSB Close Graded GR V	Cum	293.35	4,290.27	1,258,542
2	04/nsc1	GSB Reuse	Cum	203.85	2,083.63	424,752
3	05.02	WMM	Cum	621.50	4,310.14	2,678,752
4	06.01/a	Prime Coat	sqm	2,486.00	59.85	148,787
5	06.02/i	Tack Coat(Bituminous Layer)	sqm	2,486.00	16.28	40,472
6	06/Nsc1	DBM GR II	cum	174.02	12,205.30	2,123,966
7	06/Nsc2	BC GR II	cum	99.44	13,389.95	1,331,497
8	08.14	Paint on Bituminous Surface	sqm	30.00	1,012.16	30,365
Total of Bill						8,037,133

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	5,442.30	38,096
2	08.02/b	Ordinary km Stone	each	29.00	3,277.44	95,046
3	08.04	Boundary Stone	each	367.00	2,863.74	1,050,993
4	08.11/i	90 cm equilateral triangle	each	255.00	6,459.13	1,647,078
5	08.11/iii	60 cm circular	each	107.00	5,963.68	638,114
6	08.11/iv	80 cm x 60 cm rectangular	each	14.00	7,241.76	101,385
7	08.11/vii	90 cm high octagon	each	54.00	9,725.37	525,170
8	08.14	Paint on Bituminous Surface	sqm	11,474.53	1,012.16	11,614,064
9	08.15/c/v	Road Delineators(100 cm long above Road)	each	3,358.00	1,073.82	3,605,888
10	08.18/A/b	Type-A, "W" Metal Beam Crash Barrier	Rm	10424.00	3,367.42	35101986
11	08.20/ii	Road Stud/Road Markers	nos	16,484.00	387.48	6,387,220
12	08.22	Lighting on Bridges	nos	393.00	21,376.67	8,401,031

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
13	08/nsc/6	Rumble Strip	sqm	1,040.00	1,237.23	1,286,719
14	16.09	Protection Work Steel Railing	Rm	10,492.00	4,711.24	49,430,330
Total of Bill						119,923,120

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	924.95	94.34	87,259
2	10.16	Sub Structure Plaster with 1:3 Cement Mortar	sqm	924.95	225.72	208,779
3	13.01/a/i	Foundation Earthwork Ordinary Soil (0 -3m)	cum	138.72	221.12	30,673
4	14.01	Foundation Brick Work C.M. 1:3	cum	21.26	11,968.37	254,483
5	14.03/a	Foundation PCC M15	cum	14.09	10,667.07	150,278
6	14.03/e/II	Foundation RCC M25	cum	9.71	11,620.95	112,874
7	14.08	Foundation Steel (HYSD)	MT	1.17	80,804.44	94,218
8	14/nsc2	Brick Flat Soling	Sqm	188.13	1,129.07	212,406
9	15.01	Sub Structure Brick Work	cum	45.34	12,081.21	547,798
10	16.01/a/i	Super Structure RCC M25 - Solid Slab Super	cum	58.12	12,983.81	754,632
11	16.03	Structure(Upto 5m) Super Structure Steel(HYSD)	MT	5.81	88,638.22	515,165
Total of Bill						2,968,566

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	2,478.00	248.74	616,378
2	04.01/Nsc1	Cutting GSB Close Graded GR V	Cum	584.81	4,290.27	2,508,984
3	04/nsc1	GSB Reuse	Cum	406.39	2,083.63	846,771
4	05.02	WMM	Cum	1,239.00	4,310.14	5,340,263
5	05.03	Foothpath Area	sqm	2,065.00	1,642.74	3,392,258
6	06.01/a	Prime Coat	sqm	4,956.00	59.85	296,617
7	06.02/i	Tack Coat(Bituminous Layer)	sqm	4,956.00	16.28	80,684
8	06/Nsc1	DBM GR II	cum	346.92	12,205.30	4,234,263
9	06/Nsc2	BC GR II	cum	198.24	13,389.95	2,654,424
Total of Bill						19,970,641



Summary of Bill of Quantity

Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1		Filling in Foundation by Sandy Soil		44,932.30		
2	13.01/a/i	Foundation Earthwork Ordinary Soil (0 -3m)	cum	20,286.36	221.12	4,485,719
3	14.02/b	Foundation Random Rubble Masonry (	cum	2,724.77	7,964.33	21,700,999
4	14.03/a	coursed/uncoursed) Cement Mortar(1:3) Foundation PCC M15	cum	4,667.08	10,667.07	49,784,090
5	14.03/b	Foundation PCC M20	cum	168.52	11,805.66	1,989,490
6	15.03/b/i	Sub Structure PCC M20	cum	390.66	11,447.34	4,472,018
7	15.03/f/i	Sub Structure RCC M25 (Upto 5m)	cum	11,565.15	12,473.21	144,254,545
8	15.05	Sub Structure Steel (HYSD)	MT	578.26	80,804.44	46,725,814
9	15.12	Sub Structure Weepholes per Meter	Rm	7,404.50	456.80	3,382,376
10	24/i/b	MS Hook(300gm each)	kg	1,184.40	121.20	143,549
11	40	Geotextile filter(75mm sqm)	sqm	1,332.45	25.76	34,324
Total of Bill						276,972,924

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	2,925.80	221.12	646,952
2	13.01/b/ii	Foundation Earthwork Ordinary Rock(0-3m)	cum	683.00	211.31	144,325
3	13.04	Sub Structure Filter Media	cum	2,646.55	1,749.70	4,630,663
4	14.02/b	Foundation Random Rubble Masonry (	cum	1,614.84	7,964.33	12,861,127
5	14.03/a	coursed/uncoursed) Cement Mortar(1:3) Foundation PCC M15	cum	894.65	10,667.07	9,543,326
6	15.02/b	Sub Structure Random Rubble Masonry Cement	cum	2,615.15	8,450.64	22,099,708
7	15.03/b/i	Mortar(1:3) Sub Structure PCC M20	cum	234.66	11,447.34	2,686,267
8	15.12	Sub Structure Weepholes per Meter	Rm	4,009.00	456.80	1,831,311
Total of Bill						54,443,679

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	11,866.22	221.12	2,623,859
2	13.01/b/ii	Foundation Earthwork Ordinary Rock(0-3m)	cum	2,966.56	211.31	626,863
3	13.03/a	Sub Structure Backfill Granular Material	cum	2,075.30	1,480.25	3,071,955
4	13.03/b	Sub Structure Backfill Sandy Material	cum	602.51	3,529.80	2,126,722



Summary of Bill of Quantity

Bill No : 11. Breast wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
5	14.02/b	Foundation Random Rubble Masonry (coursed/uncoursed) Cement Morter(1:3)	cum	5,575.58	7,964.33	44,405,767
6	14.03/a	Foundation PCC M15	cum	2,588.09	10,667.07	27,607,380
7	15.02/b	Sub Structure Random Rubble Masonry Cement Morter(1:3)	cum	8,531.77	8,450.64	72,098,900
8	15.12	Sub Structure Weepholes per Meter	Rm	4,425.81	456.80	2,021,709
Total of Bill						154,583,156

Bill No : 12. Protection Work

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	15.12/Nsc	Protection Work Gabian Structure for Retaining Earth	cum	15,120.00	1,706.90	25,808,328
Total of Bill						25,808,328


Item Rate Analysis has been done considering

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	8.00	392.30	3,138.40
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	46.00	723.48	33,280.08
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	138.00	1,373.64	189,562.32
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	15.00	2,576.19	38,642.85
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	17.00	4,330.68	73,621.56
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	58.02	59,912.85	3,476,143.56

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	605.00	1,756.40	1,062,622.00
8	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar	Cum	2,576.00	494.21	1,273,084.96
9	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	390,055.00	34.33	13,390,588.15
10	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	90,041.00	57.65	5,190,863.65
Total of Bill 01. Site Clearance and Dismantling						24,731,547.53

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	90,911.00	318.15	28,923,334.65
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	206,700.00	161.80	33,444,060.00
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	77,707.64	315.46	24,513,652.11
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	37,120.58	87.52	3,248,793.16
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	2,548,434.40	213.50	544,090,744.40
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	637,108.60	307.61	195,980,976.45
Total of Bill 02. Earth work,Subgrade and Erosion control						830,201,560.77

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	51,147.74	4,290.27	219,437,618.78
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	34,805.50	2,083.63	72,521,786.05
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	93,765.69	4,310.14	404,143,242.48
Total of Bill 03. Sub-Base & Base Courses						696,102,647.31

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	370,766.00	59.85	22,190,345.10
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	354,602.00	17.95	6,365,105.90
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	26,612.04	12,205.30	324,807,931.81



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	14,830.64	13,389.95	198,581,528.07
Total of Bill 04. Bituminous Courses						551,944,910.88



Bill No : 05. Junction Improvement (Major & Minor)

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	293.35	4,290.27	1,258,542.12
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	203.85	2,083.63	424,752.14
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	621.50	4,310.14	2,678,752.01
4	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	2,486.00	59.85	148,787.10

Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
5	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	2,486.00	16.28	40,472.08
6	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	174.02	12,205.30	2,123,966.31
7	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	99.44	13,389.95	1,331,496.63



Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
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	30.00	1,012.16	30,364.80
Total of Bill 05. Junction Improvement (Major & Minor)						8,037,133.19



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	5,442.30	38,096.10
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	29.00	3,277.44	95,045.76
3	08.04	Reinforced Cement Concrete M15 Boundary pillars of standard design, fixed in position including finishing but excluding painting	each	367.00	2,863.74	1,050,992.58
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	255.00	6,459.13	1,647,078.15
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	107.00	5,963.68	638,113.76

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	14.00	7,241.76	101,384.64
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	54.00	9,725.37	525,169.98
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	11,474.53	1,012.16	11,614,064.33

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	3,358.00	1,073.82	3,605,887.56
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	10424	3,367.42	35101986
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	16,484.00	387.48	6,387,220.32
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	393.00	21,376.67	8,401,031.31

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	1,040.00	1,237.23	1,286,719.20
14	16.09	Mild steel railling complete as per drawing and Technical Specifications	Rm	10,492.00	4,711.24	49,430,330.08
		Total of Bill 06. Traffic signs, Road marking & other road appurtenances				119,923,120



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	924.95	94.34	87,259.31
2	10.16	Cement Plaster 12mm Thick in Cement Mortar 1:3	sqm	924.95	225.72	208,778.59
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	138.72	221.12	30,672.88
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	21.26	11,968.37	254,483.45
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	14.09	10,667.07	150,277.68
6	14.03/e/l	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M25Grade	cum	9.71	11,620.95	112,874.29
7	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	1.17	80,804.44	94,217.98
8	14/nsc2	Brick Flat Soling at Foundation	Sqm	188.13	1,129.07	212,406.29
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				



Bill No : 07. Passenger Shelter

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			cum	45.34	12,081.21	547,798.31
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	58.12	12,983.81	754,632.02
11	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	5.81	88,638.22	515,165.33
		Total of Bill 07. Passenger Shelter				2,968,566.13



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	2,478.00	248.74	616,377.72
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	584.81	4,290.27	2,508,984.22
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	406.39	2,083.63	846,770.56
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	1,239.00	4,310.14	5,340,263.46



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	2,065.00	1,642.74	3,392,258.10
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	4,956.00	59.85	296,616.60
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	4,956.00	16.28	80,683.68
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	346.92	12,205.30	4,234,262.68



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	198.24	13,389.95	2,654,423.69
Total of Bill 08. Bus Bay						19,970,640.71



Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1				44,932.30		
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	20,286.36	221.12	4,485,719.04
3	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	2,724.77	7,964.33	21,700,999.31
4	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	4,667.08	10,667.07	49,784,090.39
5	14.03/b	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M20 Grade	cum	168.52	11,805.66	1,989,489.82
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	390.66	11,447.34	4,472,017.84
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	11,565.15	12,473.21	144,254,544.63
8	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	578.26	80,804.44	46,725,813.87

Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	7,404.50	456.80	3,382,375.60
10	24/i/b	Galvanised Mild steel J /L hook	kg	1,184.40	121.20	143,549.28
11	40	Gextextile material (fine net)	sqm	1,332.45	25.76	34,323.91
Total of Bill 09. Longitudinal Drains						276,972,923.70



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	2,925.80	221.12	646,952.23
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	683.00	211.31	144,324.52
3	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	2,646.55	1,749.70	4,630,663.29
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	1,614.84	7,964.33	12,861,126.62
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	894.65	10,667.07	9,543,326.18
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	2,615.15	8,450.64	22,099,708.10
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	234.66	11,447.34	2,686,267.15
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications				



Bill No : 10. Retaining wall

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			Rm	4,009.00	456.80	1,831,311.20
Total of Bill 10. Retaining wall						54,443,679.28



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	11,866.22	221.12	2,623,859.45
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	2,966.56	211.31	626,862.95
3	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	2,075.30	1,480.25	3,071,955.42
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	602.51	3,529.80	2,126,722.15
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	5,575.58	7,964.33	44,405,767.03
6	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	2,588.09	10,667.07	27,607,379.86
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	8,531.77	8,450.64	72,098,899.93
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	4,425.81	456.80	2,021,709.09

		Total of Bill 11. Breast wall	154,583,155.89



Bill No : 12. Protection Work

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	15.12/Nsc	Supply and Installation of Mechanically woven double twisted hexagonal shaped steel wire mesh gabion boxes with Zinc + PVC coating having mesh size of 100 mm x 120 mm by using mesh wire 2.7 mm (Inner dia) and 3.7 (outer dia) with slevged wire 3.4 mm(inner dia) and 4.4 mm (outer dia) and lacing with 2.2mm inner dia and 3.3 mm outer dia.placing at indicated places in dry condition at easily accessible location as per direction of Engineer including tools, plant, labour etc. complete in all respect, carrying the material from nearest approach with all leads & lifts, manpower & machinery, materials, labor etc. complete as per detailed technical specifications and as directed by Engineer-In-Charge.	cum	15,120.00	1,706.90	25,808,328.00
Total of Bill 12. Protection Work						25,808,328.00



Item Rate Analysis has been done considering

BILL
(STRUCTURE PART)



Summary of Bill of Quantity

Bill No : 13. Culvert

Sl No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
Foundation						
1	10.20	Foundation Culvert PCC M15	cum	2,760.00	9,806.70	27,066,492
2	13.01/a/i	Foundation Earthwork Ordinary Soil (0 -3m)	cum	20,895.00	221.12	4,620,302
End of Sub Total Foundation						31,686,794
Sub Structure						
3	10.06/a	Steel culvert for Sub-Structure	Ton	1,277.00	76,315.94	97,455,455
4	10.20/b	Culvert Backfilling culvert by Gravelly materials	cum	7,695.00	1,648.36	12,684,130
5	10.20/c	Filter Media culvert behind abutment, wing and return wall	cum	10,786.00	1,631.16	17,593,692
6	15.03/f/i	Sub Structure RCC M25 (Upto 5m)	cum	15,964.00	12,473.21	199,122,324
7	15.12	Sub Structure Weepholes per Meter	Rm	5,164.00	456.80	2,358,915
End of Sub Total Sub Structure						329,214,517
Super Structure						
8	06.02/i	Tack Coat(Bituminous Layer)	sqm	4,335.00	16.28	70,574
9	06/Nsc2	BC GR II	cum	173.00	13,389.95	2,316,461
10	08.05	Paint on Concrete Surface(2 Coat)	sqm	2,206.00	94.34	208,114
11	08/nsc/5	Crash Barrier RCC M40	m	862.00	6,996.27	6,030,785
12	10.06/b	Steel culvert for Super-Structure	Ton	200.00	76,315.94	15,263,188
13	16.01/a/i	Super Structure RCC M25 - Solid Slab Super Structure(Upto 5m)	cum	2,501.00	12,983.81	32,472,509
14	16.11	Super Structure Drainage Spout	each	252.00	2,190.50	552,006
15	16.17	Super Structure Mastic Asphalt	sqm	4,335.00	552.05	2,393,137
End of Sub Total Super Structure						59,306,773
Protection Work						
16	10.19	Stone Pitching Culvert	cum	1,111.00	2,231.61	2,479,319
17	13.01/a/i/Nsc	Excavation For Protection work	cum	6,411.00	221.12	1,417,600
18	15.03/b/i	Sub Structure PCC M20	cum	1,823.00	11,447.34	20,868,501
19	16/nsc	Protection Work Curtain Wall- PCC (M-15)	cum	1,818.00	11,447.34	20,811,264
End of Sub Total Protection Work						45,576,684
Miscellaneous Work						
20	08.05	Paint on Concrete Surface(2 Coat)	sqm	2,206.00	94.34	208,114
21	09.01/nsc1	Hume Pipe(NP4 1200 dia Single ROW)	Rm	112.00	11,939.81	1,337,259
End of Sub Total Miscellaneous Work						1,545,373
Total						467,330,142

Item Rate Analysis has been done considering

Summary of Bill of Quantity

Bill No : 14. 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	5,809.00	221.12	1,284,486
2	13.01/a/ii	Foundation Earthwork Ordinary Soil (3m-6m)	cum	2,005.00	297.22	595,926
3	13.01/a/iii	Foundation Excavation Ordinary Soil(above 6m)	cum	68.00	413.51	28,119
4	14.03/a	Foundation PCC M15	cum	316.00	10,667.07	3,370,794
5	14.03/g	Foundation RCC M30	cum	988.00	13,563.94	13,401,173
6	14.08	Foundation Steel (HYSO)	MT	119.00	80,804.44	9,615,728
End of Sub Total Foundation						28,296,226
Sub Structure						
7	13.03/a	Sub Structure Backfill Granular Material	cum	393.00	1,480.25	581,738
8	13.03/b	Sub Structure Backfill Sandy Material	cum	1,723.00	3,529.80	6,081,845
9	13.04	Sub Structure Filter Media	cum	1,060.00	1,749.70	1,854,682
10	15.03/g/i	Sub Structure RCC M30 (Upto 5m)	cum	1,883.00	14,349.43	27,019,977
11	15.03/g/ii	Sub Structure RCC M30 (5m-10m)	cum	221.00	15,496.35	3,424,693
12	15.03/h/i	Sub Structure RCC M35 (Upto 5m)	cum	53.00	12,095.47	641,060
13	15.05	Sub Structure Steel (HYSO)	MT	223.00	80,804.44	18,019,390
14	15.09	Sub Structure Elastometric Bearing	cc	277,350.00	3.22	893,067
15	15.10	Sub Structure POT Cum PTFE Bearing	Ton	9,200.00	510.32	4,694,944
16	15.12	Sub Structure Weepholes per Meter	Rm	1,294.00	456.80	591,099
End of Sub Total Sub Structure						63,802,496
Super Structure						
17	06.02/i	Tack Coat(Bituminous Layer)	sqm	2,592.00	16.28	42,198
18	06/Nsc2	BC GR II	cum	104.00	13,389.95	1,392,555
19	14/nsc1/i	Super Structure Filler (Copper Plate)	m	228.00	2,080.60	474,377
20	14/nsc1/ii	Super Structure Filler (Fibre Board)	m	228.00	704.98	160,735
21	14/nsc1/iii	Super Structure Filler (Premoulder Joint)	m	228.00	225.23	51,352
22	14/nsc1/iv	Super Structure Filler (Sealing Compound)	m	228.00	36.36	8,290
23	16.01/b/i/c2/i	Super Structure RCC M30 (T Beam & Slab) (Upto 5m)	cum	1,529.00	13,420.02	20,519,211
24	16.03	Super Structure Steel(HYSO)	MT	254.00	88,638.22	22,514,108
25	16.11	Super Structure Drainage Spout	each	60.00	2,190.50	131,430
26	16.12/Nsc	Super Structure Approach Slab (M30)	cum	261.00	20,508.91	5,352,826
27	16.13	Super Structure PCC M15 Levelling Course Below Approach Slab	cum	115.00	10,310.09	1,185,660
28	16.16	Super Structure Strip Seal Expansion Joint	Rm	134.00	42,282.41	5,665,843
29	16.17	Super Structure Mastic Asphalt	sqm	2,592.00	552.05	1,430,914
End of Sub Total Super Structure						58,929,498



Summary of Bill of Quantity

Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
		Protection Work				
30	08/nsc/5	Crash Barrier RCC M40	m	471.00	6,996.27	3,295,243
31	13.01/a/i/Nsc	Excavation For Protection work	cum	1,534.00	221.12	339,198
32	16/nsc	Protection Work Curtain Wall- PCC (M-15)	cum	605.00	11,447.34	6,925,641
33	17.01/a	Protection Work Boulder Apron Laid in Wire	cum	1,061.00	2,815.89	2,987,659
34	17.02	Crates Protection Work Filter material underneath	cum	409.00	2,913.53	1,191,634
35	17.03/a	pitching in slopes Protection Work Pitching on slopes laid over	cum	160.00	2,185.04	349,606
36	17/nsc1	prepared filter media(Stone) Protection Work Flexible Apron	cum	143.00	2,167.22	309,912
End of Sub Total Protection Work						15,398,894
		Miscellaneous Work				
37	08.05	Paint on Concrete Surface(2 Coat)	sqm	965.00	94.34	91,038
End of Sub Total Miscellaneous Work						91,038
		Diversion Work				
38	03.13	Embankment fill from Roadway Cutting	cum	630.00	161.80	101,934
39	04.01/Nsc1	GSB Close Graded GR V	Cum	41.00	4,290.27	175,901
40	05.01/b/a	WBM GR-II	cum	69.00	2,829.19	195,214
41	06/Nsc1	DBM GR II	cum	14.00	12,205.30	170,874
42	06/Nsc2	BC GR II	cum	275.00	13,389.95	3,682,236
43	09.01/nsc1	Hume Pipe(NP4 1200 dia Single ROW)	Rm	30.00	11,939.81	358,194
End of Sub Total Diversion Work						4,684,354
Total						171,202,506



Item Rate Analysis has been done considering

Summary of Bill of Quantity

Bill No : 15. Repair and Rehabilitation

SI No	SOR Ref No	Description	Unit	Quantity	Rate	Cost
1	06.02/i	Tack Coat(Bituminous Layer)	sqm	3,696.00	16.28	60,171
2	06/Nsc2	BC GR II	cum	148.00	13,389.95	1,981,713
3	08.01	Precast Concrete Kerb(M20) fix at site	rm	616.00	764.84	471,141
4	08.05	Paint on Concrete Surface(2 Coat)	sqm	4,734.00	94.34	446,606
5	15.05	Sub Structure Steel (HYSD)	MT	55.00	80,804.44	4,444,244
6	16.09	Protection Work Steel Railing	Rm	616.00	4,711.24	2,902,124
7	16.17	Super Structure Mastic Asphalt	sqm	3,696.00	552.05	2,040,377
8	18.01	Removal of existing cement concrete wearing coat	sqm	3,696.00	331.51	1,225,261
9	18.04/a	Grouting using Concrete	cum	90.00	418,844.63	37,696,017
Total of Bill						51,267,653

Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
Foundation						
1	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	2,760.00	9,806.70	27,066,492.00
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	20,895.00	221.12	4,620,302.40
Sub Total of Foundation						31,686,794.40
Sub Structure						
3	10.06/a	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Sub-Structure	Ton	1,277.00	76,315.94	97,455,455.38
4	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	7,695.00	1,648.36	12,684,130.20
5	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	10,786.00	1,631.16	17,593,691.76
6	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	15,964.00	12,473.21	199,122,324.44

Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
7	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	5,164.00	456.80	2,358,915.20
Sub Total of Sub Structure						329,214,516.98
Super Structure						
8	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	4,335.00	16.28	70,573.80
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	173.00	13,389.95	2,316,461.35
10	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	2,206.00	94.34	208,114.04



Item Rate Analysis has been done considering

Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
11	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	862.00	6,996.27	6,030,784.74
12	10.06/b	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Super-Structure	Ton	200.00	76,315.94	15,263,188.00
13	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	2,501.00	12,983.81	32,472,508.81
14	16.11	Drainage Spouts complete as per drawing and Technical specification	each	252.00	2,190.50	552,006.00

Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
15	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	4,335.00	552.05	2,393,136.75
Sub Total of Super Structure						59,306,773.49
		Protection Work				
16	10.19	Dry Boulder pitching	cum	1,111.00	2,231.61	2,479,318.71
17	13.01/a/ i/Nsc	Earth work in excavation Ordinary soil For Protection Work	cum	6,411.00	221.12	1,417,600.32
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	1,823.00	11,447.34	20,868,500.82
19	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	1,818.00	11,447.34	20,811,264.12
Sub Total of Protection Work						45,576,683.97
		Miscellaneous Work				



Item Rate Analysis has been done considering

Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
20	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	2,206.00	94.34	208,114.04
21	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	112.00	11,939.81	1,337,258.72
Sub Total of Miscellaneous Work						1,545,372.76
Total of Bill 13. Culvert						467,330,141.60



Item Rate Analysis has been done considering

Bill No : 14. 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	5,809.00	221.12	1,284,486.08
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	2,005.00	297.22	595,926.10
3	13.01/a/iii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Above 6 m depth	cum	68.00	413.51	28,118.68
4	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	316.00	10,667.07	3,370,794.12
5	14.03/g	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M30 Grade	cum	988.00	13,563.94	13,401,172.72
6	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	119.00	80,804.44	9,615,728.36
Sub Total of Foundation						28,296,226.06
Sub Structure						
7	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	393.00	1,480.25	581,738.25
8	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	1,723.00	3,529.80	6,081,845.40

Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	1,060.00	1,749.70	1,854,682.00
10	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	1,883.00	14,349.43	27,019,976.69
11	15.03/g/ii	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 Between 5 to 10 m height	cum	221.00	15,496.35	3,424,693.35
12	15.03/h/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 M35 Grade Pedestal	cum	53.00	12,095.47	641,059.91
13	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	223.00	80,804.44	18,019,390.12
14	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	277,350.00	3.22	893,067.00



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
15	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	9,200.00	510.32	4,694,944.00
16	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	1,294.00	456.80	591,099.20
Sub Total of Sub Structure						63,802,495.92
Super Structure						
17	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	2,592.00	16.28	42,197.76
18	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	104.00	13,389.95	1,392,554.80



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
19	14/nsc1/i	Filler joint i)Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.	m	228.00	2,080.60	474,376.80
20	14/nsc1/ii	Filler joint Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.	m	228.00	704.98	160,735.44
21	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	228.00	225.23	51,352.44
22	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	228.00	36.36	8,290.08
23	16.01/b/i/c2/ii	RCC Grade M30 For solid slab super-structure Approach Slab	cum	1,529.00	13,420.02	20,519,210.58
24	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	254.00	88,638.22	22,514,107.88
25	16.11	Drainage Spouts complete as per drawing and Technical specification	each	60.00	2,190.50	131,430.00
26	16.12/Nsc	Reinforced cement concrete approach slab M-30 including reinforcement and formwork complete as per drawing and Technical specification	cum	261.00	20,508.91	5,352,825.51



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
27	16.13	PCC M15 ordinary Grade leveling course below approach slab complete as per drawing and Technical specification Below Approach Slab	cum	115.00	10,310.09	1,185,660.35
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	134.00	42,282.41	5,665,842.94
29	16.17	Mastic asphalt (providing and laying 12mm thik mastic asphalt wearing coures on top of deck slab excluding prime coat with paving grade bitumem 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 10 sqm and at an aproximate 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	2,592.00	552.05	1,430,913.60
Sub Total of			Super Structure			58,929,498.18
		Protection Work				



Item Rate Analysis has been done considering

Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
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	471.00	6,996.27	3,295,243.17
31	13.01/a/i/Nsc	Earth work in excavation Ordinary soil For Protection Work	cum	1,534.00	221.12	339,198.08
32	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	605.00	11,447.34	6,925,640.70
33	17.01/a	laying apron complete as per drawing and Technical specification. Boulder	cum	1,061.00	2,815.89	2,987,659.29
34	17.02	Filter material underneath pitching in slopes complete as per drawing and Technical specification	cum	409.00	2,913.53	1,191,633.77
35	17.03/a	Pitching on slopes complete as per drawing and Technical specifications Stone	cum	160.00	2,185.04	349,606.40
36	17/nsc1	Flexible Apron - Construction of flexible apron 750mm thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.				



Item Rate Analysis has been done considering

Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			cum	143.00	2,167.22	309,912.46
Sub Total of Protection Work						15,398,893.87
Miscellaneous Work						
37	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	965.00	94.34	91,038.10
Sub Total of Miscellaneous Work						91,038.10
Diversion Work						
38	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	630.00	161.80	101,934.00
39	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	41.00	4,290.27	175,901.07
40	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	69.00	2,829.19	195,214.11

Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
41	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	14.00	12,205.30	170,874.20
42	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	275.00	13,389.95	3,682,236.25
43	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	30.00	11,939.81	358,194.30
Sub Total of Diversion Work						4,684,353.93
Total of Bill 14. Minor Bridge						171,202,506.06



Item Rate Analysis has been done considering

Bill No : 15. Repair and Rehabilitation

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	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	3,696.00	16.28	60,170.88
2	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	148.00	13,389.95	1,981,712.60
3	08.01	Precast Cement concrete M20 Kerb including fixing at site	rm	616.00	764.84	471,141.44
4	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	4,734.00	94.34	446,605.56
5	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	55.00	80,804.44	4,444,244.20
6	16.09	Mild steel railing complete as per drawing and Technical Specifications	Rm	616.00	4,711.24	2,902,123.84

Bill No : 15. Repair and Rehabilitation

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
7	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	3,696.00	552.05	2,040,376.80
8	18.01	Removal of existing cement concrete wearing coat manually or jack hammer including its disposal complete as per drawing and technical specification without causing any detrimental effect to any part of bridge structure	sqm	3,696.00	331.51	1,225,260.96
9	18.04/a	Sealing of Cracks by Injection process through nipples complete as per technical specification with	cum	90.00	418,844.63	37,696,016.70
Total of Bill 15. Repair and Rehabilitation						51,267,652.98

**VARIABLE NOTATION
&
CHAINAGE DETAILS
(ROAD PART)**



Typical Cross Section

List of TCS

Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			
169570	169630		60	TCS-3A
169630	169680		50	TCS-4
169680	169825	8.66	136	TCS-3
169825	169875		50	TCS-12
169875	170275	6.56	393	TCS-3
170275	170375		100	TCS-3A
170375	170450	2.6	72	TCS-3
170450	170500		50	TCS-3A
170500	170600		100	TCS-3
170600	170700	3.96	96	TCS-5A
170700	170750	2.6	47	TCS-3
170750	170800		50	TCS-3A
170800	170975	6.06	169	TCS-3
170975	171030		55	TCS-3A
171030	171110	6.4	74	TCS-3
171110	171160	2.6	47	TCS-3A
171160	171250	6.4	84	TCS-3
171250	171550	2.6	297	TCS-10
171550	171575		25	TCS-3
171575	171675	2.6	97	TCS-3A
171675	172000	5.3	320	TCS-3
172000	172225	7.8	217	TCS-7A
172225	172275	3.96	46	TCS-3
172275	172325		50	TCS-3A
172325	172475		150	TCS-3
172475	172525	2.6	47	TCS-4
172525	172820	8.96	286	TCS-3
172820	172910		90	TCS-12
172910	173025	2.6	112	TCS-3
173025	173125	2.6	97	TCS-4
173125	173200		75	TCS-3
173200	173500	7.8	292	TCS-3A
173500	173625	6.44	119	TCS-3
173625	173675		50	TCS-12
173675	173775		100	TCS-3
173775	173850		75	TCS-3A
173850	174125	2.6	272	TCS-3
174125	174200	2.6	72	TCS-3A
174200	174250		50	TCS-3
174250	174475	2.6	222	TCS-3A
174475	174525		50	TCS-3
174525	174575	2.6	47	TCS-5A
174575	174625	2.6	47	TCS-3
174625	174930	6.44	299	TCS-3A
174930	174980		50	TCS-12
174980	175310	16.64	313	TCS-3
175310	175380		70	TCS-3A
175380	175750	12.58	357	TCS-3
175750	176025		275	TCS-4
176025	176275	6.44	244	TCS-3
176275	176375		100	TCS-7A
176375	177425	150.93	899	Makru Bridge Portion
177425	177475	40	10	TCS-4



Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			
177475	177575		100	TCS-3
177575	177660		85	TCS-3A
177660	177725	30	35	TCS-4
177725	177850		125	TCS-11A
177850	178025		175	TCS-7A
178025	178180	2.6	152	TCS-12
178180	178400	2.6	217	TCS-15
178400	178550	5.2	145	TCS-3
178550	178610		60	TCS-11
178610	178660	30	20	TCS-3
178660	178730		70	TCS-5A
178730	178780		50	TCS-5
178780	178910		130	TCS-5A
178910	178980		70	TCS-4
178980	179375	2.6	392	TCS-3
179375	179475		100	TCS-3A
179475	179780	5.2	300	TCS-3
179780	179850		70	TCS-7A
179850	179930	20	60	TCS-3
179930	179990		60	TCS-7A
179990	180060	5.26	65	TCS-5
180060	180160		100	TCS-3A
180160	180260		100	TCS-3
180260	180340	2.7	77	TCS-11
180340	180390		50	TCS-5A
180390	180560	2.6	167	TCS-3
180560	180670	2.6	107	TCS-3A
180670	180720		50	TCS-7A
180720	180820	2.6	97	TCS-3A
180820	180950	2.6	127	TCS-3
180950	181150	2.6	197	TCS-15
181150	181280		130	TCS-3A
181280	181380	2.6	97	TCS-3
181380	181480		100	TCS-3A
181480	182130	18.2	632	TCS-3
182130	182180		50	TCS-3A
182180	182340	2.6	157	TCS-3
182340	182420		80	TCS-3A
182420	182470	2.6	47	TCS-3
182470	182520		50	TCS-12
182520	182650	5.2	125	TCS-3
182650	182780		130	TCS-7
182780	182910	2.6	127	TCS-6
182910	183030	2.6	117	TCS-7
183030	183080		50	TCS-7B
183080	183160		80	TCS-7
183160	183210		50	TCS-7B
183210	183300	2.6	87	TCS-7
183300	183480	9.16	171	TCS-5
183480	183530		50	TCS-5A
183530	183660		130	TCS-3
183660	183710	5.26	45	TCS-3A
183710	184260	7.8	542	TCS-3
184260	184330		70	TCS-5A
184330	184900	7.8	562	TCS-3
184900	185080	6.14	174	TCS-5
185080	185330	5.2	245	TCS-3



Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			
185330	185480	6.56	143	TCS-5
185480	185730	5.26	245	TCS-3
185730	185780		50	TCS-3A
185780	186160	10.4	370	TCS-3
186160	186210		50	TCS-3A
186210	186310	2.6	97	TCS-3
186310	186480		170	TCS-12
186480	186630	2.6	147	TCS-3
186630	186730		100	TCS-3A
186730	186830	2.6	97	TCS-3
186830	186930		100	TCS-3A
186930	186980	6.06	44	TCS-3
186980	187030		50	TCS-12
187030	187130	6.4	94	TCS-3
187130	187180		50	TCS-11A
187180	187320		140	TCS-3
187320	187370		50	TCS-4
187370	187440	2.6	67	TCS-3
187440	187560		120	TCS-3A
187560	187660	9.1	91	TCS-3
187660	187710		50	TCS-3A
187710	187760	5	45	TCS-3
187760	187810		50	TCS-7A
187810	187925	6.06	109	TCS-3
187925	187980		55	TCS-3A
187980	188260	10.38	270	TCS-3
188260	188310		50	TCS-3A
188310	188410		100	TCS-3
188410	188460	2.6	47	TCS-3A
188460	188730	2.6	267	TCS-3
188730	188810		80	TCS-3A
188810	188860		50	TCS-3
188860	188960	3.84	96	TCS-4
188960	189020	3.84	56	TCS-11A
189020	189120	3.84	96	TCS-3
189120	189250		130	TCS-7B
189250	189350	7.68	92	TCS-3
189350	189430	7.1	73	TCS-11A
189430	189530	3.84	96	TCS-3A
189530	190060	27.37	503	TCS-7B
190060	190200	3.84	136	TCS-7
190200	190680	6.54	473	TCS-3
190680	190760		80	TCS-3A
190760	190810		50	TCS-12
190810	191030	2.6	217	TCS-3
191030	191130		100	TCS-3A
191130	191280	2.6	147	TCS-7A
191280	191380	6.32	94	TCS-3A
191380	191500		120	TCS-3
191500	191560		60	TCS-3A
191560	191780	6.4	214	TCS-3
191780	191960	2.7	177	TCS-12
191960	192020	2.6	57	TCS-3
192020	192080		60	TCS-12
192080	192160	2.6	77	TCS-8
192160	192210		50	TCS-12
192210	192280		70	TCS-4



Design Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.
From	To			
192280	192330		50	TCS-3A
192330	192530	5.2	195	TCS-5
192530	192580		50	TCS-5A
192580	193330	24.12	726	TCS-3
193330	193460		130	TCS-7A
193460	193780	8	312	TCS-3
193780	193860		80	TCS-3A
193860	193910	2.6	47	TCS-3
193910	194030		120	TCS-7A
194030	194080	2.7	47	TCS-3
194080	194230		150	TCS-12
194230	194610	12.96	367	TCS-3
194610	194710	2.6	97	TCS-12
194710	194780		70	TCS-3
194780	194830		50	TCS-3A
194830	195060	2.7	227	TCS-3
195060	195130	10.56	59	TCS-3A
195130	195180		50	TCS-3
195180	195260		80	TCS-7A
195260	195960	24.28	676	TCS-3
195960	196030		70	TCS-12
196030	196160	2.6	127	TCS-4
196160	196210		50	TCS-3A
196210	196260		50	TCS-3
196260	196330		70	TCS-6
196330	196380	2.6	47	TCS-10
196380	197200	50.37	770	TCS-6
197200	197400	28.94	171	TCS-3
197400	197800	24.53	375	TCS-6
197800	198450	9.04	641	TCS-3
198450	199750	49.38	1251	TCS-12
199750	200050	10.62	289	TCS-2A
200050	200200		150	TCS-1A
200200	200400	5.3	195	TCS-1
200400	200580	46	134	TCS-2
200580	202700	19.32	2101	TCS-1
202700	203150	7.6	442	TCS-2
203150	205974	23.48	2801	TCS-1
Total Length =		1095	35309	



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-3	14481	444.3	14925.0
TCS-5	798	32.3	830.0
TCS-2A	289	10.6	300.0
TCS-3A	3857	58.4	3915.0
TCS-1A	150	0.0	150.0
TCS-2	576	53.6	630.0
TCS-8	77	2.6	80.0
TCS-4	928	81.6	1010.0
TCS-12	2568	57.3	2625.0
TCS-5A	563	6.6	570.0
TCS-11A	304	10.9	315.0
TCS-7	551	9.0	560.0
TCS-11	137	2.7	140.0
TCS-7A	1200	10.4	1210.0
TCS-7B	733	27.4	760.0
TCS-6	1343	77.5	1420.0
Makru Bridge Portion	899	150.9	1050.0
TCS-1	5096	48.1	5144.0
TCS-10	345	5.2	350.0
TCS-15	415	5.2	420.0
Total =	35309	1095	36404



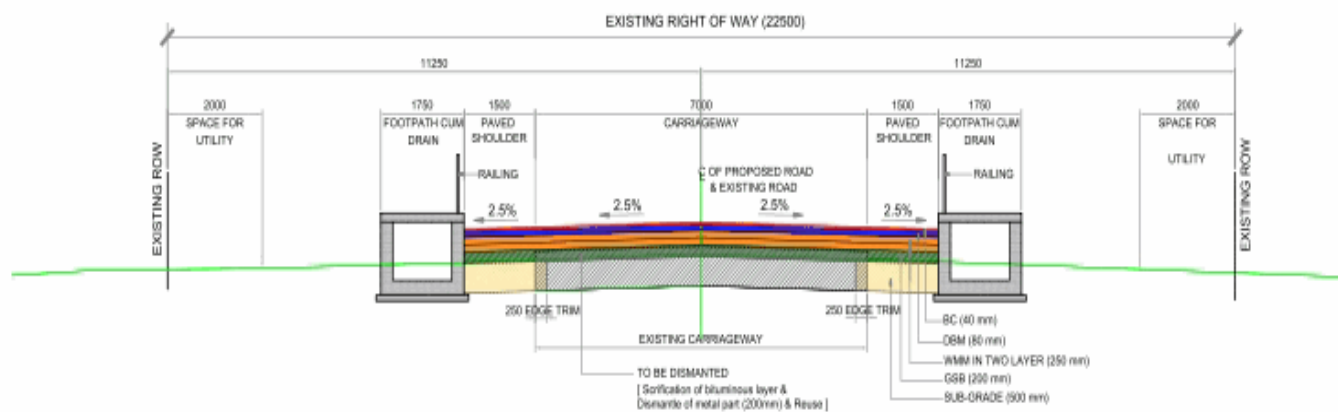
Variable Declaration

TCS-01

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	2.500	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	5096.000	m
9	Existing Pavement Width	ext_pav	7.000	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	0.000	m
16	GSB Reuse	gsb_per	41.000	



Variable Declaration



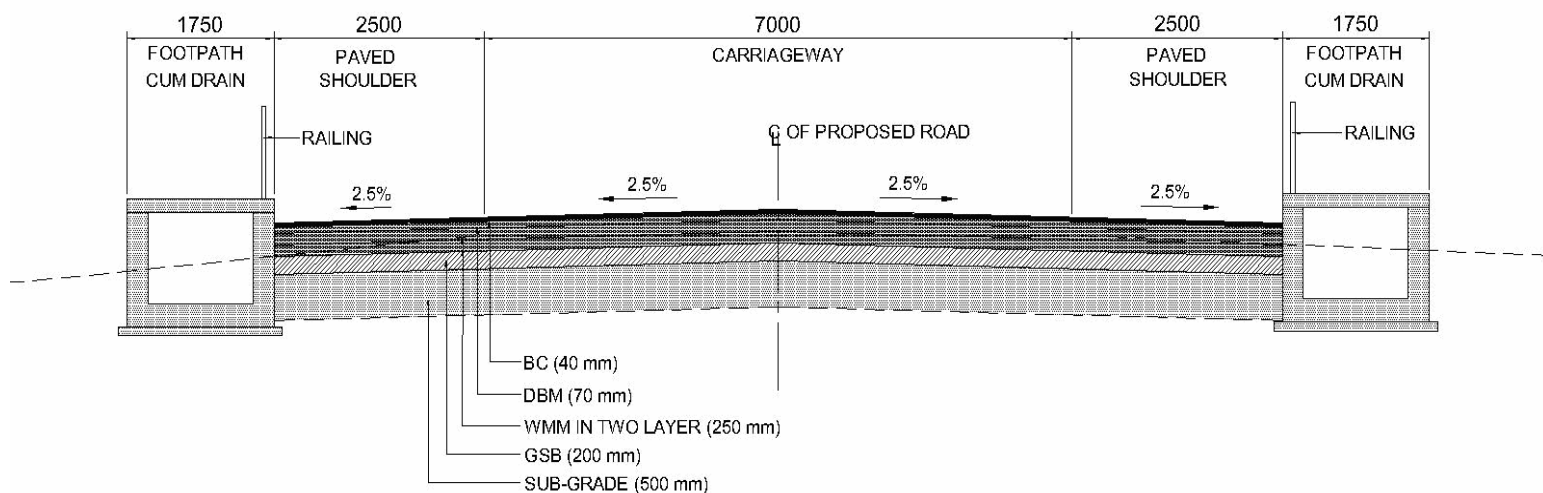
**TCS- 1 :- TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY WITH PAVED SHOULDER IN BUILT UP AREA
WITH BOTH SIDE COVERED DRAIN CUM FOOTPATH IN PLAIN TERRAIN**

Variable Declaration

TCS-01A

SI No	Variable Description	Variable	Dimension	Unit
1	Width of Carriageway	cw	7.000	m
2	Paved Shoulder	ps	2.500	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	150.000	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	0.000	m
16	GSB Reuse	gsb_per	41.000	



Variable Declaration

**TCS- 1A :- TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY WITH PAVED SHOULDER IN BUILT UP AREA
WITH BOTH SIDE COVERED DRAIN CUM FOOTPATH IN PLAIN TERRAIN (NEW CONSTRUCTION)**

[Signature]

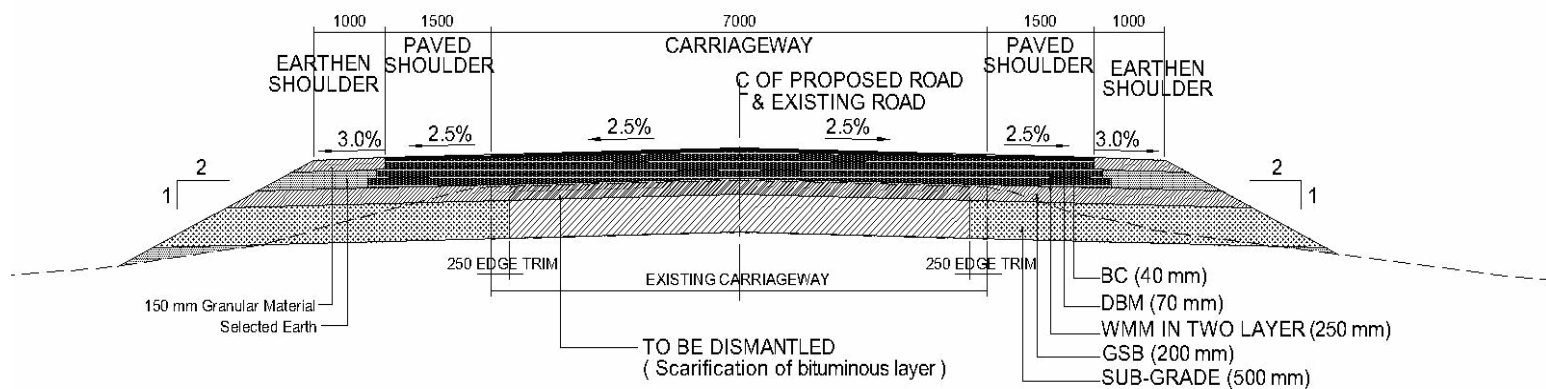
[Circular Stamp]

Variable Declaration

TCS-02

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	576.000	m
9	Existing Pavement Width	ext_pav	7.000	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	41.000	
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- 2 :- TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY WITH PAVED SHOULDER
RURAL AREA IN PLAIN TERRAIN (RECONSTRUCTION)**

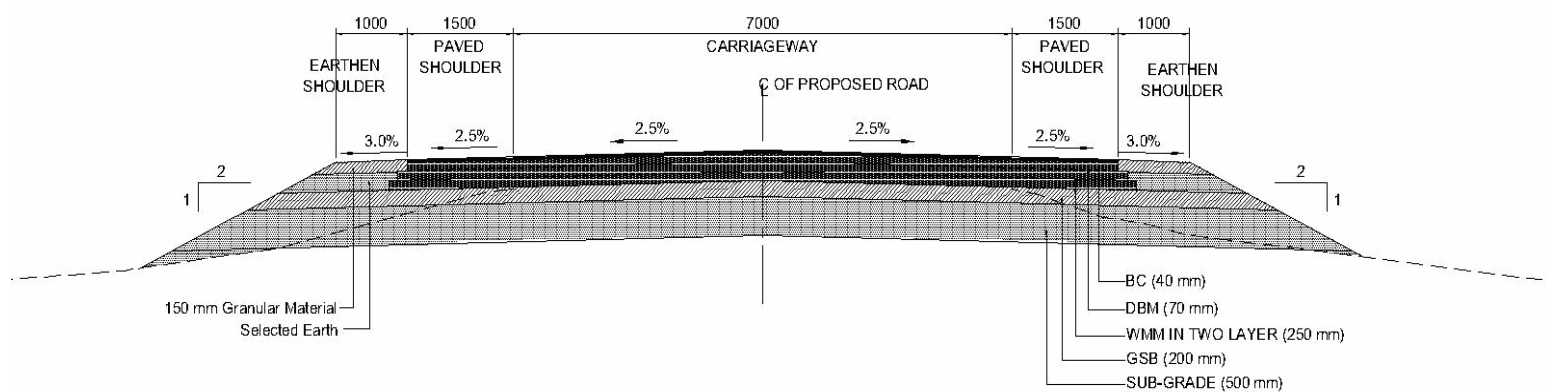
Variable Declaration

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	289.000	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	41.000	
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 PLAIN TERRAIN (NEW CONSTRUCTION)

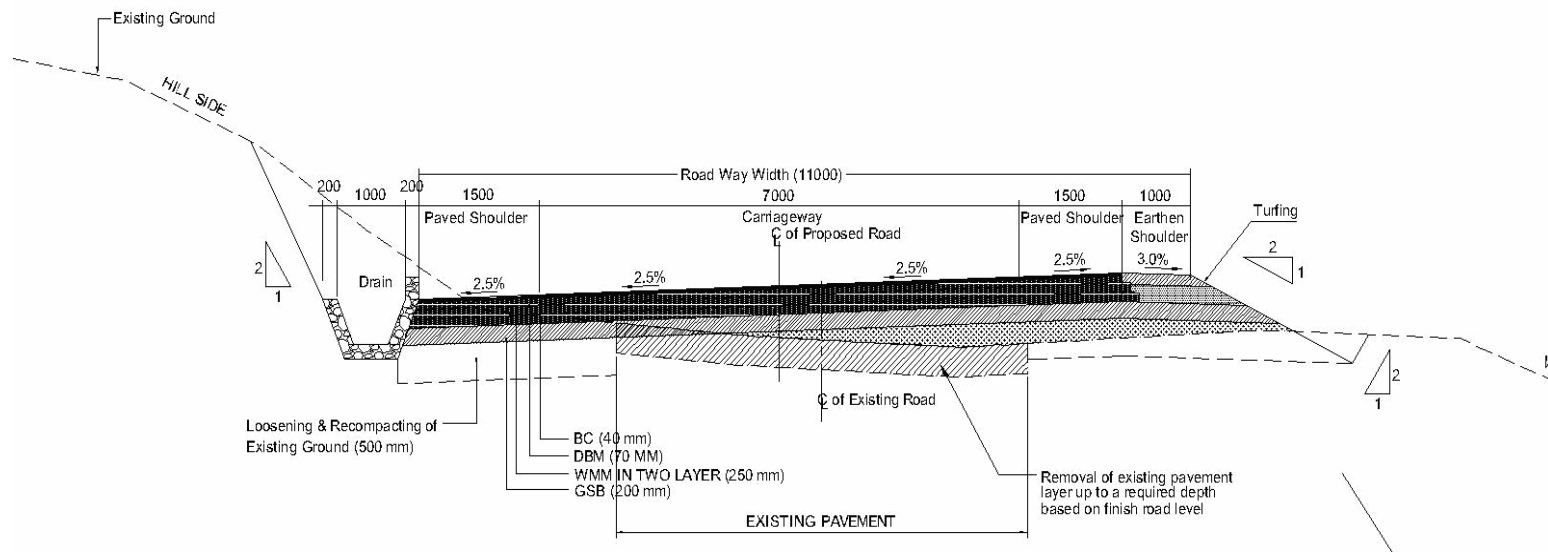
Variable Declaration

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	14481.000	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	41.000	
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)

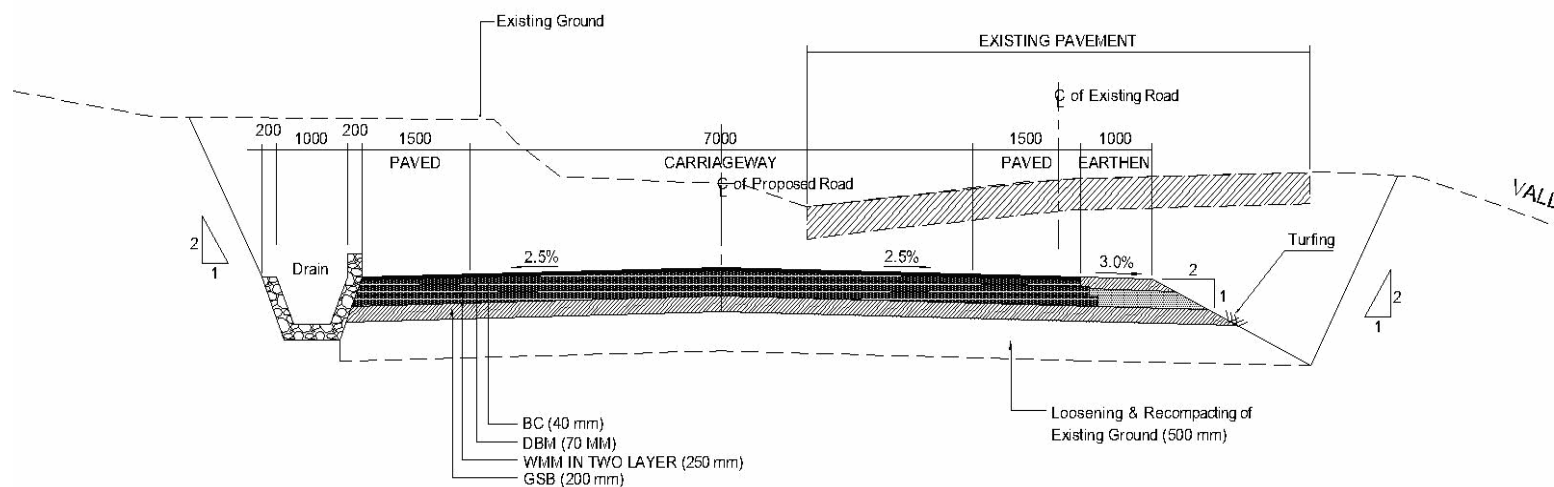
Variable Declaration

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	3857.000	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	41.000	
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)

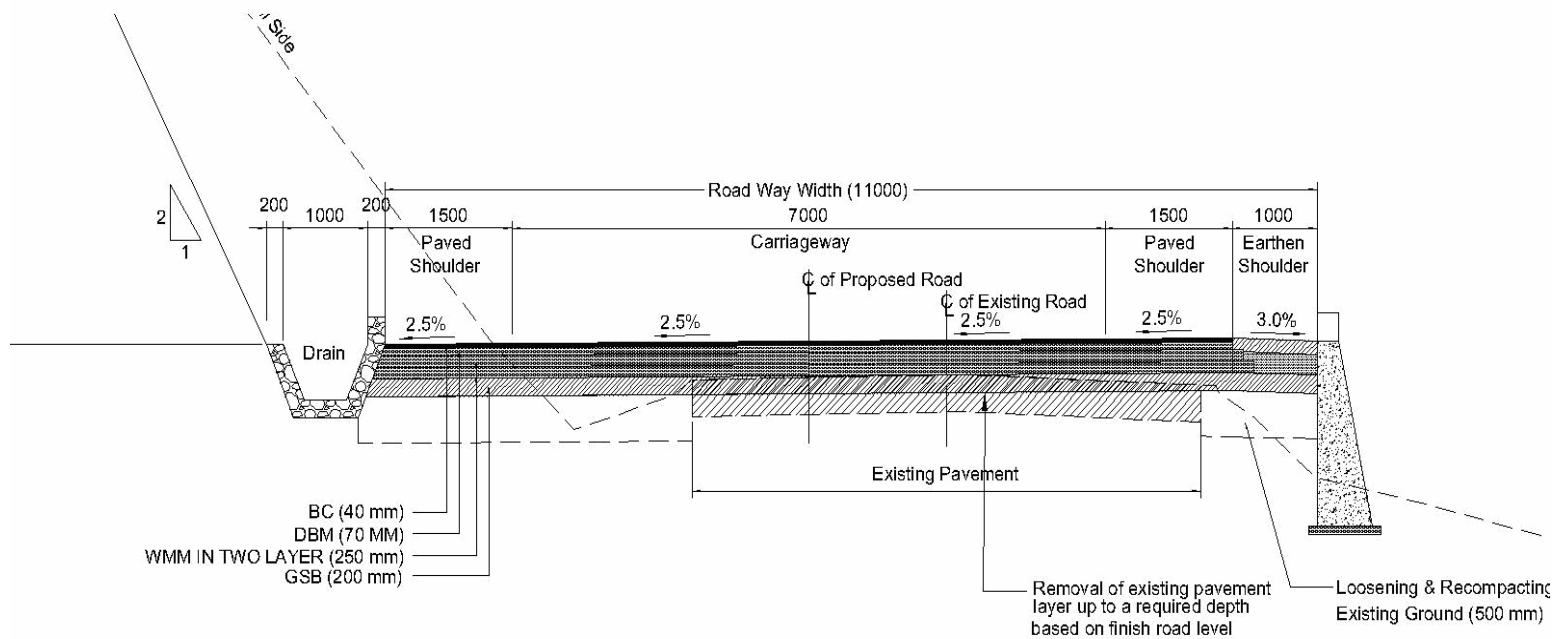
Variable Declaration

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	928.000	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	41.000	
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)

Signature

Stamp

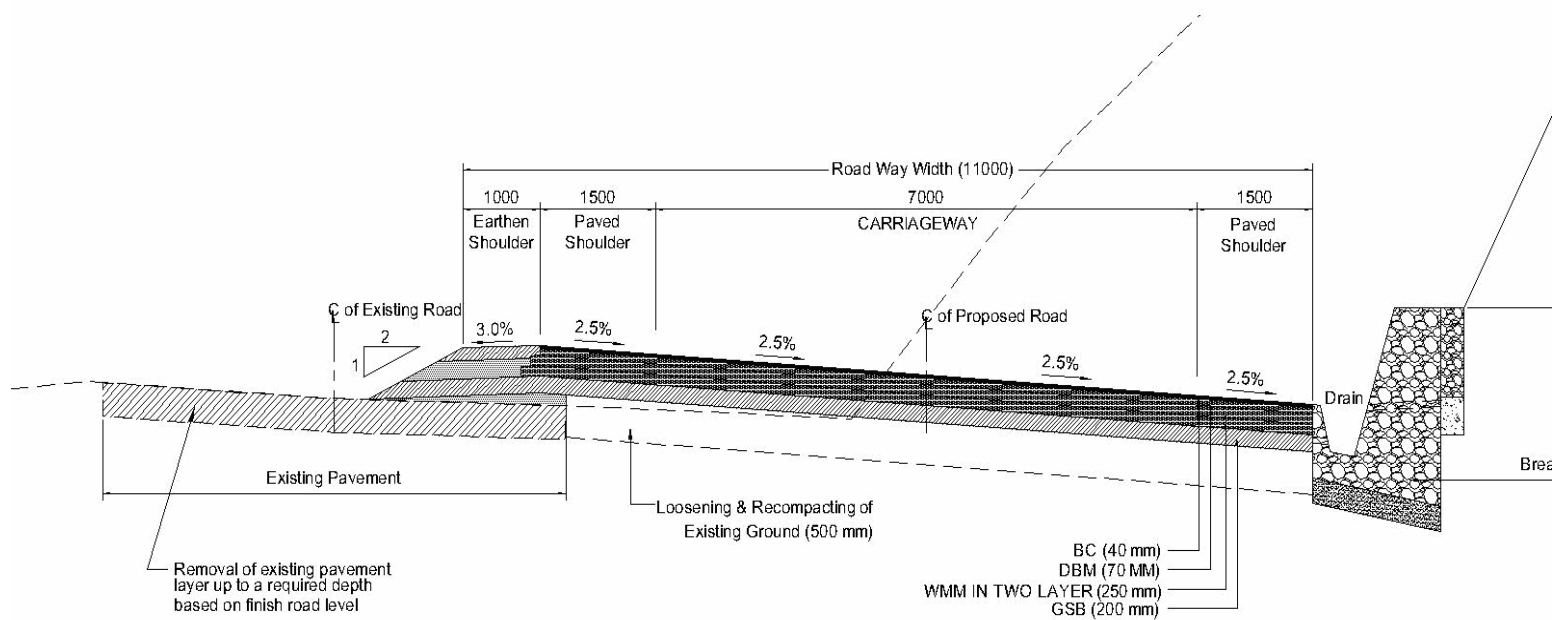
Variable Declaration

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	798.000	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	41.000	
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-5 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH BREAST WALL ON HILL SIDE AND EARTHEN SHOULDER ON VALLEY SIDE (RECONSTRUCTION)

[Signature]

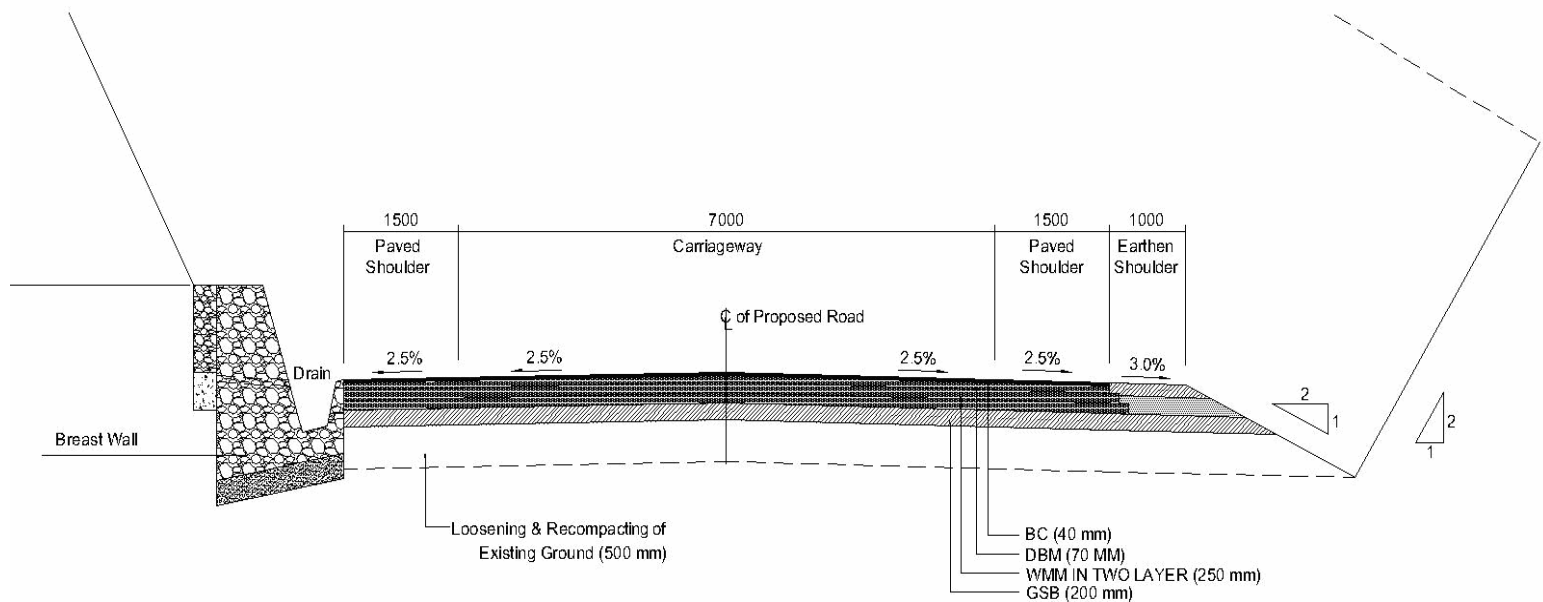
Variable Declaration

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	563.000	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	41.000	
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-5A : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH BREAST WALL ON HILL SIDE AND EARTHEN SHOULDER ON VALLEY SIDE (NEW CONSTRUCTION)

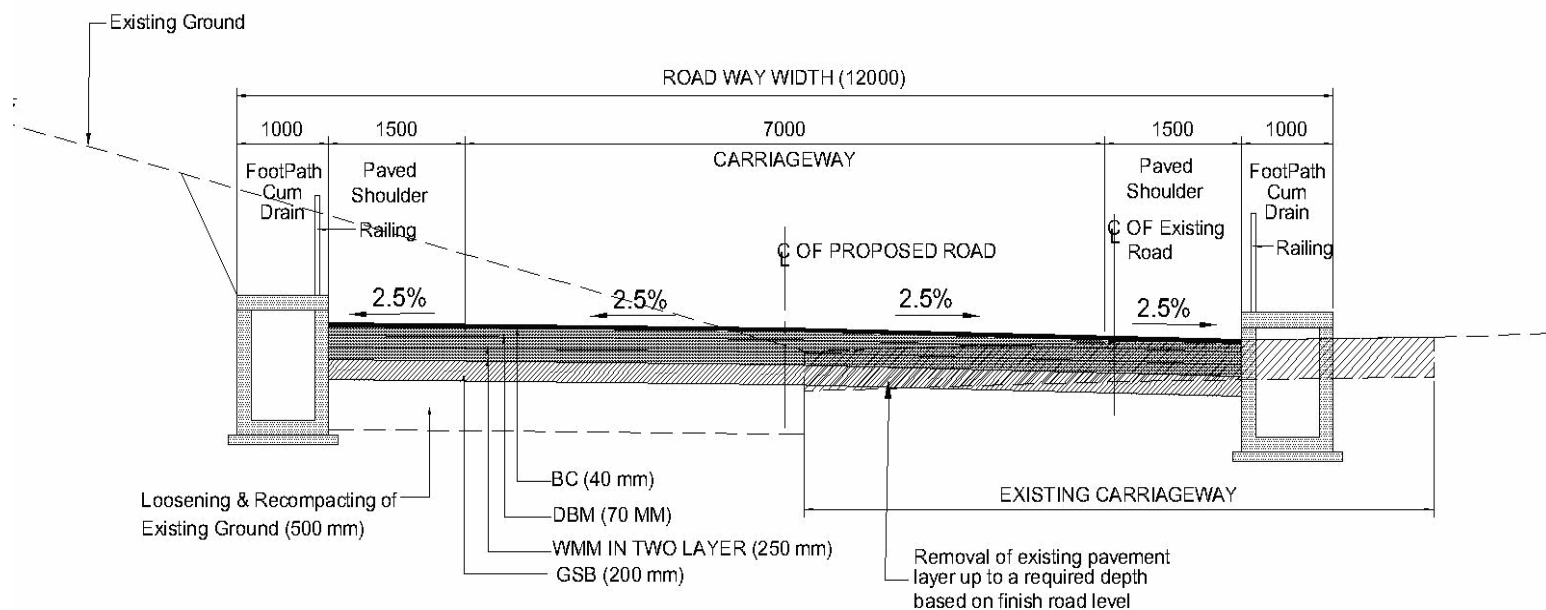
Variable Declaration

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	1343.000	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	41.000	



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)**

[Signature]

[Stamp]

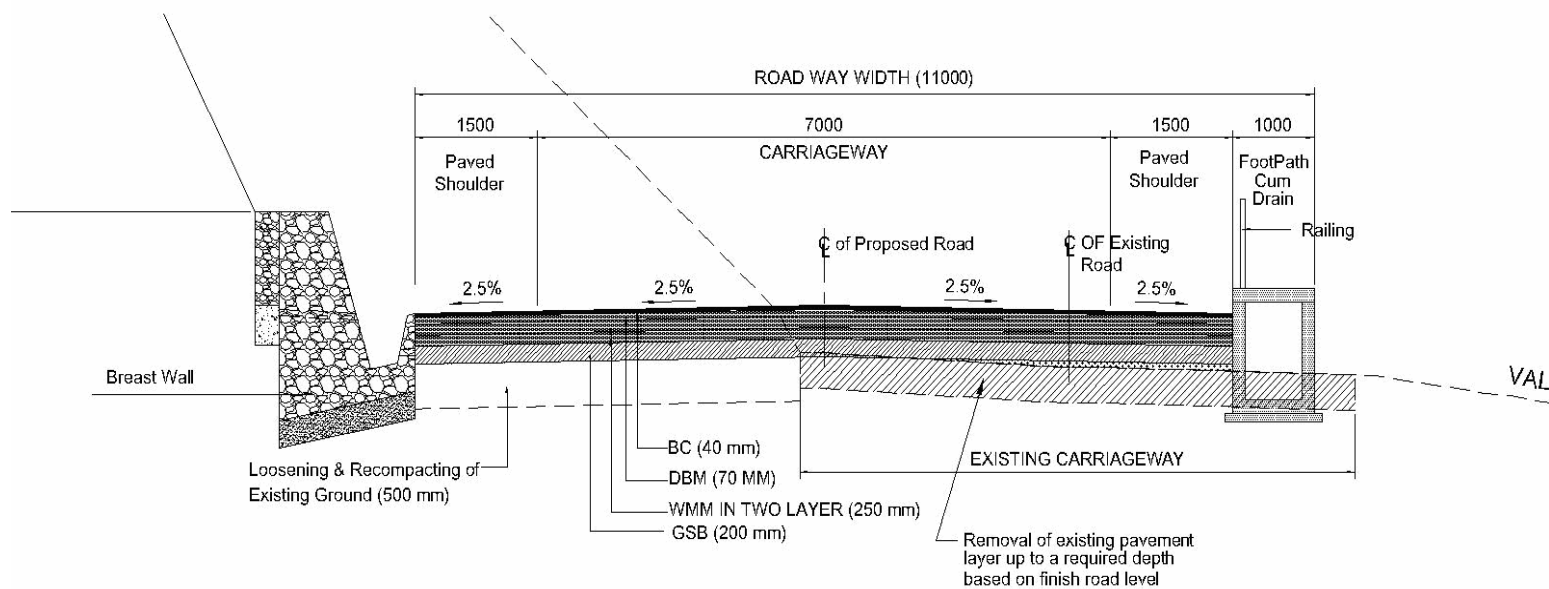
Variable Declaration

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	551.000	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	41.000	



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)

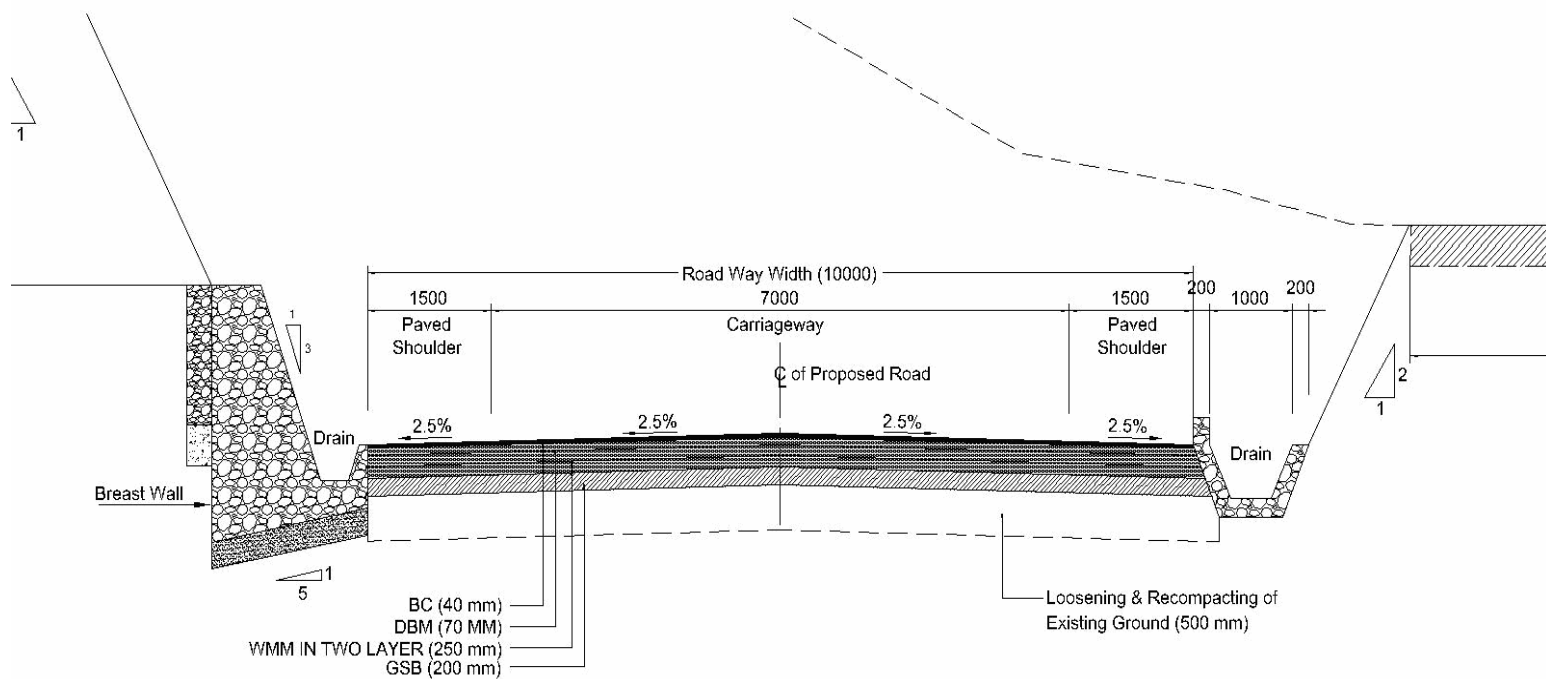
Variable Declaration

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	1200.000	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	41.000	



Variable Declaration



TCS-7A : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN BUILT-UPAREA WITH BREAST WALL ON HILL SIDE AND TRAPEZOIDAL OPEN DRAIN ON VALLEY SIDE (NEW CONSTRUCTION)

Signature: 
 Engineer

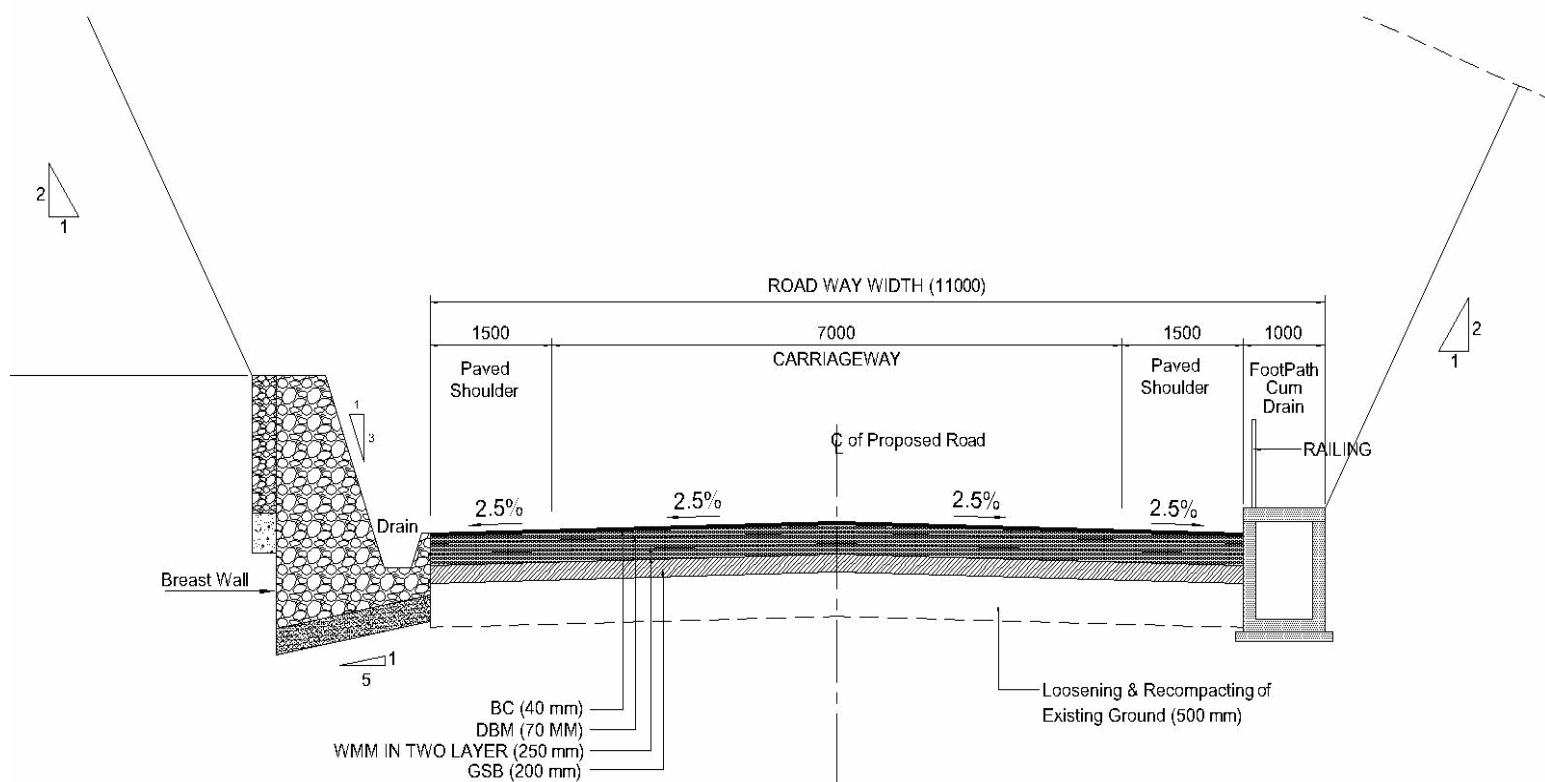
Variable Declaration

TCS-07B

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	733.000	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	41.000	



Variable Declaration



TCS-7B : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN BUILT-UPAREA WITH BREAST WALL ON HILL SIDE AND FOOTPATH CUM RCC RECTANGULAR COVERED DRAIN ON VALLEY SIDE (NEW CONSTRUCTION)

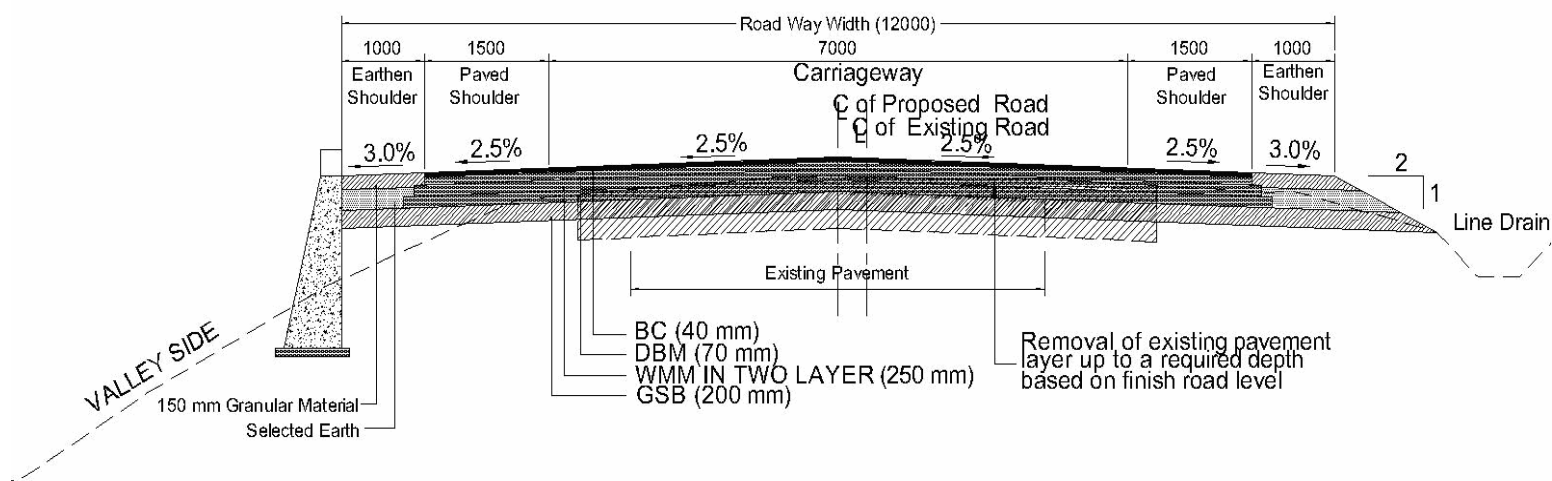
Variable Declaration

TCS-08

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	77.000	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	41.000	
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-8 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA
WITH RETAINING WALL ON ONE SIDE AND EARTHEN SHOULDER ON OTHER SIDE (RECONSTRUCTION)**

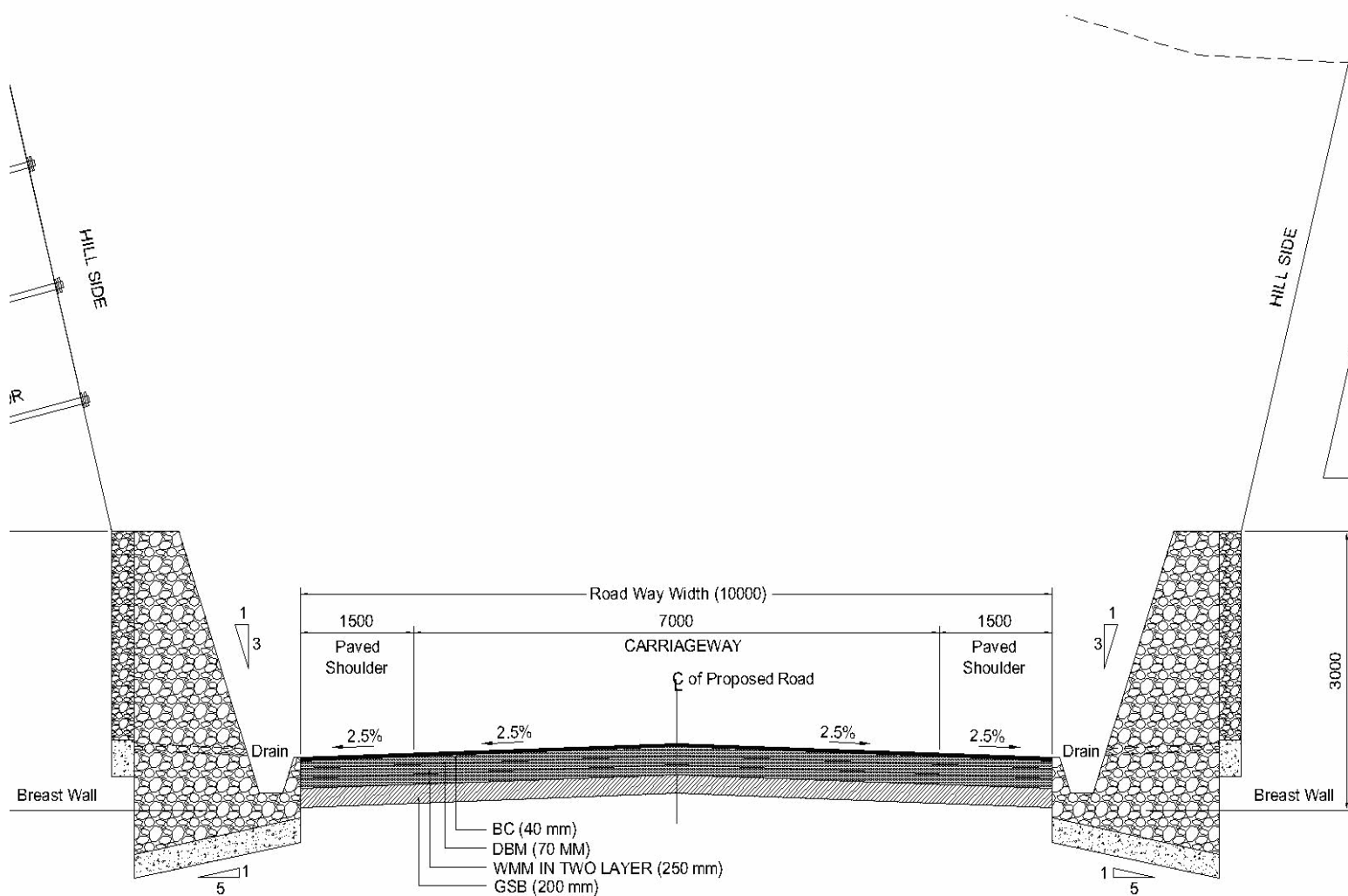
Variable Declaration

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	41.000	



Variable Declaration



TCS-9A : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH BREAST WALL ON BOTH SIDES (NEW CONSTRUCTION)

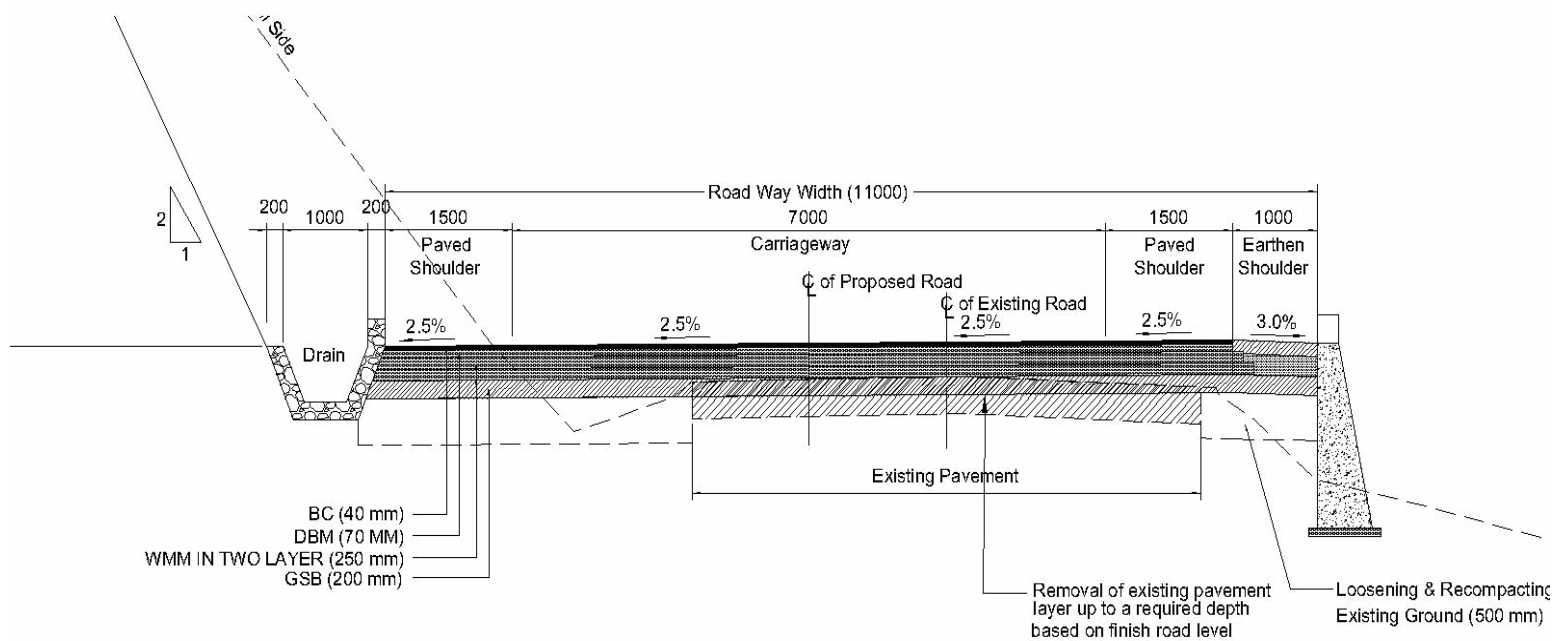
Variable Declaration

TCS-10

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	345.000	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	41.000	
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)

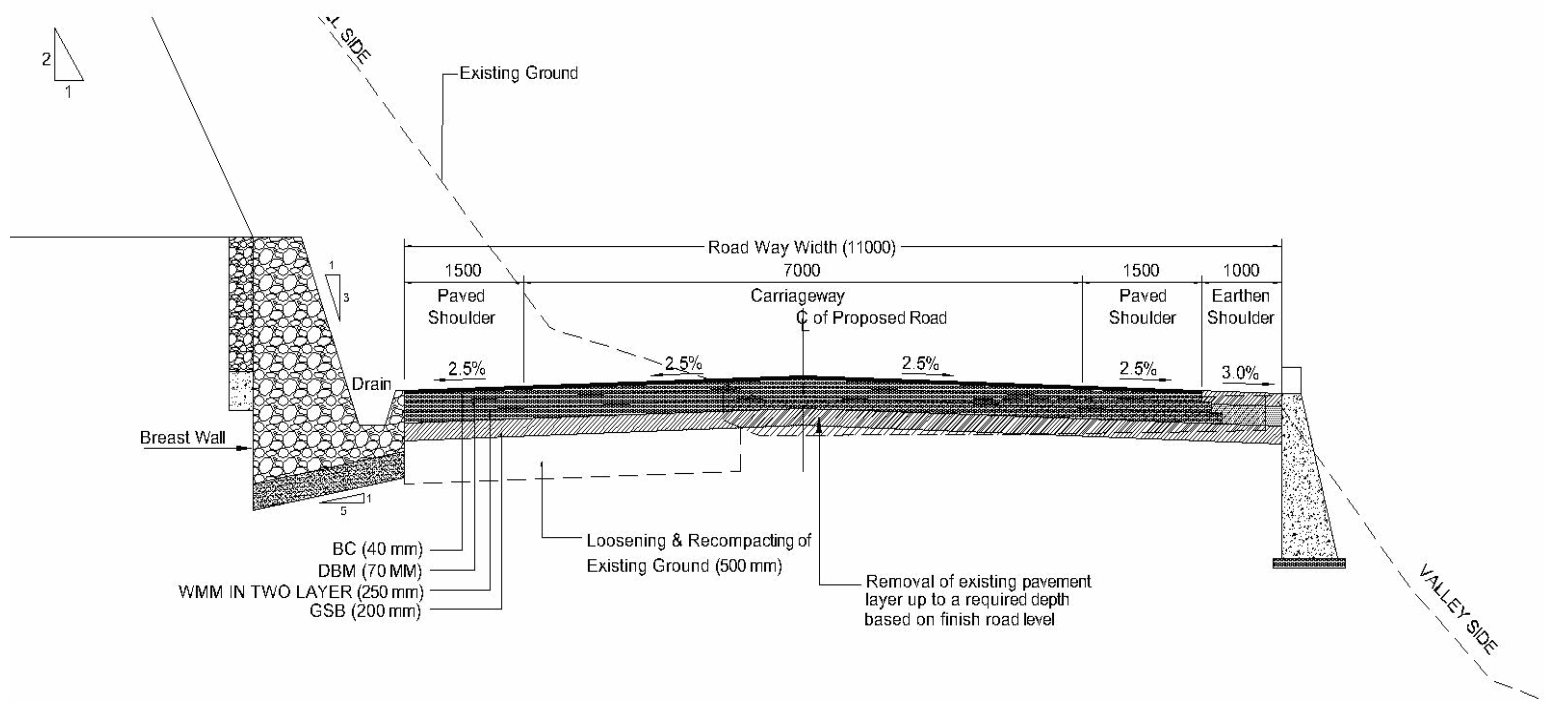
Variable Declaration

TCS-11

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	137.000	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	41.000	
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



IE CARRIAGEWAY IN RURAL AREA WITH RETAINING WALL ON VALLEY SIDE AND BREAST WALL ON HILL SIDE (NEWCONSTRUCTION)

Signature and Stamp

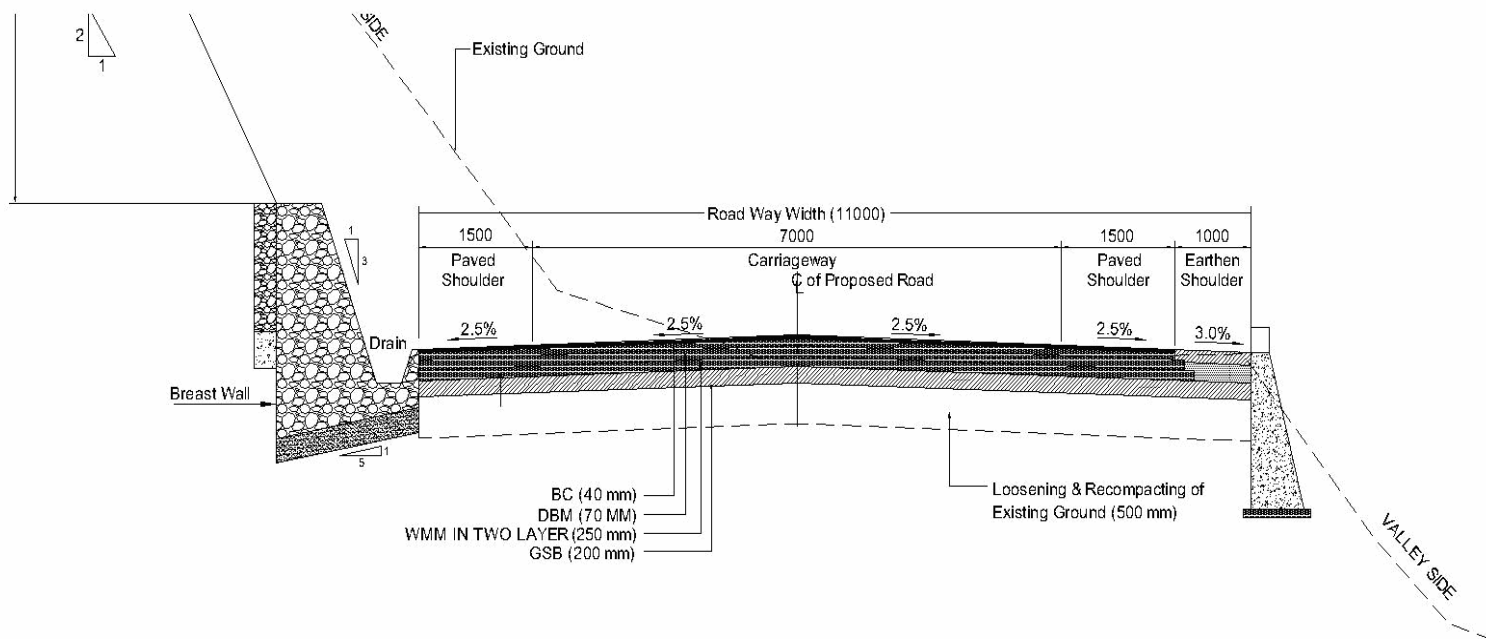
Variable Declaration

TCS-11A

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	304.000	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	41.000	



Variable Declaration



TCS-11A : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH RETAINING WALL ON VALLEY SIDE AND BREAST WALL ON HILL SIDE (RECONSTRUCTION)

Signature and Stamp of the Engineer

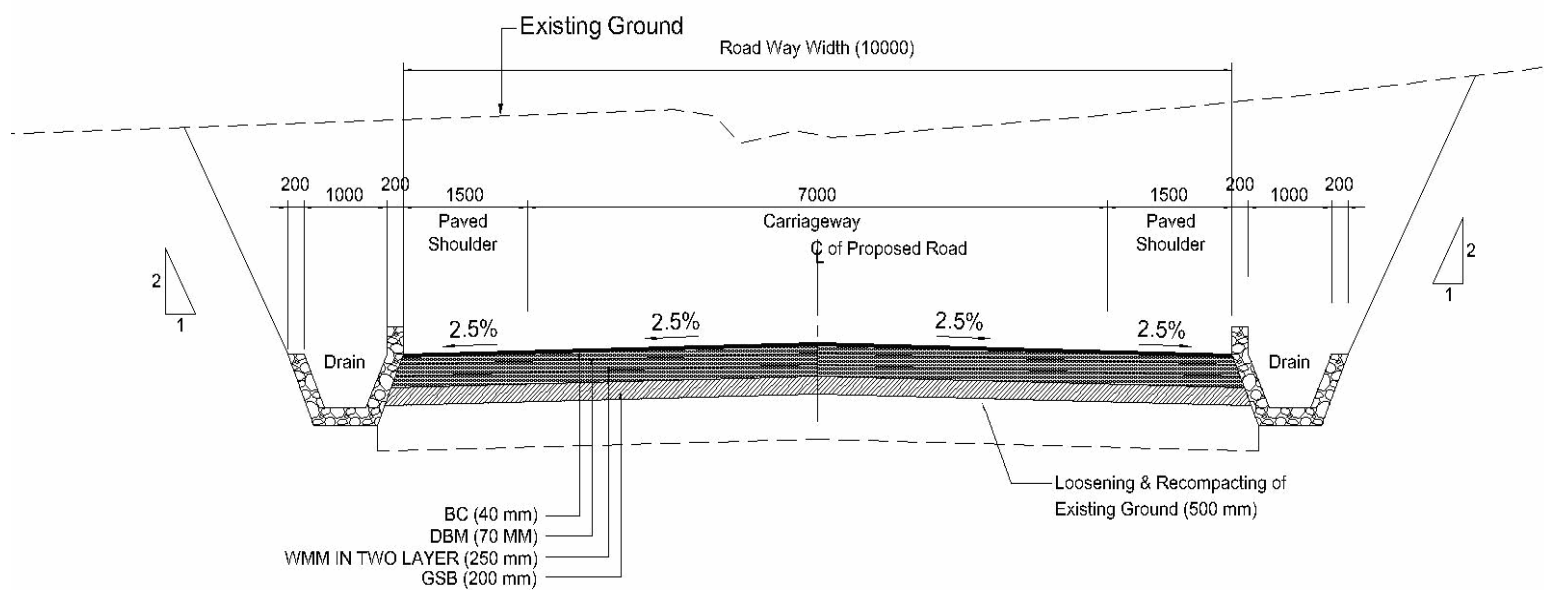
Variable Declaration

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	2568.000	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	41.000	



Variable Declaration



TCS-12 : TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH BOTH SIDE TRAPEZOIDAL OPEN DRAIN (NEW CONSTRUCTION)

Signature

Stamp

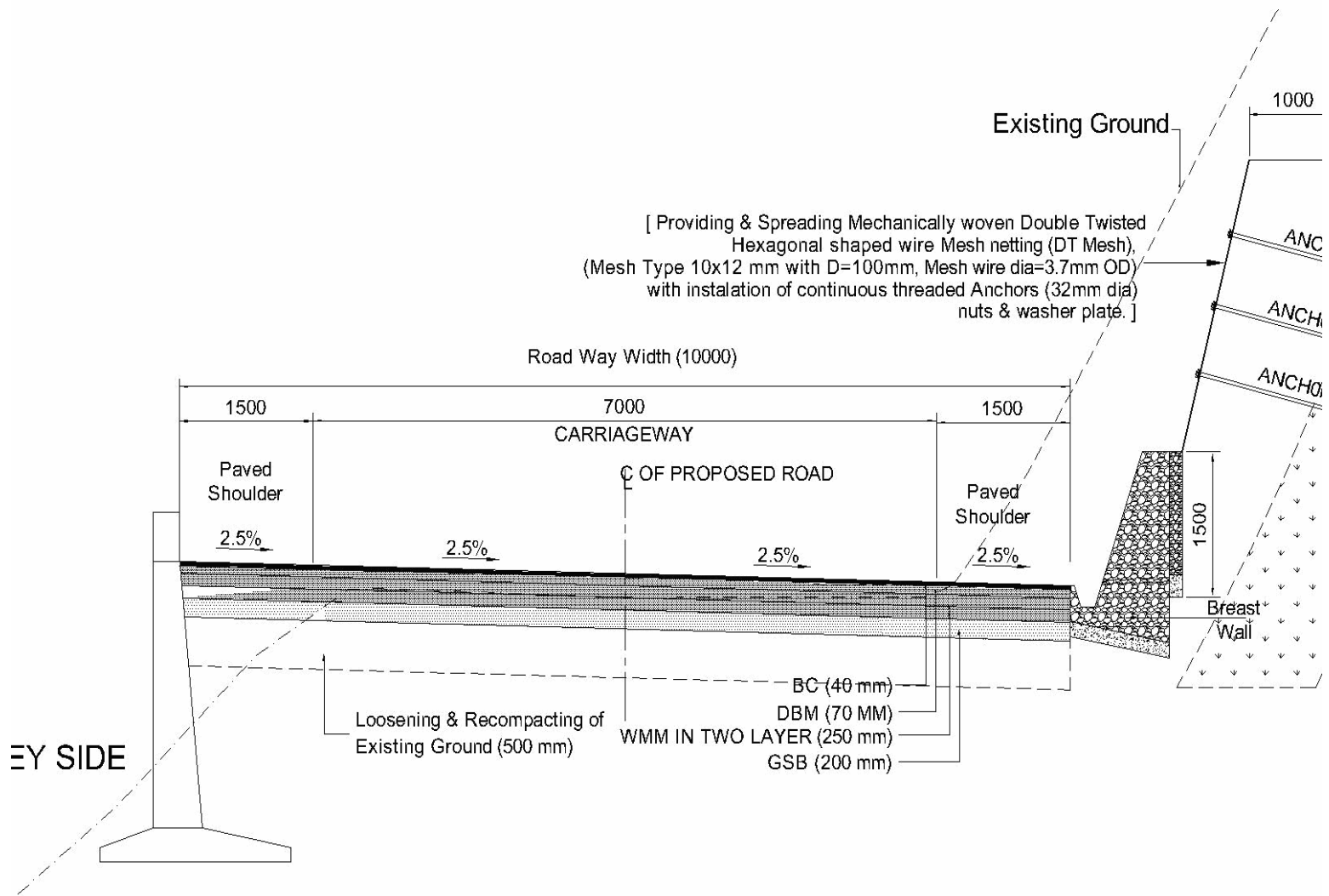
Variable Declaration

TCS-14

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	41.000	



Variable Declaration



TCS- 14 :-TYPICAL CROSS SECTION OF TWO LANE CARRIAGEWAY IN RURAL AREA WITH DT MESH AND BREAST WALL ON HILL SIDE AND RETAINING WALL IN VALLEY SIDE (NEW CONSTRUCTION)

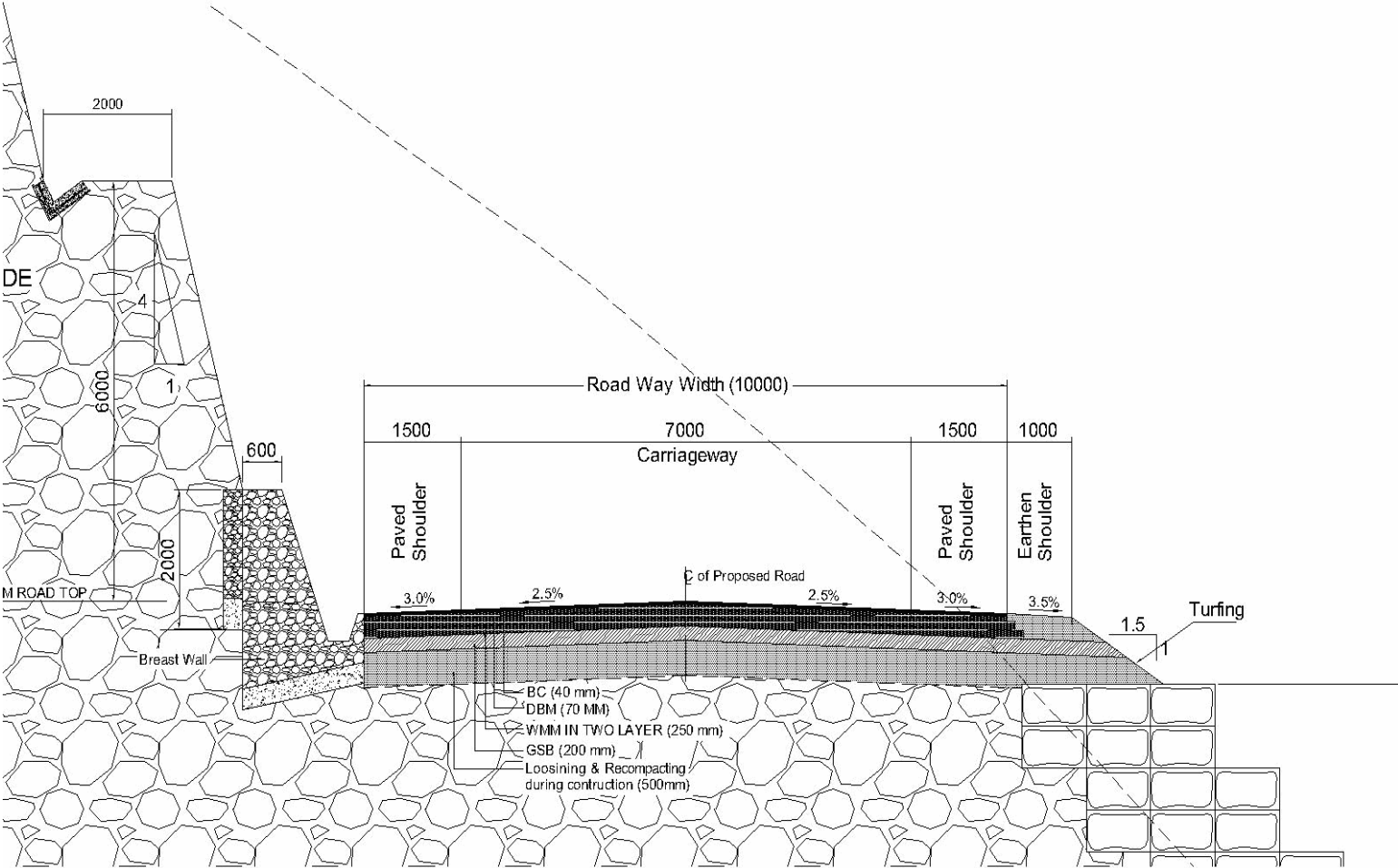
Variable Declaration

TCS-15

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	415.000	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	41.000	



Variable Declaration






Site Clearance and Dismantling

A.Tree Cutting

SI No	Girth Details		
1	Girth from 300 mm to 600 mm	8	Each
1	Girth from 600 mm to 900 mm	46	Each
2	Girth from 900 mm to 1800 mm	138	Each
4	Girth from 1800 mm to 2700 mm	15	Each
5	Above 2700 mm	17	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 58.02 Ha

..... Bill No- 01, Sl. No-6

C. Dismantling

SI No A.Rubble stone masonry in cement mortar

1	Culvert	=	2576	Cum
		Total=	2576	cum

..... Bill No- 01, Sl. No- 8

SI No B.Total Dismantling of Reinforced cement concrete

1	Culvert	=	605	Cum
		Total=	605	cum

..... Bill No- 01, Sl. No- 7

SI No D.Total Dismantling of Bituminous layer

1	Road	=	90041	sqm
		Total=	90041	sqm

..... Bill No- 01, Sl. No- 12

SI No E.Total Dismantling of Granular Layer

1	Road	=	395445	sqm
	Refer backup calculation sheet			
		Total=	395445	sqm

..... Bill No- 01, Sl. No- 13



Site Clearance and Dismantling (Tree Cutting List)

SI No	Design Ch	EASTING(M)	NORTHING	Side	GIRTH (M)
1	170732.1	525592.39	2741758.063	RHS	3.6
2	171065.6	525837.535	2741868.694	LHS	1.2
3	171153.3	525863.226	2741947.012	LHS	1.8
4	171270.5	525796.137	2742020.534	LHS	1.7
5	171281.6	525808.055	2742034.952	RHS	3.5
6	171316.3	525810.371	2742062.289	RHS	3
7	171317.8	525797.003	2742068.193	LHS	2.6
8	171343.7	525816.39	2742089.168	RHS	2.9
9	171354.4	525806.354	2742103.577	LHS	0.9
10	172233.0	525889.452	2742517.554	RHS	1.5
11	177050.6	524626.299	2744430.213	RHS	1.6
12	179154.5	524101.204	2743029.243	LHS	1.6
13	179201.4	524054.592	2743034.703	LHS	1.5
14	182264.6	523028.531	2741717.484	LHS	1.4
15	182275.6	523018.005	2741716.358	LHS	0.4
16	182284.6	523009.608	2741717.881	LHS	0.7
17	183344.7	522203.051	2741558.455	LHS	1.6
18	183346.5	522201.248	2741561.337	LHS	1.3
19	183856.9	522132.931	2741965.307	RHS	0.9
20	185992.6	521264.896	2742377.436	RHS	0.6
21	187883.4	520745.669	2741495.757	LHS	1.6
22	187889.3	520744.255	2741501.263	LHS	1.7
23	195454.6	518387.927	2741316.836	LHS	0.6
24	195712.3	518193.621	2741466.415	LHS	1.6
25	195740.9	518166.187	2741477.313	LHS	1.4
26	196487.6	517815.451	2741865.977	RHS	1.4
27	196680.7	517711.216	2741755.365	LHS	0.8
28	196682.9	517709.797	2741757.037	LHS	0.8
29	196686.0	517707.394	2741758.939	LHS	0.8
30	196707.5	517685.568	2741767.742	LHS	0.6
31	196732.4	517676.321	2741794.368	RHS	0.8
32	196738.2	517666.728	2741787.181	LHS	1.6
33	196739.7	517669.406	2741797.904	RHS	0.9
34	196742.6	517663.433	2741789.465	LHS	1.5
35	196746.5	517662.871	2741801.68	RHS	0.9
36	196747.6	517661.778	2741803.009	RHS	1.6
37	196842.0	517569.707	2741812.814	RHS	1.6
38	196844.7	517567.281	2741814.376	RHS	0.3
39	196849.6	517562.607	2741816.02	RHS	0.6
40	196885.3	517522.861	2741810.333	LHS	3.1
41	197163.5	517363.736	2742029.372	LHS	1.3
42	197327.4	517325.985	2742189.086	RHS	1.2
43	197458.5	517360.39	2742304.734	LHS	2.5
44	197521.3	517376.003	2742368.449	LHS	3.5
45	197610.7	517355.355	2742400.028	LHS	1.5
46	197613.7	517351.938	2742400.205	LHS	1.5
47	197621.9	517345.022	2742394.7	LHS	1.5
48	197631.6	517332.943	2742390.979	LHS	1.8
49	197647.5	517317.045	2742410.907	RHS	3.8
50	197767.8	517244.121	2742500.633	LHS	0.9
51	197770.3	517243.684	2742503.152	LHS	0.9



Site Clearance and Dismantling (Tree Cutting List)

SI No	Design Ch	EASTING(M)	NORTHING	Side	GIRTH (M)
52	197770.9	517243.617	2742503.838	LHS	0.8
53	197915.6	517162.83	2742588.547	LHS	0.9
54	198148.7	516942.987	2742548.69	LHS	1
55	198155.8	516929.538	2742559.215	RHS	0.5
56	198506.0	516629.754	2742384.32	RHS	0.8
57	198543.7	516608.511	2742352.789	RHS	0.9
58	198546.4	516607.311	2742350.451	RHS	0.8
59	198628.2	516565.482	2742281.269	RHS	1.5
60	198687.2	516538.321	2742228.106	LHS	1.6
61	198718.3	516514.266	2742207.261	RHS	0.8
62	198739.3	516500.223	2742191.629	RHS	0.8
63	198748.7	516494.851	2742183.861	RHS	1.6
64	198773.4	516480.69	2742163.631	RHS	1.5
65	199574.9	515901.791	2741615.294	RHS	1.6
66	199576.9	515900.422	2741613.695	RHS	1.5
67	199620.6	515863.702	2741589.919	RHS	1.5
68	200079.3	515712.521	2741272.567	RHS	1.5
69	200218.2	515603.769	2741325.624	RHS	0.4
70	200227.7	515615.088	2741308.874	LHS	1.6
71	200252.5	515585.3217	2741296.294	RHS	1.3
72	200314.3	515537.766	2741273.541	LHS	1.6
73	200338.9	515515.709	2741288.904	RHS	1.6
74	200339.0	515515.241	2741287.432	RHS	1.5
75	200465.4	515391.131	2741258.831	RHS	1.3
76	200486.3	515372.924	2741248.431	RHS	1.5
77	200620.4	515259.755	2741165.4	LHS	1.6
78	200648.8	515233.446	2741187.22	LHS	1.5
79	200650.0	515233.823	2741190.015	LHS	1.6
80	200701.6	515191.912	2741221.693	RHS	1.5
81	200716.5	515177.358	2741226.046	RHS	1.4
82	200886.2	515011.986	2741270.578	LHS	0.8
83	200888.5	515010.032	2741271.917	LHS	0.8
84	200891.0	515013.683	2741283.333	RHS	1.3
85	200893.4	515005.479	2741274.072	LHS	1.6
86	200894.3	515010.968	2741284.949	RHS	1.6
87	200907.0	514993.647	2741281.727	LHS	1.6
88	200913.8	514987.712	2741285.522	LHS	1.8
89	200942.5	514966.422	2741306.219	LHS	1.4
90	200947.1	514962.775	2741309.319	LHS	1.6
91	200978.5	514955.403	2741343.419	RHS	0.8
92	200995.8	514948.001	2741358.044	RHS	1.6
93	201057.4	514925.922	2741411.963	RHS	1.6
94	201073.7	514902.66	2741424.608	LHS	1.6
95	201079.3	514905.429	2741430.811	LHS	1.4
96	201283.2	514932.363	2741636.114	RHS	1.7
97	201301.7	514924.112	2741654.729	RHS	1.4
98	201334.3	514910.664	2741686.516	RHS	0.6
99	201395.5	514858.941	2741723.128	LHS	0.7
100	201455.3	514826.014	2741774.562	RHS	2.8
101	201542.4	514767.963	2741839.504	RHS	1.6
102	201567.3	514737.898	2741845.14	LHS	1.8



Site Clearance and Dismantling (Tree Cutting List)

SI No	Design Ch	EASTING(M)	NORTHING	Side	GIRTH (M)
103	201569.8	514735.93	2741846.661	LHS	1.4
104	201745.6	514616.484	2741975.647	LHS	0.4
105	201756.1	514610.683	2741984.65	LHS	3
106	201770.2	514609.691	2742003.457	RHS	0.7
107	201780.5	514598.362	2742006.76	RHS	2.9
108	201781.8	514588.326	2741998.855	LHS	1.2
109	201786.7	514584.903	2742002.309	LHS	1.5
110	201833.4	514552.495	2742036.032	LHS	1.9
111	201921.8	514493.853	2742102.204	LHS	1.5
112	201977.4	514450.64	2742137.772	LHS	1.5
113	201978.4	514449.964	2742138.472	LHS	0.8
114	202099.6	514369.388	2742229.276	LHS	1.6
115	202116.5	514365.769	2742249.269	RHS	0.8
116	202134.0	514344.742	2742253.234	LHS	1.5
117	202192.5	514303.566	2742294.97	LHS	0.9
118	202217.6	514296.661	2742322.698	RHS	0.7
119	202267.4	514267.059	2742362.684	RHS	1.6
120	202269.4	514265.137	2742363.764	RHS	1.6
121	202299.0	514230.679	2742373.582	LHS	0.8
122	202308.2	514224.735	2742380.597	LHS	1.6
123	202363.8	514193.98	2742427.453	LHS	1.6
124	202414.5	514162.071	2742466.924	LHS	0.8
125	202414.7	514161.217	2742466.408	LHS	1.5
126	202414.8	514161.427	2742466.684	LHS	1.8
127	202557.1	514070.712	2742576.491	LHS	1.5
128	202574.8	514065.617	2742594.946	LHS	1.6
129	202595.0	514054.479	2742611.905	LHS	0.8
130	202732.1	513967.803	2742718.143	LHS	1.6
131	202749.0	513957.939	2742731.917	LHS	1.5
132	202807.4	513922.057	2742777.914	LHS	1.5
133	202817.2	513913.908	2742783.979	LHS	1.4
134	202855.7	513890.932	2742814.828	LHS	0.9
135	202937.5	513836.061	2742872.487	LHS	0.7
136	203211.4	513570.329	2742930.122	RHS	0.8
137	203268.2	513512.232	2742923.81	LHS	1.4
138	203268.8	513511.676	2742923.998	LHS	0.8
139	203294.0	513488.47	2742941.701	RHS	2.9
140	203298.2	513482.223	2742925.669	LHS	0.9
141	203340.9	513440.095	2742933.783	LHS	1.5
142	203371.7	513411.283	2742948.556	RHS	1.6
143	203389.4	513393.984	2742952.263	RHS	0.8
144	203395.8	513387.621	2742952.942	RHS	0.6
145	203448.8	513333.183	2742949.823	LHS	1.6
146	203488.1	513294.093	2742954.388	LHS	0.8
147	203572.9	513214.323	2742987.149	RHS	0.8
148	203577.2	513210.197	2742988.501	RHS	0.7
149	203583.2	513204.849	2742991.286	RHS	1.6
150	203592.2	513195.786	2742991.965	RHS	0.9
151	203597.9	513190.453	2742993.939	RHS	0.5
152	203600.3	513184.993	2742983.915	LHS	1.4
153	203613.0	513172.878	2742988.223	LHS	3.5



Site Clearance and Dismantling (Tree Cutting List)

SI No	Design Ch	EASTING(M)	NORTHING	Side	GIRTH (M)
154	203671.5	513117.391	2743007.948	LHS	1.6
155	203843.7	512956.719	2743070.001	LHS	0.7
156	203967.5	512843.365	2743119.779	LHS	0.8
157	203987.0	512825.294	2743127.231	LHS	1.5
158	203991.9	512820.894	2743129.483	LHS	0.5
159	204109.9	512711.291	2743171.545	LHS	0.8
160	204146.4	512677.046	2743178.996	LHS	1.5
161	204248.4	512577.073	2743198.197	RHS	1.5
162	204307.4	512517.926	2743192.789	LHS	2.8
163	204436.2	512388.962	2743189.442	LHS	1.6
164	204517.8	512308.35	2743186.509	RHS	1.7
165	204521.5	512305.523	2743183.767	RHS	1.9
166	204521.9	512314.319	2743171.604	LHS	1.5
167	204627.1	512226.291	2743109.936	LHS	1.3
168	204640.0	512211.226	2743124.121	RHS	1.5
169	204739.7	512131.679	2743166.141	RHS	1.3
170	204745.7	512116.846	2743162.755	LHS	0.7
171	204794.1	512093.196	2743205.412	LHS	1.6
172	204795.2	512093.296	2743206.829	LHS	1.8
173	204806.6	512090.166	2743218.689	LHS	1.3
174	204823.4	512084.474	2743235.396	RHS	1.7
175	204834.5	512079.286	2743245.721	RHS	1.6
176	204843.5	512073.382	2743253.06	RHS	1.3
177	204900.0	512022.643	2743283.018	RHS	1.6
178	204926.5	511997.929	2743293.186	RHS	1.5
179	204998.1	511928.293	2743313.636	LHS	1.6
180	205086.6	511862.818	2743374.098	LHS	1.5
181	205089.0	511861.116	2743375.855	LHS	1.3
182	205113.7	511853.241	2743402.223	RHS	1.7
183	205114.9	511852.65	2743403.356	RHS	1.8
184	205118.3	511850.809	2743406.063	RHS	1.8
185	205120.7	511849.493	2743408.013	RHS	0.9
186	205121.5	511848.779	2743408.469	RHS	0.8
187	205122.7	511848.126	2743409.484	RHS	1.8
188	205123.6	511847.731	2743410.206	RHS	1.7
189	205124.6	511847.156	2743410.993	RHS	0.8
190	205125.2	511846.813	2743411.395	RHS	0.4
191	205125.7	511833.291	2743402.096	LHS	1.5
192	205125.7	511834.09	2743402.697	LHS	1.6
193	205125.7	511834.899	2743403.303	LHS	1.4
194	205126.7	511849.965	2743415.602	RHS	0.7
195	205127.4	511847.966	2743414.95	RHS	1.6
196	205128.2	511845.333	2743414.007	RHS	1.5
197	205145.4	511822.837	2743420.203	LHS	0.8
198	205148.9	511837.743	2743432.72	RHS	1.5
199	205169.8	511812.358	2743443.631	LHS	0.8
200	205224.1	511800.093	2743499.003	LHS	0.9
201	205264.1	511819.923	2743538.641	RHS	1.6
202	205297.3	511824.716	2743571.252	RHS	0.8
203	205302.4	511824.325	2743576.559	RHS	1.2
204	205312.1	511824.438	2743586.902	RHS	0.9



Site Clearance and Dismantling (Tree Cutting List)

SI No	Design Ch	EASTING(M)	NORTHING	Side	GIRTH (M)
205	205313.5	511824.7	2743588.512	RHS	0.9
206	205322.9	511825.463	2743598.849	RHS	0.8
207	205357.5	511806.61	2743633.276	RHS	1.6
208	205366.2	511804.279	2743644.121	RHS	1.3
209	205436.7	511733.269	2743639.216	LHS	2.9
210	205539.6	511629.124	2743632.019	LHS	1.6
211	205591.5	511578.151	2743648.281	RHS	2
212	205600.1	511569.48	2743648.667	RHS	1.2
213	205612.0	511556.508	2743638.343	LHS	2.6
214	205616.1	511552.45	2743638.754	LHS	3.2
215	205635.3	511534.369	2743651.219	RHS	1.2
216	205665.6	511503.149	2743643.102	LHS	2.9
217	205703.7	511465.422	2743644.942	LHS	2.8
218	205875.9	511293.318	2743653.232	RHS	1.3
219	205897.7	511272.4036	2743638.263	LHS	0.7
220	205905.3	511263.945	2743651.901	RHS	1.2
221	205917.9	511252.364	2743635.649	LHS	1.6
222	205921.6	511248.635	2743635.504	LHS	1.6
223	205937.8	511232.549	2743634.379	LHS	1.7
224	205959.9	511209.634	2743646.663	RHS	1.5

Summary:

Girth from 300 mm to 600 mm	8	Nos
Girth from 600 mm to 900 mm	46	Nos
Girth from 900 mm to 1800 mm	138	Nos
Girth from 1800 mm to 2700 mm	15	Nos
Above 2700 mm	17	Nos



Site Clearance and Dismantling
Clearing and Grubbing Road Land

Net Length (m)	Avg.Existin g Road Width (m)	Width to be cleared and grubbed (m)	Ext ROW	Area to be cleared and grubbed (Ha)
169570	197244	24.0	7.5	45.80
197244	205974.0	24.0	10.0	12.22

Total=

58.02

58.02 ha



Site Clearance and Dismantling

Sl. No.	Brief Description	Unit	Survey ch.	No.	L	B / H	T	Quantity	Total Quantity
			175.278	2	5.33	3.00	1.50	47.97	
			175.349	2	0.90	3.00	1.50	8.10	
			175.600	2	0.94	3.00	1.50	8.46	
			175.852	2	1.56	3.00	1.50	14.04	
			176.012	2	1.50	3.00	1.50	13.50	
			176.231	2	0.84	3.00	1.50	7.56	
			176.346	2	1.43	3.00	1.50	12.87	
			176.506	2	4.49	3.00	1.50	40.41	
			176.753	2	4.66	3.00	1.50	41.94	
			176.842	2	1.52	3.00	1.50	13.68	
			176.876	2	4.60	3.00	1.50	41.40	
			177.061	2	0.96	3.00	1.50	8.64	
			177.325	2	0.80	3.00	1.50	7.20	
			177.547	2	0.85	3.00	1.50	7.65	
			177.636	2	1.52	3.00	1.50	13.68	
			177.745	2	1.63	3.00	1.50	14.67	
			177.786	2	3.04	3.00	1.50	27.36	
			177.953	2	3.18	3.00	1.50	28.62	
			178.196	2	1.49	3.00	1.50	13.41	
			178.441	2	3.04	3.00	1.50	27.36	
			178.477	2	4.43	3.00	1.50	39.87	
			178.636	2	1.44	3.00	1.50	12.96	
			178.760	2	0.97	3.00	1.50	8.73	
			179.007	2	0.85	3.00	1.50	7.65	
			179.054	2	0.92	3.00	1.50	8.28	
			179.187	2	0.83	3.00	1.50	7.47	
			179.286	2	1.38	3.00	1.50	12.42	
			179.356	2	2.84	3.00	1.50	25.56	
			179.930	2	1.13	3.00	1.50	10.17	
			180.195	2	1.02	3.00	1.50	9.18	
			180.278	2	1.52	3.00	1.50	13.68	
			180.389	2	0.90	3.00	1.50	8.10	
			180.714	2	3.07	3.00	1.50	27.63	
			180.875	2	3.87	3.00	1.50	34.83	
			180.938	2	2.86	3.00	1.50	25.74	
			181.007	2	2.74	3.00	1.50	24.66	
			181.126	2	3.04	3.00	1.50	27.36	
			181.365	2	1.14	3.00	1.50	10.26	
			181.478	2	5.45	3.00	1.50	49.05	
			181.605	2	2.64	3.00	1.50	23.76	
			181.969	2	0.92	3.00	1.50	8.28	
			182.132	2	2.70	3.00	1.50	24.30	
			184.805	2	1.85	3.00	1.50	16.65	
			184.905	2	1.41	3.00	1.50	12.69	
			185.251	2	1.61	3.00	1.50	14.49	
			186.017	2	1.14	3.00	1.50	10.26	
			186.260	2	0.95	3.00	1.50	8.55	
			186.436	2	1.55	3.00	1.50	13.95	
			186.721	2	0.99	3.00	1.50	8.91	
			187.030	2	1.18	3.00	1.50	10.62	
			187.234	2	0.96	3.00	1.50	8.64	
			187.371	2	1.10	3.00	1.50	9.90	
			187.472	2	0.95	3.00	1.50	8.55	
			187.850	2	0.84	3.00	1.50	7.56	
			188.240	2	1.51	3.00	1.50	13.59	
			188.347	2	0.89	3.00	1.50	8.01	
			188.452	2	1.08	3.00	1.50	9.72	
			188.554	2	0.90	3.00	1.50	8.10	
			188.705	2	1.37	3.00	1.50	12.33	
			188.796	2	0.85	3.00	1.50	7.65	
			188.900	2	1.16	3.00	1.50	10.44	
			189.086	2	1.51	3.00	1.50	13.59	
			189.268	2	0.91	3.00	1.50	8.19	
			189.331	2	1.17	3.00	1.50	10.53	
			189.404	2	0.87	3.00	1.50	7.83	
			189.622	2	0.90	3.00	1.50	8.10	
			189.835	2	1.51	3.00	1.50	13.59	
			190.051	2	1.46	3.00	1.50	13.14	
			190.164	2	1.47	3.00	1.50	13.23	
			190.269	2	0.95	3.00	1.50	8.55	
			190.309	2	1.03	3.00	1.50	9.27	
			190.554	2	0.94	3.00	1.50	8.46	
			190.651	2	1.01	3.00	1.50	9.09	
			190.820	2	1.42	3.00	1.50	12.78	
			190.876	2	1.58	3.00	1.50	14.22	
			191.772	2	0.95	3.00	1.50	8.55	
			191.894	2	4.65	3.00	1.50	41.85	
			192.019	2	1.02	3.00	1.50	9.18	
			192.107	2	0.91	3.00	1.50	8.19	
			192.271	2	1.03	3.00	1.50	9.27	
			192.381	2	1.16	3.00	1.50	10.44	
			192.658	2	1.33	3.00	1.50	11.97	
			192.723	2	1.55	3.00	1.50	13.95	
			193.018	2	1.26	3.00	1.50	11.34	
			193.113	2	0.97	3.00	1.50	8.73	

A) Stone
Masonry

Abutments for
existing slab culvert
H=h, Length=L, and
thickness=t.

cum



Sl. No.	Brief Description	Unit	Survey ch.	No.	L	B / H	T	Quantity	Total Quantity
			193.616	2	0.85	3.00	1.50	7.65	
			193.744	2	0.78	3.00	1.50	7.02	
			193.978	2	4.21	3.00	1.50	37.89	
			194.140	2	4.51	3.00	1.50	40.59	
			194.457	2	2.15	3.00	1.50	19.35	
			194.630	2	5.27	3.00	1.50	47.43	
			194.699	2	2.57	3.00	1.50	23.13	
			194.788	2	3.53	3.00	1.50	31.77	
			194.866	2	5.01	3.00	1.50	45.09	
			195.159	2	2.85	3.00	1.50	25.65	
			195.256	2	3.13	3.00	1.50	28.17	
			195.290	2	2.04	3.00	1.50	18.36	
			196.023	2	2.71	3.00	1.50	24.39	
			196.130	2	2.97	3.00	1.50	26.73	
			196.197	2	2.39	3.00	1.50	21.51	
			196.412	2	2.28	3.00	1.50	20.52	
			196.478	2	2.90	3.00	1.50	26.10	
			196.595	2	2.26	3.00	1.50	20.34	
			196.804	2	2.35	3.00	1.50	21.15	
			196.872	2	1.61	3.00	1.50	14.49	
			196.980	2	0.95	3.00	1.50	8.55	
			197.204	2	4.21	3.00	1.50	37.89	
			197.336	2	2.89	3.00	1.50	26.01	
			197.566	2	2.04	3.00	1.50	18.36	
			197.816	2	2.21	3.00	1.50	19.89	
			198.278	2	1.71	3.00	1.50	15.39	
			198.512	2	1.55	3.00	1.50	13.95	
			199.028	2	4.20	3.00	1.50	37.80	
			199.299	2	1.85	3.00	1.50	16.65	
			199.438	2	1.86	3.00	1.50	16.74	
			200.199	2	1.71	3.00	1.50	15.39	
			200.289	2	1.53	3.00	1.50	13.77	
			200.354	2	1.36	3.00	1.50	12.24	
			200.441	2	1.53	3.00	1.50	13.77	
			200.560	2	1.08	3.00	1.50	9.72	
			200.637	2	1.08	3.00	1.50	9.72	
			200.784	2	1.85	3.00	1.50	16.65	
			200.831	2	1.86	3.00	1.50	16.74	
			200.946	2	1.70	3.00	1.50	15.30	
			201.178	2	2.66	3.00	1.50	23.94	
			201.434	2	1.75	3.00	1.50	15.75	
			201.505	2	1.93	3.00	1.50	17.37	
			201.609	2	1.93	3.00	1.50	17.37	
			201.818	2	2.45	3.00	1.50	22.05	
			202.226	2	1.78	3.00	1.50	16.02	
			202.405	2	2.04	3.00	1.50	18.36	
			202.688	2	1.05	3.00	1.50	9.45	
			204.472	2	3.16	3.00	1.50	28.44	
			205.312	2	1.81	3.00	1.50	16.29	
			205.492	2	1.65	3.00	1.50	14.85	
			206.176	2	2.80	3.00	1.50	25.20	
			206.899	2	1.80	3.00	1.50	16.20	
			207.017	2	1.50	3.00	1.50	13.50	

Site Clearance and Dismantling

Sl. No.	Brief Description	Unit	Survey ch.	No.	L	B / H	T	Quantity	Total Quantity
B) RCC	For Slab culvert	Cum	175.278	1	7.0	5.33	0.3	11.19	
			175.349	1	6.8	0.90	0.3	1.84	
			175.600	1	6.5	3	0.3	5.85	
			175.852	1	6.5	1.56	0.3	3.04	
			176.012	1	6.0	1.50	0.3	2.71	
			176.231	1	6.8	0.84	0.3	1.71	
			176.346	1	6.5	1.43	0.3	2.79	
			176.506	1	6.0	4.49	0.3	8.12	
			176.753	1	6.8	4.66	0.3	9.48	
			176.842	1	6.5	1.52	0.3	2.96	
			176.876	1	7.0	4.60	0.3	9.66	
			177.061	1	6.8	0.96	0.3	1.96	
			177.325	1	6.5	0.80	0.3	1.56	
			177.547	1	6.5	0.85	0.3	1.66	
			177.636	1	6.0	1.52	0.3	2.75	
			177.745	1	6.8	1.63	0.3	3.32	
			177.786	1	6.5	3.04	0.3	5.93	
			177.953	1	7.0	3.18	0.3	6.68	
			178.196	1	6.8	1.49	0.3	3.04	
			178.441	1	6.5	3.04	0.3	5.93	
			178.477	1	6.5	4.43	0.3	8.64	
			178.636	1	6.0	1.44	0.3	2.60	
			178.760	1	6.8	0.97	0.3	1.97	
			179.007	1	6.5	0.85	0.3	1.66	
			179.054	1	7.0	0.92	0.3	1.93	
			179.187	1	6.8	0.83	0.3	1.69	
			179.286	1	6.5	1.38	0.3	2.69	
			179.356	1	6.5	2.84	0.3	5.54	
			179.930	1	6.0	1.13	0.3	2.04	
			180.195	1	6.8	1.02	0.3	2.07	
			180.278	1	6.5	1.52	0.3	2.96	
			180.389	1	7.0	0.90	0.3	1.89	
			180.714	1	7.1	3.07	0.3	6.54	
			180.875	1	7.0	3.87	0.3	8.13	
			180.938	1	7.0	2.86	0.3	6.01	
			181.007	1	6.1	2.74	0.3	5.01	
			181.126	1	7.5	3.04	0.3	6.84	
			181.365	1	7.0	1.14	0.3	2.39	
			181.478	1	8.0	5.45	0.3	13.08	
			181.605	1	7.0	2.64	0.3	5.54	
			181.969	1	7.0	0.92	0.3	1.93	
			182.132	1	7.5	2.70	0.3	6.08	
			184.805	1	7.5	1.85	0.3	4.16	
			184.905	1	7.0	1.41	0.3	2.96	
			185.251	1	7.0	1.61	0.3	3.38	
			186.017	1	7.0	1.14	0.3	2.39	
			186.260	1	7.1	0.95	0.3	2.02	
			186.436	1	7.5	1.55	0.3	3.49	
			186.721	1	7.0	0.99	0.3	2.08	
			187.030	1	7.0	1.18	0.3	2.48	
			187.234	1	7.0	0.96	0.3	2.02	
			187.371	1	7.5	1.10	0.3	2.48	
			187.472	1	7.0	0.95	0.3	2.00	
			187.850	1	6.8	0.84	0.3	1.71	
			188.240	1	6.7	1.51	0.3	3.04	
			188.347	1	8.0	0.89	0.3	2.14	
			188.452	1	7.0	1.08	0.3	2.27	
			188.554	1	7.0	0.90	0.3	1.89	
			188.705	1	7.1	1.37	0.3	2.92	
			188.796	1	6.7	0.85	0.3	1.71	
			188.900	1	7.0	1.16	0.3	2.44	
			189.086	1	7.0	1.51	0.3	3.17	
			189.268	1	7.5	0.91	0.3	2.05	
			189.331	1	7.5	1.17	0.3	2.63	
			189.404	1	7.1	0.87	0.3	1.85	
			189.622	1	7.0	0.90	0.3	1.89	
			189.835	1	7.5	1.51	0.3	3.40	
			190.051	1	7.0	1.46	0.3	3.07	
			190.164	1	6.8	1.47	0.3	3.00	
			190.269	1	6.7	0.95	0.3	1.91	
			190.309	1	8.0	1.03	0.3	2.47	
			190.554	1	7.0	0.94	0.3	1.97	
			190.651	1	7.0	1.01	0.3	2.12	
			190.820	1	7.1	1.42	0.3	3.02	
			190.876	1	6.7	1.58	0.3	3.18	
			191.772	1	7.0	0.95	0.3	2.00	
			191.894	1	7.0	4.65	0.3	9.77	
			192.019	1	7.5	1.02	0.3	2.30	
			192.107	1	7.0	0.91	0.3	1.91	
			192.271	1	6.8	1.03	0.3	2.10	
			192.381	1	6.7	1.16	0.3	2.33	
			192.658	1	8.0	1.33	0.3	3.19	



Site Clearance and Dismantling

Sl. No.	Brief Description	Unit	Survey ch.	No.	L	B / H	T	Quantity	Total Quantity
			192.723	1	7.0	1.55	0.3	3.26	
			193.018	1	7.0	1.26	0.3	2.65	
			193.113	1	7.1	0.97	0.3	2.07	
			193.616	1	6.7	0.85	0.3	1.71	
			193.744	1	7.0	0.78	0.3	1.64	
			193.978	1	7.0	4.21	0.3	8.84	
			194.140	1	7.5	4.51	0.3	10.15	
			194.457	1	7.0	2.15	0.3	4.52	
			194.630	1	6.8	5.27	0.3	10.75	
			194.699	1	6.7	2.57	0.3	5.17	
			194.788	1	8.0	3.53	0.3	8.47	
			194.866	1	7.0	5.01	0.3	10.52	
			195.159	1	7.0	2.85	0.3	5.99	
			195.256	1	7.1	3.13	0.3	6.67	
			195.290	1	6.7	2.04	0.3	4.10	
			196.023	1	7.0	2.71	0.3	5.69	
			196.130	1	7.0	2.97	0.3	6.24	
			196.197	1	7.5	2.39	0.3	5.38	
			196.412	1	7.0	2.28	0.3	4.79	
			196.478	1	6.8	2.90	0.3	5.92	
			196.595	1	6.7	2.26	0.3	4.54	
			196.804	1	8.0	2.35	0.3	5.64	
			196.872	1	7.0	1.61	0.3	3.38	
			196.980	1	7.0	0.95	0.3	2.00	
			197.204	1	7.1	4.21	0.3	8.97	
			197.336	1	6.7	2.89	0.3	5.81	
			197.566	1	7.0	2.04	0.3	4.28	
			197.816	1	7.0	2.21	0.3	4.64	
			198.278	1	7.5	1.71	0.3	3.85	
			198.512	1	7.0	1.55	0.3	3.26	
			199.028	1	6.8	4.20	0.3	8.57	
			199.299	1	6.7	1.85	0.3	3.72	
			199.438	1	8.0	1.86	0.3	4.46	
			200.199	1	7.0	1.71	0.3	3.59	
			200.289	1	7.0	1.53	0.3	3.21	
			200.354	1	7.1	1.36	0.3	2.90	
			200.441	1	6.7	1.53	0.3	3.08	
			200.560	1	7.0	1.08	0.3	2.27	
			200.637	1	7.0	1.08	0.3	2.27	
			200.784	1	7.5	1.85	0.3	4.16	
			200.831	1	7.0	1.86	0.3	3.91	
			200.946	1	6.8	1.70	0.3	3.47	
			201.178	1	6.7	2.66	0.3	5.35	
			201.434	1	8.0	1.75	0.3	4.20	
			201.505	1	7.0	1.93	0.3	4.05	
			201.609	1	7.0	1.93	0.3	4.05	
			201.818	1	7.1	2.45	0.3	5.22	
			202.226	1	6.7	1.78	0.3	3.58	
			202.405	1	7.0	2.04	0.3	4.28	
			202.688	1	7.0	1.05	0.3	2.21	
			204.472	1	7.5	3.16	0.3	7.11	
			205.312	1	7.0	1.81	0.3	3.80	
			205.492	1	6.8	1.65	0.3	3.37	
			206.176	1	6.7	2.80	0.3	5.63	
			206.899	1	8.0	1.80	0.3	4.32	
			207.017	1	7.0	1.50	0.3	3.15	
			207.178	1	7.0	1.30	0.3	2.73	
			207.581	1	7.1	1.80	0.3	3.83	
			207.685	1	6.7	2.10	0.3	4.22	
			207.836	1	7.0	1.40	0.3	2.94	
			207.911	1	7.0	3.70	0.3	7.77	
			208.103	1	7.5	1.70	0.3	3.83	
			208.186	1	7.0	2.40	0.3	5.04	
			208.308	1	6.8	2.00	0.3	4.08	
			208.593	1	6.7	1.50	0.3	3.02	
			208.705	1	8.0	1.70	0.3	4.08	
								Total=	604.60

Quantity Summary of Dismantling of Existing Culvert::

Total Dismantling of Rubble stone masonry in cement mortar= 2576 cum
 Total Dismantling of Reinforced cement concrete= 605 cum



Details of Granular dismantling quantity

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	Scrified Bituminous material
169600	416.38	419.639	0.11	419.529	-3.149	25		0.31	0.308		TCS-3A	
169625	414.88	416.569	0.11	416.459	-1.579	25		0.31	0.308		TCS-3A	
169650	413.38	413.86	0.11	413.75	-0.37	25	6.7	0.31	0.308	51.59	TCS-4	18.425
169675	411.88	412.299	0.11	412.189	-0.309	25	6.7	0.31	0.308	51.59	TCS-4	18.425
169700	410.38	410.599	0.11	410.489	-0.109	25	6.7	0.31	0.308	51.59	TCS-3	18.425
169725	408.88	408.473	0.11	408.363	0.517	25	6.7	0.31	0.043	7.20	TCS-3	18.425
169750	407.38	409.343	0.11	409.233	-1.853	25	6.7	0.31	0.308	51.59	TCS-3	18.425
169775	405.88	406.106	0.11	405.996	-0.116	25	6.7	0.31	0.308	51.59	TCS-3	18.425
169800	404.38	404.512	0.11	404.402	-0.022	25	6.7	0.31	0.308	51.59	TCS-3	18.425
169825	402.88	404.711	0.11	404.601	-1.721	25	6.7	0.31	0.308	51.59	TCS-12	18.425
169850	401.402	411.787	0.11	411.677	-10.275	25	6.7	0.31	0.308	51.59	TCS-12	18.425
169875	400.05	405.193	0.11	405.083	-5.033	25	6.7	0.31	0.308	51.59	TCS-3	18.425
169900	398.839	399.464	0.11	399.354	-0.515	25	6.7	0.31	0.308	51.59	TCS-3	18.425
169925	397.761	398.106	0.11	397.996	-0.235	25	6.7	0.31	0.308	51.59	TCS-3	18.425
169950	396.711	396.945	0.11	396.835	-0.124	25	6.7	0.31	0.308	51.59	TCS-3	18.425
169975	395.662	395.565	0.11	395.455	0.207	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170000	394.613	395.62	0.11	395.51	-0.897	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170025	393.564	391.825	0.11	391.715	1.849	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170050	392.515	390.7	0.11	390.59	1.925	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170075	391.466	389.645	0.11	389.535	1.931	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170100	390.417	392.584	0.11	392.474	-2.057	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170125	389.368	390.848	0.11	390.738	-1.37	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170150	388.318	387.726	0.11	387.616	0.702	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170175	387.269	386.673	0.11	386.563	0.706	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170200	386.22	385.91	0.11	385.8	0.42	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170225	385.171	385.089	0.11	384.979	0.192	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170250	384.122	384.274	0.11	384.164	-0.042	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170275	383.073	383.507	0.11	383.397	-0.324	25		0.31	0.308		TCS-3A	
170300	382.024	384.626	0.11	384.516	-2.492	25		0.31	0.308		TCS-3A	
170325	380.975	384.785	0.11	384.675	-3.7	25		0.31	0.308		TCS-3A	
170350	379.921	380.269	0.11	380.159	-0.238	25		0.31	0.308		TCS-3A	
170375	378.816	379.625	0.11	379.515	-0.699	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170400	377.643	377.74	0.11	377.63	0.013	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170425	376.403	376.469	0.11	376.359	0.044	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170450	375.113	376.142	0.11	376.032	-0.919	25		0.31	0.308		TCS-3A	
170475	373.822	377.234	0.11	377.124	-3.302	25		0.31	0.308		TCS-3A	
170500	372.531	378.546	0.11	378.436	-5.905	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170525	371.239	370.797	0.11	370.687	0.552	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170550	369.948	368.897	0.11	368.787	1.161	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170575	368.656	370.364	0.11	370.254	-1.598	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170600	367.365	366.532	0.11	366.422	0.943	25		0.31	0.308		TCS-5A	
170625	366.074	369.586	0.11	369.476	-3.402	25		0.31	0.308		TCS-5A	
170650	364.798	375.396	0.11	375.286	-10.488	25		0.31	0.308		TCS-5A	
170675	363.588	376.226	0.11	376.116	-12.528	25		0.31	0.308		TCS-5A	
170700	362.447	375.635	0.11	375.525	-13.078	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170725	361.375	361.46	0.11	361.35	0.025	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170750	360.373	360.803	0.11	360.693	-0.32	25		0.31	0.308		TCS-3A	
170775	359.441	365.819	0.11	365.709	-6.268	25		0.31	0.308		TCS-3A	
170800	358.562	365.944	0.11	365.834	-7.272	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170825	357.687	355.603	0.11	355.493	2.194	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170850	356.812	355.354	0.11	355.244	1.568	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170875	355.937	356.388	0.11	356.278	-0.341	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170900	355.062	354.508	0.11	354.398	0.664	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170925	354.187	353.798	0.11	353.688	0.499	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170950	353.312	351.277	0.11	351.167	2.145	25	6.7	0.31	0.308	51.59	TCS-3	18.425
170975	352.437	349.9	0.11	349.79	2.647	25		0.31	0.308		TCS-3A	
171000	351.562	359.481	0.11	359.371	-7.809	25		0.31	0.308		TCS-3A	
171025	350.687	354.948	0.11	354.838	-4.151	25		0.31	0.308		TCS-3A	
171050	349.812	348.314	0.11	348.204	1.608	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171075	348.937	348.459	0.11	348.349	0.588	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171100	348.062	348.622	0.11	348.512	-0.45	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171125	347.187	352.922	0.11	352.812	-5.625	25		0.31	0.308		TCS-3A	
171150	346.312	350.807	0.11	350.697	-4.385	25		0.31	0.308		TCS-3A	
171175	345.437	345.605	0.11	345.495	-0.058	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171200	344.562	343.894	0.11	343.784	0.778	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171225	343.687	343.068	0.11	342.958	0.729	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrapped Bituminous material
171250	342.812	342.757	0.11	342.647	0.165	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171275	341.937	342.094	0.11	341.984	-0.047	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171300	341.062	340.01	0.11	339.9	1.162	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171325	340.185	340.221	0.11	340.111	0.074	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171350	339.234	338.696	0.11	338.586	0.648	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171375	338.166	336.928	0.11	336.818	1.348	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171400	336.98	336.076	0.11	335.966	1.014	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171425	335.73	335.183	0.11	335.073	0.657	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171450	334.48	334.356	0.11	334.246	0.234	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171475	333.23	333.146	0.11	333.036	0.194	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171500	331.98	331.884	0.11	331.774	0.206	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171525	330.73	330.919	0.11	330.809	-0.079	25	6.7	0.31	0.308	51.59	TCS-10	18.425
171550	329.48	329.887	0.11	329.777	-0.297	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171575	328.23	329.079	0.11	328.969	-0.739	25		0.31	0.308		TCS-3A	
171600	326.98	328.174	0.11	328.064	-1.084	25		0.31	0.308		TCS-3A	
171625	325.73	328.365	0.11	328.255	-2.525	25		0.31	0.308		TCS-3A	
171650	324.516	325.729	0.11	325.619	-1.103	25		0.31	0.308		TCS-3A	
171675	323.571	324.785	0.11	324.675	-1.104	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171700	322.903	323.949	0.11	323.839	-0.936	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171725	322.278	323.033	0.11	322.923	-0.645	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171750	321.653	321.678	0.11	321.568	0.085	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171775	320.829	320.201	0.11	320.091	0.738	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171800	319.628	318.591	0.11	318.481	1.147	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171825	318.25	317.29	0.11	317.18	1.07	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171850	316.873	315.958	0.11	315.848	1.025	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171875	315.495	314.805	0.11	314.695	0.8	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171900	314.125	314.891	0.11	314.781	-0.656	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171925	312.862	314.574	0.11	314.464	-1.602	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171950	311.736	311.886	0.11	311.776	-0.04	25	6.7	0.31	0.308	51.59	TCS-3	18.425
171975	310.745	311.088	0.11	310.978	-0.233	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172000	309.882	310.546	0.11	310.436	-0.554	25		0.31	0.308		TCS-7A	
172025	309.049	309.817	0.11	309.707	-0.658	25		0.31	0.308		TCS-7A	
172050	308.215	310.452	0.11	310.342	-2.127	25		0.31	0.308		TCS-7A	
172075	307.382	318.24	0.11	318.13	-10.748	25		0.31	0.308		TCS-7A	
172100	306.549	309.526	0.11	309.416	-2.867	25		0.31	0.308		TCS-7A	
172125	305.716	307.414	0.11	307.304	-1.588	25		0.31	0.308		TCS-7A	
172150	304.882	317.56	0.11	317.45	-12.568	25		0.31	0.308		TCS-7A	
172175	304.049	315.689	0.11	315.579	-11.53	25		0.31	0.308		TCS-7A	
172200	303.216	311.336	0.11	311.226	-8.01	25		0.31	0.308		TCS-7A	
172225	302.383	304.566	0.11	304.456	-2.073	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172250	301.549	301.192	0.11	301.082	0.467	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172275	300.716	300.618	0.11	300.508	0.208	25		0.31	0.308		TCS-3A	
172300	299.867	301.784	0.11	301.674	-1.807	25		0.31	0.308		TCS-3A	
172325	298.968	307.633	0.11	307.523	-8.555	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172350	298.018	301.156	0.11	301.046	-3.028	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172375	297.017	295.824	0.11	295.714	1.303	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172400	295.964	294.816	0.11	294.706	1.258	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172425	294.86	294.266	0.11	294.156	0.704	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172450	293.705	293.008	0.11	292.898	0.807	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172475	292.499	291.337	0.11	291.227	1.272	25	6.7	0.31	0.308	51.59	TCS-4	18.425
172500	291.241	290.127	0.11	290.017	1.224	25	6.7	0.31	0.308	51.59	TCS-4	18.425
172525	289.933	289.036	0.11	288.926	1.007	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172550	288.573	287.868	0.11	287.758	0.815	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172575	287.162	286.645	0.11	286.535	0.627	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172600	285.715	285.635	0.11	285.525	0.19	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172625	284.267	283.904	0.11	283.794	0.473	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172650	282.819	282.669	0.11	282.559	0.26	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172675	281.371	281.293	0.11	281.183	0.188	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172700	279.923	279.999	0.11	279.889	0.034	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172725	278.476	278.971	0.11	278.861	-0.385	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172750	277.028	277.998	0.11	277.888	-0.86	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172775	275.58	275.532	0.11	275.422	0.158	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172800	274.132	276.336	0.11	276.226	-2.094	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172825	272.684	275.471	0.11	275.361	-2.677	25	6.7	0.31	0.308	51.59	TCS-12	18.425
172850	271.236	273.822	0.11	273.712	-2.476	25	6.7	0.31	0.308	51.59	TCS-12	18.425
172875	269.788	276.004	0.11	275.894	-6.106	25	6.7	0.31	0.308	51.59	TCS-12	18.425
172900	268.34	271.29	0.11	271.18	-2.84	25	6.7	0.31	0.308	51.59	TCS-12	18.425
172925	266.892	266.709	0.11	266.599	0.293	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172950	265.445	265.045	0.11	264.935	0.51	25	6.7	0.31	0.308	51.59	TCS-3	18.425
172975	263.997	263.764	0.11	263.654	0.343	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrified Bituminous material
173000	262.549	262.346	0.11	262.236	0.313	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173025	261.101	261.013	0.11	260.903	0.198	25	6.7	0.31	0.308	51.59	TCS-4	18.425
173050	259.653	259.712	0.11	259.602	0.051	25	6.7	0.31	0.308	51.59	TCS-4	18.425
173075	258.205	257.916	0.11	257.806	0.399	25	6.7	0.31	0.308	51.59	TCS-4	18.425
173100	256.757	256.308	0.11	256.198	0.559	25	6.7	0.31	0.308	51.59	TCS-4	18.425
173125	255.309	254.722	0.11	254.612	0.697	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173150	253.861	252.769	0.11	252.659	1.202	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173175	252.414	250.672	0.11	250.562	1.852	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173200	250.966	248.654	0.11	248.544	2.422	25		0.31	0.308		TCS-3A	
173225	249.518	246.993	0.11	246.883	2.635	25		0.31	0.308		TCS-3A	
173250	248.07	245.649	0.11	245.539	2.531	25		0.31	0.308		TCS-3A	
173275	246.622	244.614	0.11	244.504	2.118	25		0.31	0.308		TCS-3A	
173300	245.174	244.384	0.11	244.274	0.9	25		0.31	0.308		TCS-3A	
173325	243.726	243.436	0.11	243.326	0.4	25		0.31	0.308		TCS-3A	
173350	242.278	242.396	0.11	242.286	-0.008	25		0.31	0.308		TCS-3A	
173375	240.83	240.862	0.11	240.752	0.078	25		0.31	0.308		TCS-3A	
173400	239.383	239.63	0.11	239.52	-0.137	25		0.31	0.308		TCS-3A	
173425	237.935	239.873	0.11	239.763	-1.828	25		0.31	0.308		TCS-3A	
173450	236.487	237.75	0.11	237.64	-1.153	25		0.31	0.308		TCS-3A	
173475	235.039	250.194	0.11	250.084	-15.045	25		0.31	0.308		TCS-3A	
173500	233.591	238.961	0.11	238.851	-5.26	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173525	232.143	232.404	0.11	232.294	-0.151	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173550	230.695	231.148	0.11	231.038	-0.343	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173575	229.287	229.131	0.11	229.021	0.266	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173600	228.082	227.204	0.11	227.094	0.988	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173625	227.096	226.698	0.11	226.588	0.508	25	6.7	0.31	0.308	51.59	TCS-12	18.425
173650	226.183	230.83	0.11	230.72	-4.537	25	6.7	0.31	0.308	51.59	TCS-12	18.425
173675	225.27	239.847	0.11	239.737	-14.467	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173700	224.357	224.485	0.11	224.375	-0.018	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173725	223.444	223.225	0.11	223.115	0.329	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173750	222.531	222.358	0.11	222.248	0.283	25	6.7	0.31	0.308	51.59	TCS-3	18.425
173775	221.617	221.435	0.11	221.325	0.292	25		0.31	0.308		TCS-3A	
173800	220.704	228.121	0.11	228.011	-7.307	25		0.31	0.308		TCS-3A	
173825	219.791	226.701	0.11	226.591	-6.8	25		0.31	0.308		TCS-3A	
173850	218.878	219.413	0.11	219.303	-0.425	25	6.7	0.31	0.308		TCS-3	
173875	217.965	216.981	0.11	216.871	1.094	25	6.7	0.31	0.308		TCS-3	
173900	217.051	218.615	0.11	218.505	-1.454	25	6.7	0.31	0.308		TCS-3	
173925	216.138	218.259	0.11	218.149	-2.011	25	6.7	0.31	0.308		TCS-3	
173950	215.225	214.242	0.11	214.132	1.093	25	6.7	0.31	0.308		TCS-3	
173975	214.312	213.225	0.11	213.115	1.197	25	6.7	0.31	0.308		TCS-3	
174000	213.399	212.337	0.11	212.227	1.172	25	6.7	0.31	0.308		TCS-3	
174025	212.485	211.923	0.11	211.813	0.672	25	6.7	0.31	0.308		TCS-3	
174050	211.572	211.195	0.11	211.085	0.487	25	6.7	0.31	0.308		TCS-3	
174075	210.659	210.483	0.11	210.373	0.286	25	6.7	0.31	0.308		TCS-3	
174100	209.746	209.576	0.11	209.466	0.28	25	6.7	0.31	0.308		TCS-3	
174125	208.833	208.267	0.11	208.157	0.676	25		0.31	0.308		TCS-3A	
174150	207.919	210.196	0.11	210.086	-2.167	25		0.31	0.308		TCS-3A	
174175	207.006	209.336	0.11	209.226	-2.22	25		0.31	0.308		TCS-3A	
174200	206.093	207.049	0.11	206.939	-0.846	25	6.7	0.31	0.308		TCS-3	
174225	205.18	204.604	0.11	204.494	0.686	25	6.7	0.31	0.308		TCS-3	
174250	204.267	205.07	0.11	204.96	-0.693	25		0.31	0.308		TCS-3A	
174275	203.354	203.89	0.11	203.78	-0.426	25		0.31	0.308		TCS-3A	
174300	202.44	203.726	0.11	203.616	-1.176	25		0.31	0.308		TCS-3A	
174325	201.527	210.759	0.11	210.649	-9.122	25		0.31	0.308		TCS-3A	
174350	200.614	207.423	0.11	207.313	-6.699	25		0.31	0.308		TCS-3A	
174375	199.701	210.28	0.11	210.17	-10.469	25		0.31	0.308		TCS-3A	
174400	198.788	202.77	0.11	202.66	-3.872	25		0.31	0.308		TCS-3A	
174425	197.874	197.759	0.11	197.649	0.225	25		0.31	0.308		TCS-3A	
174450	196.961	197.176	0.11	197.066	-0.105	25		0.31	0.308		TCS-3A	
174475	196.048	199.695	0.11	199.585	-3.537	25	6.7	0.31	0.308		TCS-3	
174500	195.135	195.596	0.11	195.486	-0.351	25	6.7	0.31	0.308		TCS-3	
174525	194.222	194.867	0.11	194.757	-0.535	25		0.31	0.308		TCS-5A	
174550	193.308	198.014	0.11	197.904	-4.596	25		0.31	0.308		TCS-5A	
174575	192.395	200.03	0.11	199.92	-7.525	25	6.7	0.31	0.308		TCS-3	
174600	191.482	192.096	0.11	191.986	-0.504	25	6.7	0.31	0.308		TCS-3	
174625	190.569	190.6	0.11	190.49	0.079	25		0.31	0.308		TCS-3A	
174650	189.656	192.31	0.11	192.2	-2.544	25		0.31	0.308		TCS-3A	
174675	188.743	191.135	0.11	191.025	-2.282	25		0.31	0.308		TCS-3A	
174700	187.829	188.052	0.11	187.942	-0.113	25		0.31	0.308		TCS-3A	
174725	186.929	188.272	0.11	188.162	-1.233	25		0.31	0.308		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	Scrapped Bituminous material
174750	186.063	185.692	0.11	185.582	0.481	25		0.31	0.308		TCS-3A	
174775	185.232	184.799	0.11	184.689	0.543	25		0.31	0.308		TCS-3A	
174800	184.436	184.125	0.11	184.015	0.421	25		0.31	0.308		TCS-3A	
174825	183.661	183.726	0.11	183.616	0.045	25		0.31	0.308		TCS-3A	
174850	182.888	182.916	0.11	182.806	0.082	25		0.31	0.308		TCS-3A	
174875	182.114	181.729	0.11	181.619	0.495	25		0.31	0.308		TCS-3A	
174900	181.34	182.239	0.11	182.129	-0.789	25		0.31	0.308		TCS-3A	
174925	180.566	179.819	0.11	179.709	0.857	25		0.31	0.308		TCS-3A	
174950	179.793	186.844	0.11	186.734	-6.941	25	6.7	0.31	0.308	51.59	TCS-12	18.425
174975	179.019	187.221	0.11	187.111	-8.092	25	6.7	0.31	0.308	51.59	TCS-12	18.425
175000	178.245	176.846	0.11	176.736	1.509	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175025	177.471	176.856	0.11	176.746	0.725	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175050	176.697	177.296	0.11	177.186	-0.489	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175075	175.924	175.761	0.11	175.651	0.273	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175100	175.15	175.09	0.11	174.98	0.17	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175125	174.376	177.187	0.11	177.077	-2.701	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175150	173.602	174.351	0.11	174.241	-0.639	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175175	172.829	173.781	0.11	173.671	-0.842	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175200	172.055	172.885	0.11	172.775	-0.72	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175225	171.281	171.908	0.11	171.798	-0.517	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175250	170.507	172.431	0.11	172.321	-1.814	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175275	169.734	170.105	0.11	169.995	-0.261	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175300	168.96	169.342	0.11	169.232	-0.272	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175325	168.186	168.641	0.11	168.531	-0.345	25		0.31	0.308		TCS-3A	
175350	167.418	170.298	0.11	170.188	-2.77	25		0.31	0.308		TCS-3A	
175375	166.696	169.342	0.11	169.232	-2.536	25		0.31	0.308		TCS-3A	
175400	166.027	165.742	0.11	165.632	0.395	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175425	165.401	165.216	0.11	165.106	0.295	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175450	164.779	164.278	0.11	164.168	0.611	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175475	164.156	163.947	0.11	163.837	0.319	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175500	163.533	163.192	0.11	163.082	0.451	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175525	162.911	162.778	0.11	162.668	0.243	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175550	162.288	162.299	0.11	162.189	0.099	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175575	161.665	161.654	0.11	161.544	0.121	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175600	161.043	161.085	0.11	160.975	0.068	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175625	160.42	160.933	0.11	160.823	-0.403	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175650	159.797	159.881	0.11	159.771	0.026	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175675	159.175	158.705	0.11	158.595	0.58	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175700	158.552	158.298	0.11	158.188	0.364	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175725	157.929	157.619	0.11	157.509	0.42	25	6.7	0.31	0.308	51.59	TCS-3	18.425
175750	157.298	156.747	0.11	156.637	0.661	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175775	156.646	156.298	0.11	156.188	0.458	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175800	155.971	155.858	0.11	155.748	0.223	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175825	155.275	155.285	0.11	155.175	0.1	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175850	154.558	154.632	0.11	154.522	0.036	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175875	153.819	154.69	0.11	154.58	-0.761	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175900	153.058	153.849	0.11	153.739	-0.681	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175925	152.276	152.428	0.11	152.318	-0.042	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175950	151.48	151.428	0.11	151.318	0.162	25	6.7	0.31	0.308	51.59	TCS-4	18.425
175975	150.685	150.73	0.11	150.62	0.065	25	6.7	0.31	0.308	51.59	TCS-4	18.425
176000	149.889	150.044	0.11	149.934	-0.045	25	6.7	0.31	0.308	51.59	TCS-4	18.425
176025	149.094	149.414	0.11	149.304	-0.21	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176050	148.298	149.051	0.11	148.941	-0.643	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176075	147.503	148.028	0.11	147.918	-0.415	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176100	146.707	146.569	0.11	146.459	0.248	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176125	145.912	145.583	0.11	145.473	0.439	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176150	145.116	145.276	0.11	145.166	-0.05	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176175	144.321	144.303	0.11	144.193	0.128	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176200	143.525	143.448	0.11	143.338	0.187	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176225	142.73	142.698	0.11	142.588	0.142	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176250	141.934	142.286	0.11	142.176	-0.242	25	6.7	0.31	0.308	51.59	TCS-3	18.425
176275	141.139	141.797	0.11	141.687	-0.548	25		0.31	0.308		TCS-7A	
176300	140.343	148.369	0.11	148.259	-7.916	25		0.31	0.308		TCS-7A	
176325	139.548	154.069	0.11	153.959	-14.411	25		0.31	0.308		TCS-7A	
176350	138.948	159.787	0.11	159.677	-20.729	25		0.31	0.308		TCS-7A	
176375	138.745	146.315	0.11	146.205	-7.46	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176400	138.745	138.746	0.11	138.636	0.109	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176425	138.745	138.732	0.11	138.622	0.123	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00



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	Scrapped Bituminous material
176450	138.704	138.539	0.11	138.429	0.275	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176475	137.671	137.341	0.11	137.231	0.44	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176500	136.271	136.189	0.11	136.079	0.192	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176525	135.259	134.863	0.11	134.753	0.506	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176550	134.497	134.444	0.11	134.334	0.163	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176575	133.738	133.865	0.11	133.755	-0.017	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176600	132.986	132.823	0.11	132.713	0.273	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176625	132.379	132.284	0.11	132.174	0.205	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176650	131.962	148.702	0.11	148.592	-16.63	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176675	131.658	148.48	0.11	148.37	-16.712	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176700	131.356	147.258	0.11	147.148	-15.792	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176725	131.053	133.958	0.11	133.848	-2.795	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176750	130.75	129.378	0.11	129.268	1.482	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176775	130.459	130.014	0.11	129.904	0.555	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176800	130.251	134.082	0.11	133.972	-3.721	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176825	130.137	135.037	0.11	134.927	-4.79	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176850	130.114	130.965	0.11	130.855	-0.741	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176875	130.114	148.578	0.11	148.468	-18.354	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176900	130.114	148.45	0.11	148.34	-18.226	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176925	130.114	143.977	0.11	143.867	-13.753	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176950	130.114	125.995	0.11	125.885	4.229	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
176975	130.114	110.677	0.11	110.567	19.547	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177000	130.114	105.592	0.11	105.482	24.632	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177025	130.114	112.112	0.11	112.002	18.112	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177050	130.114	119.49	0.11	119.38	10.734	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177075	130.114	125.544	0.11	125.434	4.68	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177100	130.079	133.918	0.11	133.808	-3.729	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177125	129.883	133.189	0.11	133.079	-3.196	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177150	129.515	132.864	0.11	132.754	-3.239	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177175	129.036	132.927	0.11	132.817	-3.781	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177200	128.555	134.054	0.11	133.944	-5.389	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177225	128.074	128.789	0.11	128.679	-0.605	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177250	127.593	127.235	0.11	127.125	0.468	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177275	127.281	128.334	0.11	128.224	-0.943	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177300	127.505	127.699	0.11	127.589	-0.084	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177325	128.279	128.23	0.11	128.12	0.159	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177350	129.602	128.936	0.11	128.826	0.776	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177375	131.304	130.501	0.11	130.391	0.913	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00

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	Scrified Bituminous material
177400	132.747	132.38	0.11	132.27	0.477	25	0	0.31	0.308	0.00	Makru Bridge Portion	0.00
177425	133.076	133.055	0.11	132.945	0.131	25	6.7	0.31	0.308	51.59	TCS-4	18.425
177450	133.076	133.051	0.11	132.941	0.135	25	6.7	0.31	0.308	51.59	TCS-4	18.425
177475	133.185	133.88	0.11	133.77	-0.585	25	6.7	0.31	0.308	51.59	TCS-3	18.425
177500	133.814	134.961	0.11	134.851	-1.037	25	6.7	0.31	0.308	51.59	TCS-3	18.425
177525	134.952	135.676	0.11	135.566	-0.614	25	6.7	0.31	0.308	51.59	TCS-3	18.425
177550	136.183	136.393	0.11	136.283	-0.1	25	6.7	0.31	0.308	51.59	TCS-3	18.425
177575	137.414	137.553	0.11	137.443	-0.029	25		0.31	0.308		TCS-3A	
177600	138.644	140.629	0.11	140.519	-1.875	25		0.31	0.308		TCS-3A	
177625	139.875	141.62	0.11	141.51	-1.635	25		0.31	0.308		TCS-3A	
177650	141.106	148.522	0.11	148.412	-7.306	25		0.31	0.308		TCS-3A	
177675	142.076	141.06	0.11	140.95	1.126	25	6.7	0.31	0.308	51.59	TCS-4	18.425
177700	142.432	142.207	0.11	142.097	0.335	25	6.7	0.31	0.308	51.59	TCS-4	18.425
177725	142.434	140.26	0.11	140.15	2.284	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
177750	142.531	142.777	0.11	142.667	-0.136	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
177775	143.192	144.154	0.11	144.044	-0.852	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
177800	144.381	145.962	0.11	145.852	-1.471	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
177825	145.631	147.999	0.11	147.889	-2.258	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
177850	146.895	150.238	0.11	150.128	-3.233	25		0.31	0.308		TCS-7A	
177875	148.217	151.917	0.11	151.807	-3.59	25		0.31	0.308		TCS-7A	
177900	149.602	153.201	0.11	153.091	-3.489	25		0.31	0.308		TCS-7A	
177925	151.049	154.061	0.11	153.951	-2.902	25		0.31	0.308		TCS-7A	
177950	152.545	155.092	0.11	154.982	-2.437	25		0.31	0.308		TCS-7A	
177975	154.045	159.043	0.11	158.933	-4.888	25		0.31	0.308		TCS-7A	
178000	155.545	162.506	0.11	162.396	-6.851	25		0.31	0.308		TCS-7A	
178025	157.045	163.687	0.11	163.577	-6.532	25	6.7	0.31	0.308	51.59	TCS-12	18.425
178050	158.545	166.665	0.11	166.555	-8.01	25	6.7	0.31	0.308	51.59	TCS-12	18.425
178075	160.025	161.227	0.11	161.117	-1.092	25	6.7	0.31	0.308	51.59	TCS-12	18.425
178100	161.25	162.042	0.11	161.932	-0.682	25	6.7	0.31	0.308	51.59	TCS-12	18.425
178125	162.174	171.665	0.11	171.555	-9.381	25	6.7	0.31	0.308	51.59	TCS-12	18.425
178150	163.032	179.842	0.11	179.732	-16.7	25	6.7	0.31	0.308	51.59	TCS-12	18.425
178175	163.889	180.262	0.11	180.152	-16.263	25	6.7	0.31	0.308	51.59	TCS-12	18.425
178200	164.747	168.661	0.11	168.551	-3.804	25	6.7	0.31	0.308	51.59	TCS-15	18.425
178225	165.605	165.99	0.11	165.88	-0.275	25	6.7	0.31	0.308	51.59	TCS-15	18.425
178250	166.462	170.467	0.11	170.357	-3.895	25	6.7	0.31	0.308	51.59	TCS-15	18.425
178275	167.32	172.353	0.11	172.243	-4.923	25	6.7	0.31	0.308	51.59	TCS-15	18.425
178300	168.177	172.783	0.11	172.673	-4.496	25	6.7	0.31	0.308	51.59	TCS-15	18.425
178325	169.035	168.897	0.11	168.787	0.248	25	6.7	0.31	0.308	51.59	TCS-15	18.425
178350	169.893	169.291	0.11	169.181	0.712	25	6.7	0.31	0.308	51.59	TCS-15	18.425
178375	170.75	170.043	0.11	169.933	0.817	25	6.7	0.31	0.308	51.59	TCS-15	18.425
178400	171.608	170.638	0.11	170.528	1.08	25	6.7	0.31	0.308	51.59	TCS-3	18.425
178425	172.465	172.175	0.11	172.065	0.4	25	6.7	0.31	0.308	51.59	TCS-3	18.425
178450	173.323	174.754	0.11	174.644	-1.321	25	6.7	0.31	0.308	51.59	TCS-3	18.425
178475	174.181	173.116	0.11	173.006	1.175	25	6.7	0.31	0.308	51.59	TCS-3	18.425
178500	175.038	185.568	0.11	185.458	-10.42	25	6.7	0.31	0.308	51.59	TCS-3	18.425
178525	175.896	184.926	0.11	184.816	-8.92	25	6.7	0.31	0.308	51.59	TCS-3	18.425
178550	176.753	177.173	0.11	177.063	-0.31	25	6.7	0.31	0.308	51.59	TCS-11	18.425
178575	177.532	185.284	0.11	185.174	-7.642	25	6.7	0.31	0.308	51.59	TCS-11	18.425
178600	177.916	177.989	0.11	177.879	0.037	25	6.7	0.31	0.308	51.59	TCS-11	18.425
178625	177.95	177.91	0.11	177.8	0.15	25	6.7	0.31	0.308	51.59	TCS-3	18.425
178650	177.965	178.146	0.11	178.036	-0.071	25	6.7	0.31	0.308	51.59	TCS-3	18.425
178675	178.314	184.182	0.11	184.072	-5.758	25		0.31	0.308		TCS-5A	
178700	179.105	196.086	0.11	195.976	-16.871	25		0.31	0.308		TCS-5A	
178725	180.02	197.583	0.11	197.473	-17.453	25		0.31	0.308		TCS-5A	
178750	180.935	181.445	0.11	181.335	-0.4	25	6.7	0.31	0.308	51.59	TCS-5	18.425
178775	181.83	181.997	0.11	181.887	-0.057	25	6.7	0.31	0.308	51.59	TCS-5	18.425
178800	182.498	197.557	0.11	197.447	-14.949	25		0.31	0.308		TCS-5A	
178825	182.904	192.021	0.11	191.911	-9.007	25		0.31	0.308		TCS-5A	
178850	183.255	183.761	0.11	183.651	-0.396	25		0.31	0.308		TCS-5A	
178875	183.606	187.018	0.11	186.908	-3.302	25		0.31	0.308		TCS-5A	
178900	183.962	193.84	0.11	193.73	-9.768	25		0.31	0.308		TCS-5A	
178925	184.567	184.304	0.11	184.194	0.373	25	6.7	0.31	0.308	51.59	TCS-4	18.425
178950	185.555	185.227	0.11	185.117	0.438	25	6.7	0.31	0.308	51.59	TCS-4	18.425
178975	186.683	190.331	0.11	190.221	-3.538	25	6.7	0.31	0.308	51.59	TCS-4	18.425
179000	187.802	187.945	0.11	187.835	-0.033	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179025	188.728	188.809	0.11	188.699	0.029	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179050	189.396	189.323	0.11	189.213	0.183	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179075	189.989	189.791	0.11	189.681	0.308	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179100	190.582	190.543	0.11	190.433	0.149	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrapped Bituminous material
179125	191.175	191.23	0.11	191.12	0.055	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179150	191.768	191.931	0.11	191.821	-0.053	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179175	192.361	192.224	0.11	192.114	0.247	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179200	192.953	192.745	0.11	192.635	0.318	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179225	193.546	193.425	0.11	193.315	0.231	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179250	194.139	194.118	0.11	194.008	0.131	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179275	194.732	196.492	0.11	196.382	-1.65	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179300	195.325	198.04	0.11	197.93	-2.605	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179325	195.918	195.064	0.11	194.954	0.964	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179350	196.511	196.618	0.11	196.508	0.003	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179375	197.104	196.98	0.11	196.87	0.234	25		0.31	0.308		TCS-3A	
179400	197.697	199.766	0.11	199.656	-1.959	25		0.31	0.308		TCS-3A	
179425	198.329	209.573	0.11	209.463	-11.134	25		0.31	0.308		TCS-3A	
179450	199.025	203.126	0.11	203.016	-3.991	25		0.31	0.308		TCS-3A	
179475	199.782	201.014	0.11	200.904	-1.122	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179500	200.553	200.19	0.11	200.08	0.473	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179525	201.324	200.828	0.11	200.718	0.606	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179550	202.076	202.068	0.11	201.958	0.118	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179575	202.741	202.68	0.11	202.57	0.171	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179600	203.313	203.169	0.11	203.059	0.254	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179625	203.859	203.359	0.11	203.249	0.61	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179650	204.405	204.353	0.11	204.243	0.162	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179675	204.95	204.858	0.11	204.748	0.202	24.5	6.7	0.31	0.308	50.56	TCS-3	18.0565
179699	205.474	205.439	0.11	205.329	0.145	24.5	6.7	0.31	0.308	50.56	TCS-3	18.0565
179724	206.019	205.874	0.11	205.764	0.255	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179749	206.606	206.197	0.11	206.087	0.519	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179774	207.432	208.853	0.11	208.743	-1.311	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179799	208.484	218.135	0.11	218.025	-9.541	25		0.31	0.308		TCS-7A	
179824	209.562	213.766	0.11	213.656	-4.094	25		0.31	0.308		TCS-7A	
179849	210.578	217.5	0.11	217.39	-6.812	25		0.31	0.308		TCS-7A	
179874	211.128	213.134	0.11	213.024	-1.896	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179899	211.2	209.556	0.11	209.446	1.754	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179924	211.2	211.642	0.11	211.532	-0.332	25	6.7	0.31	0.308	51.59	TCS-3	18.425
179949	211.2	225.889	0.11	225.779	-14.579	25		0.31	0.308		TCS-7A	
179974	211.2	229.016	0.11	228.906	-17.706	25		0.31	0.308		TCS-7A	
179999	211.245	219.888	0.11	219.778	-8.533	25	6.7	0.31	0.308	51.59	TCS-5	18.425
180024	211.53	211.137	0.11	211.027	0.503	25	6.7	0.31	0.308	51.59	TCS-5	18.425
180049	212.074	212.011	0.11	211.901	0.173	25	6.7	0.31	0.308	51.59	TCS-5	18.425
180074	212.706	218.54	0.11	218.43	-5.724	25		0.31	0.308		TCS-3A	
180099	213.337	213.474	0.11	213.364	-0.027	25		0.31	0.308		TCS-3A	
180124	213.969	214.366	0.11	214.256	-0.287	25		0.31	0.308		TCS-3A	
180149	214.601	217.075	0.11	216.965	-2.364	25		0.31	0.308		TCS-3A	
180174	215.233	216.523	0.11	216.413	-1.18	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180199	215.865	215.498	0.11	215.388	0.477	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180224	216.497	216.204	0.11	216.094	0.403	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180249	217.129	217.054	0.11	216.944	0.185	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180274	217.765	217.739	0.11	217.629	0.136	25	6.7	0.31	0.308	51.59	TCS-11	18.425
180299	218.461	218.419	0.11	218.309	0.152	25	6.7	0.31	0.308	51.59	TCS-11	18.425
180324	219.233	219.296	0.11	219.186	0.047	25	6.7	0.31	0.308	51.59	TCS-11	18.425
180349	220.081	222.744	0.11	222.634	-2.553	25		0.31	0.308		TCS-5A	
180374	221	228.475	0.11	228.365	-7.365	25		0.31	0.308		TCS-5A	
180399	221.936	228.607	0.11	228.497	-6.561	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180424	222.873	223.982	0.11	223.872	-0.999	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180449	223.809	225.424	0.11	225.314	-1.505	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180474	224.745	225.648	0.11	225.538	-0.793	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180499	225.681	227.622	0.11	227.512	-1.831	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180524	226.613	226.642	0.11	226.532	0.081	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180549	227.422	229.511	0.11	229.401	-1.979	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180574	228.056	237.824	0.11	237.714	-9.658	25		0.31	0.308		TCS-3A	
180599	228.635	235.05	0.11	234.94	-6.305	25		0.31	0.308		TCS-3A	
180624	229.213	229.061	0.11	228.951	0.262	25		0.31	0.308		TCS-3A	
180649	229.792	234.958	0.11	234.848	-5.056	25		0.31	0.308		TCS-3A	
180674	230.371	247.773	0.11	247.663	-17.292	25		0.31	0.308		TCS-7A	
180699	230.949	246.462	0.11	246.352	-15.403	25		0.31	0.308		TCS-7A	
180724	231.528	239.041	0.11	238.931	-7.403	25		0.31	0.308		TCS-3A	
180749	232.106	231.103	0.11	230.993	1.113	25		0.31	0.308		TCS-3A	
180774	232.685	234.762	0.11	234.652	-1.967	25		0.31	0.308		TCS-3A	
180799	233.265	235.471	0.11	235.361	-2.096	25		0.31	0.308		TCS-3A	
180824	233.953	233.972	0.11	233.862	0.091	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180849	234.808	234.717	0.11	234.607	0.201	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrified Bituminous material
180874	235.726	235.862	0.11	235.752	-0.026	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180899	236.643	236.578	0.11	236.468	0.175	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180924	237.561	236.84	0.11	236.73	0.831	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180949	238.478	237.656	0.11	237.546	0.932	25	6.7	0.31	0.308	51.59	TCS-3	18.425
180974	239.395	239.307	0.11	239.197	0.198	25	6.7	0.31	0.308	51.59	TCS-15	18.425
180999	240.313	256.009	0.11	255.899	-15.586	25	6.7	0.31	0.308	51.59	TCS-15	18.425
181024	241.216	266.746	0.11	266.636	-25.42	25	6.7	0.31	0.308	51.59	TCS-15	18.425
181049	241.831	242.068	0.11	241.958	-0.127	25	6.7	0.31	0.308	51.59	TCS-15	18.425
181074	242.071	241.775	0.11	241.665	0.406	25	6.7	0.31	0.308	51.59	TCS-15	18.425
181099	242.208	245.73	0.11	245.62	-3.412	25	6.7	0.31	0.308	51.59	TCS-15	18.425
181124	242.345	250.291	0.11	250.181	-7.836	25	6.7	0.31	0.308	51.59	TCS-15	18.425
181149	242.483	255.602	0.11	255.492	-13.009	25	6.7	0.31	0.308	51.59	TCS-15	18.425
181174	242.62	249.507	0.11	249.397	-6.777	25		0.31	0.308		TCS-3A	
181199	242.757	241.729	0.11	241.619	1.138	25		0.31	0.308		TCS-3A	
181224	242.895	241.984	0.11	241.874	1.021	25		0.31	0.308		TCS-3A	
181249	243.088	247.783	0.11	247.673	-4.585	25		0.31	0.308		TCS-3A	
181274	243.505	245.276	0.11	245.166	-1.661	25		0.31	0.308		TCS-3A	
181299	244.102	243.985	0.11	243.875	0.227	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181324	244.71	244.499	0.11	244.389	0.321	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181349	245.319	244.959	0.11	244.849	0.47	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181374	245.927	246.722	0.11	246.612	-0.685	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181399	246.536	249.007	0.11	248.897	-2.361	25		0.31	0.308		TCS-3A	
181424	247.144	249.885	0.11	249.775	-2.631	25		0.31	0.308		TCS-3A	
181449	247.753	249.046	0.11	248.936	-1.183	25		0.31	0.308		TCS-3A	
181474	248.361	255.458	0.11	255.348	-6.987	25		0.31	0.308		TCS-3A	
181499	248.97	249.334	0.11	249.224	-0.254	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181524	249.578	249.666	0.11	249.556	0.022	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181549	250.187	250.691	0.11	250.581	-0.394	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181574	250.796	251.137	0.11	251.027	-0.231	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181599	251.404	251.033	0.11	250.923	0.481	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181624	252.013	251.551	0.11	251.441	0.572	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181649	252.621	252.48	0.11	252.37	0.251	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181674	253.231	255.454	0.11	255.344	-2.113	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181699	253.859	253.363	0.11	253.253	0.606	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181724	254.512	253.498	0.11	253.388	1.124	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181749	255.189	255.716	0.11	255.606	-0.417	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181774	255.89	255.759	0.11	255.649	0.241	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181799	256.616	256.497	0.11	256.387	0.229	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181824	257.366	257.284	0.11	257.174	0.192	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181849	258.14	257.82	0.11	257.71	0.43	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181874	258.937	259.055	0.11	258.945	-0.008	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181899	259.739	260.566	0.11	260.456	-0.717	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181924	260.542	262.373	0.11	262.263	-1.721	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181949	261.345	261.853	0.11	261.743	-0.398	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181974	262.147	263.023	0.11	262.913	-0.766	25	6.7	0.31	0.308	51.59	TCS-3	18.425
181999	262.95	263.12	0.11	263.01	-0.06	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182024	263.752	263.543	0.11	263.433	0.319	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182049	264.555	265.692	0.11	265.582	-1.027	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182074	265.358	275.054	0.11	274.944	-9.586	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182099	266.16	268.592	0.11	268.482	-2.322	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182124	266.963	266.644	0.11	266.534	0.429	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182149	267.765	272.797	0.11	272.687	-4.922	25		0.31	0.308		TCS-3A	
182174	268.568	274.752	0.11	274.642	-6.074	25		0.31	0.308		TCS-3A	
182199	269.371	268.884	0.11	268.774	0.597	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182224	270.173	270.635	0.11	270.525	-0.352	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182249	270.976	270.415	0.11	270.305	0.671	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182274	271.779	271.469	0.11	271.359	0.42	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182299	272.581	272.272	0.11	272.162	0.419	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182324	273.384	272.766	0.11	272.656	0.728	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182349	274.186	277.188	0.11	277.078	-2.892	25		0.31	0.308		TCS-3A	
182374	274.989	277.61	0.11	277.5	-2.511	25		0.31	0.308		TCS-3A	
182399	275.792	277.791	0.11	277.681	-1.889	25		0.31	0.308		TCS-3A	
182424	276.594	276.5	0.11	276.39	0.204	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182449	277.397	277.144	0.11	277.034	0.363	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182474	278.199	281.644	0.11	281.534	-3.335	25	6.7	0.31	0.308	51.59	TCS-12	18.425
182499	279.002	284.563	0.11	284.453	-5.451	25	6.7	0.31	0.308	51.59	TCS-12	18.425
182524	279.805	279.513	0.11	279.403	0.402	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182549	280.607	283.531	0.11	283.421	-2.814	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182574	281.41	281.005	0.11	280.895	0.515	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182599	282.212	281.047	0.11	280.937	1.275	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrapped Bituminous material
182624	283.015	281.469	0.11	281.359	1.656	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182649	283.818	281.947	0.11	281.837	1.981	25	6.7	0.31	0.308	51.59	TCS-3	18.425
182674	284.62	282.896	0.11	282.786	1.834	25	6.7	0.31	0.308	51.59	TCS-7	18.425
182699	285.423	283.662	0.11	283.552	1.871	25	6.7	0.31	0.308	51.59	TCS-7	18.425
182724	286.225	284.968	0.11	284.858	1.367	25	6.7	0.31	0.308	51.59	TCS-7	18.425
182749	287.028	288.755	0.11	288.645	-1.617	25	6.7	0.31	0.308	51.59	TCS-7	18.425
182774	287.824	290.19	0.11	290.08	-2.256	25	6.7	0.31	0.308	51.59	TCS-7	18.425
182799	288.547	288.445	0.11	288.335	0.212	25	6.7	0.31	0.308	51.59	TCS-6	18.425
182824	289.179	289.012	0.11	288.902	0.277	25	6.7	0.31	0.308	51.59	TCS-6	18.425
182849	289.719	289.671	0.11	289.561	0.158	25	6.7	0.31	0.308	51.59	TCS-6	18.425
182874	290.168	290.042	0.11	289.932	0.236	25	6.7	0.31	0.308	51.59	TCS-6	18.425
182899	290.527	290.438	0.11	290.328	0.199	25	6.7	0.31	0.308	51.59	TCS-6	18.425
182924	290.794	290.496	0.11	290.386	0.408	25	6.7	0.31	0.308	51.59	TCS-7	18.425
182949	290.97	290.91	0.11	290.8	0.17	25	6.7	0.31	0.308	51.59	TCS-7	18.425
182974	291.055	290.716	0.11	290.606	0.449	25	6.7	0.31	0.308	51.59	TCS-7	18.425
182999	291.048	290.511	0.11	290.401	0.647	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183024	290.951	290.291	0.11	290.181	0.77	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183049	290.762	294.997	0.11	294.887	-4.125	25		0.31	0.308		TCS-7B	
183074	290.489	298.837	0.11	298.727	-8.238	25		0.31	0.308		TCS-7B	
183099	290.198	290.813	0.11	290.703	-0.505	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183124	289.907	289.864	0.11	289.754	0.153	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183149	289.616	290.614	0.11	290.504	-0.888	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183174	289.325	300.468	0.11	300.358	-11.033	25		0.31	0.308		TCS-7B	
183199	289.035	296.026	0.11	295.916	-6.881	25		0.31	0.308		TCS-7B	
183224	288.744	288.616	0.11	288.506	0.238	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183249	288.453	291.675	0.11	291.565	-3.112	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183274	288.162	292.701	0.11	292.591	-4.429	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183299	287.871	289.761	0.11	289.651	-1.78	25	6.7	0.31	0.308	51.59	TCS-7	18.425
183324	287.58	286.977	0.11	286.867	0.713	25	6.7	0.31	0.308	51.59	TCS-5	18.425
183349	287.289	287.442	0.11	287.332	-0.043	25	6.7	0.31	0.308	51.59	TCS-5	18.425
183374	286.998	286.934	0.11	286.824	0.174	25	6.7	0.31	0.308	51.59	TCS-5	18.425
183399	286.707	289.132	0.11	289.022	-2.315	25	6.7	0.31	0.308	51.59	TCS-5	18.425
183424	286.416	286.381	0.11	286.271	0.145	25	6.7	0.31	0.308	51.59	TCS-5	18.425
183449	286.125	286.321	0.11	286.211	-0.086	25	6.7	0.31	0.308	51.59	TCS-5	18.425
183474	285.835	286.192	0.11	286.082	-0.247	25	6.7	0.31	0.308	51.59	TCS-5	18.425
183499	285.544	296.358	0.11	296.248	-10.704	25		0.31	0.308		TCS-5A	
183524	285.253	304.938	0.11	304.828	-19.575	25		0.31	0.308		TCS-5A	
183549	284.962	286.307	0.11	286.197	-1.235	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183574	284.671	286.018	0.11	285.908	-1.237	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183599	284.38	291.344	0.11	291.234	-6.854	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183624	284.089	284.495	0.11	284.385	-0.296	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183649	283.798	283.926	0.11	283.816	-0.018	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183674	283.507	291.283	0.11	291.173	-7.666	25		0.31	0.308		TCS-3A	
183699	283.216	290.035	0.11	289.925	-6.709	25		0.31	0.308		TCS-3A	
183724	282.949	282.841	0.11	282.731	0.218	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183749	282.824	282.251	0.11	282.141	0.683	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183774	282.856	283.321	0.11	283.211	-0.355	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183799	283.037	284.361	0.11	284.251	-1.214	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183824	283.251	284.265	0.11	284.155	-0.904	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183849	283.466	283.226	0.11	283.116	0.35	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183874	283.68	283.842	0.11	283.732	-0.052	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183899	283.895	286.204	0.11	286.094	-2.199	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183924	284.109	284.043	0.11	283.933	0.176	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183949	284.323	283.478	0.11	283.368	0.955	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183974	284.538	284.988	0.11	284.878	-0.34	25	6.7	0.31	0.308	51.59	TCS-3	18.425
183999	284.752	284.792	0.11	284.682	0.07	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184024	284.967	283.794	0.11	283.684	1.283	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184049	285.181	284.088	0.11	283.978	1.203	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184074	285.396	285.45	0.11	285.34	0.056	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184099	285.61	285.474	0.11	285.364	0.246	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184124	285.824	286.054	0.11	285.944	-0.12	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184149	286.039	286.106	0.11	285.996	0.043	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184174	286.253	285.899	0.11	285.789	0.464	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184199	286.457	286.099	0.11	285.989	0.468	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184224	286.62	285.926	0.11	285.816	0.804	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184249	286.74	286.929	0.11	286.819	-0.079	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184274	286.816	293.355	0.11	293.245	-6.429	25		0.31	0.308		TCS-5A	
184299	286.848	300.798	0.11	300.688	-13.84	25		0.31	0.308		TCS-5A	
184324	286.838	289.006	0.11	288.896	-2.058	25		0.31	0.308		TCS-5A	
184349	286.784	286.514	0.11	286.404	0.38	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrapped Bituminous material
184374	286.686	286.305	0.11	286.195	0.491	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184399	286.545	286.608	0.11	286.498	0.047	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184424	286.361	285.464	0.11	285.354	1.007	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184449	286.133	285.134	0.11	285.024	1.109	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184474	285.862	286.326	0.11	286.216	-0.354	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184499	285.547	295.566	0.11	295.456	-9.909	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184524	285.189	286.874	0.11	286.764	-1.575	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184549	284.788	284.594	0.11	284.484	0.304	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184574	284.343	291.876	0.11	291.766	-7.423	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184599	283.865	286.49	0.11	286.38	-2.515	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184624	283.385	283.07	0.11	282.96	0.425	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184649	282.905	283.139	0.11	283.029	-0.124	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184674	282.425	282.35	0.11	282.24	0.185	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184699	281.945	282.328	0.11	282.218	-0.273	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184724	281.465	282.134	0.11	282.024	-0.559	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184749	280.985	281.087	0.11	280.977	0.008	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184774	280.505	280.217	0.11	280.107	0.398	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184799	280.024	279.925	0.11	279.815	0.209	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184824	279.544	279.359	0.11	279.249	0.295	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184849	279.064	278.748	0.11	278.638	0.426	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184874	278.584	277.995	0.11	277.885	0.699	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184899	278.104	277.065	0.11	276.955	1.149	25	6.7	0.31	0.308	51.59	TCS-3	18.425
184924	277.624	281.79	0.11	281.68	-4.056	25	6.7	0.31	0.308	51.59	TCS-5	18.425
184949	277.144	281.962	0.11	281.852	-4.708	25	6.7	0.31	0.308	51.59	TCS-5	18.425
184974	276.664	276.108	0.11	275.998	0.666	25	6.7	0.31	0.308	51.59	TCS-5	18.425
184999	276.184	275.227	0.11	275.117	1.067	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185024	275.704	275.979	0.11	275.869	-0.165	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185049	275.224	274.642	0.11	274.532	0.692	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185074	274.744	274.411	0.11	274.301	0.443	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185099	274.264	274.287	0.11	274.177	0.087	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185124	273.867	273.939	0.11	273.829	0.038	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185149	273.689	273.372	0.11	273.262	0.427	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185174	273.731	274.079	0.11	273.969	-0.238	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185199	273.992	273.992	0.11	273.882	0.11	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185224	274.389	275.764	0.11	275.654	-1.265	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185249	274.788	276.898	0.11	276.788	-2	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185274	275.187	277.209	0.11	277.099	-1.912	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185299	275.586	275.602	0.11	275.492	0.094	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185324	275.985	276.459	0.11	276.349	-0.364	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185349	276.384	276.899	0.11	276.789	-0.405	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185374	276.782	276.999	0.11	276.889	-0.107	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185399	277.181	277.213	0.11	277.103	0.078	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185424	277.58	277.567	0.11	277.457	0.123	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185449	277.979	278.157	0.11	278.047	-0.068	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185474	278.378	278.194	0.11	278.084	0.294	25	6.7	0.31	0.308	51.59	TCS-5	18.425
185499	278.736	286.14	0.11	286.03	-7.294	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185524	278.953	285.893	0.11	285.783	-6.83	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185549	279.065	278.778	0.11	278.668	0.397	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185574	279.172	278.808	0.11	278.698	0.474	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185599	279.28	279.117	0.11	279.007	0.273	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185624	279.387	279.265	0.11	279.155	0.232	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185649	279.495	279.342	0.11	279.232	0.263	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185674	279.602	279.304	0.11	279.194	0.408	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185699	279.709	279.652	0.11	279.542	0.167	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185724	279.817	279.993	0.11	279.883	-0.066	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185749	279.896	293.124	0.11	293.014	-13.118	25		0.31	0.308		TCS-3A	
185774	279.83	286.211	0.11	286.101	-6.271	25		0.31	0.308		TCS-3A	
185799	279.632	279.478	0.11	279.368	0.264	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185824	279.421	278.95	0.11	278.84	0.581	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185849	279.21	284.748	0.11	284.638	-5.428	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185874	278.999	278.32	0.11	278.21	0.789	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185899	278.788	280.143	0.11	280.033	-1.245	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185924	278.578	278.739	0.11	278.629	-0.051	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185949	278.371	278.251	0.11	278.141	0.23	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185974	278.276	278.141	0.11	278.031	0.245	25	6.7	0.31	0.308	51.59	TCS-3	18.425
185999	278.335	279.948	0.11	279.838	-1.503	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186024	278.494	280.455	0.11	280.345	-1.851	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186049	278.655	279.374	0.11	279.264	-0.609	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186074	278.815	279.036	0.11	278.926	-0.111	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186099	278.975	279.026	0.11	278.916	0.059	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrapped Bituminous material
186124	279.136	279.046	0.11	278.936	0.2	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186149	279.296	279.246	0.11	279.136	0.16	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186174	279.457	282.036	0.11	281.926	-2.469	25		0.31	0.308		TCS-3A	
186199	279.617	285.313	0.11	285.203	-5.586	25		0.31	0.308		TCS-3A	
186224	279.797	279.723	0.11	279.613	0.184	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186249	280.244	282.221	0.11	282.111	-1.867	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186274	281.016	280.998	0.11	280.888	0.128	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186299	281.865	281.292	0.11	281.182	0.683	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186324	282.713	282.326	0.11	282.216	0.497	25	6.7	0.31	0.308	51.59	TCS-12	18.425
186349	283.552	283.39	0.11	283.28	0.272	25	6.7	0.31	0.308	51.59	TCS-12	18.425
186374	283.977	284.3	0.11	284.19	-0.213	25	6.7	0.31	0.308	51.59	TCS-12	18.425
186399	283.774	284.22	0.11	284.11	-0.336	25	6.7	0.31	0.308	51.59	TCS-12	18.425
186424	282.988	283.064	0.11	282.954	0.034	25	6.7	0.31	0.308	51.59	TCS-12	18.425
186449	282.079	281.926	0.11	281.816	0.263	25	6.7	0.31	0.308	51.59	TCS-12	18.425
186474	281.17	280.704	0.11	280.594	0.576	25	6.7	0.31	0.308	51.59	TCS-12	18.425
186499	280.261	279.916	0.11	279.806	0.455	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186524	279.353	279.381	0.11	279.271	0.082	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186549	278.532	285.956	0.11	285.846	-7.314	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186574	277.865	280.761	0.11	280.651	-2.786	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186599	277.344	280.761	0.11	280.651	-3.307	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186624	276.863	276.925	0.11	276.815	0.048	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186649	276.382	282.781	0.11	282.671	-6.289	25		0.31	0.308		TCS-3A	
186674	275.901	279.315	0.11	279.205	-3.304	25		0.31	0.308		TCS-3A	
186699	275.42	281.854	0.11	281.744	-6.324	25		0.31	0.308		TCS-3A	
186724	274.94	286.365	0.11	286.255	-11.315	25		0.31	0.308		TCS-3A	
186749	274.459	274.176	0.11	274.066	0.393	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186774	273.978	273.884	0.11	273.774	0.204	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186799	273.448	273.226	0.11	273.116	0.332	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186824	272.716	271.351	0.11	271.241	1.475	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186849	271.77	280.194	0.11	280.084	-8.314	25		0.31	0.308		TCS-3A	
186874	270.611	284.598	0.11	284.488	-13.877	25		0.31	0.308		TCS-3A	
186899	269.361	284.417	0.11	284.307	-14.946	25		0.31	0.308		TCS-3A	
186924	268.111	279.484	0.11	279.374	-11.263	25		0.31	0.308		TCS-3A	
186949	266.861	267.028	0.11	266.918	-0.057	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186974	265.611	265.24	0.11	265.13	0.481	25	6.7	0.31	0.308	51.59	TCS-3	18.425
186999	264.361	277.75	0.11	277.64	-13.279	25	6.7	0.31	0.308	51.59	TCS-12	18.425
187024	263.227	280.291	0.11	280.181	-16.954	25	6.7	0.31	0.308	51.59	TCS-12	18.425
187049	262.362	264.772	0.11	264.662	-2.3	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187074	261.73	262.104	0.11	261.994	-0.264	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187099	261.127	260.542	0.11	260.432	0.695	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187124	260.525	260.56	0.11	260.45	0.075	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187149	259.923	271.328	0.11	271.218	-11.295	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
187174	259.32	265.129	0.11	265.019	-5.699	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
187199	258.718	258.781	0.11	258.671	0.047	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187224	258.115	258.192	0.11	258.082	0.033	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187249	257.513	257.788	0.11	257.678	-0.165	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187274	256.911	256.066	0.11	255.956	0.955	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187299	256.308	255.398	0.11	255.288	1.02	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187324	255.714	254.82	0.11	254.71	1.004	25	6.7	0.31	0.308	51.59	TCS-4	18.425
187349	255.203	254.464	0.11	254.354	0.849	25	6.7	0.31	0.308	51.59	TCS-4	18.425
187374	254.794	264.309	0.11	264.199	-9.405	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187399	254.435	253.863	0.11	253.753	0.682	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187424	254.076	253.634	0.11	253.524	0.552	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187449	253.717	262.037	0.11	261.927	-8.21	25		0.31	0.308		TCS-3A	
187474	253.358	265.774	0.11	265.664	-12.306	25		0.31	0.308		TCS-3A	
187499	252.999	255.185	0.11	255.075	-2.076	25		0.31	0.308		TCS-3A	
187524	252.64	261.609	0.11	261.499	-8.859	25		0.31	0.308		TCS-3A	
187549	252.281	254.383	0.11	254.273	-1.992	25		0.31	0.308		TCS-3A	
187574	251.922	250.89	0.11	250.78	1.142	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187599	251.563	251.376	0.11	251.266	0.297	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187624	251.204	252.886	0.11	252.776	-1.572	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187649	250.845	252.003	0.11	251.893	-1.048	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187674	250.386	261.402	0.11	261.292	-10.906	25		0.31	0.308		TCS-3A	
187699	249.726	263.294	0.11	263.184	-13.458	25		0.31	0.308		TCS-3A	
187724	248.965	248.176	0.11	248.066	0.899	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187749	248.204	249.245	0.11	249.135	-0.931	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187774	247.443	265.675	0.11	265.565	-18.122	25		0.31	0.308		TCS-7A	
187799	246.682	254.008	0.11	253.898	-7.216	25		0.31	0.308		TCS-7A	
187824	245.921	246.442	0.11	246.332	-0.411	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187849	245.16	245.301	0.11	245.191	-0.031	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrapped Bituminous material
187874	244.399	244.191	0.11	244.081	0.318	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187899	243.638	244.655	0.11	244.545	-0.907	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187924	242.877	248.985	0.11	248.875	-5.998	25	6.7	0.31	0.308	51.59	TCS-3	18.425
187949	242.116	248.921	0.11	248.811	-6.695	25		0.31	0.308		TCS-3A	
187974	241.355	248.41	0.11	248.3	-6.945	25		0.31	0.308		TCS-3A	
187999	240.594	241.626	0.11	241.516	-0.922	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188024	239.833	238.665	0.11	238.555	1.278	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188049	239.096	237.711	0.11	237.601	1.495	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188074	238.392	237.167	0.11	237.057	1.335	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188099	237.72	237.052	0.11	236.942	0.778	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188124	237.081	237.3	0.11	237.19	-0.109	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188149	236.474	237.229	0.11	237.119	-0.645	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188174	235.9	237.141	0.11	237.031	-1.131	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188199	235.359	237.591	0.11	237.481	-2.122	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188224	234.85	235.498	0.11	235.388	-0.538	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188249	234.373	234.835	0.11	234.725	-0.352	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188274	233.929	236.51	0.11	236.4	-2.471	25		0.31	0.308		TCS-3A	
188299	233.518	240.951	0.11	240.841	-7.323	25		0.31	0.308		TCS-3A	
188324	233.138	232.309	0.11	232.199	0.939	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188349	232.768	232.092	0.11	231.982	0.786	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188374	232.398	231.927	0.11	231.817	0.581	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188399	232.028	231.395	0.11	231.285	0.743	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188424	231.658	236.151	0.11	236.041	-4.383	25		0.31	0.308		TCS-3A	
188449	231.287	230.576	0.11	230.466	0.821	25		0.31	0.308		TCS-3A	
188474	230.917	230.298	0.11	230.188	0.729	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188499	230.547	236.258	0.11	236.148	-5.601	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188524	230.177	229.462	0.11	229.352	0.825	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188549	229.806	229.709	0.11	229.599	0.207	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188574	229.436	229.474	0.11	229.364	0.072	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188599	229.066	229.055	0.11	228.945	0.121	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188624	228.696	229.019	0.11	228.909	-0.213	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188649	228.325	228.35	0.11	228.24	0.085	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188674	227.955	228.144	0.11	228.034	-0.079	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188699	227.585	227.781	0.11	227.671	-0.086	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188724	227.215	228.703	0.11	228.593	-1.378	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188749	226.845	230.024	0.11	229.914	-3.069	25		0.31	0.308		TCS-3A	
188774	226.474	236.894	0.11	236.784	-10.31	25		0.31	0.308		TCS-3A	
188799	226.104	229.643	0.11	229.533	-3.429	25		0.31	0.308		TCS-3A	
188824	225.734	224.709	0.11	224.599	1.135	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188849	225.364	224.145	0.11	224.035	1.329	25	6.7	0.31	0.308	51.59	TCS-3	18.425
188874	224.993	223.91	0.11	223.8	1.193	25	6.7	0.31	0.308	51.59	TCS-4	18.425
188899	224.623	225.862	0.11	225.752	-1.129	25	6.7	0.31	0.308	51.59	TCS-4	18.425
188924	224.253	233.049	0.11	232.939	-8.686	25	6.7	0.31	0.308	51.59	TCS-4	18.425
188949	223.883	226.119	0.11	226.009	-2.126	25	6.7	0.31	0.308	51.59	TCS-4	18.425
188974	223.512	222.668	0.11	222.558	0.954	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
188999	223.142	223.772	0.11	223.662	-0.52	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
189024	222.772	233.907	0.11	233.797	-11.025	25	6.7	0.31	0.308	51.59	TCS-3	18.425
189049	222.402	232.449	0.11	232.339	-9.937	25	6.7	0.31	0.308	51.59	TCS-3	18.425
189074	222.032	222.376	0.11	222.266	-0.234	25	6.7	0.31	0.308	51.59	TCS-3	18.425
189099	221.574	222.254	0.11	222.144	-0.57	25	6.7	0.31	0.308	51.59	TCS-3	18.425
189124	220.867	226.052	0.11	225.942	-5.075	25		0.31	0.308		TCS-7B	
189149	219.997	229.336	0.11	229.226	-9.229	25		0.31	0.308		TCS-7B	
189174	219.123	220.144	0.11	220.034	-0.911	25		0.31	0.308		TCS-7B	
189199	218.249	218.507	0.11	218.397	-0.148	25		0.31	0.308		TCS-7B	
189224	217.375	221.759	0.11	221.649	-4.274	25		0.31	0.308		TCS-7B	
189249	216.501	220.678	0.11	220.568	-4.067	25		0.31	0.308		TCS-7B	
189274	215.661	215.415	0.11	215.305	0.356	25	6.7	0.31	0.308	51.59	TCS-3	18.425
189299	215.126	218.227	0.11	218.117	-2.991	25	6.7	0.31	0.308	51.59	TCS-3	18.425
189324	214.954	215.896	0.11	215.786	-0.832	25	6.7	0.31	0.308	51.59	TCS-3	18.425
189349	214.954	215.017	0.11	214.907	0.047	25	6.7	0.31	0.308	51.59	TCS-3	18.425
189374	214.898	218.866	0.11	218.756	-3.858	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
189399	214.45	223.926	0.11	223.816	-9.366	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
189424	213.558	225.038	0.11	224.928	-11.37	25	6.7	0.31	0.308	51.59	TCS-11A	18.425
189449	212.485	212.216	0.11	212.106	0.379	25		0.31	0.308		TCS-3A	
189474	211.411	213.611	0.11	213.501	-2.09	25		0.31	0.308		TCS-3A	
189499	210.338	211.162	0.11	211.052	-0.714	25		0.31	0.308		TCS-3A	
189524	209.265	217.068	0.11	216.958	-7.693	25		0.31	0.308		TCS-3A	
189549	208.192	208.45	0.11	208.34	-0.148	25		0.31	0.308		TCS-7B	
189574	207.119	207.029	0.11	206.919	0.2	25		0.31	0.308		TCS-7B	
189599	206.041	206.126	0.11	206.016	0.025	25		0.31	0.308		TCS-7B	



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	Scrapped Bituminous material
189624	204.911	217.757	0.11	217.647	-12.736	25		0.31	0.308		TCS-7B	
189649	203.718	203.811	0.11	203.701	0.017	25		0.31	0.308		TCS-7B	
189674	202.473	205.277	0.11	205.167	-2.694	25		0.31	0.308		TCS-7B	
189699	201.223	207.614	0.11	207.504	-6.281	25		0.31	0.308		TCS-7B	
189724	199.973	200.492	0.11	200.382	-0.409	25		0.31	0.308		TCS-7B	
189749	198.723	209.477	0.11	209.367	-10.644	25		0.31	0.308		TCS-7B	
189774	197.473	204.837	0.11	204.727	-7.254	25		0.31	0.308		TCS-7B	
189799	196.223	197.638	0.11	197.528	-1.305	25		0.31	0.308		TCS-7B	
189824	194.973	197.415	0.11	197.305	-2.332	25		0.31	0.308		TCS-7B	
189849	193.9	212.055	0.11	211.945	-18.045	25		0.31	0.308		TCS-7B	
189874	193.434	194.014	0.11	193.904	-0.47	25		0.31	0.308		TCS-7B	
189899	193.415	190.252	0.11	190.142	3.273	25		0.31	0.308		TCS-7B	
189924	193.407	191.859	0.11	191.749	1.658	25		0.31	0.308		TCS-7B	
189949	193.058	202.041	0.11	201.931	-8.873	25		0.31	0.308		TCS-7B	
189974	192.189	203.852	0.11	203.742	-11.553	25		0.31	0.308		TCS-7B	
189999	190.953	188.384	0.11	188.274	2.679	25		0.31	0.308		TCS-7B	
190024	189.703	186.817	0.11	186.707	2.996	25		0.31	0.308		TCS-7B	
190049	188.453	186.091	0.11	185.981	2.472	25		0.31	0.308		TCS-7B	
190074	187.203	184.688	0.11	184.578	2.625	25	6.7	0.31	0.308	51.59	TCS-7	18.425
190099	185.953	184.373	0.11	184.263	1.69	25	6.7	0.31	0.308	51.59	TCS-7	18.425
190124	184.734	183.652	0.11	183.542	1.192	25	6.7	0.31	0.308	51.59	TCS-7	18.425
190149	183.612	183.226	0.11	183.116	0.496	25	6.7	0.31	0.308	51.59	TCS-7	18.425
190174	182.587	183.19	0.11	183.08	-0.493	25	6.7	0.31	0.308	51.59	TCS-7	18.425
190199	181.662	182.31	0.11	182.2	-0.538	25	6.7	0.31	0.308	51.59	TCS-7	18.425
190224	180.834	180.982	0.11	180.872	-0.038	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190249	180.105	180.093	0.11	179.983	0.122	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190274	179.474	179.581	0.11	179.471	0.003	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190299	178.942	179.024	0.11	178.914	0.028	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190324	178.476	178.303	0.11	178.193	0.283	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190349	178.012	177.72	0.11	177.61	0.402	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190374	177.549	177.217	0.11	177.107	0.442	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190399	177.085	180.594	0.11	180.484	-3.399	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190424	176.621	184.947	0.11	184.837	-8.216	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190449	176.158	177.129	0.11	177.019	-0.861	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190474	175.694	176.652	0.11	176.542	-0.848	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190499	175.231	175.844	0.11	175.734	-0.503	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190524	174.767	175.027	0.11	174.917	-0.15	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190549	174.303	174.181	0.11	174.071	0.232	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190574	173.84	173.71	0.11	173.6	0.24	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190599	173.376	173.32	0.11	173.21	0.166	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190624	172.906	172.806	0.11	172.696	0.21	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190649	172.391	172.192	0.11	172.082	0.309	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190674	171.825	172.489	0.11	172.379	-0.554	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190699	171.208	174.22	0.11	174.11	-2.902	25		0.31	0.308		TCS-3A	
190724	170.541	177.654	0.11	177.544	-7.003	25		0.31	0.308		TCS-3A	
190749	169.823	171.739	0.11	171.629	-1.806	25		0.31	0.308		TCS-3A	
190774	169.053	175.865	0.11	175.755	-6.702	25	6.7	0.31	0.308	51.59	TCS-12	18.425
190799	168.233	182.242	0.11	182.132	-13.899	25	6.7	0.31	0.308	51.59	TCS-12	18.425
190824	167.369	166.299	0.11	166.189	1.18	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190849	166.498	165.114	0.11	165.004	1.494	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190874	165.627	164.405	0.11	164.295	1.332	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190899	164.757	177.469	0.11	177.359	-12.602	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190924	163.886	163.314	0.11	163.204	0.682	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190949	163.015	162.966	0.11	162.856	0.159	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190974	162.145	162.436	0.11	162.326	-0.181	25	6.7	0.31	0.308	51.59	TCS-3	18.425
190999	161.274	161.591	0.11	161.481	-0.207	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191024	160.403	161.147	0.11	161.037	-0.634	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191049	159.533	167.798	0.11	167.688	-8.155	25		0.31	0.308		TCS-3A	
191074	158.662	159.916	0.11	159.806	-1.144	25		0.31	0.308		TCS-3A	
191099	157.791	159.031	0.11	158.921	-1.13	25		0.31	0.308		TCS-3A	
191124	156.921	160.21	0.11	160.1	-3.179	25		0.31	0.308		TCS-3A	
191149	156.05	172.002	0.11	171.892	-15.842	25		0.31	0.308		TCS-7A	
191174	155.179	185.445	0.11	185.335	-30.156	25		0.31	0.308		TCS-7A	
191199	154.309	167.175	0.11	167.065	-12.756	25		0.31	0.308		TCS-7A	
191224	153.438	155.305	0.11	155.195	-1.757	25		0.31	0.308		TCS-7A	
191249	152.567	154.512	0.11	154.402	-1.835	25		0.31	0.308		TCS-7A	
191274	151.697	161.249	0.11	161.139	-9.442	25		0.31	0.308		TCS-7A	
191299	150.826	151.741	0.11	151.631	-0.805	25		0.31	0.308		TCS-3A	
191324	150.032	150.96	0.11	150.85	-0.818	25		0.31	0.308		TCS-3A	
191349	149.637	150.323	0.11	150.213	-0.576	25		0.31	0.308		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	Scrified Bituminous material
191374	149.602	149.442	0.11	149.332	0.27	25		0.31	0.308		TCS-3A	
191399	149.508	152.949	0.11	152.839	-3.331	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191424	149.053	148.57	0.11	148.46	0.593	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191449	148.31	147.682	0.11	147.572	0.738	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191474	147.55	147.124	0.11	147.014	0.536	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191499	146.79	146.691	0.11	146.581	0.209	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191524	146.031	149.803	0.11	149.693	-3.662	25		0.31	0.308		TCS-3A	
191549	145.271	159.92	0.11	159.81	-14.539	25		0.31	0.308		TCS-3A	
191574	144.511	144.521	0.11	144.411	0.1	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191599	143.751	145.513	0.11	145.403	-1.652	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191624	142.992	149.462	0.11	149.352	-6.36	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191649	142.232	142.059	0.11	141.949	0.283	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191674	141.472	142.396	0.11	142.286	-0.814	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191699	140.712	143.282	0.11	143.172	-2.46	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191724	139.952	140.838	0.11	140.728	-0.776	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191749	139.193	139.492	0.11	139.382	-0.189	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191774	138.433	138.951	0.11	138.841	-0.408	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191799	137.673	143.87	0.11	143.76	-6.087	25	6.7	0.31	0.308	51.59	TCS-12	18.425
191824	136.913	148.367	0.11	148.257	-11.344	25	6.7	0.31	0.308	51.59	TCS-12	18.425
191849	136.154	134.87	0.11	134.76	1.394	25	6.7	0.31	0.308	51.59	TCS-12	18.425
191874	135.394	133.347	0.11	133.237	2.157	25	6.7	0.31	0.308	51.59	TCS-12	18.425
191899	134.634	136.012	0.11	135.902	-1.268	25	6.7	0.31	0.308	51.59	TCS-12	18.425
191924	133.874	153.314	0.11	153.204	-19.33	25	6.7	0.31	0.308	51.59	TCS-12	18.425
191949	133.115	142.338	0.11	142.228	-9.113	25	6.7	0.31	0.308	51.59	TCS-12	18.425
191974	132.355	132.144	0.11	132.034	0.321	25	6.7	0.31	0.308	51.59	TCS-3	18.425
191999	131.595	131.976	0.11	131.866	-0.271	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192024	130.829	139.811	0.11	139.701	-8.872	25	6.7	0.31	0.308	51.59	TCS-12	18.425
192049	129.894	146.474	0.11	146.364	-16.47	25	6.7	0.31	0.308	51.59	TCS-12	18.425
192074	128.719	142.841	0.11	142.731	-14.012	25	6.7	0.31	0.308	51.59	TCS-12	18.425
192099	127.469	128.418	0.11	128.308	-0.839	25		0.31	0.308		TCS-8	
192124	126.219	124.09	0.11	123.98	2.239	25		0.31	0.308		TCS-8	
192149	124.969	121.761	0.11	121.651	3.318	25		0.31	0.308		TCS-8	
192174	123.719	132.736	0.11	132.626	-8.907	25	6.7	0.31	0.308	51.59	TCS-12	18.425
192199	122.469	132.165	0.11	132.055	-9.586	25	6.7	0.31	0.308	51.59	TCS-12	18.425
192224	121.219	118.578	0.11	118.468	2.751	25	6.7	0.31	0.308	51.59	TCS-4	18.425
192249	119.969	117.953	0.11	117.843	2.126	25	6.7	0.31	0.308	51.59	TCS-4	18.425
192274	118.719	120.269	0.11	120.159	-1.44	25	6.7	0.31	0.308	51.59	TCS-4	18.425
192299	117.469	125.52	0.11	125.41	-7.941	25		0.31	0.308		TCS-3A	
192324	116.219	120.846	0.11	120.736	-4.517	25		0.31	0.308		TCS-3A	
192349	114.997	115.208	0.11	115.098	-0.101	25	6.7	0.31	0.308	51.59	TCS-5	18.425
192374	114.08	114.294	0.11	114.184	-0.104	25	6.7	0.31	0.308	51.59	TCS-5	18.425
192399	113.54	113.887	0.11	113.777	-0.237	25	6.7	0.31	0.308	51.59	TCS-5	18.425
192424	113.313	113.611	0.11	113.501	-0.188	25	6.7	0.31	0.308	51.59	TCS-5	18.425
192449	113.118	113.468	0.11	113.358	-0.24	25	6.7	0.31	0.308	51.59	TCS-5	18.425
192474	112.924	113.131	0.11	113.021	-0.097	25	6.7	0.31	0.308	51.59	TCS-5	18.425
192499	112.73	112.858	0.11	112.748	-0.018	25	6.7	0.31	0.308	51.59	TCS-5	18.425
192524	112.535	112.44	0.11	112.33	0.205	25	6.7	0.31	0.308	51.59	TCS-5	18.425
192549	112.341	112.285	0.11	112.175	0.166	25		0.31	0.308		TCS-5A	
192574	112.147	121.84	0.11	121.73	-9.583	25		0.31	0.308		TCS-5A	
192599	111.952	111.092	0.11	110.982	0.97	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192624	111.758	114.528	0.11	114.418	-2.66	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192649	111.563	111.133	0.11	111.023	0.54	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192674	111.369	110.973	0.11	110.863	0.506	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192699	111.175	112.986	0.11	112.876	-1.701	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192724	110.98	111.048	0.11	110.938	0.042	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192749	110.786	110.296	0.11	110.186	0.6	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192774	110.592	116.706	0.11	116.596	-6.004	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192799	110.397	114.796	0.11	114.686	-4.289	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192824	110.203	113.53	0.11	113.42	-3.217	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192849	110.009	111.167	0.11	111.057	-1.048	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192874	109.814	108.985	0.11	108.875	0.939	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192899	109.62	121.76	0.11	121.65	-12.03	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192924	109.425	109.193	0.11	109.083	0.342	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192949	109.231	108.619	0.11	108.509	0.722	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192974	109.037	113.322	0.11	113.212	-4.175	25	6.7	0.31	0.308	51.59	TCS-3	18.425
192999	108.842	108.605	0.11	108.495	0.347	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193024	108.648	108.238	0.11	108.128	0.52	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193049	108.454	107.742	0.11	107.632	0.822	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193074	108.255	107.732	0.11	107.622	0.633	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193099	107.965	107.852	0.11	107.742	0.223	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrapped Bituminous material
193124	107.548	107.367	0.11	107.257	0.291	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193149	107.014	106.632	0.11	106.522	0.492	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193174	106.462	105.995	0.11	105.885	0.577	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193199	105.909	105.448	0.11	105.338	0.571	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193224	105.356	104.823	0.11	104.713	0.643	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193249	104.803	104.395	0.11	104.285	0.518	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193274	104.25	103.901	0.11	103.791	0.459	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193299	103.698	103.065	0.11	102.955	0.743	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193324	103.145	103.125	0.11	103.015	0.13	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193349	102.592	111.15	0.11	111.04	-8.448	25		0.31	0.308		TCS-7A	
193374	102.039	117.003	0.11	116.893	-14.854	25		0.31	0.308		TCS-7A	
193399	101.487	115.523	0.11	115.413	-13.926	25		0.31	0.308		TCS-7A	
193424	100.934	108.565	0.11	108.455	-7.521	25		0.31	0.308		TCS-7A	
193449	100.381	110.123	0.11	110.013	-9.632	25		0.31	0.308		TCS-7A	
193474	99.828	101.107	0.11	100.997	-1.169	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193499	99.275	99.295	0.11	99.185	0.09	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193524	98.723	98.923	0.11	98.813	-0.09	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193549	98.17	98.406	0.11	98.296	-0.126	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193574	97.617	100.957	0.11	100.847	-3.23	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193599	97.064	99.063	0.11	98.953	-1.889	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193624	96.511	96.81	0.11	96.7	-0.189	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193649	95.959	95.655	0.11	95.545	0.414	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193674	95.406	95.411	0.11	95.301	0.105	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193699	94.853	95.194	0.11	95.084	-0.231	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193724	94.3	94.723	0.11	94.613	-0.313	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193749	93.747	94.111	0.11	94.001	-0.254	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193774	93.195	93.444	0.11	93.334	-0.139	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193799	92.642	98.29	0.11	98.18	-5.538	25		0.31	0.308		TCS-3A	
193824	92.089	98.067	0.11	97.957	-5.868	25		0.31	0.308		TCS-3A	
193849	91.536	93.371	0.11	93.261	-1.725	25		0.31	0.308		TCS-3A	
193874	90.983	91.63	0.11	91.52	-0.537	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193899	90.431	91.7	0.11	91.59	-1.159	25	6.7	0.31	0.308	51.59	TCS-3	18.425
193924	89.878	91.311	0.11	91.201	-1.323	25		0.31	0.308		TCS-7A	
193949	89.325	97.435	0.11	97.325	-8	25		0.31	0.308		TCS-7A	
193974	88.772	107.133	0.11	107.023	-18.251	25		0.31	0.308		TCS-7A	
193999	88.22	115.914	0.11	115.804	-27.584	25		0.31	0.308		TCS-7A	
194024	87.667	101.286	0.11	101.176	-13.509	25		0.31	0.308		TCS-7A	
194049	87.114	88.228	0.11	88.118	-1.004	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194074	86.561	87.743	0.11	87.633	-1.072	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194099	86.008	94.409	0.11	94.299	-8.291	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194124	85.456	93.769	0.11	93.659	-8.203	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194149	84.903	90.814	0.11	90.704	-5.801	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194174	84.35	100.637	0.11	100.527	-16.177	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194199	83.803	97.374	0.11	97.264	-13.461	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194224	83.446	85.847	0.11	85.737	-2.291	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194249	83.359	82.696	0.11	82.586	0.773	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194274	83.359	82.612	0.11	82.502	0.857	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194299	83.023	89.325	0.11	89.215	-6.192	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194324	82.063	80.934	0.11	80.824	1.239	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194349	80.813	78.433	0.11	78.323	2.49	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194374	79.563	78.005	0.11	77.895	1.668	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194399	78.329	77.651	0.11	77.541	0.788	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194424	77.269	77.248	0.11	77.138	0.131	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194449	76.425	76.41	0.11	76.3	0.125	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194474	75.762	75.321	0.11	75.211	0.551	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194499	75.118	74.967	0.11	74.857	0.261	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194524	74.473	74.43	0.11	74.32	0.153	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194549	73.829	73.926	0.11	73.816	0.013	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194574	73.185	73.284	0.11	73.174	0.011	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194599	72.541	72.555	0.11	72.445	0.096	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194624	71.897	75.871	0.11	75.761	-3.864	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194649	71.253	85.253	0.11	85.143	-13.89	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194674	70.609	90.514	0.11	90.404	-19.795	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194699	69.871	77.252	0.11	77.142	-7.271	25	6.7	0.31	0.308	51.59	TCS-12	18.425
194724	68.836	69.151	0.11	69.041	-0.205	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194749	67.593	67.19	0.11	67.08	0.513	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194774	66.343	65.768	0.11	65.658	0.685	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194799	65.093	72.276	0.11	72.166	-7.073	25		0.31	0.308		TCS-3A	
194824	63.843	69.498	0.11	69.388	-5.545	25		0.31	0.308		TCS-3A	
194849	62.652	61.969	0.11	61.859	0.793	25	6.7	0.31	0.308	51.59	TCS-3	18.425

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	Scrified Bituminous material
194874	61.571	61.213	0.11	61.103	0.468	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194899	60.598	67.197	0.11	67.087	-6.489	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194924	59.736	60.585	0.11	60.475	-0.739	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194949	58.982	60.619	0.11	60.509	-1.527	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194974	58.338	71.97	0.11	71.86	-13.522	25	6.7	0.31	0.308	51.59	TCS-3	18.425
194999	57.803	57.5	0.11	57.39	0.413	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195024	57.378	56.966	0.11	56.856	0.522	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195049	57.003	56.344	0.11	56.234	0.769	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195074	56.628	58.62	0.11	58.51	-1.882	25		0.31	0.308		TCS-3A	
195099	56.253	60.741	0.11	60.631	-4.378	25		0.31	0.308		TCS-3A	
195124	55.878	65.903	0.11	65.793	-9.915	25		0.31	0.308		TCS-3A	
195149	55.468	55.031	0.11	54.921	0.547	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195174	54.943	54.13	0.11	54.02	0.923	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195199	54.335	71.331	0.11	71.221	-16.886	25		0.31	0.308		TCS-7A	
195224	53.723	75.83	0.11	75.72	-21.997	25		0.31	0.308		TCS-7A	
195249	53.111	69.56	0.11	69.45	-16.339	25		0.31	0.308		TCS-7A	
195274	52.5	53.203	0.11	53.093	-0.593	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195299	51.888	51.652	0.11	51.542	0.346	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195324	51.277	50.286	0.11	50.176	1.101	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195349	50.665	49.689	0.11	49.579	1.086	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195374	50.054	49.455	0.11	49.345	0.709	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195399	49.442	48.706	0.11	48.596	0.846	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195424	48.831	48.221	0.11	48.111	0.72	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195449	48.219	47.548	0.11	47.438	0.781	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195474	47.607	49.239	0.11	49.129	-1.522	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195499	46.996	46.818	0.11	46.708	0.288	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195524	46.384	46.425	0.11	46.315	0.069	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195549	45.773	46.175	0.11	46.065	-0.292	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195574	45.161	45.284	0.11	45.174	-0.013	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195599	44.55	44.803	0.11	44.693	-0.143	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195624	43.938	44.687	0.11	44.577	-0.639	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195649	43.327	44.747	0.11	44.637	-1.31	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195674	42.715	44.518	0.11	44.408	-1.693	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195699	42.103	43.17	0.11	43.06	-0.957	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195724	41.495	47.468	0.11	47.358	-5.863	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195749	41.082	40.529	0.11	40.419	0.663	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195774	40.971	40.043	0.11	39.933	1.038	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195799	40.971	40.982	0.11	40.872	0.099	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195824	41.111	41.295	0.11	41.185	-0.074	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195849	41.635	41.76	0.11	41.65	-0.015	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195874	42.551	42.647	0.11	42.537	0.014	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195899	43.776	43.844	0.11	43.734	0.042	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195924	45.026	45.719	0.11	45.609	-0.583	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195949	46.276	47.82	0.11	47.71	-1.434	25	6.7	0.31	0.308	51.59	TCS-3	18.425
195974	47.526	49.565	0.11	49.455	-1.929	25	6.7	0.31	0.308	51.59	TCS-12	18.425
195999	48.776	53.303	0.11	53.193	-4.417	25	6.7	0.31	0.308	51.59	TCS-12	18.425
196024	49.757	53.114	0.11	53.004	-3.247	25	6.7	0.31	0.308	51.59	TCS-12	18.425
196049	50.12	50.153	0.11	50.043	0.077	25	6.7	0.31	0.308	51.59	TCS-4	18.425
196074	49.869	49.302	0.11	49.192	0.677	25	6.7	0.31	0.308	51.59	TCS-4	18.425
196099	49.385	49.055	0.11	48.945	0.44	25	6.7	0.31	0.308	51.59	TCS-4	18.425
196124	48.901	46.753	0.11	46.643	2.258	25	6.7	0.31	0.308	51.59	TCS-4	18.425
196149	48.435	49.242	0.11	49.132	-0.697	25	6.7	0.31	0.308	51.59	TCS-4	18.425
196174	48.086	63.806	0.11	63.696	-15.61	25		0.31	0.308		TCS-3A	
196199	47.867	55.873	0.11	55.763	-7.896	25		0.31	0.308		TCS-3A	
196224	47.778	48.319	0.11	48.209	-0.431	25	6.7	0.31	0.308	51.59	TCS-3	18.425
196249	47.819	48.469	0.11	48.359	-0.54	25	6.7	0.31	0.308	51.59	TCS-3	18.425
196274	47.991	49.031	0.11	48.921	-0.93	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196299	48.292	49.469	0.11	49.359	-1.067	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196324	48.723	49.387	0.11	49.277	-0.554	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196349	49.265	44.77	0.11	44.66	4.605	25	6.7	0.31	0.308	51.59	TCS-10	18.425
196374	49.821	48.728	0.11	48.618	1.203	25	6.7	0.31	0.308	51.59	TCS-10	18.425
196399	50.377	49.849	0.11	49.739	0.638	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196424	50.898	50.484	0.11	50.374	0.524	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196449	50.918	51.395	0.11	51.285	-0.367	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196474	50.293	50.143	0.11	50.033	0.26	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196499	49.114	48.486	0.11	48.376	0.738	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196524	47.864	45.131	0.11	45.021	2.843	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196549	46.631	46.804	0.11	46.694	-0.063	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196574	45.641	46.392	0.11	46.282	-0.641	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196599	44.963	46.895	0.11	46.785	-1.822	25	6.7	0.31	0.308	51.59	TCS-6	18.425

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	Scrified Bituminous material
196624	44.598	45.114	0.11	45.004	-0.406	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196649	44.528	44.421	0.11	44.311	0.217	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196674	44.528	44.012	0.11	43.902	0.626	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196699	44.528	43.569	0.11	43.459	1.069	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196724	44.528	44.008	0.11	43.898	0.63	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196749	44.528	43.944	0.11	43.834	0.694	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196774	44.528	44.247	0.11	44.137	0.391	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196799	44.528	44.838	0.11	44.728	-0.2	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196824	44.528	45.012	0.11	44.902	-0.374	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196849	44.528	45.201	0.11	45.091	-0.563	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196874	44.528	44.914	0.11	44.804	-0.276	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196899	44.528	44.343	0.11	44.233	0.295	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196924	44.528	44.704	0.11	44.594	-0.066	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196949	44.528	44.49	0.11	44.38	0.148	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196974	44.528	44.315	0.11	44.205	0.323	25	6.7	0.31	0.308	51.59	TCS-6	18.425
196999	44.528	43.35	0.11	43.24	1.288	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197024	44.528	41.36	0.11	41.25	3.278	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197049	44.528	37.347	0.11	37.347	7.181	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197074	44.528	38.958	0.11	38.848	5.68	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197099	44.528	43.575	0.11	43.465	1.063	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197124	44.528	44.595	0.11	44.485	0.043	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197149	44.528	44.323	0.11	44.213	0.315	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197174	44.528	44.692	0.11	44.582	-0.054	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197199	44.528	44.634	0.11	44.524	0.004	25	6.7	0.31	0.308	51.59	TCS-6	18.425
197224	44.528	39.203	0.11	39.093	5.435	25	6.7	0.31	0.308	51.59	TCS-3	18.425
197249	44.528	45.604	0.11	45.494	-0.966	25	7	0.31	0.308	53.90	TCS-3	19.25
197274	44.528	43.682	0.11	43.572	0.956	25	7	0.31	0.308	53.90	TCS-3	19.25
197299	44.528	44.353	0.11	44.243	0.285	25	7	0.31	0.308	53.90	TCS-3	19.25
197324	44.528	43.189	0.11	43.079	1.449	25	7	0.31	0.308	53.90	TCS-3	19.25
197349	44.528	44.092	0.11	43.982	0.546	25	7	0.31	0.308	53.90	TCS-3	19.25
197374	44.543	44.444	0.11	44.334	0.209	25	7	0.31	0.308	53.90	TCS-3	19.25
197399	44.691	44.777	0.11	44.667	0.024	25	7	0.31	0.308	53.90	TCS-3	19.25
197424	44.994	51.512	0.11	51.402	-6.408	25	7	0.31	0.308	53.90	TCS-6	19.25
197449	45.454	45.654	0.11	45.544	-0.09	25	7	0.31	0.308	53.90	TCS-6	19.25
197474	46.055	45.785	0.11	45.675	0.38	25	7	0.31	0.308	53.90	TCS-6	19.25
197499	46.68	46.516	0.11	46.406	0.274	25	7	0.31	0.308	53.90	TCS-6	19.25
197524	47.305	46.942	0.11	46.832	0.473	25	7	0.31	0.308	53.90	TCS-6	19.25
197549	47.93	47.535	0.11	47.425	0.505	25	7	0.31	0.308	53.90	TCS-6	19.25
197574	48.51	48.248	0.11	48.138	0.372	25	7	0.31	0.308	53.90	TCS-6	19.25
197599	48.922	49.015	0.11	48.905	0.017	25	7	0.31	0.308	53.90	TCS-6	19.25
197624	49.207	48.661	0.11	48.551	0.656	25	7	0.31	0.308	53.90	TCS-6	19.25
197649	49.484	48.756	0.11	48.646	0.838	25	7	0.31	0.308	53.90	TCS-6	19.25
197674	49.629	50.082	0.11	49.972	-0.343	25	7	0.31	0.308	53.90	TCS-6	19.25
197699	49.279	50.215	0.11	50.105	-0.826	25	7	0.31	0.308	53.90	TCS-6	19.25
197724	48.549	49.927	0.11	49.817	-1.268	25	7	0.31	0.308	53.90	TCS-6	19.25
197749	47.799	48.579	0.11	48.469	-0.67	25	7	0.31	0.308	53.90	TCS-6	19.25
197774	47.049	45.68	0.11	45.57	1.479	25	7	0.31	0.308	53.90	TCS-6	19.25
197799	46.299	46.014	0.11	45.904	0.395	25	7	0.31	0.308	53.90	TCS-6	19.25
197824	45.568	45.059	0.11	44.949	0.619	25	7	0.31	0.308	53.90	TCS-3	19.25
197849	45.031	45.063	0.11	44.953	0.078	25	7	0.31	0.308	53.90	TCS-3	19.25
197874	44.733	45.102	0.11	44.992	-0.259	25	7	0.31	0.308	53.90	TCS-3	19.25
197899	44.672	45	0.11	44.89	-0.218	25	7	0.31	0.308	53.90	TCS-3	19.25
197924	44.832	44.714	0.11	44.604	0.228	25	7	0.31	0.308	53.90	TCS-3	19.25



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	Scrapped Bituminous material
197949	45.035	44.97	0.11	44.86	0.175	25	7	0.31	0.308	53.90	TCS-3	19.25
197974	45.238	44.983	0.11	44.873	0.365	25	7	0.31	0.308	53.90	TCS-3	19.25
197999	45.44	45.249	0.11	45.139	0.301	25	7	0.31	0.308	53.90	TCS-3	19.25
198024	45.643	45.156	0.11	45.046	0.597	25	7	0.31	0.308	53.90	TCS-3	19.25
198049	45.813	45.479	0.11	45.369	0.444	25	7	0.31	0.308	53.90	TCS-3	19.25
198074	45.852	47.323	0.11	47.213	-1.361	25	7	0.31	0.308	53.90	TCS-3	19.25
198099	45.752	53.695	0.11	53.585	-7.833	25	7	0.31	0.308	53.90	TCS-3	19.25
198124	45.57	46.024	0.11	45.914	-0.344	25	7	0.31	0.308	53.90	TCS-3	19.25
198149	45.386	44.988	0.11	44.878	0.508	25	7	0.31	0.308	53.90	TCS-3	19.25
198174	45.203	44.947	0.11	44.837	0.366	25	7	0.31	0.308	53.90	TCS-3	19.25
198199	45.02	44.769	0.11	44.659	0.361	25	7	0.31	0.308	53.90	TCS-3	19.25
198224	44.837	44.65	0.11	44.54	0.297	25	7	0.31	0.308	53.90	TCS-3	19.25
198249	44.653	44.502	0.11	44.392	0.261	25	7	0.31	0.308	53.90	TCS-3	19.25
198274	44.47	44.369	0.11	44.259	0.211	25	7	0.31	0.308	53.90	TCS-3	19.25
198299	44.287	44.011	0.11	43.901	0.386	25	7	0.31	0.308	53.90	TCS-3	19.25
198324	44.103	43.994	0.11	43.884	0.219	25	7	0.31	0.308	53.90	TCS-3	19.25
198349	43.92	44.018	0.11	43.908	0.012	25	7	0.31	0.308	53.90	TCS-3	19.25
198374	43.737	44.025	0.11	43.915	-0.178	25	7	0.31	0.308	53.90	TCS-3	19.25
198399	43.553	43.853	0.11	43.743	-0.19	25	7	0.31	0.308	53.90	TCS-3	19.25
198424	43.37	43.353	0.11	43.243	0.127	25	7	0.31	0.308	53.90	TCS-3	19.25
198449	43.187	43.08	0.11	42.97	0.217	25	7	0.31	0.308	53.90	TCS-3	19.25
198474	43.004	42.945	0.11	42.835	0.169	25	7	0.31	0.308	53.90	TCS-12	19.25
198499	42.846	42.454	0.11	42.344	0.502	25	7	0.31	0.308	53.90	TCS-12	19.25
198524	42.764	41.263	0.11	41.153	1.611	25	7	0.31	0.308	53.90	TCS-12	19.25
198549	42.752	39.245	0.11	39.135	3.617	25	7	0.31	0.308	53.90	TCS-12	19.25
198574	42.752	33.966	0.11	33.856	8.896	25	7	0.31	0.308	53.90	TCS-12	19.25
198599	42.752	39.167	0.11	39.057	3.695	25	7	0.31	0.308	53.90	TCS-12	19.25
198624	42.752	40.778	0.11	40.668	2.084	25	7	0.31	0.308	53.90	TCS-12	19.25
198649	42.752	41.526	0.11	41.416	1.336	25	7	0.31	0.308	53.90	TCS-12	19.25
198674	42.752	42.043	0.11	41.933	0.819	25	7	0.31	0.308	53.90	TCS-12	19.25
198699	42.752	41.972	0.11	41.862	0.89	25	7	0.31	0.308	53.90	TCS-12	19.25
198724	42.752	41.932	0.11	41.822	0.93	25	7	0.31	0.308	53.90	TCS-12	19.25
198749	42.752	41.917	0.11	41.807	0.945	25	7	0.31	0.308	53.90	TCS-12	19.25
198774	42.752	42.279	0.11	42.169	0.583	25	7	0.31	0.308	53.90	TCS-12	19.25
198799	42.787	42.735	0.11	42.625	0.162	25	7	0.31	0.308	53.90	TCS-12	19.25
198824	42.989	42.939	0.11	42.829	0.16	25	7	0.31	0.308	53.90	TCS-12	19.25
198849	43.37	43.016	0.11	42.906	0.464	25	7	0.31	0.308	53.90	TCS-12	19.25
198874	43.866	43.825	0.11	43.715	0.151	25	7	0.31	0.308	53.90	TCS-12	19.25
198899	44.366	45.058	0.11	44.948	-0.582	25	7	0.31	0.308	53.90	TCS-12	19.25
198924	44.865	46.145	0.11	46.035	-1.17	25	7	0.31	0.308	53.90	TCS-12	19.25
198949	45.364	46.698	0.11	46.588	-1.224	25	7	0.31	0.308	53.90	TCS-12	19.25
198974	45.863	46.782	0.11	46.672	-0.809	25	7	0.31	0.308	53.90	TCS-12	19.25
198999	46.362	47.108	0.11	46.998	-0.636	25	7	0.31	0.308	53.90	TCS-12	19.25
199024	46.862	47.069	0.11	46.959	-0.097	25	7	0.31	0.308	53.90	TCS-12	19.25
199049	47.361	47.15	0.11	47.04	0.321	25	7	0.31	0.308	53.90	TCS-12	19.25
199074	47.86	47.053	0.11	46.943	0.917	25	7	0.31	0.308	53.90	TCS-12	19.25
199099	48.359	46.106	0.11	45.996	2.363	25	7	0.31	0.308	53.90	TCS-12	19.25
199124	48.859	47.028	0.11	46.918	1.941	25	7	0.31	0.308	53.90	TCS-12	19.25
199149	49.358	48.771	0.11	48.661	0.697	25	7	0.31	0.308	53.90	TCS-12	19.25
199174	49.857	49.866	0.11	49.756	0.101	25	7	0.31	0.308	53.90	TCS-12	19.25
199199	50.356	50.888	0.11	50.778	-0.422	25	7	0.31	0.308	53.90	TCS-12	19.25
199224	50.855	51.888	0.11	51.778	-0.923	25	7	0.31	0.308	53.90	TCS-12	19.25
199249	51.355	53.003	0.11	52.893	-1.538	25	7	0.31	0.308	53.90	TCS-12	19.25
199274	51.854	52.695	0.11	52.585	-0.731	25	7	0.31	0.308	53.90	TCS-12	19.25
199299	52.353	52.444	0.11	52.334	0.019	25	7	0.31	0.308	53.90	TCS-12	19.25
199324	52.846	52.184	0.11	52.074	0.772	25	7	0.31	0.308	53.90	TCS-12	19.25
199349	53.207	52.854	0.11	52.744	0.463	25	7	0.31	0.308	53.90	TCS-12	19.25
199374	53.39	54.656	0.11	54.546	-1.156	25	7	0.31	0.308	53.90	TCS-12	19.25
199399	53.414	54.441	0.11	54.331	-0.917	25	7	0.31	0.308	53.90	TCS-12	19.25
199424	53.414	51.991	0.11	51.881	1.533	25	7	0.31	0.308	53.90	TCS-12	19.25
199449	53.414	52.538	0.11	52.428	0.986	25	7	0.31	0.308	53.90	TCS-12	19.25
199474	53.414	53.532	0.11	53.422	-0.008	25	7	0.31	0.308	53.90	TCS-12	19.25
199499	53.414	54.002	0.11	53.892	-0.478	25	7	0.31	0.308	53.90	TCS-12	19.25
199524	53.414	54.383	0.11	54.273	-0.859	25	7	0.31	0.308	53.90	TCS-12	19.25
199549	53.414	54.076	0.11	53.966	-0.552	25	7	0.31	0.308	53.90	TCS-12	19.25
199574	53.414	53.353	0.11	53.243	0.171	25	7	0.31	0.308	53.90	TCS-12	19.25
199599	53.414	53.264	0.11	53.154	0.26	25	7	0.31	0.308	53.90	TCS-12	19.25
199624	53.414	53.71	0.11	53.6	-0.186	25	7	0.31	0.308	53.90	TCS-12	19.25
199649	53.414	53.516	0.11	53.406	0.008	25	7	0.31	0.308	53.90	TCS-12	19.25
199674	53.414	54.122	0.11	54.012	-0.598	25	7	0.31	0.308	53.90	TCS-12	19.25



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	Scrapped Bituminous material
199699	53.414	55.204	0.11	55.094	-1.68	25	7	0.31	0.308	53.90	TCS-12	19.25
199724	53.414	54.283	0.11	54.173	-0.759	25	7	0.31	0.308	53.90	TCS-12	19.25
199749	53.414	53.823	0.11	53.713	-0.299	25	7	0.31	0.308	53.90	TCS-12	19.25
199774	53.414	52.882	0.11	52.772	0.642	25	7	0.31	0.308	53.90	TCS-2A	19.25
199799	53.414	52.058	0.11	51.948	1.466	25	7	0.31	0.308	53.90	TCS-2A	19.25
199824	53.414	51.98	0.11	51.87	1.544	25	7	0.31	0.308	53.90	TCS-2A	19.25
199849	53.414	52.303	0.11	52.193	1.221	25	7	0.31	0.308	53.90	TCS-2A	19.25
199874	53.414	52.351	0.11	52.241	1.173	25	7	0.31	0.308	53.90	TCS-2A	19.25
199899	53.393	52.219	0.11	52.109	1.284	25	7	0.31	0.308	53.90	TCS-2A	19.25
199924	53.327	52.352	0.11	52.242	1.085	25	7	0.31	0.308	53.90	TCS-2A	19.25
199949	53.216	52.325	0.11	52.215	1.001	25	7	0.31	0.308	53.90	TCS-2A	19.25
199974	53.059	52.6	0.11	52.49	0.569	25	7	0.31	0.308	53.90	TCS-2A	19.25
199999	52.857	52.485	0.11	52.375	0.482	25	7	0.31	0.308	53.90	TCS-2A	19.25
200024	52.609	51.756	0.11	51.646	0.963	25	7	0.31	0.308	53.90	TCS-2A	19.25
200049	52.317	51.476	0.11	51.366	0.951	25	7	0.31	0.308	53.90	TCS-2A	19.25
200074	51.978	51.378	0.11	51.268	0.71	25	7	0.31	0.308	53.90	TCS-1A	19.25
200099	51.595	51.618	0.11	51.508	0.087	25	7	0.31	0.308	53.90	TCS-1A	19.25
200124	51.166	51.626	0.11	51.516	-0.35	25	7	0.31	0.308	53.90	TCS-1A	19.25
200149	50.692	51.703	0.11	51.593	-0.901	25	7	0.31	0.308	53.90	TCS-1A	19.25
200174	50.173	51.424	0.11	51.314	-1.141	25	7	0.31	0.308	53.90	TCS-1A	19.25
200199	49.629	49.85	0.11	49.74	-0.111	25	7	0.31	0.308	53.90	TCS-1A	19.25
200224	49.085	48.776	0.11	48.666	0.419	25	7	0.31	0.308	53.90	TCS-1	19.25
200249	48.541	48.424	0.11	48.314	0.227	25	7	0.31	0.308	53.90	TCS-1	19.25
200274	47.997	47.728	0.11	47.618	0.379	25	7	0.31	0.308	53.90	TCS-1	19.25
200299	47.453	46.884	0.11	46.774	0.679	25	7	0.31	0.308	53.90	TCS-1	19.25
200324	46.909	46.939	0.11	46.829	0.08	25	7	0.31	0.308	53.90	TCS-1	19.25
200349	46.365	46.176	0.11	46.066	0.299	25	7	0.31	0.308	53.90	TCS-1	19.25
200374	45.821	45.111	0.11	45.001	0.82	25	7	0.31	0.308	53.90	TCS-1	19.25
200399	45.277	44.781	0.11	44.781	0.496	25	7	0.31	0.308	53.90	TCS-1	19.25
200424	44.733	45.007	0.11	44.897	-0.164	25	7	0.31	0.308	53.90	TCS-2	19.25
200449	44.189	45.049	0.11	44.939	-0.75	25	7	0.31	0.308	53.90	TCS-2	19.25
200474	43.664	44.434	0.11	44.324	-0.66	25	7	0.31	0.308	53.90	TCS-2	19.25
200499	43.324	43.021	0.11	42.911	0.413	25	7	0.31	0.308	53.90	TCS-2	19.25
200524	43.212	43.153	0.11	43.043	0.169	25	7	0.31	0.308	53.90	TCS-2	19.25
200549	43.212	40.492	0.11	40.382	2.83	25	7	0.31	0.308	53.90	TCS-2	19.25
200574	43.212	42.429	0.11	42.319	0.893	25	7	0.31	0.308	53.90	TCS-2	19.25
200599	43.212	42.696	0.11	42.586	0.626	25	7	0.31	0.308	53.90	TCS-1	19.25
200624	43.212	42.365	0.11	42.255	0.957	25	7	0.31	0.308	53.90	TCS-1	19.25
200649	43.212	42.548	0.11	42.438	0.774	25	7	0.31	0.308	53.90	TCS-1	19.25
200674	43.212	42.396	0.11	42.286	0.926	25	7	0.31	0.308	53.90	TCS-1	19.25
200699	43.212	42.482	0.11	42.372	0.84	25	7	0.31	0.308	53.90	TCS-1	19.25
200724	43.212	42.644	0.11	42.534	0.678	25	7	0.31	0.308	53.90	TCS-1	19.25
200749	43.212	42.91	0.11	42.8	0.412	25	7	0.31	0.308	53.90	TCS-1	19.25
200774	43.212	43.143	0.11	43.033	0.179	25	7	0.31	0.308	53.90	TCS-1	19.25
200799	43.212	43.25	0.11	43.14	0.072	25	7	0.31	0.308	53.90	TCS-1	19.25
200824	43.225	43.365	0.11	43.255	-0.03	25	7	0.31	0.308	53.90	TCS-1	19.25
200849	43.26	43.48	0.11	43.37	-0.11	25	7	0.31	0.308	53.90	TCS-1	19.25
200874	43.318	43.567	0.11	43.457	-0.139	25	7	0.31	0.308	53.90	TCS-1	19.25
200899	43.397	43.615	0.11	43.505	-0.108	25	7	0.31	0.308	53.90	TCS-1	19.25
200924	43.486	43.624	0.11	43.514	-0.028	25	7	0.31	0.308	53.90	TCS-1	19.25
200949	43.574	43.542	0.11	43.432	0.142	25	7	0.31	0.308	53.90	TCS-1	19.25
200974	43.663	43.6	0.11	43.49	0.173	25	7	0.31	0.308	53.90	TCS-1	19.25
200999	43.751	43.495	0.11	43.385	0.366	25	7	0.31	0.308	53.90	TCS-1	19.25
201024	43.84	43.434	0.11	43.324	0.516	25	7	0.31	0.308	53.90	TCS-1	19.25
201049	43.922	43.417	0.11	43.307	0.615	25	7	0.31	0.308	53.90	TCS-1	19.25
201074	43.982	43.439	0.11	43.329	0.653	25	7	0.31	0.308	53.90	TCS-1	19.25
201099	44.02	43.475	0.11	43.365	0.655	25	7	0.31	0.308	53.90	TCS-1	19.25
201124	44.034	43.575	0.11	43.465	0.569	25	7	0.31	0.308	53.90	TCS-1	19.25
201149	44.026	43.718	0.11	43.608	0.418	25	7	0.31	0.308	53.90	TCS-1	19.25
201174	43.994	43.685	0.11	43.575	0.419	25	7	0.31	0.308	53.90	TCS-1	19.25
201199	43.94	43.633	0.11	43.523	0.417	25	7	0.31	0.308	53.90	TCS-1	19.25
201224	43.862	43.651	0.11	43.541	0.321	25	7	0.31	0.308	53.90	TCS-1	19.25
201249	43.768	43.687	0.11	43.577	0.191	25	7	0.31	0.308	53.90	TCS-1	19.25
201274	43.673	43.607	0.11	43.497	0.176	25	7	0.31	0.308	53.90	TCS-1	19.25
201299	43.578	43.396	0.11	43.286	0.292	25	7	0.31	0.308	53.90	TCS-1	19.25
201324	43.483	43.304	0.11	43.194	0.289	25	7	0.31	0.308	53.90	TCS-1	19.25
201349	43.388	43.225	0.11	43.115	0.273	25	7	0.31	0.308	53.90	TCS-1	19.25
201374	43.293	43.143	0.11	43.033	0.26	25	7	0.31	0.308	53.90	TCS-1	19.25
201399	43.198	43.043	0.11	42.933	0.265	25	7	0.31	0.308	53.90	TCS-1	19.25
201424	43.103	42.942	0.11	42.832	0.271	25	7	0.31	0.308	53.90	TCS-1	19.25



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	Scrapped Bituminous material
201449	43.008	42.86	0.11	42.75	0.258	25	7	0.31	0.308	53.90	TCS-1	19.25
201474	42.913	42.811	0.11	42.701	0.212	25	7	0.31	0.308	53.90	TCS-1	19.25
201499	42.818	42.734	0.11	42.624	0.194	25	7	0.31	0.308	53.90	TCS-1	19.25
201524	42.723	42.64	0.11	42.53	0.193	25	7	0.31	0.308	53.90	TCS-1	19.25
201549	42.628	42.614	0.11	42.504	0.124	25	7	0.31	0.308	53.90	TCS-1	19.25
201574	42.533	42.539	0.11	42.429	0.104	25	7	0.31	0.308	53.90	TCS-1	19.25
201599	42.438	42.478	0.11	42.368	0.07	25	7	0.31	0.308	53.90	TCS-1	19.25
201624	42.358	42.422	0.11	42.312	0.046	25	7	0.31	0.308	53.90	TCS-1	19.25
201649	42.307	42.193	0.11	42.083	0.224	25	7	0.31	0.308	53.90	TCS-1	19.25
201674	42.284	42.243	0.11	42.133	0.151	25	7	0.31	0.308	53.90	TCS-1	19.25
201699	42.291	42.274	0.11	42.164	0.127	25	7	0.31	0.308	53.90	TCS-1	19.25
201724	42.312	42.166	0.11	42.056	0.256	25	7	0.31	0.308	53.90	TCS-1	19.25
201749	42.333	42.282	0.11	42.172	0.161	25	7	0.31	0.308	53.90	TCS-1	19.25
201774	42.354	42.384	0.11	42.274	0.08	25	7	0.31	0.308	53.90	TCS-1	19.25
201799	42.375	42.36	0.11	42.25	0.125	25	7	0.31	0.308	53.90	TCS-1	19.25
201824	42.396	42.207	0.11	42.097	0.299	25	7	0.31	0.308	53.90	TCS-1	19.25
201849	42.418	42.358	0.11	42.248	0.17	25	7	0.31	0.308	53.90	TCS-1	19.25
201874	42.439	42.459	0.11	42.349	0.09	25	7	0.31	0.308	53.90	TCS-1	19.25
201899	42.46	42.462	0.11	42.352	0.108	25	7	0.31	0.308	53.90	TCS-1	19.25
201924	42.481	42.502	0.11	42.392	0.089	25	7	0.31	0.308	53.90	TCS-1	19.25
201949	42.502	42.465	0.11	42.355	0.147	25	7	0.31	0.308	53.90	TCS-1	19.25
201974	42.523	42.417	0.11	42.307	0.216	25	7	0.31	0.308	53.90	TCS-1	19.25
201999	42.544	42.48	0.11	42.37	0.174	25	7	0.31	0.308	53.90	TCS-1	19.25
202024	42.565	42.605	0.11	42.495	0.07	25	7	0.31	0.308	53.90	TCS-1	19.25
202049	42.586	42.706	0.11	42.596	-0.01	25	7	0.31	0.308	53.90	TCS-1	19.25
202074	42.607	42.757	0.11	42.647	-0.04	25	7	0.31	0.308	53.90	TCS-1	19.25
202099	42.628	42.689	0.11	42.579	0.049	25	7	0.31	0.308	53.90	TCS-1	19.25
202124	42.649	42.614	0.11	42.504	0.145	25	7	0.31	0.308	53.90	TCS-1	19.25
202149	42.67	42.635	0.11	42.525	0.145	25	7	0.31	0.308	53.90	TCS-1	19.25
202174	42.691	42.692	0.11	42.582	0.109	25	7	0.31	0.308	53.90	TCS-1	19.25
202199	42.712	42.73	0.11	42.62	0.092	25	7	0.31	0.308	53.90	TCS-1	19.25
202224	42.733	42.752	0.11	42.642	0.091	25	7	0.31	0.308	53.90	TCS-1	19.25
202249	42.754	42.759	0.11	42.649	0.105	25	7	0.31	0.308	53.90	TCS-1	19.25
202274	42.772	42.773	0.11	42.663	0.109	25	7	0.31	0.308	53.90	TCS-1	19.25
202299	42.772	42.77	0.11	42.66	0.112	25	7	0.31	0.308	53.90	TCS-1	19.25
202324	42.753	42.773	0.11	42.663	0.09	25	7	0.31	0.308	53.90	TCS-1	19.25
202349	42.714	42.678	0.11	42.568	0.146	25	7	0.31	0.308	53.90	TCS-1	19.25
202374	42.657	42.412	0.11	42.302	0.355	25	7	0.31	0.308	53.90	TCS-1	19.25
202399	42.58	42.298	0.11	42.188	0.392	25	7	0.31	0.308	53.90	TCS-1	19.25
202424	42.487	42.349	0.11	42.239	0.248	25	7	0.31	0.308	53.90	TCS-1	19.25
202449	42.393	42.328	0.11	42.218	0.175	25	7	0.31	0.308	53.90	TCS-1	19.25
202474	42.299	42.189	0.11	42.079	0.22	25	7	0.31	0.308	53.90	TCS-1	19.25
202499	42.205	42.034	0.11	41.924	0.281	25	7	0.31	0.308	53.90	TCS-1	19.25
202524	42.111	41.922	0.11	41.812	0.299	25	7	0.31	0.308	53.90	TCS-1	19.25
202549	42.017	41.97	0.11	41.86	0.157	25	7	0.31	0.308	53.90	TCS-1	19.25
202574	41.922	41.821	0.11	41.711	0.211	25	7	0.31	0.308	53.90	TCS-1	19.25
202599	41.828	41.709	0.11	41.599	0.229	25	7	0.31	0.308	53.90	TCS-1	19.25
202624	41.734	41.751	0.11	41.641	0.093	25	7	0.31	0.308	53.90	TCS-1	19.25
202649	41.64	41.753	0.11	41.643	-0.003	25	7	0.31	0.308	53.90	TCS-1	19.25
202674	41.546	41.628	0.11	41.518	0.028	25	7	0.31	0.308	53.90	TCS-1	19.25
202699	41.451	41.399	0.11	41.289	0.162	25	7	0.31	0.308	53.90	TCS-1	19.25
202724	41.357	41.199	0.11	41.089	0.268	25	7	0.31	0.308	53.90	TCS-1	19.25
202749	41.263	41.009	0.11	40.899	0.364	25	7	0.31	0.308	53.90	TCS-1	19.25
202774	41.169	41.077	0.11	40.967	0.202	25	7	0.31	0.308	53.90	TCS-1	19.25
202799	41.075	41.117	0.11	41.007	0.068	25	7	0.31	0.308	53.90	TCS-1	19.25
202824	40.981	41.008	0.11	40.898	0.083	25	7	0.31	0.308	53.90	TCS-1	19.25
202849	40.897	40.871	0.11	40.761	0.136	25	7	0.31	0.308	53.90	TCS-1	19.25
202874	40.83	40.754	0.11	40.644	0.186	25	7	0.31	0.308	53.90	TCS-1	19.25
202899	40.781	40.827	0.11	40.717	0.064	25	7	0.31	0.308	53.90	TCS-1	19.25
202924	40.749	40.63	0.11	40.52	0.229	25	7	0.31	0.308	53.90	TCS-1	19.25
202949	40.724	40.526	0.11	40.416	0.308	25	7	0.31	0.308	53.90	TCS-1	19.25
202974	40.699	40.624	0.11	40.514	0.185	25	7	0.31	0.308	53.90	TCS-1	19.25
202999	40.675	40.689	0.11	40.579	0.096	25	7	0.31	0.308	53.90	TCS-1	19.25
203024	40.65	40.665	0.11	40.555	0.095	25	7	0.31	0.308	53.90	TCS-1	19.25
203049	40.625	40.623	0.11	40.513	0.112	25	7	0.31	0.308	53.90	TCS-1	19.25
203074	40.601	40.574	0.11	40.464	0.137	25	7	0.31	0.308	53.90	TCS-1	19.25
203099	40.584	40.583	0.11	40.473	0.111	25	7	0.31	0.308	53.90	TCS-1	19.25
203124	40.592	40.579	0.11	40.469	0.123	25	7	0.31	0.308	53.90	TCS-1	19.25
203149	40.623	40.574	0.11	40.464	0.159	25	7	0.31	0.308	53.90	TCS-1	19.25
203174	40.657	40.597	0.11	40.487	0.17	25	7	0.31	0.308	53.90	TCS-1	19.25



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	Scrapped Bituminous material
203199	40.691	40.701	0.11	40.591	0.1	25	7	0.31	0.308	53.90	TCS-1	19.25
203224	40.725	40.749	0.11	40.639	0.086	25	7	0.31	0.308	53.90	TCS-1	19.25
203249	40.759	40.764	0.11	40.654	0.105	25	7	0.31	0.308	53.90	TCS-1	19.25
203274	40.793	40.823	0.11	40.713	0.08	25	7	0.31	0.308	53.90	TCS-1	19.25
203299	40.828	40.844	0.11	40.734	0.094	25	7	0.31	0.308	53.90	TCS-1	19.25
203324	40.862	40.871	0.11	40.761	0.101	25	7	0.31	0.308	53.90	TCS-1	19.25
203349	40.896	40.876	0.11	40.766	0.13	25	7	0.31	0.308	53.90	TCS-1	19.25
203374	40.93	40.867	0.11	40.757	0.173	25	7	0.31	0.308	53.90	TCS-1	19.25
203399	40.964	40.869	0.11	40.759	0.205	25	7	0.31	0.308	53.90	TCS-1	19.25
203424	40.999	40.974	0.11	40.864	0.135	25	7	0.31	0.308	53.90	TCS-1	19.25
203449	41.033	41.072	0.11	40.962	0.071	25	7	0.31	0.308	53.90	TCS-1	19.25
203474	41.067	41.156	0.11	41.046	0.021	25	7	0.31	0.308	53.90	TCS-1	19.25
203499	41.101	41.253	0.11	41.143	-0.042	25	7	0.31	0.308	53.90	TCS-1	19.25
203524	41.135	41.253	0.11	41.143	-0.008	25	7	0.31	0.308	53.90	TCS-1	19.25
203549	41.169	41.246	0.11	41.136	0.033	25	7	0.31	0.308	53.90	TCS-1	19.25
203574	41.196	41.254	0.11	41.144	0.052	25	7	0.31	0.308	53.90	TCS-1	19.25
203599	41.201	41.278	0.11	41.168	0.033	25	7	0.31	0.308	53.90	TCS-1	19.25
203624	41.184	41.279	0.11	41.169	0.015	25	7	0.31	0.308	53.90	TCS-1	19.25
203649	41.163	41.212	0.11	41.102	0.061	25	7	0.31	0.308	53.90	TCS-1	19.25
203674	41.142	41.127	0.11	41.017	0.125	25	7	0.31	0.308	53.90	TCS-1	19.25
203699	41.121	40.967	0.11	40.857	0.264	25	7	0.31	0.308	53.90	TCS-1	19.25
203724	41.1	40.947	0.11	40.837	0.263	25	7	0.31	0.308	53.90	TCS-1	19.25
203749	41.079	40.857	0.11	40.747	0.332	25	7	0.31	0.308	53.90	TCS-1	19.25
203774	41.058	40.891	0.11	40.781	0.277	25	7	0.31	0.308	53.90	TCS-1	19.25
203799	41.037	40.993	0.11	40.883	0.154	25	7	0.31	0.308	53.90	TCS-1	19.25
203824	41.015	40.903	0.11	40.793	0.222	25	7	0.31	0.308	53.90	TCS-1	19.25
203849	40.994	40.863	0.11	40.753	0.241	25	7	0.31	0.308	53.90	TCS-1	19.25
203874	40.973	40.843	0.11	40.733	0.24	25	7	0.31	0.308	53.90	TCS-1	19.25
203899	40.952	40.789	0.11	40.679	0.273	25	7	0.31	0.308	53.90	TCS-1	19.25
203924	40.931	40.718	0.11	40.608	0.323	25	7	0.31	0.308	53.90	TCS-1	19.25
203949	40.91	40.633	0.11	40.523	0.387	25	7	0.31	0.308	53.90	TCS-1	19.25
203974	40.889	40.479	0.11	40.369	0.52	25	7	0.31	0.308	53.90	TCS-1	19.25
203999	40.868	40.365	0.11	40.255	0.613	25	7	0.31	0.308	53.90	TCS-1	19.25
204024	40.847	40.353	0.11	40.243	0.604	25	7	0.31	0.308	53.90	TCS-1	19.25
204049	40.826	40.368	0.11	40.258	0.568	25	7	0.31	0.308	53.90	TCS-1	19.25
204074	40.804	40.387	0.11	40.277	0.527	25	7	0.31	0.308	53.90	TCS-1	19.25
204099	40.783	40.487	0.11	40.377	0.406	25	7	0.31	0.308	53.90	TCS-1	19.25
204124	40.857	40.985	0.11	40.875	-0.018	25	7	0.31	0.308	53.90	TCS-1	19.25
204149	41.352	41.356	0.11	41.246	0.106	25	7	0.31	0.308	53.90	TCS-1	19.25
204174	42.294	42.151	0.11	42.041	0.253	25	7	0.31	0.308	53.90	TCS-1	19.25
204199	43.639	43.55	0.11	43.44	0.199	25	7	0.31	0.308	53.90	TCS-1	19.25
204224	45.051	44.937	0.11	44.827	0.224	25	7	0.31	0.308	53.90	TCS-1	19.25
204249	46.335	46.218	0.11	46.108	0.227	25	7	0.31	0.308	53.90	TCS-1	19.25
204274	47.345	47.249	0.11	47.139	0.206	25	7	0.31	0.308	53.90	TCS-1	19.25
204299	48.08	47.967	0.11	47.857	0.223	25	7	0.31	0.308	53.90	TCS-1	19.25
204324	48.541	48.537	0.11	48.427	0.114	25	7	0.31	0.308	53.90	TCS-1	19.25
204349	48.727	48.799	0.11	48.689	0.038	25	7	0.31	0.308	53.90	TCS-1	19.25
204374	48.639	48.657	0.11	48.547	0.092	25	7	0.31	0.308	53.90	TCS-1	19.25
204399	48.276	48.35	0.11	48.24	0.036	25	7	0.31	0.308	53.90	TCS-1	19.25
204424	47.639	47.715	0.11	47.605	0.034	25	7	0.31	0.308	53.90	TCS-1	19.25
204449	46.727	46.796	0.11	46.686	0.041	25	7	0.31	0.308	53.90	TCS-1	19.25
204474	45.622	45.689	0.11	45.579	0.043	25	7	0.31	0.308	53.90	TCS-1	19.25
204499	44.509	44.535	0.11	44.425	0.084	25	7	0.31	0.308	53.90	TCS-1	19.25
204524	43.397	43.378	0.11	43.268	0.129	25	7	0.31	0.308	53.90	TCS-1	19.25
204549	42.29	42.215	0.11	42.105	0.185	25	7	0.31	0.308	53.90	TCS-1	19.25
204574	41.435	41.486	0.11	41.376	0.059	25	7	0.31	0.308	53.90	TCS-1	19.25
204599	40.959	40.94	0.11	40.83	0.129	25	7	0.31	0.308	53.90	TCS-1	19.25
204624	40.836	40.929	0.11	40.819	0.017	25	7	0.31	0.308	53.90	TCS-1	19.25
204649	40.785	41.007	0.11	40.897	-0.112	25	7	0.31	0.308	53.90	TCS-1	19.25
204674	40.734	40.676	0.11	40.566	0.168	25	7	0.31	0.308	53.90	TCS-1	19.25
204699	40.683	40.341	0.11	40.231	0.452	25	7	0.31	0.308	53.90	TCS-1	19.25
204724	40.632	40.571	0.11	40.461	0.171	25	7	0.31	0.308	53.90	TCS-1	19.25
204749	40.582	40.613	0.11	40.503	0.079	25	7	0.31	0.308	53.90	TCS-1	19.25
204774	40.531	40.581	0.11	40.471	0.06	25	7	0.31	0.308	53.90	TCS-1	19.25
204799	40.48	40.388	0.11	40.278	0.202	25	7	0.31	0.308	53.90	TCS-1	19.25
204824	40.429	40.385	0.11	40.275	0.154	25	7	0.31	0.308	53.90	TCS-1	19.25
204849	40.594	40.467	0.11	40.357	0.237	25	7	0.31	0.308	53.90	TCS-1	19.25
204874	41.544	41.525	0.11	41.415	0.129	25	7	0.31	0.308	53.90	TCS-1	19.25
204899	42.7	42.789	0.11	42.679	0.021	25	7	0.31	0.308	53.90	TCS-1	19.25
204924	43.857	43.757	0.11	43.647	0.21	25	7	0.31	0.308	53.90	TCS-1	19.25



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	Scrapped Bituminous material
204949	45.014	44.822	0.11	44.712	0.302	25	7	0.31	0.308	53.90	TCS-1	19.25
204974	46.171	46.175	0.11	46.065	0.106	25	7	0.31	0.308	53.90	TCS-1	19.25
204999	47.328	47.246	0.11	47.136	0.192	25	7	0.31	0.308	53.90	TCS-1	19.25
205024	48.223	48.117	0.11	48.007	0.216	25	7	0.31	0.308	53.90	TCS-1	19.25
205049	48.419	48.36	0.11	48.25	0.169	25	7	0.31	0.308	53.90	TCS-1	19.25
205074	48.171	48.152	0.11	48.042	0.129	25	7	0.31	0.308	53.90	TCS-1	19.25
205099	47.916	47.749	0.11	47.639	0.277	25	7	0.31	0.308	53.90	TCS-1	19.25
205124	47.662	47.565	0.11	47.455	0.207	25	7	0.31	0.308	53.90	TCS-1	19.25
205149	47.421	47.602	0.11	47.492	-0.071	25	7	0.31	0.308	53.90	TCS-1	19.25
205174	47.314	47.477	0.11	47.367	-0.053	25	7	0.31	0.308	53.90	TCS-1	19.25
205199	47.369	47.278	0.11	47.168	0.201	25	7	0.31	0.308	53.90	TCS-1	19.25
205224	47.582	47.478	0.11	47.368	0.214	25	7	0.31	0.308	53.90	TCS-1	19.25
205249	47.846	47.855	0.11	47.745	0.101	25	7	0.31	0.308	53.90	TCS-1	19.25
205274	48.1	48.233	0.11	48.123	-0.023	25	7	0.31	0.308	53.90	TCS-1	19.25
205299	48.004	47.905	0.11	47.795	0.209	25	7	0.31	0.308	53.90	TCS-1	19.25
205324	47.382	47.341	0.11	47.231	0.151	25	7	0.31	0.308	53.90	TCS-1	19.25
205349	46.234	46.35	0.11	46.24	-0.006	25	7	0.31	0.308	53.90	TCS-1	19.25
205374	44.814	44.717	0.11	44.607	0.207	25	7	0.31	0.308	53.90	TCS-1	19.25
205399	43.394	43.108	0.11	42.998	0.396	25	7	0.31	0.308	53.90	TCS-1	19.25
205424	41.974	41.957	0.11	41.847	0.127	25	7	0.31	0.308	53.90	TCS-1	19.25
205449	40.554	40.457	0.11	40.347	0.207	25	7	0.31	0.308	53.90	TCS-1	19.25
205474	39.368	39.085	0.11	38.975	0.393	25	7	0.31	0.308	53.90	TCS-1	19.25
205499	38.616	38.454	0.11	38.344	0.272	25	7	0.31	0.308	53.90	TCS-1	19.25
205524	38.297	38.485	0.11	38.375	-0.078	25	7	0.31	0.308	53.90	TCS-1	19.25
205549	38.413	38.644	0.11	38.534	-0.121	25	7	0.31	0.308	53.90	TCS-1	19.25
205574	38.962	38.93	0.11	38.82	0.142	25	7	0.31	0.308	53.90	TCS-1	19.25
205599	39.711	39.687	0.11	39.577	0.134	25	7	0.31	0.308	53.90	TCS-1	19.25
205624	40.46	40.42	0.11	40.31	0.15	25	7	0.31	0.308	53.90	TCS-1	19.25
205649	41.014	40.934	0.11	40.824	0.19	25	7	0.31	0.308	53.90	TCS-1	19.25
205674	41.071	40.984	0.11	40.874	0.197	25	7	0.31	0.308	53.90	TCS-1	19.25
205699	40.628	40.647	0.11	40.537	0.091	25	7	0.31	0.308	53.90	TCS-1	19.25
205724	39.802	39.822	0.11	39.712	0.09	25	7	0.31	0.308	53.90	TCS-1	19.25
205749	39.096	39.083	0.11	38.973	0.123	25	7	0.31	0.308	53.90	TCS-1	19.25
205774	38.986	38.959	0.11	38.849	0.137	25	7	0.31	0.308	53.90	TCS-1	19.25
205799	39.502	39.513	0.11	39.403	0.099	25	7	0.31	0.308	53.90	TCS-1	19.25
205824	40.403	40.422	0.11	40.312	0.091	25	7	0.31	0.308	53.90	TCS-1	19.25
205849	41.308	41.032	0.11	40.922	0.386	25	7	0.31	0.308	53.90	TCS-1	19.25
205874	42.213	41.897	0.11	41.787	0.426	25	7	0.31	0.308	53.90	TCS-1	19.25
205899	43.118	43.083	0.11	42.973	0.145	25	7	0.31	0.308	53.90	TCS-1	19.25
205924	43.885	43.894	0.11	43.784	0.101	25	7	0.31	0.308	53.90	TCS-1	19.25
205949	44.057	44.07	0.11	43.96	0.097	25	7	0.31	0.308	53.90	TCS-1	19.25
205973.67	44.044	44.044	0.11	43.934	0.11	25	7	0.31	0.308	53.90	TCS-1	19.25

36399

59316.6989

21200

Total quantity for dismantling (Bituminous layer)=
Quantity of Dismantelled Bituminous

21200 cum
282672 sqm

Dismantling GSB material=

59317 cum

Quantity of Granular Material(sqm)
(Assume avg thickness 150mm)

395445 sqm

Quantity of GSB material for reuse (@ 60%) =

35590 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)
169575	12.7	0	0.00	0.00
169600	106.16	0	1485.71	0.00
169625	53.28	0.08	1778.08	1.16
169650	32.07	102.09	876.24	2075.40
169675	23.6	0	602.97	2067.72
169700	32.04	0	660.95	0.00
169725	8.39	0	505.33	0.00
169750	40	0	604.83	0.00
169775	18.79	0	734.86	0.00
169800	9.14	14.53	349.12	181.60
169825	52.35	0	768.67	181.60
169850	237.83	0	3621.46	0.00
169875	117.28	0	4452.56	0.00
169900	16.74	0	1718.64	0.00
169925	12.89	0	365.19	0.00
169950	12.57	165.9	318.54	1914.69
169975	14.66	0	321.57	2797.65
170000	64.15	5.97	778.74	89.27
170025	9.54	17.62	701.25	328.86
170050	8.71	11.73	185.16	390.17
170075	3.58	11.19	151.39	287.94
170100	104.69	1.98	1353.36	164.68
170125	76.44	0	2264.13	24.81
170150	3.02	0.29	993.29	3.64
170175	1.19	0.17	52.67	5.79
170200	4.78	0	74.67	2.15
170225	39.29	0	550.91	0.00
170250	38.36	0	1102.49	0.00
170275	15.88	0	766.04	0.00
170300	109.06	0	1622.47	0.00
170325	141.14	1.09	2710.02	14.67
170350	38.71	0.27	1884.24	18.48
170375	67.84	0	1305.76	3.41
170400	35.85	0	1386.67	0.00
170425	7.3	0	618.22	0.00
170450	26.01	0	424.40	0.00
170475	68.27	0	1183.50	0.00
170500	138.37	0	2462.43	0.00
170525	15.84	0.02	1710.02	0.20
170550	10.56	4.04	298.96	54.35
170575	41.84	4.49	587.80	116.36
170600	8.15	3.58	613.88	102.28
170625	148.76	0	1961.33	44.72
170650	360.99	0	6371.81	0.00
170675	435.69	0	9958.50	0.00
170700	364.88	0	10180.23	0.00
170725	7.43	0.25	5711.85	3.41
170750	25.32	0	434.65	3.43
170775	156.39	0	2234.01	0.00
170800	221	0	3797.26	0.00
170825	0	22.82	2653.79	285.03
170850	0	13.48	0.00	457.67
170875	14.84	1.05	209.35	182.43



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
170900	2.36	0.16	216.36	15.03
170925	7.03	3.35	117.33	43.86
170950	1.17	28.66	97.36	419.69
170975	1.35	39.63	25.11	988.52
171000	139.51	0	1621.98	566.56
171025	111.05	0	3078.83	0.00
171050	2.11	10	1530.58	120.58
171075	1.03	2.05	43.79	146.33
171100	19.77	0	271.18	29.96
171125	121.82	0	1795.90	0.00
171150	97.49	0	2679.19	0.00
171175	14	0	1449.62	0.00
171200	0.56	11.59	182.66	108.95
171225	0	1.25	6.55	141.94
171250	14.28	0	173.10	15.58
171275	9.7	5.49	271.82	77.54
171300	5.33	39.06	170.08	660.67
171325	7.74	8.73	162.03	618.61
171350	0.23	7.9	99.65	207.84
171375	0	35.45	2.87	523.41
171400	0.19	46.07	2.40	977.87
171425	0.7	40.04	10.89	1104.29
171450	4.32	25.48	62.55	829.30
171475	4.28	10.99	107.97	419.89
171500	17.85	0.05	300.63	111.43
171525	8.7	3.9	349.53	56.61
171550	12.78	47.3	271.31	569.09
171575	16.7	42.8	356.99	1266.76
171600	40.7	0	710.05	568.63
171625	76.63	0	1466.61	0.00
171650	67.07	0	1796.18	0.00
171675	35.37	0	1280.47	0.00
171700	28.28	0	764.90	0.00
171725	24.7	0	626.72	0.00
171750	7.52	6.79	383.46	121.81
171775	0.21	1.7	95.45	121.18
171800	1.29	11.86	18.71	169.53
171825	0.11	4.29	17.46	201.87
171850	0	8.11	1.34	154.99
171875	37.63	2.89	470.34	137.61
171900	50.65	0	1103.45	36.18
171925	68.12	0	1588.15	0.00
171950	10.04	0	1126.30	0.00
171975	24.97	0	449.82	0.00
172000	40.9	0	784.42	0.00
172025	73.11	0.04	1301.78	0.49
172050	207.49	0.25	3559.12	3.58
172075	294.7	0	7674.75	2.91
172100	120.15	0	6582.85	0.00
172125	43.63	0	2343.51	0.00
172150	364.2	0	5341.56	0.00
172175	294.35	0	7387.96	0.00
172200	159.07	0	5054.15	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)
172225	67.46	0.3	2831.61	3.71
172250	6.25	0	1047.42	3.11
172275	5.96	0	149.76	0.00
172300	63.9	0	967.17	0.00
172325	183.04	0	3102.29	0.00
172350	46.47	0.45	2808.88	5.85
172375	9.35	5.7	639.54	83.23
172400	13.96	9.47	267.89	196.32
172425	10.46	3.08	305.16	156.84
172450	15.13	3.18	319.85	78.19
172475	9.3	4.32	305.36	93.75
172500	0	133.55	116.22	1723.38
172525	6.35	110.99	79.35	3056.69
172550	18.18	2.05	300.99	1484.40
172575	10.98	0.32	324.65	31.35
172600	6.94	0.06	205.43	5.09
172625	3.83	0	128.65	0.88
172650	5.91	21.85	116.24	329.74
172675	13.18	0	237.49	282.44
172700	24.49	0	470.99	0.00
172725	33.14	0	744.47	0.00
172750	36.92	0	939.09	0.00
172775	17	0	680.38	0.00
172800	32.52	1.38	577.23	18.97
172825	57.21	0	1100.07	18.39
172850	64.79	0	1525.06	0.00
172875	210.21	0	3437.49	0.00
172900	81.66	0	3648.33	0.00
172925	13.63	0	1191.11	0.00
172950	25.38	0	487.56	0.00
172975	17	0	529.70	0.00
173000	5.59	0	281.26	0.00
173025	22.62	0	327.34	0.00
173050	11.19	127.26	390.60	2225.46
173075	43.9	0	671.19	1718.06
173100	3.18	273.71	588.56	3421.34
173125	26.96	185.38	386.76	5191.79
173150	0.07	4.79	342.89	2259.17
173175	34.88	10.92	376.31	203.21
173200	0	51.43	316.23	1044.00
173225	0.36	80.94	3.63	2248.92
173250	0.03	26.68	4.78	1412.26
173275	2.17	17.85	30.42	540.91
173300	5.64	1.17	117.39	224.91
173325	5.19	1.67	140.44	37.71
173350	10.9	0	196.28	22.10
173375	11.31	0	277.58	0.00
173400	14.79	0	326.18	0.00
173425	93.08	0	1259.07	0.00
173450	116.65	0	1999.92	0.00
173475	328.94	0	4661.30	0.00
173500	87.1	0	4912.48	0.00
173525	12.7	0	1289.97	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)
173550	15.58	0	350.50	0.00
173575	19.85	0	442.21	0.00
173600	0.46	5.2	257.56	65.75
173625	10.47	0.06	150.30	70.17
173650	112.01	0	1693.88	0.76
173675	287.46	0	5122.10	0.00
173700	15.34	0	3777.78	0.00
173725	7.35	0	283.93	0.00
173750	7.5	0	185.52	0.00
173775	48.46	0	699.43	0.00
173800	164.89	0	2666.80	0.00
173825	172.63	0	4481.34	0.00
173850	46.36	0	2949.28	0.00
173875	0	6.68	627.00	84.63
173900	109.11	0	1505.16	84.42
173925	95.93	0	2563.05	0.00
173950	38.28	0.79	1677.65	9.88
173975	16.38	3	683.24	47.40
174000	37.02	6.42	623.13	121.64
174025	78.78	3.07	1182.18	128.06
174050	59.69	0	1376.18	41.32
174075	4.62	0.14	644.95	2.00
174100	34.14	0	449.21	1.89
174125	18.61	0.51	659.34	6.37
174150	56.1	0	933.86	6.37
174175	56.32	0	1405.30	0.00
174200	30.78	0	1088.78	0.00
174225	10.86	0.16	484.75	1.96
174250	34.67	1.45	480.69	22.78
174275	33.56	0.05	777.02	20.36
174300	98.68	0.5	1653.02	6.84
174325	177.78	0.02	3455.68	6.49
174350	123.41	0.46	3764.78	5.97
174375	211.27	0	4183.39	5.70
174400	102.43	0	3921.23	0.00
174425	58.55	0	2038.54	0.00
174450	10.76	0	930.94	0.00
174475	166.4	0	2484.15	0.00
174500	18.03	0	2579.05	0.00
174525	22.04	0	503.34	0.00
174550	177.21	0	2599.38	0.00
174575	352.89	0	6626.20	0.00
174600	22.55	0	4692.96	0.00
174625	6.92	8.61	368.41	107.68
174650	194.11	0	2512.88	107.68
174675	122.55	2.04	3897.05	25.65
174700	82.18	78.1	2315.08	1263.74
174725	54.79	5.76	1491.99	1449.18
174750	18.27	2.09	861.74	102.82
174775	24.95			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
174875	5.03	0	145.56	1.32
174900	31.15	1.19	421.93	16.24
174925	3.31	3.65	405.30	63.96
174950	193.98	0	2477.83	46.08
174975	158.56	0	4406.73	0.00
175000	39.73	5.85	2492.50	72.84
175025	1.5	3.37	603.18	117.15
175050	28.95	0	418.02	49.25
175075	10.06	0	500.37	0.00
175100	33.69	0	532.80	0.00
175125	105.75	0	1698.35	0.00
175150	18.17	0	1651.68	0.00
175175	23.19	0.56	514.86	7.48
175200	21.9	0	563.88	6.99
175225	42.32	0	789.80	0.00
175250	81.48	0	1645.23	0.00
175275	16.56	0	1371.18	0.00
175300	26.17	0	538.36	0.00
175325	52.13	0	900.81	0.00
175350	82.05	0	1629.22	0.00
175375	108	0	2375.62	0.00
175400	16.58	0.09	1557.35	1.09
175425	26.49	0	402.54	1.01
175450	29.27	0	458.46	0.00
175475	80.58	4.36	1185.91	89.53
175500	2.79	0.13	1042.06	56.07
175525	41.4	0	572.78	1.66
175550	24.46	0	837.55	0.00
175575	50.47	0	936.57	0.00
175600	48.29	0	1194.16	0.00
175625	61.42	0	1277.35	0.00
175650	52.95	0	1347.07	0.00
175675	22.51	0	932.91	0.00
175700	18.34	0.09	533.28	1.10
175725	7.67	5.82	339.57	62.02
175750	1.17	0.29	112.12	71.80
175775	9.37	31.52	130.44	413.57
175800	2.99	28.19	153.34	773.13
175825	6.11	36.75	113.68	811.66
175850	7.46	70.91	169.57	1345.73
175875	41.38	67.7	610.41	1732.70
175900	41.24	89.95	1023.13	2041.15
175925	18.15	74.87	706.65	2461.37
175950	17.83	84.74	445.89	2063.99
175975	31.05	86.81	643.02	1783.28
176000	25.86	95.34	728.41	2080.99
176025	11.83	167.13	459.12	3659.17
176050	45.99	0	637.81	3313.00
176075	28.73	0	812.83	0.00
176100	15.97			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
176200	48.02	0	862.37	0.00
176225	10.17	0	734.78	0.00
176250	8.15	82.13	229.00	1026.68
176275	50.35	0.31	719.05	1082.20
176300	303.65	0	4389.57	3.84
176325	568.75	0	10905.01	0.00
176350	843.92	0	22418.06	0.00
176375	407.98	0	21160.83	0.00
176400	11.16	0	6628.46	0.00
176425	10.75	0.77	273.80	9.62
176450	10.12	0	274.69	7.84
176475	3.58	18.28	182.71	164.36
176500	8.14	0	146.51	228.46
177425	5.97	40.01	176.38	0.00
177450	6.86	25.68	160.36	821.06
177475	17.72	60.12	307.19	1072.46
177500	97.13	0	1435.58	751.51
177525	60.08	0	1921.50	0.00
177550	133.99	0	2352.04	0.00
177575	24.72	0	1968.93	0.00
177600	157.44	0	2277.02	0.00
177625	104.18	0	3270.24	0.00
177650	252.51	0.02	4458.54	0.24
177675	87.14	1.6	4377.10	20.11
177700	4.58	77.24	1181.92	938.63
177725	2.68	70.12	90.79	1842.07
177750	11.91	0	182.07	886.60
177775	82.74	0	1140.07	0.00
177800	105.02	0	2321.46	0.00
177825	46.56	0	1894.79	0.00
177850	129.95	0	2206.38	0.00
177875	250.44	0	4754.90	0.00
177900	285.96	0	7081.23	0.00
177925	129.15	0	5755.02	0.00
177950	218.04	0	4624.08	0.00
177975	181.41	0	4993.17	0.00
178000	383.75	0	7064.58	0.00
178025	279.97	0	8035.12	0.00
178050	297.12	0	6727.91	0.00
178075	172.41	0	5451.47	0.00
178100	91.77	0	3073.40	0.00
178125	418.74	0	5965.14	0.00
178150	516.82	0	11195.79	0.00
178175	533.47	0	13128.54	0.00
178200	301.16	0	10432.82	0.00
178225	161.2	0	6035.48	0.00
178250	193.35	0	4773.95	0.00
178275	389.66	0	7862.55	0.00
178300	438.82	0	11186.95	0.00
178325	21.88			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
178425	40.34	22.51	532.55	770.66
178450	83.98	5.27	1373.61	480.82
178475	49.39	5.11	1213.73	146.84
178500	255.67	0	3272.19	68.16
178525	153.35	0	5085.84	0.00
178550	17.91	0.17	2192.90	1.95
178575	329.48	0	5920.71	1.59
178600	208.06	0	8364.36	0.00
178625	8.37	1.59	2705.34	19.89
178650	10.77	0	239.25	0.00
178675	355.28	0	5776.90	0.00
178700	862.47	0	23504.57	0.00
178725	1002.64	0	30752.43	0.00
178750	332.79	0	16692.88	0.00
178775	364.08	0	7597.97	0.00
178800	695.06	0	12483.42	0.00
178825	502.37	0	14967.88	0.00
178850	340.97	0	10541.70	0.00
178875	418.67	0	9495.46	0.00
178900	367.23	0	9823.70	0.00
178925	71.11	56.59	5479.19	707.41
178950	146.91	97.38	2710.42	1952.19
178975	248.22	0	4368.66	1417.77
179000	10.84	0	3095.84	0.00
179025	21.27	0	401.36	0.00
179050	30.5	80.08	647.15	1001.05
179075	30.47	0	762.13	1001.05
179100	23.36	0	620.18	0.00
179125	46.86	0	678.87	0.00
179150	13.03	0	651.06	0.00
179175	8.03	114.56	263.31	1431.97
179200	4.99	115.21	162.81	2872.12
179225	42.64	0	595.38	1440.15
179250	15.78	0	730.22	0.00
179275	152	0	2097.22	0.00
179300	144.18	0	4079.36	0.00
179325	222.22	0.26	5657.55	3.24
179350	341.86	0	9157.50	3.24
179375	38.04	0	6034.85	0.00
179400	101.26	0	1730.62	0.00
179425	311.64	0	4282.55	0.00
179450	138	0.12	4449.95	1.84
179475	60.77	0	2259.00	1.65
179500	19.09	0.3	1008.20	3.68
179525	34.6	0.26	859.33	6.64
179550	21.52	0	950.41	3.70
179575	176.5	0	3274.71	0.00
179600	84.86	0	3348.00	0.00
179625	38.61	0.63	1450.00	8.13
179650	46.05			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
179750	25.99	0	842.13	0.00
179775	76.49	1.23	1087.88	17.39
179800	207.41	0	3183.63	17.94
179825	98.09	0	3756.81	0.00
179850	160.97	0	3698.91	0.00
179875	43.98	0	2863.23	0.00
179900	0.34	91.18	554.02	1139.79
179925	16.25	0	207.29	1139.79
179950	421.35	0	5915.12	0.00
179975	522.13	0	14508.60	0.00
180000	295.41	0	10618.40	0.00
180025	261.52	0.8	5508.46	10.72
180050	221.43	0	5525.93	10.27
180075	208.5	0	6273.48	0.00
180100	100.05	0	4338.41	0.00
180125	72.96	0	2066.08	0.00
180150	74.35	0	1485.43	0.00
180175	38.13	0	1172.25	0.00
180200	41.37	0	932.63	0.00
180225	24.13	0	818.76	0.00
180250	71.07	0	1190.03	0.00
180275	471.25	0	6870.74	0.00
180300	575.71	0	15247.98	0.00
180325	433.44	0	15098.05	0.00
180350	204.76	0	8347.74	0.00
180375	294.89	0	6245.69	0.00
180400	166.33	0	5683.60	0.00
180425	39.58	0	2379.77	0.00
180450	53.61	0	1164.88	0.00
180475	67.16	0.52	1581.70	7.04
180500	84.63	0.04	1911.05	7.52
180525	30.72	4.35	1384.29	79.53
180550	104.8	0	1597.50	79.05
180575	232.8	0	3903.13	0.00
180600	111.82	0	4237.28	0.00
180625	11.24	0	1558.50	0.00
180650	262.24	0	3961.99	0.00
180675	660.56	0	13549.45	0.00
180700	644.17	0	19182.61	0.00
180725	371.58	0	15171.79	0.00
180750	239.84	3.82	9469.00	46.85
180775	247.2	0.86	6729.20	57.73
180800	210	0	5520.13	10.95
180825	30.31	0	2569.69	0.03
180850	71.34	0	1080.26	0.00
180875	148.91	0	2242.48	0.00
180900	13.8	0	1726.78	0.00
180925	4.49	0.93	225.65	11.74
180950	85.36	5.93	1123.02	85.78
180975	67.06			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
181075	669.55	0	16158.80	0.00
181100	845.13	1.46	24200.23	16.83
181125	711.45	2.02	19457.17	43.59
181150	558.1	0	15869.38	25.28
181175	352.17	2.17	11378.43	27.09
181200	203.15	8.33	6941.56	131.24
181225	179.51	2.49	4783.24	135.32
181250	169.05	0	4567.20	30.70
181275	77.44	0	3229.81	0.00
181300	48.68	0.46	1639.21	5.46
181325	24.95	0	920.45	5.70
181350	2.55	0.22	338.33	2.78
181375	64.29	1.25	685.90	20.50
181400	76.17	0.44	1370.65	24.65
181425	65.9	0	1554.56	6.32
181450	30.44	0	1197.22	0.00
181475	167.53	0	2579.78	0.00
181500	11.88	0	2505.34	0.00
181525	10.64	0	274.41	0.00
181550	74.42	0	1183.75	0.00
181575	33.53	0	1289.69	0.00
181600	38.83	0	870.95	0.00
181625	64.38	0	1494.30	0.00
181650	46.55	0	1535.73	0.00
181675	80.64	0	1488.50	0.00
181700	47.25	3.07	0.00	0.00
181725	62.49	4.5	1597.50	105.96
181750	46.39	0.12	1446.32	59.88
181775	18.06	0	824.04	1.45
181800	38.33	0	636.64	0.00
181825	22.72	0	632.69	0.00
181850	31.15	0	625.10	0.00
181875	12.82	0	549.62	0.00
181900	21.03	0	428.04	0.00
181925	91.92	0	1661.87	0.00
181950	56.91	0	2110.67	0.00
181975	111.68	0	1945.69	0.00
182000	76.03	0	2113.75	0.00
182025	149.08	0	3236.91	0.00
182050	41.1	0	2638.01	0.00
182075	322.62	0	4138.17	0.00
182100	173.05	0	5786.29	0.00
182125	147.92	0	4702.98	0.00
182150	98.64	0	3209.48	0.00
182175	109.21	0	2421.57	0.00
182200	45.37	1.02	1932.25	0.00
182225	75.86	0.09	1518.99	14.05
182250	27.92	4.65	1359.60	56.48
182275	42.15	0	945.18	54.44
182300	142.36			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
182400	71.3	0	1600.79	0.00
182425	14.29	24.34	1069.85	304.27
182450	21.15	0	465.15	253.10
182475	137.88	0	2155.88	0.00
182500	187.88	0	4438.87	0.00
182525	100.79	0	4051.32	0.00
182550	159.93	0	3698.96	0.00
182575	22.95	0	2522.83	0.00
182600	42.35	5.31	890.65	65.13
182625	4.43	10.46	643.70	194.06
182650	0.7	16.34	67.02	332.25
182675	8.84	13.49	119.20	372.81
182700	3.11	14.97	140.63	362.91
182725	8.66	4.83	135.38	252.59
182750	83.53	1.14	1124.90	75.17
182775	94.32	0.05	2223.12	14.94
182800	12.02	0	1329.36	0.64
182825	8.67	0	258.74	0.00
182850	17.47	0	326.75	0.00
182875	11.24	0	358.87	0.00
182900	9.37	0	257.71	0.00
182925	27.16	0	453.04	0.00
182950	46.93	0	873.88	0.00
182975	21.62	0	851.80	0.06
183000	75.61	0	1291.41	0.06
183025	0.28	0.94	1213.00	12.44
183050	163.55	0	2532.05	12.43
183075	210.97	0	4887.34	0.00
183100	36.63	0	2919.14	0.12
183125	12.91	0.03	566.11	0.54
183150	78.14	0	1021.27	0.41
183175	271.97	0	4012.75	0.00
183200	153.01	0	4917.19	0.00
183225	7.71	0	2008.98	0.00
183250	191.61	0	2491.43	0.00
183275	151.88	0	4293.55	0.00
183300	69.61	0.02	2768.60	0.19
183325	84.38	1.34	2176.38	16.89
183350	171.04	0	4716.31	16.62
183375	226.33	0	6125.53	0.00
183400	201.48	0	5181.77	0.00
183425	54.19	0	3074.98	0.00
183450	226.71	0	3440.64	0.00
183475	292.25	0	7172.41	0.00
183500	587.54	0	13902.65	0.00
183525	873.74	0	23033.93	0.00
183550	278.5	0	17719.33	0.00
183575	289.7	0	7734.67	0.00
183600	301.09	0	7384.89	0.00
183625	55.6			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
183725	12.2	0	1971.45	0.00
183750	60.37	0.17	918.43	2.17
183775	54.94	4.52	1460.89	58.15
183800	60.82	7.14	1360.86	153.14
183825	37.92	4.85	1020.65	178.36
183850	9.01	0.15	519.88	71.19
183875	47.21	0	697.51	1.84
183900	72.9	0	1501.33	0.00
183925	21.63	0	1208.80	0.00
183950	0	4.46	305.72	60.20
183975	346.4	0	5952.57	60.61
184000	26.33	0.36	6375.70	4.00
184025	32.9	9.22	956.83	113.01
184050	42.64	5.59	1038.88	181.90
184075	29.74	0.99	897.98	82.40
184100	40.35	0	757.38	13.49
184125	39.05	0	801.79	0.00
184150	42.56	0	969.19	0.00
184175	49.1	0	1158.58	0.00
184200	43.25	0	1186.43	0.00
184225	112.62	0.09	2014.26	1.17
184250	100.1	0	2658.98	1.17
184275	220.33	0	3577.74	0.00
184300	380.59	0	6745.62	0.00
184325	378.96	0	9340.46	0.00
184350	354.8	0	10833.53	0.00
184375	259.61	0.07	10713.89	0.92
184400	542.67	0.89	13649.54	11.62
184425	107.41	3.27	10922.04	49.00
184450	31.67	2.12	2123.38	64.34
184475	17.53	0	620.29	26.31
184500	268.22	0	3350.14	0.00
184525	92.83	0.93	3929.92	12.62
184550	35.22	2.16	1368.30	41.61
184575	172.7	0.54	2447.60	35.11
184600	152.43	0.34	4064.14	11.04
184625	25.28	0	2353.33	4.22
184650	59.7	0	1130.13	0.00
184675	33.57	0	1171.04	0.00
184700	17.44	0	595.16	0.00
184725	62.33	0	860.15	0.00
184750	76.06	0	1359.33	0.00
184775	49.06	0	1493.23	0.00
184800	107.81	0	2032.26	0.00
184825	170.78	0.36	3866.04	4.63
184850	41.79	0	2782.43	4.57
184875	37.99	2.55	918.60	33.01
184900	56.82	8.32	1011.70	144.88
184925	152.27	0.88	2341.05	122.01
184950	266.2			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
185050	208.43	0.04	9589.94	0.46
185075	97.88	0	3828.81	0.47
185100	83.34	0	2265.18	0.00
185125	25.2	0	1257.45	0.00
185150	31.35	0	651.94	0.00
185175	24.9	0	660.58	0.00
185200	27.19	0	602.68	0.00
185225	51.16	0	895.66	0.00
185250	54.08	0	1237.44	0.00
185275	40.59	0	1139.13	0.00
185300	30.84	0	881.74	0.00
185325	88.25	0	1603.69	0.00
185350	352.47	1.67	7210.40	19.42
185375	457.76	0	12509.84	19.86
185400	306.4	0	9708.93	0.00
185425	157.96	0	5804.50	0.00
185450	213.96	54.55	4011.94	829.96
185475	133.12	0	4338.52	681.84
185500	340.63	0	5921.93	0.00
185525	395.48	0	9201.42	0.00
185550	268.25	0	9793.82	0.00
185575	23.13	0.68	5031.48	7.00
185600	21.73	0	582.33	8.30
185625	88.57	0	924.58	0.00
185650	45.57	0	1041.27	0.00
185675	70.62	0	1363.38	0.00
185700	10.6	0.17	1015.19	2.07
185725	49.74	0	787.24	1.94
185750	457.88	0	7835.94	0.00
185775	232.24	0	10697.98	0.00
185800	5.64	0	3615.49	0.00
185825	113.39	0.08	1789.27	0.99
185850	145.36	0.07	3285.14	1.84
185875	15.8	2.35	1996.74	30.35
185900	51.34	0.16	637.29	36.49
185925	81.72	0	1149.49	2.60
185950	31.33	158.92	1261.39	2568.68
185975	133.68	0	2062.52	1986.48
186000	50.53	0	2302.55	0.00
186025	28.21	0	997.88	0.00
186050	16.48	0	552.75	0.00
186075	263.11	0	5359.07	0.00
186100	167.89	0	6870.51	0.00
186125	92.36	0	3104.96	0.00
186150	4.22	0.44	1303.21	5.78
186175	89.64	0	1311.30	6.12
186200	129.72	0	2716.21	0.00
186225	12.23	0	1577.22	0.00
186250	61.86	0	790.41	0.00
186275	22.99			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
186375	103.49	0	1367.81	0.00
186400	67.78	0	1925.33	0.00
186425	90.25	0	1836.02	0.00
186450	13.38	0	1239.92	0.00
186475	46.37	0	768.16	0.00
186500	3.8	4.72	633.64	60.08
186525	24.88	0	323.70	47.59
186550	126.81	0	1596.93	0.02
186575	25.74	0	1723.73	0.02
186600	152.15	0	2250.11	0.00
186625	17.65	0	2535.40	0.00
186650	107.72	0	1742.84	0.00
186675	77.68	0	2468.59	0.00
186700	128.13	0	2538.55	0.00
186725	239.06	0	4455.25	0.00
186750	4.94	0.05	3040.59	0.57
186775	7.13	0	152.42	0.53
186800	20.29	0	361.63	0.00
186825	0	13.6	272.70	163.24
186850	156.7	0	2040.99	167.40
186875	338.45	0	6145.80	0.00
186900	308.32	0	7609.14	0.00
186925	227.18	0	6009.73	0.00
186950	63.53	0.37	3273.30	5.00
186975	8.18	1.17	862.62	19.87
187000	337.61	0	4322.43	14.57
187025	424.76	0	9529.64	0.00
187050	97.9	0	6533.20	0.00
187075	14.69	0	1477.91	0.00
187100	0.7	70.04	194.16	759.98
187125	158.06	0	2370.04	759.47
187150	553.58	0	10550.18	0.00
187175	227.61	0	11422.58	0.00
187200	23.82	0	3400.26	0.00
187225	9.11	0.15	413.09	1.90
187250	22.89	0	399.98	1.91
187275	70.03	1.14	1090.87	14.43
187300	62	3.8	1650.38	0.00
187325	79.05	284.43	1194.60	6146.89
187350	105.83	178.51	1796.95	8718.82
187375	178.28	0.11	3510.81	2315.27
187425	16.95	0.01	2440.38	0.00
187450	161.68	0	2330.00	0.15
187475	276.14	0.41	5411.88	5.21
187500	221.48	1.9	5960.63	29.52
187525	185.5	2.08	4970.68	50.18
187550	102.4	2.6	3825.87	56.60
187575	0.03	8.67	1464.05	139.94
187600	22.33	0	311.38	109.93
187625	132.07			



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
187725	0	5.380	6186.97	66.60
187750	132.48	0.000	1936.74	65.93
187775	620.99	0.000	10999.91	0.00
187800	183.98	0.000	11595.79	0.00
187825	12.85	0.560	2650.03	6.27
187850	36.92	0.000	630.66	6.83
187875	26.92	0.000	798.01	0.00
187900	94.09	0.000	1368.61	0.00
187925	140.9	0.000	2339.39	0.00
187950	204.57	0.000	3397.64	0.00
187975	155.33	0.020	3630.59	0.32
188000	67.08	4.000	2652.68	52.01
188025	31.63	5.450	1233.90	118.19
188050	36.49	7.250	880.48	156.27
188075	0	77.850	513.91	791.71
188100	1.2	1.380	15.36	932.07
188125	40.29	0.000	518.59	17.25
188150	26.67	0.000	837.03	0.00
188175	64.19	0.060	1165.92	0.71
188200	155.78	0.000	3691.52	0.56
188225	27.39	0.920	3165.75	8.01
188250	67.42	0.000	1354.50	9.62
188275	86.34	0.000	1647.65	0.00
188300	104.64	0.000	2034.03	0.00
188325	2.75	8.860	1258.11	122.41
188350	6.7	1.260	121.90	124.01
188375	5.04	0.320	165.98	19.43
188400	22.05	0.260	372.92	7.50
188425	122.17	1.530	1802.71	22.34
188450	66.43	4.830	2459.03	86.05
188475	38.45	2.330	1311.00	0.00
188500	133.94	0.650	2130.41	37.72
188525	41.08	0.830	2373.59	17.60
188550	16.84	0.000	775.80	10.29
188575	68.08	0.000	1011.67	0.00
188600	32.12	0.000	993.88	0.00
188625	75.5	0.000	994.11	0.00
188650	105.29	0.000	1661.53	0.00
188675	51.38	95.000	1755.47	1490.95
188700	57.28	0.000	1409.30	1064.41
188725	92.89	0.000	1928.87	0.00
188750	93.11	0.030	2156.36	0.37
188775	225.14	0.000	3307.18	0.45
188800	146.85	1.220	4380.19	15.92
188825	73.09	3.350	2962.03	55.42
188850	0	51.530	1166.75	425.21
188875	0	114.680	0.00	1583.75
188900	54.51	1.840	681.40	1456.58
188925	170.85	0.000	2817.02	23.04
188950	65.4	1.740	2953.17	21.82
188975	3.7	154.260	863.83	1950.11
189000	29.72	0.260	424.13	1811.10
189025	276.62	0.000	4154.48	3.12



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
189050	250.22	0.000	7222.08	0.00
189075	11.96	0.000	3451.16	0.00
189100	103.01	0.000	1467.67	0.00
189125	152.51	0.000	3094.33	0.00
189150	173.3	0.000	3883.14	0.00
189175	64.2	0.000	2853.39	0.00
189200	28.03	0.000	1068.38	0.00
189225	114.89	0.000	1745.37	0.00
189250	84.8	0.000	2496.12	0.00
189275	49.47	0.000	1678.35	0.00
189300	196.07	0.000	3069.26	0.00
189325	38.43	0.000	3010.64	0.00
189350	6.02	0.260	613.64	3.64
189375	415.15	0.000	7776.86	3.75
189400	486.8	0.000	15032.06	0.00
189425	220.39	0.000	9040.75	0.00
189450	20.57	0.000	3011.95	0.00
189475	174.26	0.520	2435.35	6.55
189500	92.2	3.010	3248.93	44.70
189525	183.41	0.710	3109.82	49.77
189550	99.56	0.000	3035.74	9.91
189575	8.98	0.000	1178.27	0.00
189600	48.18	0.000	701.54	0.00
189625	222.11	0.000	3378.62	0.00
189650	18.7	0.910	3068.51	11.09
189675	248.61	0.000	3530.12	10.99
189700	155.76	0.000	5146.78	0.00
189725	21.39	0.000	2194.99	0.00
189750	211.89	0.000	2771.29	0.00
189775	155.34	0.000	4448.25	0.00
189800	78.46	0.000	2922.51	0.00
189825	100.82	0.000	2414.69	0.00
189850	453.44	0.000	7505.08	0.00
189875	13.31	0.490	6146.64	6.77
189900	0.31	44.450	170.22	561.79
189925	1.71	13.670	25.31	726.58
189950	226.36	0.000	2850.88	170.92
189975	297.37	0.000	6546.60	0.00
190000	0	33.850	4053.71	426.73
190025	0	39.540	0.00	932.84
190050	28.08	18.150	423.83	697.72
190075	38.53	16.600	906.71	414.31
190100	75.79	7.400	1429.08	299.99
190125	80.61	1.340	1954.99	109.30
190150	104.09	0.000	2308.66	16.77
190175	89.55	0.000	2420.49	0.00
190200	128.58	0.000	2726.66	0.00
190225	128.31	0.000	3211.08	0.00
190250	18.65	0.000	1837.00	0.00
190275	35.47	0.000	676.59	0.00
190300	8.43	0.000	522.56	0.02
190325	61.49	0.000	794.42	0.02
190350	112.74	0.000	2013.78	0.09



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
190375	9.75	0.000	1609.20	0.11
190400	186.87	0.000	2643.88	0.01
190425	332.34	0.000	6427.12	0.00
190450	195.96	0.000	5795.69	0.00
190475	112.17	0.000	3407.46	0.00
190500	114.46	0.000	2832.87	0.00
190525	186	2.220	4403.00	25.29
190550	134.89	0.000	5070.85	24.36
190575	233.42	0.000	5102.83	0.00
190600	22.39	0.000	3112.26	0.00
190625	15.53	0.000	451.80	0.00
190650	172.35	0.000	2497.31	0.00
190675	126.63	0.680	4694.50	8.03
190700	144.46	3.290	3422.19	49.31
190725	170.02	0.000	3264.80	47.30
190750	90.64	7.430	2647.56	109.08
190775	135.08	0.000	2756.85	96.47
190800	279.68	0.000	5184.56	0.00
190825	0.02	6.300	3496.26	78.70
190850	1.46	8.190	18.67	180.82
190875	0.52	11.310	24.75	0.00
190900	266.19	0.000	2865.80	149.92
190925	85.23	0.780	3993.64	10.37
190950	6.83	0.000	1251.48	9.30
190975	180.95	0.000	3368.82	0.00
191000	50.4	0.000	3220.80	0.00
191025	95.11	0.000	1551.64	0.00
191050	253.2	0.000	3210.41	0.00
191075	170.65	0.000	3983.35	0.00
191100	125.44	0.000	3552.80	0.00
191125	172.19	0.000	4326.21	0.00
191150	626.89	0.000	12385.57	0.00
191175	966	0.000	23460.52	0.00
191200	415.13	0.000	17939.07	0.00
191225	124.73	0.000	6614.01	0.00
191250	125.93	0.000	2521.53	0.00
191275	290.92	0.000	4096.44	0.00
191300	161.95	0.000	4331.63	0.00
191325	154.45	0.000	3654.42	0.00
191350	171.04	0.000	4913.81	0.00
191375	210.78	0.160	7314.74	2.30
191400	700.25	0.000	17140.49	2.27
191425	151.48	0.000	11833.61	0.00
191450	14.33	1.370	2072.72	17.08
191475	27.59	0.190	524.07	19.48
191500	42.11	0.190	871.32	4.81
191525	168.95	0.000	2205.14	2.74
191550	323.08	0.000	5011.49	0.00
191575	68.65	0.000	4139.42	0.00
191600	110.86	0.000	1965.88	0.00
191625	220.9	0.000	4305.81	0.00
191650	6.29	0.000	3409.88	0.00
191675	174.28	0.000	3197.70	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)
191700	285.36	0.000	7592.25	0.00
191725	131.74	0.000	5341.40	0.00
191750	22.19	0.000	1924.11	0.00
191775	64.04	0.000	1023.51	0.00
191800	212.07	0.000	3064.04	0.00
191825	228.72	0.000	5249.61	0.00
191850	0	70.500	2872.41	1082.75
191875	0.28	83.790	3.41	2043.01
191900	70.55	0.000	885.41	1047.42
191925	443.85	0.000	6429.99	0.00
191950	198.07	0.000	8022.93	0.00
191975	2.4	0.010	2514.78	0.15
192000	14.87	0.000	213.99	0.15
192025	208.53	0.000	2878.92	0.00
192050	401.05	0.000	7619.82	0.00
192075	310.11	0.000	8889.60	0.00
192100	25.9	0.000	4200.19	0.00
192125	0	54.010	323.77	675.15
192150	0	50.050	0.00	1300.73
192175	186.76	0.000	2334.49	625.58
192200	215.87	0.000	5032.88	0.00
192225	0	33.620	2698.39	420.31
192250	0	41.490	0.00	938.88
192275	60.39	2.880	791.62	538.86
192300	225.67	0.000	3963.42	32.72
192325	118.31	0.000	4741.58	0.00
192350	39.43	0.000	2137.72	0.00
192375	9.13	0.000	648.56	0.09
192400	13.07	0.000	277.21	0.09
192425	13	0.000	324.86	0.00
192450	87.56	0.000	1284.93	0.00
192475	224.33	0.000	3898.62	0.00
192500	29.76	0.000	3176.18	0.00
192525	52.92	0.000	1033.53	0.00
192550	119.64	0.150	2157.01	1.83
192575	385.16	0.000	6524.76	1.82
192600	235.2	3.640	8314.44	45.73
192625	146.31	0.000	4873.41	45.59
192650	93.22	0.440	2994.17	5.47
192675	67.89	0.000	1945.74	5.64
192700	187.96	0.000	3047.16	0.10
192725	47.93	0.000	2817.61	0.00
192750	3.31	9.420	627.50	120.30
192775	151.87	0.000	1922.06	118.78
192800	166.8	0.000	3983.44	0.00
192825	278.97	0.000	5631.14	0.00
192850	202.25	0.000	6481.75	0.00
192875	66.76	1.330	3677.05	16.65
192900	306.39	0.000	4860.05	16.65
192925	12.51	0.000	4043.19	0.00
192950	13.47	0.480	324.76	6.03
192975	187.68	0.090	2514.31	7.16
193000	8.74	0.000	2455.23	1.13



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
193025	7.5	0.050	198.74	0.70
193050	0.44	1.370	98.14	17.91
193075	7.07	0.060	93.84	17.97
193100	50.87	0.000	764.42	0.81
193125	6.73	0.000	753.87	0.00
193150	11.29	0.000	225.30	0.00
193175	93.45	0.000	1309.27	0.00
193200	46.91	0.000	1754.41	0.00
193225	9.11	0.000	700.22	0.00
193250	25.98	0.000	438.63	0.00
193275	45.13	0.000	812.99	0.05
193300	70.71	0.130	1142.59	1.71
193325	97.4	0.000	2001.12	1.65
193350	216.41	0.000	3922.66	0.00
193375	468.32	0.000	8559.12	0.00
193400	397.42	0.000	10821.72	0.00
193425	171.87	0.000	7116.17	0.00
193450	229.43	0.000	5016.32	0.00
193475	43.91	0.000	3416.78	0.00
193500	19.32	0.000	790.38	0.00
193525	65.11	0.000	979.98	0.00
193550	44.03	0.000	1095.53	0.00
193575	119.99	0.860	1693.18	12.17
193600	63.96	1.020	1921.47	26.56
193625	22.06	0.000	966.54	13.92
193650	10.84	0.000	411.14	0.00
193675	11.09	0.000	275.68	0.00
193700	14.81	0.000	323.42	0.00
193725	45.92	0.000	759.15	0.00
193750	30.17	0.000	951.24	0.00
193775	33.68	0.000	798.21	0.00
193800	201.49	0.000	2939.68	0.00
193825	191.53	0.000	4912.81	0.00
193850	50.38	0.000	3023.95	0.00
193875	24.6	0.000	941.44	0.00
193900	142.05	0.000	2250.99	0.00
193925	306.8	0.000	6189.00	0.00
193950	418.99	0.000	9236.62	0.00
193975	849.57	0.000	15856.98	0.00
194000	1008.53	0.000	23226.28	0.00
194025	400.82	0.000	17616.87	0.00
194050	28.22	0.000	5362.94	0.00
194075	26.82	0.000	688.05	0.00
194100	264.14	0.000	3637.09	0.00
194125	193.94	0.000	5726.07	0.00
194150	147.38	0.000	4266.57	0.00
194175	444.12	0.000	7465.01	0.00
194200	394.45	0.000	11332.19	0.00
194225	70.85	0.000	6346.98	0.00
194250	3.75	1.000	955.00	12.47
194275	0	4.440	46.87	67.97
194300	133.97	0.000	1674.57	55.50
194325	26.13	17.260	1924.74	224.15



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
194350	11.74	34.600	422.11	682.27
194375	53.29	12.900	789.73	596.37
194400	90.93	1.200	1934.15	175.88
194425	11.94	0.000	1784.98	16.02
194450	59.04	0.000	1021.76	0.00
194475	65.8	0.040	1507.98	0.53
194500	11.26	0.470	796.72	7.16
194525	15.98	0.000	315.46	6.32
194550	36.38	0.000	654.54	0.00
194575	28.44	0.000	810.27	0.00
194600	21.79	0.000	627.86	0.00
194625	246.99	0.000	3414.82	0.00
194650	552.73	0.000	11926.58	0.00
194675	678.38	0.000	18234.61	0.00
194700	192.87	0.000	12553.61	0.00
194725	22.18	0.000	2977.97	0.00
194750	7.67	2.020	344.71	27.58
194775	0.78	0.740	106.92	34.29
194800	163.24	0.000	1802.57	10.58
194825	83.2	4.360	3080.50	0.00
194850	24.15	3.070	1143.49	103.32
194875	69.07	0.000	1181.40	38.08
194900	225.08	0.000	3676.88	0.00
195000	153.47	0.000	18927.50	0.00
195025	36.44	0.360	2649.09	4.68
195050	22.85	4.670	829.83	54.04
195075	164.22	0.000	2430.59	55.62
195100	78.01	0.000	3027.82	0.00
195125	350.32	0.000	5354.08	0.00
195150	54.58	0.000	5061.24	0.09
195175	0.72	2.100	691.250	26.330
195200	540.38	0.000	6834.070	26.120
195225	574.96	0.000	14665.000	0.000
195250	399.72	0.000	12964.920	0.000
195275	127.96	0.000	7513.590	0.000
195300	1.17	0.870	1957.790	10.270
195325	0	20.340	14.910	237.400
195350	13.42	4.760	195.830	292.600
195375	7.34	0.100	268.790	60.930
195400	41.47	0.300	610.220	4.930
195425	13.57	0.150	688.100	5.580
195450	18.58	0.090	376.330	2.990
195475	69.36	0.000	964.840	1.070
195500	16.55	0.000	992.360	0.000
195525	13.48	0.120	379.450	1.470
195550	16.96	0.000	389.570	1.400
195575	10.72	0.000	346.750	0.000
195600	13.22	0.000	296.570	0.000
195625	21.67	0.000	432.490	0.000
195650	33.75	0.000	694.430	0.000
195675	48.5	0.000	1028.140	0.000
195700	70.87	0.000	1492.090	0.000
195725	118.31	0.000	2414.840	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)
195750	4.67	0.000	1648.130	0.000
195775	0	50.060	57.210	629.990
195800	5.13	16.070	64.160	826.590
195825	11.51	0.000	208.020	200.870
195850	9.89	0.000	267.610	0.000
195875	6.28	0.000	203.970	0.020
195900	9.09	0.000	195.510	0.020
195925	18.46	0.000	344.590	0.000
195950	35.06	0.000	668.510	0.000
195975	82.63	0.000	1516.550	0.000
196000	194.54	0.000	3732.110	0.000
196025	270.93	0.000	6514.500	0.000
196050	6.19	3.020	3941.870	34.850
196075	1.66	26.100	100.790	330.560
196100	3.65	45.810	67.130	852.780
196125	1.91	46.200	68.630	1195.670
196150	24.4	0.000	329.040	570.900
196175	436.18	0.000	6430.380	0.000
196200	438.56	0.000	12735.850	0.000
196225	153.23	0.000	8904.110	0.000
196250	66.46	0.000	2862.310	0.000
196275	24.96	0.000	1055.250	0.000
196300	105.4	0.000	1629.500	0.000
196325	92.72	0.000	1866.310	0.000
196350	2.56	134.660	904.030	2227.230
196375	0.04	10.680	31.850	1899.610
196400	2.59	0.000	32.870	133.500
196425	4.24	0.000	85.320	0.000
196450	38.43	0.000	533.320	0.000
196475	10.73	0.000	608.850	0.000
196500	0	6.080	128.790	92.560
196525	2.31	60.600	28.300	856.260
196550	11.1	2.920	167.560	793.980
196575	93.62	0.000	1309.060	36.460
196600	101.2	0.000	2479.030	0.000
196625	28.68	0.000	1875.380	0.000
196650	43.98	0.000	1116.320	0.070
196675	0.98	0.000	651.110	0.070
196700	0	5.230	12.210	65.360
196725	2.3	0.920	27.970	77.130
196750	1.49	1.470	43.240	32.650
196775	5.07	0.000	81.460	18.990
196800	9.63	4.880	180.150	64.120
196825	19.24	0.000	354.870	64.440
196850	20.94	0.000	503.540	0.000
196875	13.87	0.000	435.240	0.000
196900	4.43	4.840	227.610	68.250
196925	7.12	0.760	141.020	79.950
196950	5.39	3.850	156.610	53.730
196975	3.69	3.600	112.460	95.640
197000	0	14.410	43.180	222.000
197025	0	52.610	0.000	825.130
197050	0	238.290	0.000	3636.260



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
197075	0	88.630	0.000	4086.590
197100	1.65	2.620	20.630	1140.690
197125	5.69	0.020	91.730	33.050
197150	5.25	0.000	134.380	0.300
197175	11.44	0.000	205.790	0.000
197200	8.57	0.000	250.320	0.000
197225	0	80.050	107.090	1000.680
197250	17.37	5.050	217.080	1063.750
197275	3.85	0.990	265.160	75.440
197300	4.93	0.000	109.760	12.360
197325	0	11.510	61.490	143.220
197350	3.94	0.040	48.030	141.160
197375	6.69	2.770	133.340	29.360
197400	137.55	0.000	1879.940	32.240
197425	121.83	0.000	3147.300	0.000
197450	17.01	0.000	1581.860	0.000
197475	2.98	1.330	244.420	17.460
197500	12.67	0.000	202.050	15.330
197525	5.38	1.940	228.210	23.560
197550	2.79	2.230	100.200	54.460
197575	8.32	0.000	121.660	37.840
197600	11.59	0.000	230.100	0.000
197625	2.4	0.610	175.170	7.610
197650	4.32	0.000	79.690	8.390
197675	21.04	0.000	326.770	0.000
197700	48.22	0.000	865.830	0.000
197725	38.23	0.000	1080.660	0.000
197750	36.24	0.000	930.820	0.000
197775	0	11.950	452.960	149.310
197800	5.02	0.000	62.780	149.310
197825	1.48	8.520	81.240	106.470
197850	8.98	0.000	130.040	111.850
197875	37.28	0.000	529.660	0.000
197900	19.06	0.360	628.640	3.780
197925	5.82	1.520	296.940	24.860
197950	6.34	2.660	151.900	52.640
197975	5.72	0.000	150.620	32.570
198000	22.48	0.000	369.420	0.000
198025	30.37	0.020	672.910	0.200
198050	31.2	0.000	759.520	0.200
198075	47.62	0.000	935.140	0.000
198100	169.97	0.000	2567.920	0.000
198125	28.51	0.000	2446.230	0.000
198150	2.78	7.210	391.110	90.070
198175	4.46	0.580	90.460	97.290
198200	7.62	0.000	151.030	7.220
198225	8.54	0.000	202.050	0.000
198250	9.22	0.000	221.990	0.000
198275	9.15	0.000	229.590	0.000
198300	4.7	13.300	173.180	166.200
198325	6.19	3.990	136.230	216.060
198350	11.06	0.000	215.670	49.860
198375	14.68	0.000	321.750	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)
198400	16.45	0.000	389.150	0.000
198425	8.84	0.000	316.140	0.000
198450	5.94	0.870	183.970	11.030
198475	6.75	1.810	153.870	35.660
198500	2.25	0.190	111.000	26.370
198525	0	15.490	28.360	195.040
198550	0	55.770	0.000	890.820
198575	0	191.900	0.000	3095.860
198600	0	65.020	0.000	3211.500
198625	0	24.160	0.000	1135.320
198650	0	7.120	0.000	392.820
198675	0.18	0.740	2.200	98.220
198700	0.09	1.500	3.310	27.950
198725	0.59	3.330	8.500	60.400
198750	0.83	3.910	17.730	90.540
198775	3.53	0.880	54.490	59.870
198800	9.32	0.000	160.660	10.980
198825	10.43	0.000	247.180	0.000
198850	4.88	0.000	191.350	0.000
198875	8.91	0.000	172.220	0.000
198900	21.06	0.000	374.610	0.000
198925	29.97	0.000	638.050	0.000
198950	30.73	0.000	758.840	0.000
198975	23.63	0.000	679.510	0.000
199000	20.79	0.000	555.170	0.000
199025	12.51	0.000	416.130	0.000
199050	6.33	0.000	235.460	0.000
199075	0	4.770	79.190	59.610
199100	0	27.310	0.040	400.940
199125	0	16.520	0.000	547.830
199150	1.45	0.000	18.080	206.500
199175	10.22	0.000	145.880	0.000
199200	18.69	0.000	361.430	0.000
199225	26.12	0.000	560.090	0.000
199250	36.3	0.000	780.230	0.000
199275	22.25	0.000	731.950	0.000
199300	10.1	0.000	404.470	0.000
199325	1.17	1.920	140.890	23.940
199350	6.31	0.000	93.420	23.940
199375	30.21	0.000	456.450	0.000
199400	18.35	0.000	606.950	0.000
199425	0	13.600	230.520	169.610
199450	1.33	4.190	16.780	221.880
199475	10.69	0.000	151.070	52.260
199500	18.81	0.000	369.910	0.000
199525	25.07	0.000	548.530	0.000
199550	20.16	0.000	565.340	0.000
199575	10.16	0.000	378.980	0.000
199600	7.4	0.000	219.550	0.000
199625	14.51	0.000	273.940	0.000
199650	14.97	0.000	367.860	0.000
199675	19.86	0.000	428.930	0.000
199700	34.04	0.000	657.940	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)
199725	21.31	0.000	679.660	0.000
199750	15.19	0.000	454.740	0.000
199775	0.74	0.000	199.050	0.000
199800	0	12.420	9.190	155.220
199825	0	18.830	0.000	395.880
199850	0	4.430	0.000	298.450
199875	0.66	4.780	8.900	112.310
199900	0.12	8.640	9.880	166.770
199925	1.4	3.580	18.950	152.770
199950	1.57	1.800	37.170	67.290
199975	9.73	0.000	141.260	22.480
200000	10.83	0.000	259.550	0.000
200025	1.03	2.690	165.610	32.820
200050	0	3.210	15.620	73.250
200075	0.62	0.090	8.410	41.480
200100	10.49	0.000	138.840	1.160
200125	16.89	0.000	342.220	0.000
200150	24.72	0.000	520.040	0.000
200175	36.82	0.000	737.190	0.000
200200	22.94	0.130	654.370	1.760
200225	8.48	0.000	353.100	1.690
200250	8.57	0.000	213.110	0.000
200275	4.73	0.000	167.900	0.000
200300	2.54	0.000	93.860	0.000
200325	10.26	0.000	160.620	0.000
200350	6.4	0.160	205.270	2.030
200375	1.45	1.520	96.210	21.350
200400	4	0.000	68.010	19.320
200425	13.96	0.000	225.190	0.000
200450	23.47	0.000	469.090	0.000
200475	22.09	0.000	570.690	0.000
200500	4.080	0.000	327.090	0.000
200525	6.790	0.170	135.800	2.180
200550	0.000	41.420	84.830	519.880
200575	3.750	4.630	46.860	575.570
200600	0.060	1.980	45.450	86.730
200625	0.070	3.140	1.830	65.490
200650	0.930	0.450	13.390	44.350
200675	0.380	1.780	16.090	27.940
200700	0.100	1.790	5.880	44.800
200725	0.430	0.450	6.580	28.180
200750	3.770	0.000	52.410	5.670
200775	6.640	0.000	130.130	0.000
200800	8.250	0.000	186.170	0.000
200825	9.940	0.000	227.420	0.000
200850	10.780	0.000	259.020	0.000
200875	11.930	0.000	283.770	0.000
200900	11.200	0.000	289.340	0.000
200925	9.600	0.000	260.410	0.000
200950	7.850	0.000	218.910	0.000
200975	8.200	0.000	201.290	0.000
201000	5.160	0.000	166.900	0.000
201025	2.960	0.000	100.860	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)
201050	1.750	0.440	58.020	5.670
201075	1.270	0.870	36.960	16.750
201100	0.490	1.130	21.630	25.560
201125	0.620	0.400	13.870	19.230
201150	1.910	0.750	31.610	14.310
201175	2.050	0.760	49.450	18.790
201200	2.350	0.350	55.020	13.870
201225	3.720	0.130	75.880	6.060
201250	5.300	0.000	112.650	1.640
201275	6.030	0.000	140.810	0.000
201300	5.270	0.000	139.880	0.000
201325	3.230	0.440	106.320	5.240
201350	4.940	0.000	101.930	5.300
201375	5.170	0.000	126.070	0.000
201400	5.660	0.000	135.320	0.000
201425	5.400	0.000	138.160	0.000
201450	5.660	0.000	138.180	0.000
201475	6.460	0.000	151.520	0.000
201500	6.730	0.000	164.940	0.000
201525	6.690	0.000	167.720	0.000
201550	7.740	0.000	180.330	0.000
201575	8.410	0.000	201.920	0.000
201600	8.630	0.000	213.030	0.000
201625	8.090	0.000	209.050	0.000
201650	6.270	0.000	179.500	0.000
201675	7.450	0.000	171.470	0.000
201700	7.740	0.000	189.830	0.000
201725	5.990	0.000	171.570	0.000
201750	7.150	0.000	164.220	0.000
201775	8.010	0.000	189.530	0.000
201800	7.150	0.000	189.540	0.000
201825	6.130	0.000	166.000	0.000
201850	7.080	0.000	165.150	0.000
201875	8.140	0.000	190.250	0.000
201900	8.010	0.000	201.910	0.000
201925	7.950	0.000	199.560	0.000
201950	7.610	0.000	194.560	0.000
201975	6.650	0.000	178.270	0.000
202000	7.460	0.000	176.320	0.000
202025	8.770	0.000	202.800	0.000
202050	9.840	0.000	232.540	0.000
202075	10.110	0.000	249.320	0.000
202100	8.580	0.000	233.590	0.000
202125	7.350	0.000	199.090	0.000
202150	7.330	0.000	183.500	0.000
202175	7.800	0.000	189.140	0.000
202200	8.020	0.000	197.770	0.000
202225	7.920	0.000	199.320	0.000
202250	7.860	0.000	197.280	0.000
202275	7.800	0.000	195.710	0.000
202300	7.910	0.000	196.300	0.000
202325	8.360	0.000	203.300	0.000
202350	7.460	0.000	197.730	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)
202375	4.590	0.000	150.580	0.000
202400	4.060	0.000	108.130	0.000
202425	5.480	0.000	119.270	0.000
202450	6.080	0.000	144.420	0.000
202475	5.210	0.000	141.070	0.000
202500	5.130	0.000	129.220	0.000
202525	5.420	0.000	131.870	0.000
202550	7.170	0.000	157.340	0.000
202575	5.810	0.000	162.130	0.000
202600	4.600	0.080	130.020	0.980
202625	7.360	0.000	149.480	0.980
202650	9.440	0.000	210.040	0.000
202675	8.570	0.000	225.120	0.000
202700	5.480	0.100	175.620	1.250
202725	4.110	0.540	119.850	7.990
202750	3.000	0.950	88.820	18.560
202775	4.100	1.420	88.740	29.520
202800	7.530	0.000	145.390	17.710
202825	7.550	0.000	188.530	0.000
202850	5.010	0.260	157.060	3.300
202875	3.830	1.330	110.260	19.970
202900	6.270	0.100	126.290	17.840
202925	3.980	0.250	129.180	4.180
202950	3.200	0.480	91.140	8.700
202975	4.390	0.750	95.870	14.770
203000	4.810	0.540	115.180	15.960
203025	5.970	0.390	134.470	11.670
203050	5.320	0.150	141.180	6.740
203075	5.190	0.520	131.460	8.380
203100	5.810	0.050	137.480	7.060
203125	6.900	0.000	158.850	0.580
203150	7.340	0.000	178.060	0.000
203175	6.870	0.000	177.600	0.000
203200	7.670	0.000	181.750	0.000
203225	6.740	0.280	180.150	3.560
203250	9.760	0.000	206.270	3.560
203275	8.720	0.000	231.090	0.000
203300	8.210	0.000	211.730	0.000
203325	7.570	0.000	197.350	0.000
203350	6.960	0.000	181.460	0.000
203375	6.770	0.000	171.570	0.000
203400	6.760	0.000	169.130	0.000
203425	7.720	0.000	181.050	0.000
203450	8.660	0.000	204.840	0.000
203475	9.270	0.000	224.130	0.000
203500	8.260	0.000	219.060	0.000
203525	7.310	0.000	194.660	0.000
203550	7.440	0.000	184.080	0.000
203575	7.300	0.000	184.030	0.000
203600	7.910	0.000	190.030	0.000
203625	6.230	7.430	176.830	91.440
203650	5.590	3.610	147.960	135.940
203675	5.530	2.710	139.110	78.490



QUANTITY CALCULATION OF CUTFILL

For Soil & Ordinary Rock:-

Chainage (m)	Cut Area (sqm)	Fill Area (sqm)	Earthwork - Cut Volume (cum)	Earthwork - Fill Volume (cum)
203700	4.220	2.310	121.850	62.720
203725	4.500	0.000	108.940	28.830
203750	4.290	0.000	109.840	0.000
203775	3.010	7.590	91.270	94.880
203800	6.320	0.000	116.680	94.880
203825	5.870	0.000	152.470	0.000
203850	5.930	0.000	147.590	0.000
203875	6.170	0.000	151.340	0.000
203900	5.690	0.000	148.260	0.000
203925	3.960	0.000	120.620	0.000
203950	2.490	1.840	80.710	23.050
203975	1.470	0.220	49.520	25.760
204000	0.400	2.090	23.390	28.790
204025	0.400	1.320	10.100	42.640
204050	0.780	1.480	14.780	35.100
204075	0.830	3.110	20.110	57.460
204100	3.550	1.580	54.570	58.940
204125	9.710	0.090	164.310	21.430
204150	7.930	0.970	217.820	13.700
204175	5.610	0.410	167.810	17.540
204200	6.130	0.110	146.330	6.490
204225	6.840	0.000	162.080	1.370
204250	6.940	0.000	172.260	0.000
204275	7.090	0.000	175.390	0.000
204300	6.800	0.000	173.590	0.000
204325	8.220	0.000	187.730	0.000
204350	9.070	0.000	216.160	0.000
204375	8.380	0.000	218.210	0.000
204400	9.110	0.000	218.640	0.000
204425	9.120	0.000	227.790	0.000
204450	8.510	0.000	220.350	0.000
204475	9.300	0.000	221.220	0.000
204500	8.900	0.000	223.920	0.000
204525	7.700	0.000	204.800	0.000
204550	7.130	0.000	184.810	0.000
204575	8.500	0.000	195.520	0.000
204600	7.260	0.000	197.130	0.000
204625	8.400	0.000	196.090	0.000
204650	10.600	0.000	236.090	0.000
204675	6.350	0.000	207.610	0.000
204700	3.500	0.000	119.460	0.000
204725	6.020	0.000	117.590	0.000
204750	10.030	0.000	200.480	0.000
204775	10.690	0.000	258.960	0.000
204800	8.520	0.000	240.060	0.000
204825	8.670	0.000	214.850	0.000
204850	7.060	0.000	196.490	0.000
204875	8.720	0.000	195.900	0.000
204900	9.480	0.000	226.590	0.000
204925	7.920	0.000	217.280	0.000
204950	7.500	0.000	192.860	0.000
204975	9.260	0.000	209.770	0.000
205000	7.690	0.000	212.400	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)
205025	6.350	0.000	175.820	0.000
205050	7.300	0.000	170.700	0.000
205075	7.240	0.000	181.830	0.000
205100	5.590	0.000	160.380	0.000
205125	7.410	0.000	162.010	0.000
205150	11.260	0.000	232.550	0.000
205175	10.470	0.000	270.940	0.000
205200	6.600	0.000	212.520	0.000
205225	6.880	0.000	167.480	0.000
205250	8.050	0.000	185.820	0.000
205275	9.420	0.000	218.080	0.000
205300	6.190	0.000	195.030	0.000
205325	7.180	0.000	166.320	0.000
205350	8.780	0.000	196.870	0.000
205375	6.610	0.000	189.740	0.000
205400	4.770	0.000	140.420	0.000
205425	6.690	0.000	142.100	0.000
205450	5.900	0.000	157.370	0.000
205475	4.140	0.000	125.520	0.000
205500	6.430	0.000	131.720	0.000
205525	10.420	0.000	210.050	0.000
205550	10.380	0.000	259.680	0.000
205575	7.910	0.000	228.540	0.000
205600	9.410	0.000	216.460	0.000
205625	8.420	0.000	222.780	0.000
205650	7.610	0.000	200.320	0.000
205675	7.080	0.000	183.540	0.000
205700	8.970	0.000	200.680	0.000
205725	10.690	0.000	245.930	0.000
205750	10.530	0.000	265.460	0.000
205775	10.170	0.000	259.000	0.000
205800	9.470	0.000	245.560	0.000
205825	6.530	0.050	200.030	0.610
205850	2.740	1.000	115.870	13.100
205875	2.050	1.960	59.830	37.040
205900	5.170	1.570	90.140	44.160
205925	1.250	40.170	80.250	521.700
205950	7.260	0.040	106.410	502.540
		Total =	3,206,454	206,700

Scarified Bituminous and Granular Material(A)=	21200	cum
Total Earthwork in cutting(C) =	3206454	cum
Actual earthwork in soil(C-A-B)=	3,185,254	cum

Assume 20% total cutting Volume for Ordinary Rock (	637,051	cum
Earthwork In soil =	2,548,203	cum
Earthwork in filling =	206,700	cum
Total Earthwork in filling =	206,700	cum

Using 40% of cutting material for filling earthworks in embankment
Earthwork used from Roadway Cutting Material= 1274102 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	3185543.000	cum
2	Total Earthwork In Filling (Consider Only Embankment)	tot_fill	206700.000	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	169625.012	169671.516	44.069	1.5	30	66.10	45	111.10
Arc	169837.589	169927.718	4.512	1.5	30	6.77	45	51.77
Arc	169975.043	170030.157	29.112	1.5	30	43.67	45	88.67
Arc	170250.601	170261.764	23.905	1.2	20	28.69	24	52.69
Arc	170319.622	170336.736	12.595	1.2	15	15.11	18	33.11
Arc	170408.312	170428.221	33.774	0.6	15	20.26	9	29.26
Arc	170501.628	170563.56	24.877	1.5	25	37.32	37.5	74.82
Arc	170708.199	170745.639	8.745	1.5	25	13.12	37.5	50.62
Arc	170776.065	170800.043	16.061	0.9	30	14.45	27	41.45
Arc	170830.381	170866.187	22.857	1.2	35	27.43	42	69.43
Arc	170958.722	170984.117	19.709	1.2	20	23.65	24	47.65
Arc	171053.411	171085.768	7.586	1.2	15	9.10	18	27.10
Arc	171117.867	171150.481	25.484	1.5	20	38.23	30	68.23
Arc	171180.564	171197.669	31.685	1.5	15	47.53	22.5	70.03
Arc	171257.737	171284.234	28.057	1.2	40	33.67	48	81.67
Arc	171371.03	171377.371	9.094	0.9	25	8.18	22.5	30.68
Arc	171405.81	171435.454	39.845	0.9	20	35.86	18	53.86
Arc	171473.795	171527.733	41.141	0.9	20	37.03	18	55.03
Arc	171563.838	171576.193	14.632	0.6	20	8.78	12	20.78
Arc	171694.187	171749.072	28.939	1.2	40	34.73	48	82.73
Arc	171931.008	171945.432	36.743	0.9	30	33.07	27	60.07
Arc	171996.19	172005.378	26.438	1.5	30	39.66	45	84.66
Arc	172072.021	172114.829	29.948	1.5	30	44.92	45	89.92
Arc	172175.661	172182.51	11.618	1.5	30	17.43	45	62.43
Arc	172243.017	172277.479	139.917	0.6	15	83.95	9	92.95
Arc	172362.112	172368.668	16.496	1.5	30	24.74	45	69.74
Arc	172554.12	172645.981	85.862	0.6	15	51.52	9	60.52
Arc	172727.372	172806.759	229.159	0.6	25	137.50	15	152.50
Arc	173011.505	173043.896	38.577	0.9	45	34.72	40.5	75.22
Arc	173104.823	173136.137	37.62	0.6	80	22.57	48	70.57
Arc	173177.425	173209.521	11.389	0.6	60	6.83	36	42.83
Arc	173279.312	173321.037	35.6	0.9	45	32.04	40.5	72.54
Arc	173432.413	173470.712	78.716	0.9	55	70.84	49.5	120.34
Arc	173525.797	173531.773	16.487	0.9	45	14.84	40.5	55.34
Arc	173562.311	173583.517	21.063	0.6	35	12.64	21	33.64
Arc	173608.709	173681.478	123.62	0.6	40	74.17	24	98.17
Arc	173813.199	173888.522	69.54	1.2	40	83.45	48	131.45
Arc	173997.99	174077.801	66.974	0.6	25	40.18	15	55.18
Arc	174228.315	174249.964	45.441	1.5	15	68.16	22.5	90.66
Arc	174444.53	174515.436	61.116	1.2	15	73.34	18	91.34
Arc	174701.554	174719.045	197.729	0.9	20	177.96	18	195.96
Arc	174779.271	174813.641	30.042	0.9	20	27.04	18	45.04
Arc	174884.941	174900.658	57.174	0.6	15	34.30	9	43.30
Arc	175020.741	175043.874	5.499	0.9	15	4.95	13.5	18.45
Arc	175074.585	175119.569	7.094	0.6	15	4.26	9	13.26
Arc	175148.001	175162.869	11.253	0.6	25	6.75	15	21.
Arc	175188.951	175224.242	35.899	0.6	20	21.54	12	33.

	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	175254.406	175262.966	12.567	0.6	15	7.54	9	16.54
Arc	175314.099	175320.46	15.752	1.2	25	18.90	30	48.90
Arc	175417.446	175454.604	10.418	1.5	15	15.63	22.5	38.13
Arc	175499.873	175537.472	18.768	1.2	20	22.52	24	46.52
Arc	175596.126	175649.225	26.757	0.6	20	16.05	12	28.05
Arc	175688.036	175724.547	7.973	1.5	30	11.96	45	56.96
Arc	175759.824	175788.397	8.041	0.9	30	7.24	27	34.24
Arc	175906.917	175919.625	7.646	1.5	25	11.47	37.5	48.97
Arc	175963.063	175975.036	6.445	1.5	25	9.67	37.5	47.17
Arc	176039.326	176070.887	28.365	1.5	20	42.55	30	72.55
Arc	176173.989	176210.281	42.941	1.5	30	64.41	45	109.41
Arc	176254.822	176281.677	50.244	1.5	30	75.37	45	120.37
Arc	176337.235	176385.156	11.325	1.5	20	16.99	30	46.99
Arc	176506.578	176681.252	21.627	0.9	30	19.46	27	46.46
Arc	176765.711	176935.531	18.419	0.9	15	16.58	13.5	30.08
Arc	177059.211	177123.246	12.825	0.9	30	11.54	27	38.54
Arc	177346.886	177393.728	33.137	1.2	30	39.76	36	75.76
Arc	177505.714	177548.332	18.744	1.5	15	28.12	22.5	50.62
Arc	177657.12	177685.621	31.78	0.6	30	19.07	18	37.07
Arc	177755.81	177770.481	31.257	0.9	30	28.13	27	55.13
Arc	177894.516	177934.417	17.522	0.9	15	15.77	13.5	29.27
Arc	178022.309	178135.321	19.007	0.6	30	11.40	18	29.40
Arc	178216.92	178401.635	49.356	1.5	15	74.03	22.5	96.53
Arc	178446.838	178477.145	29.088	1.5	20	43.63	30	73.63
Arc	178550.359	178581.723	11.981	1.2	30	14.38	36	50.38
Arc	178672.251	178704.397	8.563	1.5	20	12.84	30	42.84
Arc	178761.145	178779.549	165.462	0.6	30	99.28	18	117.28
Arc	178965.102	178972.014	12.121	0.9	15	10.91	13.5	24.41
Arc	179100.77	179130.566	26.186	0.9	25	23.57	22.5	46.07
Arc	179295.57	179366.605	20.813	1.2	45	24.98	54	78.98
Arc	179417.472	179444.292	18.923	1.5	15	28.38	22.5	50.88
Arc	179521.398	179554.371	12.065	0.6	15	7.24	9	16.24
Arc	179630.675	179655.758	53.099	0.9	35	47.79	31.5	79.29
Arc	179770.913	179787.999	27.226	0.9	15	24.50	13.5	38.00
Arc	179840.326	179855.693	47.657	0.6	20	28.59	12	40.59
Arc	179950.992	179965.953	52.237	0.6	15	31.34	9	40.34
Arc	180014.486	180022.157	75.998	0.6	25	45.60	15	60.60
Arc	180060.459	180091.908	29.062	0.6	45	17.44	27	44.44
Arc	180137.121	180167.553	17.729	1.5	20	26.59	30	56.59
Arc	180290.652	180317.312	29.498	1.5	20	44.25	30	74.25
Arc	180421.799	180561.958	68.507	0.6	30	41.10	18	59.10
Arc	180637.788	180741.264	10.999	0.9	20	9.90	18	27.90
Arc	180818.425	180883.19	112.244	0.6	20	67.35	12	79.35
Arc	180978.732	181082.676	60.882	0.6	15	36.53	9	45.53
Arc	181230.604	181301.408	33.296	0.9	35	29.97	31.5	61.47
Arc	181367.098	181403.999	9.616	0.9	20	8.65	18	26.65
Arc	181481.844	181525.376	15.439	1.2	20	18.53	24	42.53
Arc	181570.572	181577.045	17.164	0.9	15	15.45	13.5	28.95
Arc	181616.496	181626.538	7.83	1.2	15	9.40	18	27.
Arc	181685.482	181717.812	7.751	0.9	25	6.98	22.5	29.

	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	181747.848	181769.703	30.467	0.9	20	27.42	18	45.42
Arc	181799.973	181820.153	38.471	1.2	15	46.17	18	64.17
Arc	181910.36	181923.16	14.234	1.5	20	21.35	30	51.35
Arc	181973.887	181979.042	32.843	0.9	25	29.56	22.5	52.06
Arc	182019.664	182027.002	21.924	0.9	15	19.73	13.5	33.23
Arc	182068.939	182074.903	18.977	0.6	20	11.39	12	23.39
Arc	182116.212	182121.788	42.095	1.2	30	50.51	36	86.51
Arc	182172.984	182183.645	32.517	1.5	20	48.78	30	78.78
Arc	182238.757	182293.972	144.32	0.6	30	86.59	18	104.59
Arc	182349.51	182364.153	32.43	0.9	35	29.19	31.5	60.69
Arc	182442.536	182626.525	36.294	1.5	15	54.44	22.5	76.94
Arc	182694.355	182718.025	6.019	1.2	15	7.22	18	25.22
Arc	182927.836	182943.712	39.497	1.5	15	59.25	22.5	81.75
Arc	183011.726	183037.345	16.223	1.2	30	19.47	36	55.47
Arc	183092.079	183188.755	23.242	0.6	30	13.95	18	31.95
Arc	183331.468	183348.013	23.978	0.6	20	14.39	12	26.39
Arc	183379.279	183434.396	55.449	0.6	30	33.27	18	51.27
Arc	183490.514	183535.429	36.307	1.5	15	54.46	22.5	76.96
Arc	183676.218	183690.792	6.923	1.5	30	10.38	45	55.38
Arc	183736.429	183763.647	69.943	1.2	15	83.93	18	101.93
Arc	183809.792	183828.048	45.044	1.5	15	67.57	22.5	90.07
Arc	183935.365	184020.609	108.343	0.6	15	65.01	9	74.01
Arc	184098.906	184115.098	14.435	1.5	20	21.65	30	51.65
Arc	184163.16	184236.355	28.472	1.5	35	42.71	52.5	95.21
Arc	184272.026	184280.406	10.221	1.5	30	15.33	45	60.33
Arc	184356.198	184424.672	14.485	1.5	30	21.73	45	66.73
Arc	184506.681	184541.132	17.173	1.5	15	25.76	22.5	48.26
Arc	184617.005	184643.71	73.466	1.2	30	88.16	36	124.16
Arc	184697.796	184735.664	22.541	1.5	25	33.81	37.5	71.31
Arc	184796.022	184828.672	12.363	1.5	40	18.54	60	78.54
Arc	184875.312	184909.581	15.323	1.2	15	18.39	18	36.39
Arc	184976.617	185015.723	25.144	1.5	30	37.72	45	82.72
Arc	185126.658	185264.411	15.906	1.5	30	23.86	45	68.86
Arc	185334.793	185349.235	26.433	1.2	30	31.72	36	67.72
Arc	185419.355	185427.433	35.269	0.6	20	21.16	12	33.16
Arc	185555.25	185562.157	50.947	0.9	30	45.85	27	72.85
Arc	185613.935	185642.501	54.857	1.5	15	82.29	22.5	104.79
Arc	185729.591	185809.718	29.248	1.5	20	43.87	30	73.87
Arc	185889.916	185922.184	17.994	1.2	15	21.59	18	39.59
Arc	186038.958	186074.087	36.528	1.5	15	54.79	22.5	77.29
Arc	186105.117	186125.223	37.366	0.6	25	22.42	15	37.42
Arc	186152.917	186160.195	33.982	1.2	30	40.78	36	76.78
Arc	186216.602	186237.76	103.786	0.6	15	62.27	9	71.27
Arc	186290.68	186320.973	38.673	0.6	30	23.20	18	41.20
Arc	186376.434	186409.333	99.229	0.9	25	89.31	22.5	111.81
Arc	186452.734	186485.302	50.765	1.5	30	76.15	45	121.15
Arc	186524.822	186555.656	80.584	0.6	20	48.35	12	60.35
Arc	186616.031	186649.021	21.025	1.5	30	31.54	45	76.54
Arc	186704.162	186714.783	8.665	1.5	30	13.00	45	58.
Arc	186780.667	186811.376	18.211	1.5	30	27.32	45	72.



	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	186903.209	186932.896	18.548	1.2	20	22.26	24	46.26
Arc	187077.79	187174.31	60.684	1.5	15	91.03	22.5	113.53
Arc	187285.434	187328.568	22.123	1.5	25	33.18	37.5	70.68
Arc	187411.23	187425.293	5.832	1.5	20	8.75	30	38.75
Arc	187471.73	187504.841	31.103	1.5	30	46.65	45	91.65
Arc	187561.848	187588.893	8.2	1.2	30	9.84	36	45.84
Arc	187654.072	187671.676	73.036	1.5	0	109.55	0	109.55
Arc	187733.733	187803.278	12.437	1.2	20	14.92	24	38.92
Arc	187902.698	187962.695	19.515	1.5	15	29.27	22.5	51.77
Arc	188054.399	188069.416	25.748	1.5	15	38.62	22.5	61.12
Arc	188183.144	188228.352	43.602	0.6	25	26.16	15	41.16
Arc	188270.214	188304.014	83.111	1.2	30	99.73	36	135.73
Arc	188360.141	188381.661	10.934	1.2	0	13.12	0	13.12
Arc	188434.277	188469.511	41.802	1.2	20	50.16	24	74.16
Arc	188518.211	188529.15	11.508	1.5	30	17.26	45	62.26
Arc	188586.542	188644.257	15.722	1.5	30	23.58	45	68.58
Arc	188677.461	188718.194	36.529	0.6	35	21.92	21	42.92
Arc	188757.147	188764.115	28.48	1.2	15	34.18	18	52.18
Arc	188835.844	188844.446	29.879	1.5	20	44.82	30	74.82
Arc	189022.194	189051.868	26.338	1.5	15	39.51	22.5	62.01
Arc	189142.693	189182.499	16.206	1.2	25	19.45	30	49.45
Arc	189343.238	189379.709	12.804	0.6	30	7.68	18	25.68
Arc	189523.215	189553.81	67.038	1.2	30	80.45	36	116.45
Arc	189638.036	189676.903	154.159	0.6	35	92.50	21	113.50
Arc	189738	189749.199	14.19	0.9	40	12.77	36	48.77
Arc	189819.953	189859.288	12.806	1.5	30	19.21	45	64.21
Arc	190005.132	190043.687	17.501	1.5	20	26.25	30	56.25
Arc	190294.661	190331.668	21.638	1.2	30	25.97	36	61.97
Arc	190377.33	190384.174	18.023	1.2	30	21.63	36	57.63
Arc	190441.478	190452.96	15.871	0.9	30	14.28	27	41.28
Arc	190520.322	190546.801	18.906	1.2	30	22.69	36	58.69
Arc	190601.378	190617.042	27.232	1.5	35	40.85	52.5	93.35
Arc	190658.223	190663.343	36.208	0.9	30	32.59	27	59.59
Arc	190719.349	190737.319	7.976	0.9	30	7.18	27	34.18
Arc	190871.038	190897.799	16.429	0.9	25	14.79	22.5	37.29
Arc	190957.862	190964.8	62.793	1.2	30	75.35	36	111.35
Arc	191025.946	191061.526	24.563	1.5	25	36.84	37.5	74.34
Arc	191122.034	191161.962	21.465	0.9	25	19.32	22.5	41.82
Arc	191244.492	191288.168	32.892	0.6	30	19.74	18	37.74
Arc	191350.99	191388.234	29.256	0.6	30	17.55	18	35.55
Arc	191525.44	191571.13	50.393	0.6	15	30.24	9	39.24
Arc	191639.85	191679.256	26.754	0.9	20	24.08	18	42.08
Arc	191778.438	191840.016	40.734	1.5	25	61.10	37.5	98.60
Arc	191961.372	192010.425	18.144	1.5	30	27.22	45	72.22
Arc	192282.368	192405.366	88.272	1.2	30	105.93	36	141.93
Arc	192574.109	192592.519	8.694	1.2	20	10.43	24	34.43
Arc	192657.818	192752.766	15.026	1.5	30	22.54	45	67.54
Arc	192832.802	192901.946	6.934	1.5	30	10.40	45	55.40
Arc	193008.495	193024.931	16.373	1.5	15	24.56	22.5	47.
Arc	193092.597	193104.592	43.028	1.2	30	51.63	36	87.



	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	193275.716	193290.286	23.827	1.5	30	35.74	45	80.74
Arc	193527.763	193606.34	17.376	1.5	35	26.06	52.5	78.56
Arc	193655.853	193684.727	130.527	0.6	15	78.32	9	87.32
Arc	193877.827	193921.653	5.601	1.5	15	8.40	22.5	30.90
Arc	194184.368	194221.03	5.478	1.5	20	8.22	30	38.22
Arc	194317.089	194343.932	89.652	1.2	20	107.58	24	131.58
Arc	194411.462	194424.201	37.153	1.5	20	55.73	30	85.73
Arc	194487.967	194500.117	12.92	1.5	30	19.38	45	64.38
Arc	194636.469	194739.288	30.195	1.5	15	45.29	22.5	67.79
Arc	194790.906	194826.023	26.892	1.5	15	40.34	22.5	62.84
Arc	194865.287	194897.057	44.363	1.2	20	53.24	24	77.24
Arc	194933.655	194967.683	36.501	1.5	30	54.75	45	99.75
Arc	195028.19	195040.448	107.287	1.2	30	128.74	36	164.74
Arc	195227.949	195330.287	35.248	0.9	15	31.72	13.5	45.22
Arc	195445.867	195480.841	20.576	1.2	30	24.69	36	60.69
Arc	195532.406	195540.845	103.238	0.9	30	92.91	27	119.91
Arc	195597.317	195618.84	20.768	1.5	25	31.15	37.5	68.65
Arc	195733.801	195746.64	59.782	0.9	30	53.80	27	80.80
Arc	195856.428	195883.985	46.176	1.5	25	69.26	37.5	106.76
Arc	195952.816	196076.657	42.804	0.9	15	38.52	13.5	52.02
Arc	196101.202	196137.875	19.314	0.9	25	17.38	22.5	39.88
Arc	196153.204	196222.617	13.371	1.5	30	20.06	45	65.06
Arc	196283.949	196333.444	43.603	1.5	15	65.40	22.5	87.90
Arc	196477.952	196482.468	33.251	0.6	15	19.95	9	28.95
Arc	196618.744	196649.14	21.022	1.5	30	31.53	45	76.53
Arc	196726.626	196750.765	40.896	0.9	15	36.81	13.5	50.31
Arc	196794.374	196806.992	47.563	0.6	30	28.54	18	46.54
Arc	196824.944	196858.735	251.448	0.6	25	150.87	15	165.87
Arc	196895.36	196920.656	37.965	0.9	25	34.17	22.5	56.67
Arc	196985.973	196994.736	55.822	0.6	15	33.49	9	42.49
Arc	197150.969	197167.065	29.747	0.9	30	26.77	27	53.77
Arc	197343.201	197366.198	28.286	0.9	20	25.46	18	43.46
Arc	197429.072	197448.91	14.143	0.9	30	12.73	27	39.73
Arc	197489.923	197497.514	42.235	0.6	20	25.34	12	37.34
Arc	197559.33	197586.958	19.267	0.9	30	17.34	27	44.34
Arc	197630.144	197663.524	7.417	0.9	30	6.68	27	33.68
Arc	197865.799	197894.238	11.346	1.5	20	17.02	30	47.02
Arc	197983.528	197992.626	68.223	1.2	15	81.87	18	99.87
Arc	198055.714	198095.827	41.849	1.5	25	62.77	37.5	100.27
Arc	198453.923	198495.359	33.197	1.5	15	49.80	22.5	72.30
Arc	198609.705	198624.34	44.123	1.5	20	66.18	30	96.18
Arc	199677.381	199706.74	7.484	1.5	25	11.23	37.5	48.73
Arc	199824.059	199861.237	12.833	1.5	30	19.25	45	64.25
Arc	200019.625	200047.003	16.387	0.9	25	14.75	22.5	37.25
Arc	200171.053	200202.409	34.857	1.5	20	52.29	30	82.29
Arc	200270.757	200282.449	31.205	0.9	30	28.08	27	55.08
Arc	200317.827	200462.028	15.167	0.9	20	13.65	18	31.65
Arc	200606.544	200623.159	9.558	0.9	35	8.60	31.5	40.10
Arc	200654.887	200741.045	6.43	0.9	20	5.79	18	23.
Arc	200856.069	201100.084	19.783	0.9	30	17.80	27	44.

	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	201289.495	201328.315	34.206	0.6	25	20.52	15	35.52
Arc	202920.556	202958.275	25.832	0.6	30	15.50	18	33.50
Arc	204130.182	204141.572	32.089	1.2	20	38.51	24	62.51
Arc	204473.531	204509.321	26.426	1.5	15	39.64	22.5	62.14
Arc	204609.712	204692.009	27.237	1.5	30	40.86	45	85.86
Arc	204855.604	204872.11	21.327	1.5	15	31.99	22.5	54.49
Arc	204969.268	204990.356	32.352	1.5	25	48.53	37.5	86.03
Arc	205116.341	205242.53	26.036	1.5	25	39.05	37.5	76.55
Arc	205331.07	205405.243	20.562	1.5	20	30.84	30	60.84
Arc	205486.43	205553.543	24.357	0.6	25	14.61	15	29.61
								16164

Total Area of Extra Widening= 16164 sqm



Variable Declaration

Extra Widening on Flexible Pavement

SI No	Variable Description	Variable	Dimension	Unit
1	Total Area of Extra Widening	ew_area	16164.000	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	41.000	percentage



Hydroseeding

Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
169570	169630	0	60.0	TCS-3A	Valley
169825	169875	0	100.0	TCS-12	Both
170275	170375	0	100.0	TCS-3A	Valley
170450	170500	0	50.0	TCS-3A	Valley
170600	170700	3.96	96.0	TCS-5A	Valley
170750	170800	0	50.0	TCS-3A	Valley
170975	171030	0	55.0	TCS-3A	Valley
171110	171160	2.6	47.4	TCS-3A	Valley
171575	171675	2.6	97.4	TCS-3A	Valley
172000	172225	7.8	217.2	TCS-7A	Valley
172275	172325	0	50.0	TCS-3A	Valley
172820	172910	0	180.0	TCS-12	Both
173200	173500	7.8	292.2	TCS-3A	Valley
173625	173675	0	100.0	TCS-12	Both
173775	173850	0	75.0	TCS-3A	Valley
174125	174200	2.6	72.4	TCS-3A	Valley
174250	174475	2.6	222.4	TCS-3A	Valley
174525	174575	2.6	47.4	TCS-5A	Valley
174625	174930	6.44	298.6	TCS-3A	Valley
174930	174980	0	100.0	TCS-12	Both
175310	175380	0	70.0	TCS-3A	Valley
176275	176375	0	100.0	TCS-7A	Valley
177575	177660	0	85.0	TCS-3A	Valley
177725	177850	0	125.0	TCS-11A	Valley
177850	178025	0	175.0	TCS-7A	Valley
178025	178200	2.6	344.8	TCS-12	Both
178200	178300	2.6	97.4	TCS-5A	Valley
178660	178730	0	70.0	TCS-5A	Valley
178780	178910	0	130.0	TCS-5A	Valley
179375	179475	0	100.0	TCS-3A	Valley
179780	179850	0	70.0	TCS-7A	Valley
179930	179990	0	60.0	TCS-7A	Valley
180060	180160	0	100.0	TCS-3A	Valley
180340	180390	0	50.0	TCS-5A	Valley
180560	180670	2.6	107.4	TCS-3A	Valley
180670	180720	0	50.0	TCS-7A	Valley
180720	180820	2.6	97.4	TCS-3A	Valley
180980	181200	2.6	217.4	TCS-5A	Valley
181200	181280	0	80.0	TCS-3A	Valley
181380	181480	0	100.0	TCS-3A	Valley
182130	182180	0	50.0	TCS-3A	Valley
182340	182420	0	80.0	TCS-3A	Valley
182470	182520	0	100.0	TCS-12	Both
183480	183530	0	50.0	TCS-5A	Valley
183660	183710	5.26	44.7	TCS-3A	Valley
184260	184330	0	70.0	TCS-5A	Valley
185730	185780	0	50.0	TCS-3A	Valley



186160	186210	0	50.0	TCS-3A	Valley
186310	186480	0	340.0	TCS-12	Both
186630	186730	0	100.0	TCS-3A	Valley
186830	186930	0	100.0	TCS-3A	Valley
186980	187030	0	100.0	TCS-12	Both
187130	187180	0	50.0	TCS-11A	Valley
187440	187560	0	120.0	TCS-3A	Valley
187660	187710	0	50.0	TCS-3A	Valley
187760	187810	0	50.0	TCS-7A	Valley
187925	187980	0	55.0	TCS-3A	Valley
188260	188310	0	50.0	TCS-3A	Valley
188410	188460	2.6	47.4	TCS-3A	Valley
188730	188810	0	80.0	TCS-3A	Valley
188960	189020	3.84	56.2	TCS-11A	Valley
189350	189430	7.1	72.9	TCS-11A	Valley
189430	189530	3.84	96.2	TCS-3A	Valley
190680	190760	0	80.0	TCS-3A	Valley
190760	190810	0	100.0	TCS-12	Both
191030	191130	0	100.0	TCS-3A	Valley
191130	191280	2.6	147.4	TCS-7A	Valley
191280	191380	6.32	93.7	TCS-3A	Valley
191500	191560	0	60.0	TCS-3A	Valley
191780	191960	2.7	354.6	TCS-12	Both
192020	192080	0	120.0	TCS-12	Both
192160	192210	0	100.0	TCS-12	Both
192280	192330	0	50.0	TCS-3A	Valley
192530	192580	0	50.0	TCS-5A	Valley
193330	193460	0	130.0	TCS-7A	Valley
193780	193860	0	80.0	TCS-3A	Valley
193910	194030	0	120.0	TCS-7A	Valley
194080	194230	0	300.0	TCS-12	Both
194610	194710	2.6	194.8	TCS-12	Both
194780	194830	0	50.0	TCS-3A	Valley
195060	195130	10.56	59.4	TCS-3A	Valley
195180	195260	0	80.0	TCS-7A	Valley
195960	196030	0	140.0	TCS-12	Both
196160	196210	0	50.0	TCS-3A	Valley
198450	199750	49.38	2501.2	TCS-12	Both
Total =			11364		

Avg. Height of Hydroseeding =

8 m

Area of Hydroseeding =

90911 sqm



RCC Covered Drain

Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.	Side	Width
From	To					
171250	171550	2.6	297.4	TCS-10	Hill	1.0
182650	182780	0	130.0	TCS-7	Valley	1.0
182780	182910	2.6	254.8	TCS-6	Both	1.0
182910	183030	2.6	117.4	TCS-7	Valley	1.0
183030	183080	0	50.0	TCS-7B	Valley	1.0
183080	183160	0	80.0	TCS-7	Valley	1.0
183160	183210	0	50.0	TCS-7B	Valley	1.0
183210	183300	2.6	87.4	TCS-7	Valley	1.0
189120	189250	0	130.0	TCS-7B	Valley	1.0
189530	190060	27.37	502.6	TCS-7B	Valley	1.0
190060	190200	3.84	136.2	TCS-7	Valley	1.0
196260	196330	0	140.0	TCS-6	Both	1.0
196330	196380	2.6	47.4	TCS-10	Hill	1.0
196380	197200	50.37	1539.3	TCS-6	Both	1.0
197400	197800	24.53	750.9	TCS-6	Both	1.0
200050	200200	0	300.0	TCS-1A	Both	1.75
200200	200400	5.3	389.4	TCS-1	Both	1.75
200580	202700	19.32	4201.4	TCS-1	Both	1.75
203150	205974	23.48	5601.0	TCS-1	Both	1.75
Total =			14805			

RCC Covered Drain 1.0 m= 4313 m

RCC Covered Drain 1.75 m= 10492 m



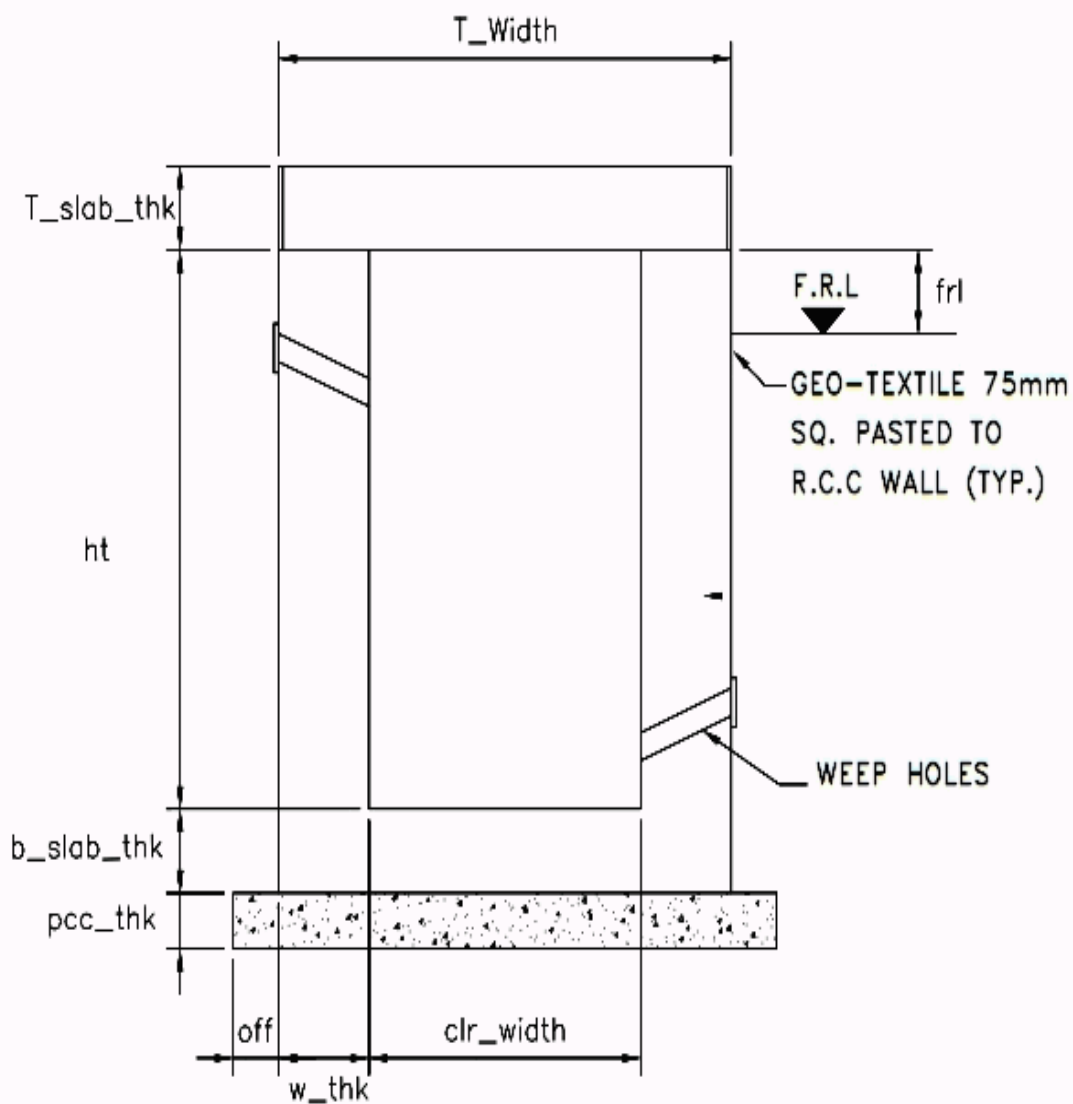
Variable Declaration

RCC Cover Drain 1.0m

SI No	Variable Description	Variable	Dimension	Unit
1	Top Width	t_width	1.000	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	4313.000	m
9	Reinforcement Per Cum RCC	s	0.050	MT/Cum RCC
10	Finished Road Level	frl	0.300	m



Variable Declaration



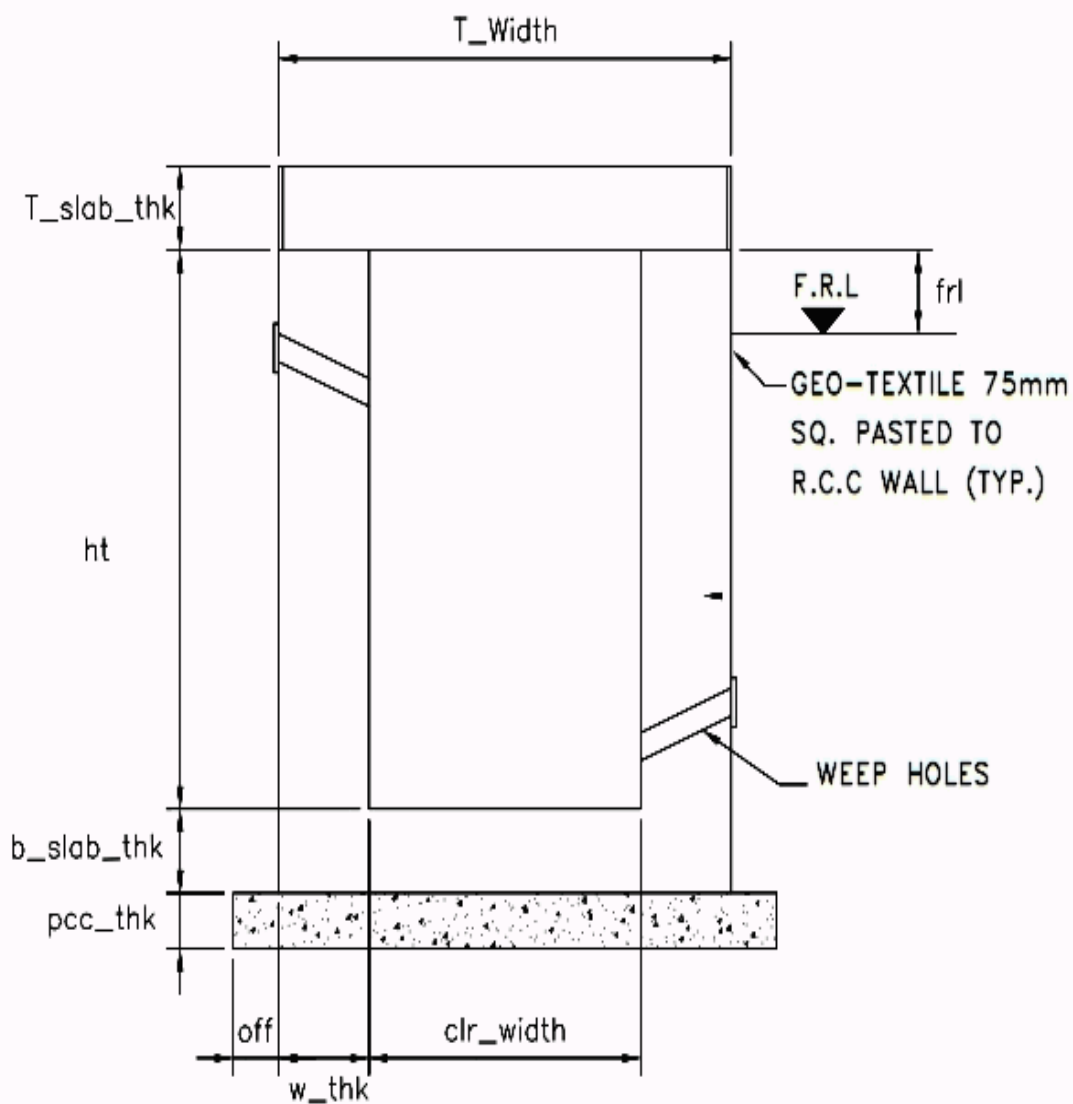
Variable Declaration

RCC Cover Drain 1.75m

SI 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	10492.000	m
9	Reinforcement Per Cum RCC	s	0.050	MT/Cum RCC
10	Finished Road Level	frl	0.300	m



Variable Declaration



Triangular Drain & Chut Drain

Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
169570	169630	0	60.0	TCS-3A	Hill
169630	169680	0	50.0	TCS-4	Hill
169680	169825	8.66	136.3	TCS-3	Hill
169825	169875	0	100.0	TCS-12	Both
169875	170275	6.56	393.4	TCS-3	Hill
170275	170375	0	100.0	TCS-3A	Hill
170375	170450	2.6	72.4	TCS-3	Hill
170450	170500	0	50.0	TCS-3A	Hill
170500	170600	0	100.0	TCS-3	Hill
170700	170750	2.6	47.4	TCS-3	Hill
170750	170800	0	50.0	TCS-3A	Hill
170800	170975	6.06	168.9	TCS-3	Hill
170975	171030	0	55.0	TCS-3A	Hill
171030	171110	6.4	73.6	TCS-3	Hill
171110	171160	2.6	47.4	TCS-3A	Hill
171160	171250	6.4	83.6	TCS-3	Hill
171550	171575	0	25.0	TCS-3	Hill
171575	171675	2.6	97.4	TCS-3A	Hill
171675	172000	5.3	319.7	TCS-3	Hill
172000	172225	7.8	217.2	TCS-7A	Valley
172225	172275	3.96	46.0	TCS-3	Hill
172275	172325	0	50.0	TCS-3A	Hill
172325	172475	0	150.0	TCS-3	Hill
172475	172525	2.6	47.4	TCS-4	Hill
172525	172820	8.96	286.0	TCS-3	Hill
172820	172910	0	180.0	TCS-12	Both
172910	173025	2.6	112.4	TCS-3	Hill
173025	173125	2.6	97.4	TCS-4	Hill
173125	173200	0	75.0	TCS-3	Hill
173200	173500	7.8	292.2	TCS-3A	Hill
173500	173625	6.44	118.6	TCS-3	Hill
173625	173675	0	100.0	TCS-12	Both
173675	173775	0	100.0	TCS-3	Hill
173775	173850	0	75.0	TCS-3A	Hill
173850	174125	2.6	272.4	TCS-3	Hill
174125	174200	2.6	72.4	TCS-3A	Hill
174200	174250	0	50.0	TCS-3	Hill
174250	174475	2.6	222.4	TCS-3A	Hill
174475	174525	0	50.0	TCS-3	Hill
174525	174625	2.6	47.4	TCS-3	Hill
174625	174930	6.44	298.6	TCS-3A	Hill
174930	174980	0	100.0	TCS-12	Both
174980	175310	16.64	313.4	TCS-3	Hill
175310	175380	0	70.0	TCS-3A	Hill
175380	175750	12.58	357.4	TCS-3	Hill
175750	176025	0	275.0	TCS-4	Hill
176025	176275	6.44	243.6	TCS-3	Hill



176275	176375	0	100.0	TCS-7A	Valley
177425	177475	40	10.0	TCS-4	Hill
177475	177575	0	100.0	TCS-3	Hill
177575	177660	0	85.0	TCS-3A	Hill
177660	177725	30	35.0	TCS-4	Hill
177850	178025	0	175.0	TCS-7A	Valley
178025	178200	2.6	344.8	TCS-12	Both
178300	178550	5.2	244.8	TCS-3	Hill
178610	178660	30	20.0	TCS-3	Hill
178910	178980	0	70.0	TCS-4	Hill
178980	179375	2.6	392.4	TCS-3	Hill
179375	179475	0	100.0	TCS-3A	Hill
179475	179780	5.2	299.8	TCS-3	Hill
179780	179850	0	70.0	TCS-7A	Valley
179850	179930	20	60.0	TCS-3	Hill
179930	179990	0	60.0	TCS-7A	Valley
180060	180160	0	100.0	TCS-3A	Hill
180160	180260	0	100.0	TCS-3	Hill
180390	180560	2.6	167.4	TCS-3	Hill
180560	180670	2.6	107.4	TCS-3A	Hill
180670	180720	0	50.0	TCS-7A	Valley
180720	180820	2.6	97.4	TCS-3A	Hill
180820	180980	2.6	157.4	TCS-3	Hill
181200	181280	0	80.0	TCS-3A	Hill
181280	181380	2.6	97.4	TCS-3	Hill
181380	181480	0	100.0	TCS-3A	Hill
181480	182130	18.2	631.8	TCS-3	Hill
182130	182180	0	50.0	TCS-3A	Hill
182180	182340	2.6	157.4	TCS-3	Hill
182340	182420	0	80.0	TCS-3A	Hill
182420	182470	2.6	47.4	TCS-3	Hill
182470	182520	0	100.0	TCS-12	Both
182520	182650	5.2	124.8	TCS-3	Hill
183530	183660	0	130.0	TCS-3	Hill
183660	183710	5.26	44.7	TCS-3A	Hill
183710	184260	7.8	542.2	TCS-3	Hill
184330	184900	7.8	562.2	TCS-3	Hill
185080	185330	5.2	244.8	TCS-3	Hill
185480	185730	5.26	244.7	TCS-3	Hill
185730	185780	0	50.0	TCS-3A	Hill
185780	186160	10.4	369.6	TCS-3	Hill
186160	186210	0	50.0	TCS-3A	Hill
186210	186310	2.6	97.4	TCS-3	Hill
186310	186480	0	340.0	TCS-12	Both
186480	186630	2.6	147.4	TCS-3	Hill
186630	186730	0	100.0	TCS-3A	Hill
186730	186830	2.6	97.4	TCS-3	Hill
186830	186930	0	100.0	TCS-3A	Hill
186930	186980	6.06	43.9	TCS-3	Hill
186980	187030	0	100.0	TCS-12	Both



187030	187130	6.4	93.6	TCS-3	Hill
187180	187320	0	140.0	TCS-3	Hill
187320	187370	0	50.0	TCS-4	Hill
187370	187440	2.6	67.4	TCS-3	Hill
187440	187560	0	120.0	TCS-3A	Hill
187560	187660	9.1	90.9	TCS-3	Hill
187660	187710	0	50.0	TCS-3A	Hill
187710	187760	5	45.0	TCS-3	Hill
187760	187810	0	50.0	TCS-7A	Valley
187810	187925	6.06	108.9	TCS-3	Hill
187925	187980	0	55.0	TCS-3A	Hill
187980	188260	10.38	269.6	TCS-3	Hill
188260	188310	0	50.0	TCS-3A	Hill
188310	188410	0	100.0	TCS-3	Hill
188410	188460	2.6	47.4	TCS-3A	Hill
188460	188730	2.6	267.4	TCS-3	Hill
188730	188810	0	80.0	TCS-3A	Hill
188810	188860	0	50.0	TCS-3	Hill
188860	188960	3.84	96.2	TCS-4	Hill
189020	189120	3.84	96.2	TCS-3	Hill
189250	189350	7.68	92.3	TCS-3	Hill
189430	189530	3.84	96.2	TCS-3A	Hill
190200	190680	6.54	473.5	TCS-3	Hill
190680	190760	0	80.0	TCS-3A	Hill
190760	190810	0	100.0	TCS-12	Both
190810	191030	2.6	217.4	TCS-3	Hill
191030	191130	0	100.0	TCS-3A	Hill
191130	191280	2.6	147.4	TCS-7A	Valley
191280	191380	6.32	93.7	TCS-3A	Hill
191380	191500	0	120.0	TCS-3	Hill
191500	191560	0	60.0	TCS-3A	Hill
191560	191780	6.4	213.6	TCS-3	Hill
191780	191960	2.7	354.6	TCS-12	Both
191960	192020	2.6	57.4	TCS-3	Hill
192020	192080	0	120.0	TCS-12	Both
192160	192210	0	100.0	TCS-12	Both
192210	192280	0	70.0	TCS-4	Hill
192280	192330	0	50.0	TCS-3A	Hill
192580	193330	24.12	725.9	TCS-3	Hill
193330	193460	0	130.0	TCS-7A	Valley
193460	193780	8	312.0	TCS-3	Hill
193780	193860	0	80.0	TCS-3A	Hill
193860	193910	2.6	47.4	TCS-3	Hill
193910	194030	0	120.0	TCS-7A	Valley
194030	194080	2.7	47.3	TCS-3	Hill
194080	194230	0	300.0	TCS-12	Both
194230	194610	12.96	367.0	TCS-3	Hill
194610	194710	2.6	194.8	TCS-12	Both
194710	194780	0	70.0	TCS-3	Hill
194780	194830	0	50.0	TCS-3A	Hill



194830	195060	2.7	227.3	TCS-3	Hill
195060	195130	10.56	59.4	TCS-3A	Hill
195130	195180	0	50.0	TCS-3	Hill
195180	195260	0	80.0	TCS-7A	Valley
195260	195960	24.28	675.7	TCS-3	Hill
195960	196030	0	140.0	TCS-12	Both
196030	196160	2.6	127.4	TCS-4	Hill
196160	196210	0	50.0	TCS-3A	Hill
196210	196260	0	50.0	TCS-3	Hill
197200	197400	28.94	171.1	TCS-3	Hill
197800	198450	9.04	641.0	TCS-3	Hill
198450	199750	49.38	2501.2	TCS-12	Both
Total =			25721		



Catchwater Drain

Chainage (m)		Length of CD (m)	Net Length (m)
From	To		
169570	169630	0	60.0
169825	169875	0	50.0
170275	170375	0	100.0
170450	170500	0	50.0
170600	170700	3.96	96.0
170750	170800	0	50.0
170975	171030	0	55.0
171110	171160	2.6	47.4
171575	171675	2.6	97.4
172000	172225	7.8	217.2
172275	172325	0	50.0
172820	172910	0	90.0
173200	173500	7.8	292.2
173625	173675	0	50.0
173775	173850	0	75.0
174125	174200	2.6	72.4
174250	174475	2.6	222.4
174525	174575	2.6	47.4
174625	174930	6.44	298.6
174930	174980	0	50.0
175310	175380	0	70.0
176275	176375	0	100.0
177575	177660	0	85.0
177725	177850	0	125.0
177850	178025	0	175.0
178025	178200	2.6	172.4
178200	178300	2.6	97.4
178660	178730	0	70.0
178730	178780	0	50.0
178780	178910	0	130.0
179375	179475	0	100.0
179780	179850	0	70.0
179930	179990	0	60.0
179990	180060	5.26	64.7
180060	180160	0	100.0
180340	180390	0	50.0
180560	180670	2.6	107.4
180670	180720	0	50.0
180720	180820	2.6	97.4
180980	181200	2.6	217.4
181200	181280	0	80.0
181380	181480	0	100.0
182130	182180	0	50.0
182340	182420	0	80.0
182470	182520	0	50.0
183300	183480	9.16	170.8
183480	183530	0	50.0



183660	183710	5.26	44.7
184260	184330	0	70.0
184900	185080	6.14	173.9
185330	185480	6.56	143.4
185730	185780	0	50.0
186160	186210	0	50.0
186310	186480	0	170.0
186630	186730	0	100.0
186830	186930	0	100.0
186980	187030	0	50.0
187130	187180	0	50.0
187440	187560	0	120.0
187660	187710	0	50.0
187760	187810	0	50.0
187925	187980	0	55.0
188260	188310	0	50.0
188410	188460	2.6	47.4
188730	188810	0	80.0
188960	189020	3.84	56.2
189350	189430	7.1	72.9
189430	189530	3.84	96.2
190680	190760	0	80.0
190760	190810	0	50.0
191030	191130	0	100.0
191130	191280	2.6	147.4
191280	191380	6.32	93.7
191500	191560	0	60.0
191780	191960	2.7	177.3
192020	192080	0	60.0
192160	192210	0	50.0
192280	192330	0	50.0
192330	192530	5.2	194.8
192530	192580	0	50.0
193330	193460	0	130.0
193780	193860	0	80.0
193910	194030	0	120.0
194080	194230	0	150.0
194610	194710	2.6	97.4
194780	194830	0	50.0
195060	195130	10.56	59.4
195180	195260	0	80.0
195960	196030	0	70.0
196160	196210	0	50.0
198450	199750	49.38	1250.6
Total =			9574

Total Length of Triangular Drain =
Chute Drain (of avg 8 m height @ 50m
Interval) =

35295 m
1532 m



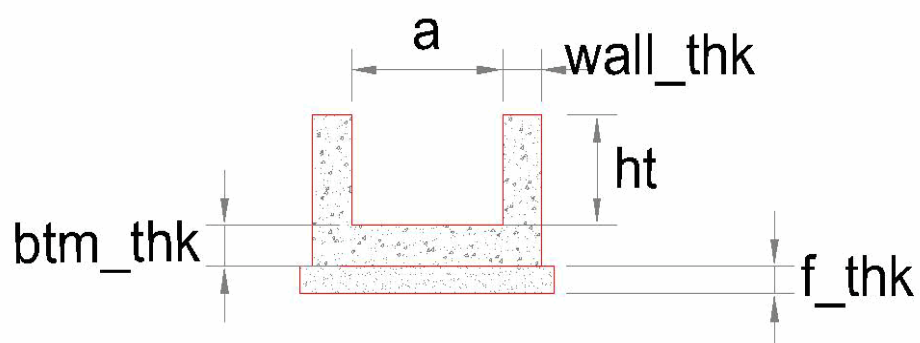
Variable Declaration

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	1532.000	m



Variable Declaration



CHUT DRAIN

A handwritten signature and a circular official stamp are located in the bottom right corner of the page.

Triangular Drain & Chut Drain

Chainage (m)		Length of CD	Net Length (m)	TCS No.	Side
From	To				
169570	169630	0	60.0	TCS-3A	Hill
169630	169680	0	50.0	TCS-4	Hill
169680	169825	8.66	136.3	TCS-3	Hill
169825	169875	0	100.0	TCS-12	Both
169875	170275	6.56	393.4	TCS-3	Hill
170275	170375	0	100.0	TCS-3A	Hill
170375	170450	2.6	72.4	TCS-3	Hill
170450	170500	0	50.0	TCS-3A	Hill
170500	170600	0	100.0	TCS-3	Hill
170700	170750	2.6	47.4	TCS-3	Hill
170750	170800	0	50.0	TCS-3A	Hill
170800	170975	6.06	168.9	TCS-3	Hill
170975	171030	0	55.0	TCS-3A	Hill
171030	171110	6.4	73.6	TCS-3	Hill
171110	171160	2.6	47.4	TCS-3A	Hill
171160	171250	6.4	83.6	TCS-3	Hill
171550	171575	0	25.0	TCS-3	Hill
171575	171675	2.6	97.4	TCS-3A	Hill
171675	172000	5.3	319.7	TCS-3	Hill
172000	172225	7.8	217.2	TCS-7A	Valley
172225	172275	3.96	46.0	TCS-3	Hill
172275	172325	0	50.0	TCS-3A	Hill
172325	172475	0	150.0	TCS-3	Hill
172475	172525	2.6	47.4	TCS-4	Hill
172525	172820	8.96	286.0	TCS-3	Hill
172820	172910	0	180.0	TCS-12	Both
172910	173025	2.6	112.4	TCS-3	Hill
173025	173125	2.6	97.4	TCS-4	Hill
173125	173200	0	75.0	TCS-3	Hill
173200	173500	7.8	292.2	TCS-3A	Hill
173500	173625	6.44	118.6	TCS-3	Hill
173625	173675	0	100.0	TCS-12	Both
173675	173775	0	100.0	TCS-3	Hill
173775	173850	0	75.0	TCS-3A	Hill
173850	174125	2.6	272.4	TCS-3	Hill
174125	174200	2.6	72.4	TCS-3A	Hill
174200	174250	0	50.0	TCS-3	Hill
174250	174475	2.6	222.4	TCS-3A	Hill
174475	174525	0	50.0	TCS-3	Hill
174525	174625	2.6	47.4	TCS-3	Hill
174625	174930	6.44	298.6	TCS-3A	Hill
174930	174980	0	100.0	TCS-12	Both
174980	175310	16.64	313.4	TCS-3	Hill
175310	175380	0	70.0	TCS-3A	Hill
175380	175750	12.58	357.4	TCS-3	Hill
175750	176025	0	275.0	TCS-4	Hill
176025	176275	6.44	243.6	TCS-3	Hill



176275	176375	0	100.0	TCS-7A	Valley
177425	177475	40	10.0	TCS-4	Hill
177475	177575	0	100.0	TCS-3	Hill
177575	177660	0	85.0	TCS-3A	Hill
177660	177725	30	35.0	TCS-4	Hill
177850	178025	0	175.0	TCS-7A	Valley
178025	178200	2.6	344.8	TCS-12	Both
178300	178550	5.2	244.8	TCS-3	Hill
178610	178660	30	20.0	TCS-3	Hill
178910	178980	0	70.0	TCS-4	Hill
178980	179375	2.6	392.4	TCS-3	Hill
179375	179475	0	100.0	TCS-3A	Hill
179475	179780	5.2	299.8	TCS-3	Hill
179780	179850	0	70.0	TCS-7A	Valley
179850	179930	20	60.0	TCS-3	Hill
179930	179990	0	60.0	TCS-7A	Valley
180060	180160	0	100.0	TCS-3A	Hill
180160	180260	0	100.0	TCS-3	Hill
180390	180560	2.6	167.4	TCS-3	Hill
180560	180670	2.6	107.4	TCS-3A	Hill
180670	180720	0	50.0	TCS-7A	Valley
180720	180820	2.6	97.4	TCS-3A	Hill
180820	180980	2.6	157.4	TCS-3	Hill
181200	181280	0	80.0	TCS-3A	Hill
181280	181380	2.6	97.4	TCS-3	Hill
181380	181480	0	100.0	TCS-3A	Hill
181480	182130	18.2	631.8	TCS-3	Hill
182130	182180	0	50.0	TCS-3A	Hill
182180	182340	2.6	157.4	TCS-3	Hill
182340	182420	0	80.0	TCS-3A	Hill
182420	182470	2.6	47.4	TCS-3	Hill
182470	182520	0	100.0	TCS-12	Both
182520	182650	5.2	124.8	TCS-3	Hill
183530	183660	0	130.0	TCS-3	Hill
183660	183710	5.26	44.7	TCS-3A	Hill
183710	184260	7.8	542.2	TCS-3	Hill
184330	184900	7.8	562.2	TCS-3	Hill
185080	185330	5.2	244.8	TCS-3	Hill
185480	185730	5.26	244.7	TCS-3	Hill
185730	185780	0	50.0	TCS-3A	Hill
185780	186160	10.4	369.6	TCS-3	Hill
186160	186210	0	50.0	TCS-3A	Hill
186210	186310	2.6	97.4	TCS-3	Hill
186310	186480	0	340.0	TCS-12	Both
186480	186630	2.6	147.4	TCS-3	Hill
186630	186730	0	100.0	TCS-3A	Hill
186730	186830	2.6	97.4	TCS-3	Hill
186830	186930	0	100.0	TCS-3A	Hill
186930	186980	6.06	43.9	TCS-3	Hill
186980	187030	0	100.0	TCS-12	Both



187030	187130	6.4	93.6	TCS-3	Hill
187180	187320	0	140.0	TCS-3	Hill
187320	187370	0	50.0	TCS-4	Hill
187370	187440	2.6	67.4	TCS-3	Hill
187440	187560	0	120.0	TCS-3A	Hill
187560	187660	9.1	90.9	TCS-3	Hill
187660	187710	0	50.0	TCS-3A	Hill
187710	187760	5	45.0	TCS-3	Hill
187760	187810	0	50.0	TCS-7A	Valley
187810	187925	6.06	108.9	TCS-3	Hill
187925	187980	0	55.0	TCS-3A	Hill
187980	188260	10.38	269.6	TCS-3	Hill
188260	188310	0	50.0	TCS-3A	Hill
188310	188410	0	100.0	TCS-3	Hill
188410	188460	2.6	47.4	TCS-3A	Hill
188460	188730	2.6	267.4	TCS-3	Hill
188730	188810	0	80.0	TCS-3A	Hill
188810	188860	0	50.0	TCS-3	Hill
188860	188960	3.84	96.2	TCS-4	Hill
189020	189120	3.84	96.2	TCS-3	Hill
189250	189350	7.68	92.3	TCS-3	Hill
189430	189530	3.84	96.2	TCS-3A	Hill
190200	190680	6.54	473.5	TCS-3	Hill
190680	190760	0	80.0	TCS-3A	Hill
190760	190810	0	100.0	TCS-12	Both
190810	191030	2.6	217.4	TCS-3	Hill
191030	191130	0	100.0	TCS-3A	Hill
191130	191280	2.6	147.4	TCS-7A	Valley
191280	191380	6.32	93.7	TCS-3A	Hill
191380	191500	0	120.0	TCS-3	Hill
191500	191560	0	60.0	TCS-3A	Hill
191560	191780	6.4	213.6	TCS-3	Hill
191780	191960	2.7	354.6	TCS-12	Both
191960	192020	2.6	57.4	TCS-3	Hill
192020	192080	0	120.0	TCS-12	Both
192160	192210	0	100.0	TCS-12	Both
192210	192280	0	70.0	TCS-4	Hill
192280	192330	0	50.0	TCS-3A	Hill
192580	193330	24.12	725.9	TCS-3	Hill
193330	193460	0	130.0	TCS-7A	Valley
193460	193780	8	312.0	TCS-3	Hill
193780	193860	0	80.0	TCS-3A	Hill
193860	193910	2.6	47.4	TCS-3	Hill
193910	194030	0	120.0	TCS-7A	Valley
194030	194080	2.7	47.3	TCS-3	Hill
194080	194230	0	300.0	TCS-12	Both
194230	194610	12.96	367.0	TCS-3	Hill
194610	194710	2.6	194.8	TCS-12	Both
194710	194780	0	70.0	TCS-3	Hill
194780	194830	0	50.0	TCS-3A	Hill



194830	195060	2.7	227.3	TCS-3	Hill
195060	195130	10.56	59.4	TCS-3A	Hill
195130	195180	0	50.0	TCS-3	Hill
195180	195260	0	80.0	TCS-7A	Valley
195260	195960	24.28	675.7	TCS-3	Hill
195960	196030	0	140.0	TCS-12	Both
196030	196160	2.6	127.4	TCS-4	Hill
196160	196210	0	50.0	TCS-3A	Hill
196210	196260	0	50.0	TCS-3	Hill
197200	197400	28.94	171.1	TCS-3	Hill
197800	198450	9.04	641.0	TCS-3	Hill
198450	199750	49.38	2501.2	TCS-12	Both
Total =			25721		



Catchwater Drain

Chainage (m)		Length of CD (m)	Net Length (m)
From	To		
169570	169630	0	60.0
169825	169875	0	50.0
170275	170375	0	100.0
170450	170500	0	50.0
170600	170700	3.96	96.0
170750	170800	0	50.0
170975	171030	0	55.0
171110	171160	2.6	47.4
171575	171675	2.6	97.4
172000	172225	7.8	217.2
172275	172325	0	50.0
172820	172910	0	90.0
173200	173500	7.8	292.2
173625	173675	0	50.0
173775	173850	0	75.0
174125	174200	2.6	72.4
174250	174475	2.6	222.4
174525	174575	2.6	47.4
174625	174930	6.44	298.6
174930	174980	0	50.0
175310	175380	0	70.0
176275	176375	0	100.0
177575	177660	0	85.0
177725	177850	0	125.0
177850	178025	0	175.0
178025	178200	2.6	172.4
178200	178300	2.6	97.4
178660	178730	0	70.0
178730	178780	0	50.0
178780	178910	0	130.0
179375	179475	0	100.0
179780	179850	0	70.0
179930	179990	0	60.0
179990	180060	5.26	64.7
180060	180160	0	100.0
180340	180390	0	50.0
180560	180670	2.6	107.4
180670	180720	0	50.0
180720	180820	2.6	97.4
180980	181200	2.6	217.4
181200	181280	0	80.0
181380	181480	0	100.0
182130	182180	0	50.0
182340	182420	0	80.0
182470	182520	0	50.0
183300	183480	9.16	170.8
183480	183530	0	50.0



183660	183710	5.26	44.7
184260	184330	0	70.0
184900	185080	6.14	173.9
185330	185480	6.56	143.4
185730	185780	0	50.0
186160	186210	0	50.0
186310	186480	0	170.0
186630	186730	0	100.0
186830	186930	0	100.0
186980	187030	0	50.0
187130	187180	0	50.0
187440	187560	0	120.0
187660	187710	0	50.0
187760	187810	0	50.0
187925	187980	0	55.0
188260	188310	0	50.0
188410	188460	2.6	47.4
188730	188810	0	80.0
188960	189020	3.84	56.2
189350	189430	7.1	72.9
189430	189530	3.84	96.2
190680	190760	0	80.0
190760	190810	0	50.0
191030	191130	0	100.0
191130	191280	2.6	147.4
191280	191380	6.32	93.7
191500	191560	0	60.0
191780	191960	2.7	177.3
192020	192080	0	60.0
192160	192210	0	50.0
192280	192330	0	50.0
192330	192530	5.2	194.8
192530	192580	0	50.0
193330	193460	0	130.0
193780	193860	0	80.0
193910	194030	0	120.0
194080	194230	0	150.0
194610	194710	2.6	97.4
194780	194830	0	50.0
195060	195130	10.56	59.4
195180	195260	0	80.0
195960	196030	0	70.0
196160	196210	0	50.0
198450	199750	49.38	1250.6
Total =			9574

Total Length of Triangular Drain =
Chute Drain (of avg 8 m height @ 50m
Interval) =

35295 m
1532 m



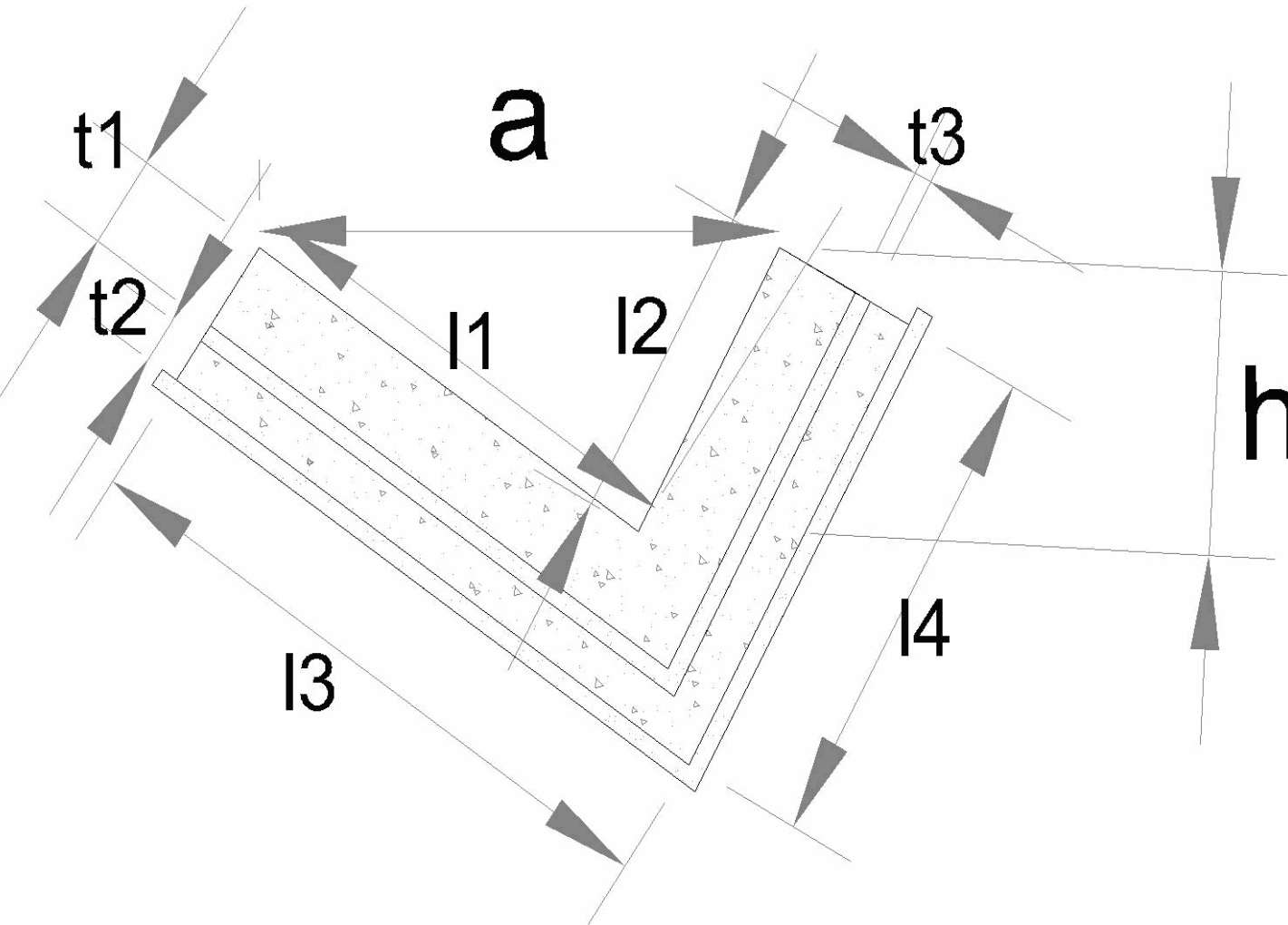
Variable Declaration

Triangular Shaped Drain

SI No	Variable Description	Variable	Dimension	Unit
1	Ref Drawing	a	0.600	m
2	Ref Drawing	h	0.300	m
3	Ref Drawing	t1	0.100	m
4	Length	l	35295.000	m
5	Ref Drawing	t2	0.050	m
6	Ref Drawing	t3	0.025	m
7	Ref Drawing	l1	0.530	m
8	Ref Drawing	l2	0.342	
9	Ref Drawing	l3	0.712	
10	Ref Drawing	l4	0.530	
11	sand bed at bottom thickness	t4	0.025	



Variable Declaration

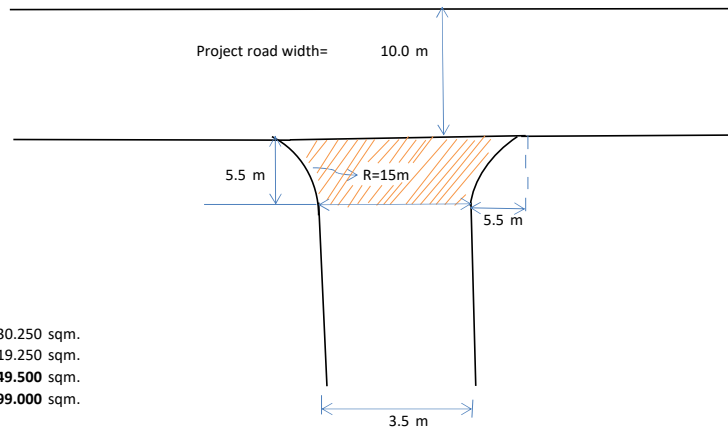


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Minor Junction

SI No	Design ch	Survey ch.	Type	SI No	Design ch	Survey ch.	Type	SI No	Design ch	Survey ch.	Type	SI No	Design ch	Survey ch.	Type
1	171.200	176.870	3-legged	9	200.800	209.075	3-legged	17	203.400	211.700	3-legged	25	205.600	213.900	3-legged
2	182.900	189.690	3-legged	10	201.300	209.575	3-legged	18	203.850	212.175	3-legged	26	205.800	214.100	3-legged
3	196.450	204.300	3-legged	11	201.900	210.175	3-legged	19	204.000	212.275	3-legged	27	205.810	214.110	3-legged
4	196.670	204.575	3-legged	12	202.450	210.775	3-legged	20	204.100	212.400	3-legged	28	205.925	214.225	3-legged
5	197.000	204.900	3-legged	13	202.800	211.100	3-legged	21	204.400	212.675	3-legged				
6	197.750	205.775	3-legged	14	202.900	211.275	3-legged	22	204.600	212.900	3-legged				
7	199.700	207.975	3-legged	15	203.200	211.425	3-legged	23	205.000	213.275	3-legged				
8	200.260	208.575	3-legged	16	203.350	211.670	3-legged	24	205.650	213.375	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	28	49.50	1386							
		Total =	1386							

HP Culvert in cross road= 112



Variable Declaration

Minor Junction

SI No	Variable Description	Variable	Dimension	Unit
1	Total_area	tot_area	1386.000	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	41.000	



RR Masonry Retaining Wall

Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.	Side	Avg. Height (m)
From	To					
169630	169680	0	50.0	TCS-4	Valley	2
171250	171550	2.6	297.4	TCS-10	Valley	3
172475	172525	2.6	47.4	TCS-4	Valley	2
173025	173125	2.6	97.4	TCS-4	Valley	2
175750	176025	0	275.0	TCS-4	Valley	2
177425	177475	40	10.0	TCS-4	Valley	2
177660	177725	30	35.0	TCS-4	Valley	2
177725	177850	0	125.0	TCS-11A	Valley	2
178550	178610	0	60.0	TCS-11	Valley	2
178910	178980	0	70.0	TCS-4	Valley	2
180260	180340	2.7	77.3	TCS-11	Valley	2
187130	187180	0	50.0	TCS-11A	Valley	2
187320	187370	0	50.0	TCS-4	Valley	2
188860	188960	3.84	96.2	TCS-4	Valley	2
188960	189020	3.84	56.2	TCS-11A	Valley	2
189350	189430	7.1	72.9	TCS-11A	Valley	2
192080	192160	2.6	77.4	TCS-8	Valley	2
192210	192280	0	70.0	TCS-4	Valley	2
196030	196160	2.6	127.4	TCS-4	Valley	3
196330	196380	2.6	47.4	TCS-10	Valley	2
Total =			1792			

Length of 2.0 m Retaining Wall = **1367 m**
 Length of 3.0 m Retaining Wall = **425 m**



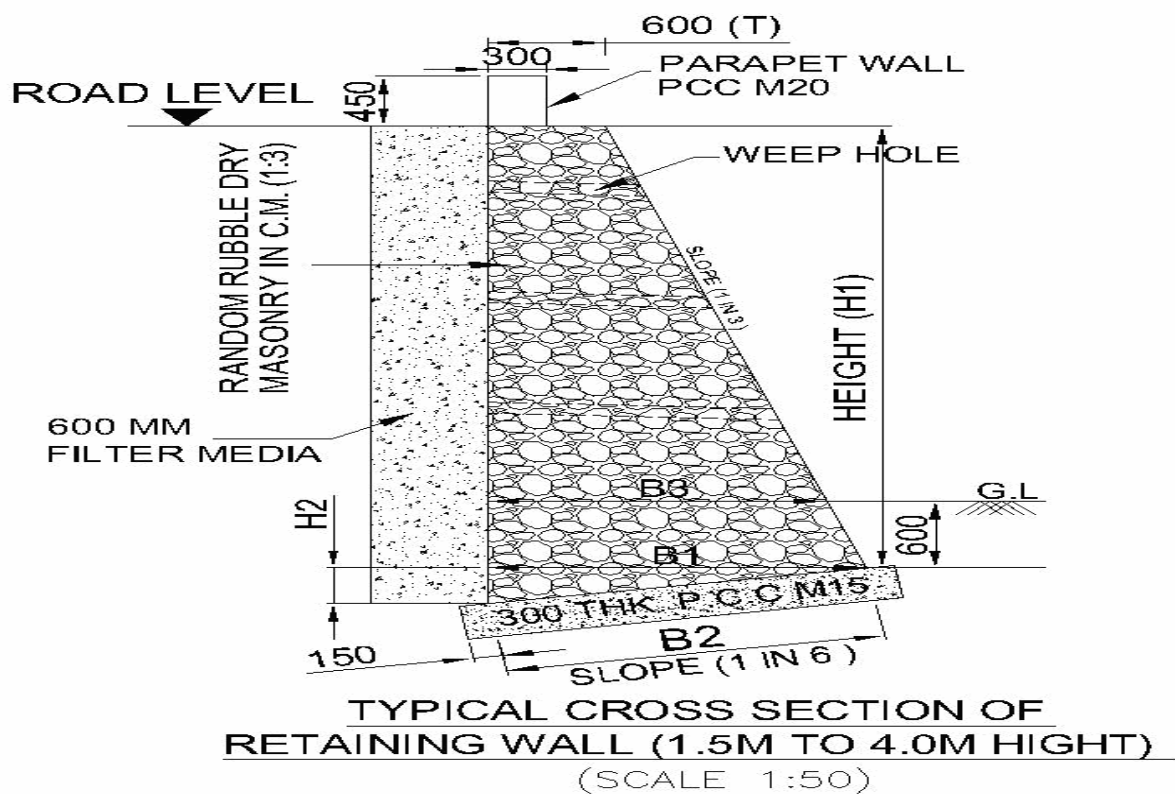
Variable Declaration

Retaining Wall 2.0m

SI 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	1367.000	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



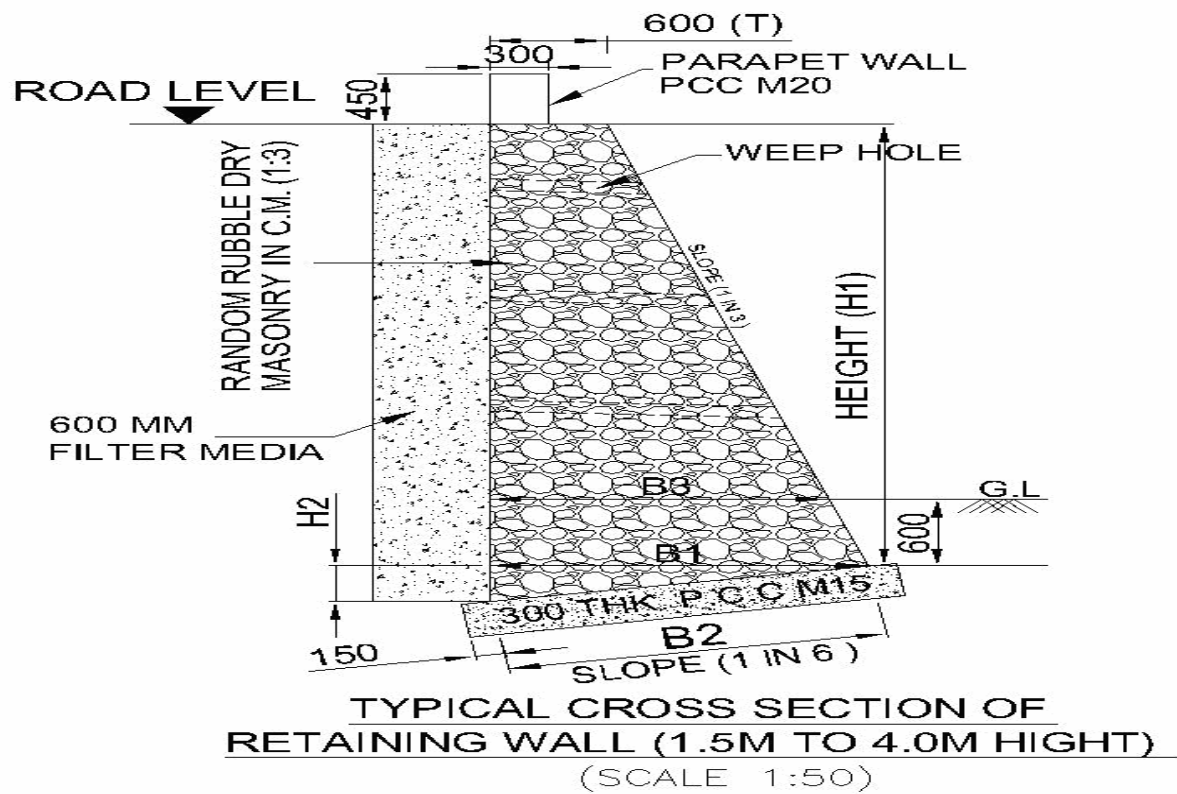
Variable Declaration

Retaining Wall 3.0m

SI 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	425.000	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



Breast Wall					
Chainage (m)		Length of CD	Net Length (m)	Side	Avg. Height (m)
From	To				
170600	170700	3.96	96.0	Hill	2
172000	172225	7.8	217.2	Hill	2
174525	174575	2.6	47.4	Hill	2
176275	176375	0	100.0	Hill	2
177725	177850	0	125.0	Hill	2
177850	178025	0	175.0	Hill	2
178200	178400	2.6	97.4	Hill	2
178660	178730	0	70.0	Hill	2
178730	178780	0	50.0	Hill	2
178780	178910	0	130.0	Hill	2
179780	179850	0	70.0	Hill	2
179930	179990	0	60.0	Hill	2
179990	180060	5.26	64.7	Hill	2
180340	180390	0	50.0	Hill	2
180670	180720	0	50.0	Hill	2
180980	181200	2.6	217.4	Hill	2
182650	182780	0	130.0	Hill	2
182910	183030	2.6	117.4	Hill	2
183030	183080	0	50.0	Hill	2
183080	183160	0	80.0	Hill	2
183160	183210	0	50.0	Hill	2
183210	183300	2.6	87.4	Hill	2
183300	183480	9.16	170.8	Hill	2
183480	183530	0	50.0	Hill	2
184260	184330	0	70.0	Hill	2
184900	185080	6.14	173.9	Hill	2
185330	185480	6.56	143.4	Hill	2
187130	187180	0	50.0	Hill	2
187760	187810	0	50.0	Hill	2
188960	189020	3.84	56.2	Hill	2
189120	189250	0	130.0	Hill	2
189350	189430	7.1	72.9	Hill	2
189530	190060	27.37	502.6	Hill	2
190060	190200	3.84	136.2	Hill	2
191130	191280	2.6	147.4	Hill	2
192330	192530	5.2	194.8	Hill	2
192530	192580	0	50.0	Hill	2
193330	193460	0	130.0	Hill	2
193910	194030	0	120.0	Hill	2
195180	195260	0	80.0	Hill	2
Total =			4463		



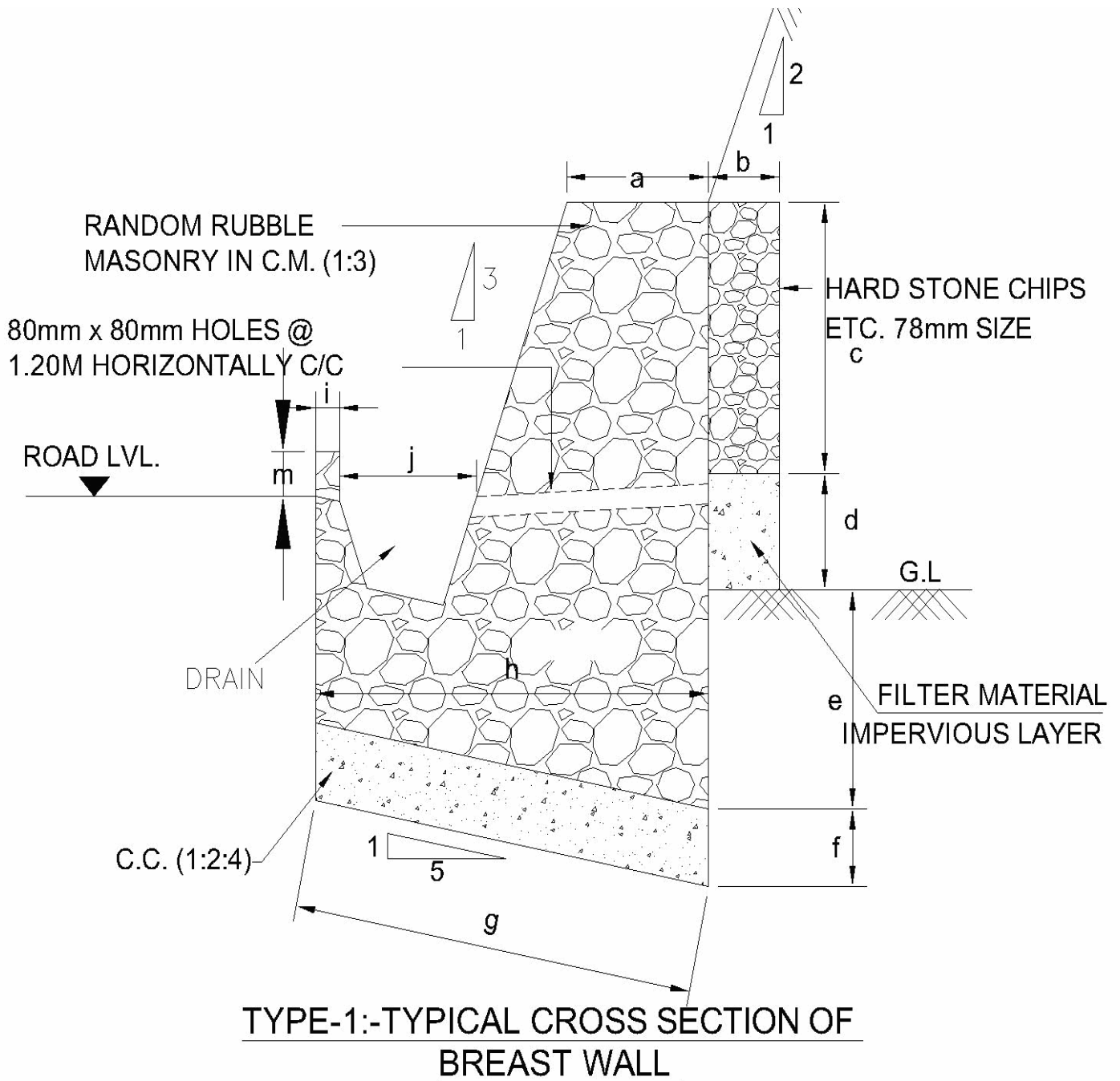
Variable Declaration

Breast Wall 2.0m Ht

SI No	Variable Description	Variable	Dimension	Unit
1	From Diagram	a	0.600	m
2	From Diagram	b	0.300	m
3	From Diagram	c	1.550	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	1.933	m
8	From Diagram	h	1.890	m
9	From Diagram	i	0.100	m
10	From Diagram	j	0.600	m
11	length	l	4463.000	m
12	Percentage of Earthwork in Ordinary Rock(20%)	p	0.200	
13	From Diagram	m	0.000	m



Variable Declaration



BusBay & Passenger Shelter

Chainage	Side	Name of Place
171+650	Both Side	Luangchum
182+780	Both Side	Kaiphundai
190+100	Both Side	Old Kaiphundai
197+800	Both Side	Tatbung
202+750	Both Side	Khunou
203+230	Both Side	Jirighat
205+610	Both Side	Jiribam

No of Busbay and Passenger Shelter=

14



Variable Declaration

Passenger Shelter

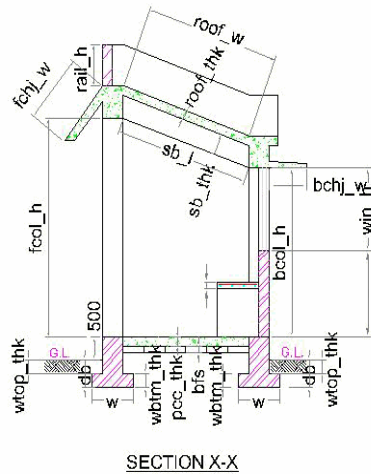
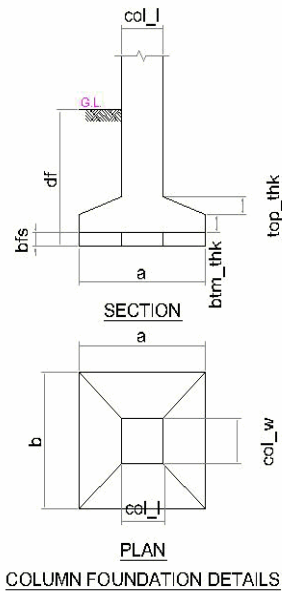
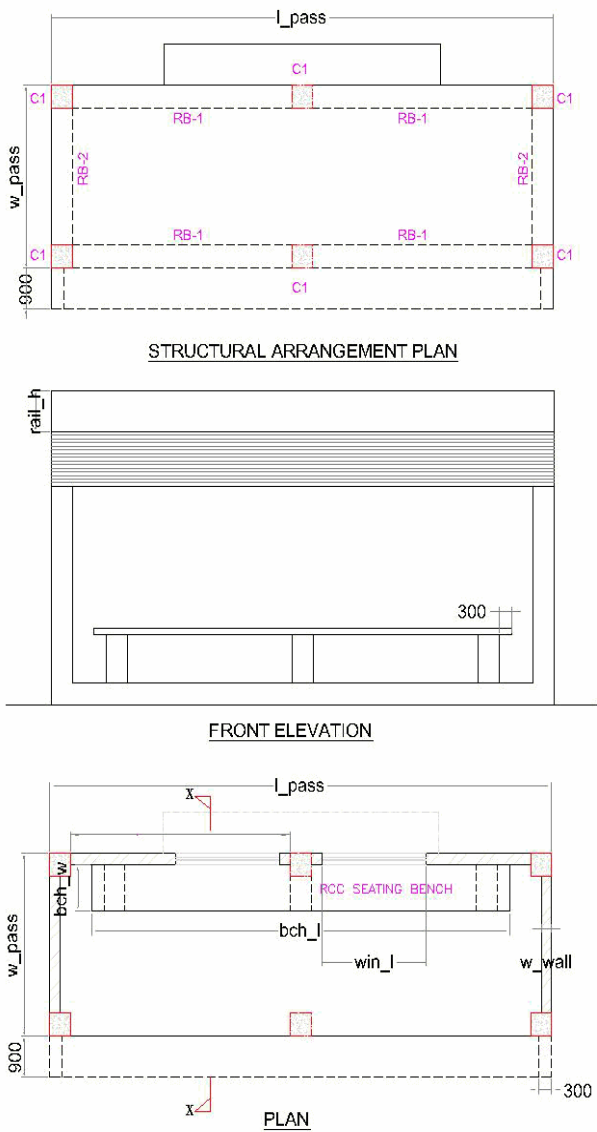
SI No	Variable Description	Variable	Dimension	Unit
1	No of Passenger Shelter	n	14.000	nos
2	Foundation Length for column	a	0.750	m
3	Foundation Width for column	b	0.750	m
4	Foundation Depth for column	df	0.750	m
5	Nos of column	col_n	6.000	Nos
6	Foundation length for Brick work	l	13.500	m
7	Foundation 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	fcoll_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
37	Thickness of Roof slab	roof_thk	0.110	m

Variable Declaration

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



PASSENGER SHELTER

BusBay & Passenger Shelter

Chainage	Side	Name of Place
171+650	Both Side	Luangchum
182+780	Both Side	Kaiphundai
190+100	Both Side	Old Kaiphundai
197+800	Both Side	Tatbung
202+750	Both Side	Khunou
203+230	Both Side	Jirighat
205+610	Both Side	Jiribam

No of Busbay and Passenger Shelter=

14



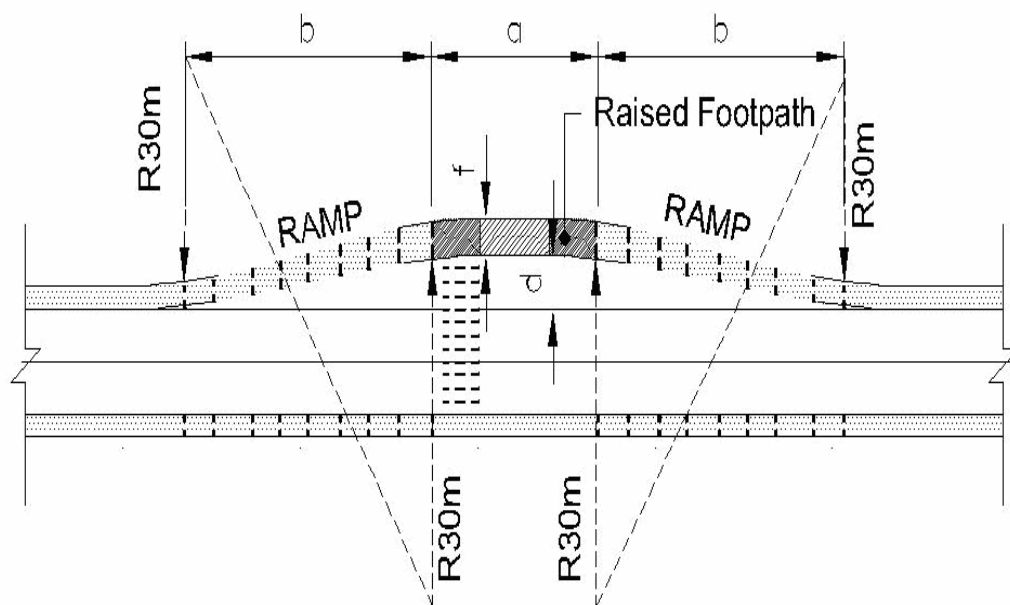
Variable Declaration

Busbay (2 Lane)

SI 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	14.000	nos
8	Width Footpath	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	41.000	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=	393	Nos	Bill No- 06, Sl. No- 10
Kilometer stones=	29	Nos	Bill No- 06, Sl. No- 2
5th Kilometer stones=	7	Nos	Bill No- 06, Sl. No- 1
Boundary Stones=	367	Nos	Bill No- 06, Sl. No- 3
Delineators (100 cm long and circular shaped)+Hazard marker =	3358	Nos	Bill No- 06, Sl. No- 8
Road Stud=	16484	Nos	Bill No- 06, Sl. No- 9
900 mm Octagonal	54	Nos	Bill No- 06, Sl. No- 8
600 mm circular	107	Nos	Bill No- 06, Sl. No- 5
900 mm Tringular	255	Nos	Bill No- 06, Sl. No- 5
800 mm x 600 mm rectangular	14	Nos	Bill No- 06, Sl. No- 6
Convex Mirror for Blind Curve	0	Nos	Bill No- 06, Sl. No- 16
Rumble Strip=	1040	sqm	Bill No- 06, Sl. No- 13



Traffic sign Calculation

SI No	Type	IRC-67 2012 Specification	Dimension	Chainage / Location	No	Remarks
1	Right/Left Hand Side Curve	fig 15.02	900 mm Triangular		59	@ 2per location
3	Zig-Zag Curve	fig 15.07	900 mm Triangular		13	@ 1per location
4	Reverse Curve	fig 15.06 & 15.05	900 mm Triangular		24	@ 1per location
5	Built-up area	fig 15.35	900 mm Triangular		38	@ 2per location
6	Side road	fig 15.09 & 15.10	900 mm Triangular		28	@ 2per location
7	Pedestain Crossing		900 mm Triangular	side road, bus bay	8	@ 2per location
8	Bus Stop	fig 17.35	800x600 rectangular		14	@ 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	800	@ 4 per structure
12	Stop Sign	fig 14.01	900 mm Octagonal	Side road & cross road	54	@ 1 per location
13	Speed limit	fig 14.37	600mm Circular		107	@ 2per location
14	Rumble strip	fig 15.50	900 Triangular		52	@ 2per location in Built Up Area & @ 1per location in Side Road
15	Hair pin Bend	fig 15.03 & 15.04	900 mm Triangular		33	@ 2per location
16	Convex Mirror for Blind Curve				0	@ 1per location





SUMMARY			
90 cm equilateral triangle		255	nos
Stop Sign (90 cm high octagon)		54	nos
60 cm circular		107	nos
80 cm x 60 cm rectangular		14	nos
Direction Sign	<.0.9 sqm	0	nos
Direction Sign	>0.9 sqm	0	nos
Hazard Marker		800	nos
Convex Mirror for Blind Curve		0	nos
Rumble Strip		52	nos

Calculation of km Stone, Hectometer Stone and Boundary Stone

Item	Remarks	Nos
Kilometer stones	Total KM Stone- No. of 5th KM stone	29
5th Kilometer stones	(km stone 5th, 10th , 15th, 20th etc)	7
Boundary stones	(Total Lengthx5x2) + 2x1	367



CALCULATION FOR ROAD STUD											
		START CHAINAGE (m)	END CHAINAGE (m)		START CH. Road Stud	END CH. Road stud					Total On shoulder (nos)
		169625.012	169671.516	25	169580.012	169716.516	136.50	30	6	23	46
		169837.589	169927.718	15	169802.589	169962.718	160.13	85	6	27	54
		169975.043	170030.157	15	169940.043	170065.157	125.11	30	6	21	42
		170250.601	170261.764	30	170200.601	170311.764	111.16	30	6	19	38
		170319.622	170336.736	30	170269.622	170386.736	117.11	40	6	20	40
		170408.312	170428.221	30	170358.312	170478.221	119.91	30	6	20	40
		170501.628	170563.56	20	170461.628	170603.56	141.93	40	6	24	48
		170708.199	170745.639	15	170673.199	170780.639	107.44	30	6	18	36
		170776.065	170800.043	25	170731.065	170845.043	113.98	30	6	19	38
		170830.381	170866.187	25	170785.381	170911.187	125.81	30	6	21	42
		170958.722	170984.117	30	170908.722	171034.117	125.39	30	6	21	42
		171053.411	171085.768	35	170998.411	171140.768	142.36	30	6	24	48
		171117.867	171150.481	20	171077.867	171190.481	112.61	170	6	19	38
		171180.564	171197.669	15	171145.564	171232.669	87.10	30	6	15	30
		171257.737	171284.234	20	171217.737	171324.234	106.50	35	6	18	36
		171371.03	171377.371	15	171336.030	171412.371	76.34	110	6	13	26
		171405.81	171435.454	40	171345.810	171495.454	149.64	300	6	25	50
		171473.795	171527.733	25	171428.795	171572.733	143.94	50	6	24	48
		171563.838	171576.193	20	171523.838	171616.193	92.36	80	6	16	32
		171694.187	171749.072	20	171654.187	171789.072	134.88	25	6	23	46
		171931.008	171945.432	20	171891.008	171985.432	94.42	30	6	16	32
		171996.19	172005.378	40	171936.190	172065.378	129.19	50	6	22	44
		172072.021	172114.829	30	172022.021	172164.829	142.81	30	6	24	48
		172175.661	172182.51	30	172125.661	172232.51	106.85	30	6	18	36
		172243.017	172277.479	30	172193.017	172327.479	134.46	30	6	23	46
		172362.112	172368.668	30	172312.112	172418.668	106.56	35	6	18	36
		172554.12	172645.981	30	172504.120	172695.981	191.86	60	6	32	64
		172727.372	172806.759	25	172682.372	172851.759	169.39	45	6	29	58
		173011.505	173043.896	45	172946.505	173108.896	162.39	50	6	28	56
		173104.823	173136.137	80	173004.823	173236.137	231.31	170	6	39	78
		173177.425	173209.521	60	173097.425	173289.521	192.10	30	6	33	66
		173279.312	173321.037	45	173214.312	173386.037	171.73	30	6	29	58
		173432.413	173470.712	55	173357.413	173545.712	188.30	30	6	32	64
		173525.797	173531.773	45	173460.797	173596.773	135.98	40	6	23	46
		173562.311	173583.517	35	173507.311	173638.517	131.21	300	6	22	44
		173608.709	173681.478	40	173548.709	173741.478	192.77	40	6	33	66
		173813.199	173888.522	40	173753.199	173948.522	195.32	70	6	33	66
		173997.99	174077.801	25	173952.990	174122.801	169.81	50	6	29	58
		174228.315	174249.964	15	174193.315	174284.964	91.65	35	6	16	32
		174444.53	174515.436	15	174409.530	174550.436	140.91	60	6	24	48
		174701.554	174719.045	15	174666.554	174754.045	87.49	50	6	15	30
		174779.271	174813.641	15	174744.271	174848.641	104.37	125	6	18	36
		174884.941	174900.658	0	174864.941	174920.658	55.72	50	6	10	20
		175020.741	175043.874	0	175000.741	175063.874	63.13	30	6	11	22
		175074.585	175119.569	20	175034.585	175159.569	124.98	170	6	21	42
		175148.001	175162.869	20	175108.001	175202.869	94.87	40	6	16	32
		175188.951	175224.242	15	175153.951	175259.242	105.29	170	6	18	36
		175254.406	175262.966	15	175219.406	175297.966	78.56	35	6	14	28
		175314.099	175320.46	15	175279.099	175355.46	76.36		6	13	26
					175372.446	175499.604	127.16		6	22	44
					175459.873	175577.472	117.60		6	20	40
					175576.126	175669.225	93.10		6	16	32
					175643.036	175769.547	126.51		6	22	44
					175724.824	175823.397	98.57		6	17	34
					175866.917	175959.625	92.71		6	16	32
					175923.063	176015.036	91.97		6	16	32
					175989.326	176120.887	131.56		6	22	44
					176123.989	176260.281	136.29		6	23	46
					176209.822	176326.677	116.86		6	20	40
					176292.235	176430.156	137.92		6	23	46
					176404.089	176497.535	93.45		6	16	32
					176456.578	176731.252	274.67		6	46	92

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					
		176765.711	176935.531	30	176715.711	176985.531	269.82	200	6	45	90
		177059.211	177123.246	20	177019.211	177163.246	144.04	30	6	25	50
		177346.886	177393.728	30	177296.886	177443.728	146.84	300	6	25	50
		177505.714	177548.332	0	177485.714	177568.332	82.62	300	6	14	28
		177657.12	177685.621	30	177607.120	177735.621	128.50	300	6	22	44
		177755.81	177770.481	30	177705.810	177820.481	114.67	200	6	20	40
		177894.516	177934.417	15	177859.516	177969.417	109.90	125	6	19	38
		178022.309	178135.321	30	177972.309	178185.321	213.01	150	6	36	72
		178216.92	178401.635	30	178166.920	178451.635	284.71	200	6	48	96
		178446.838	178477.145	15	178411.838	178512.145	100.31	30	6	17	34
		178550.359	178581.723	30	178500.359	178631.723	131.36	30	6	22	44
		178672.251	178704.397	15	178637.251	178739.397	102.15	25	6	18	36
		178761.145	178779.549	20	178721.145	178819.549	98.40	125	6	17	34
		178965.102	178972.014	30	178915.102	179022.014	106.91	80	6	18	36
		179100.77	179130.566	20	179060.770	179170.566	109.80	20	6	19	38
		179295.57	179366.605	30	179245.570	179416.605	171.04	50	6	29	58
		179417.472	179444.292	15	179382.472	179479.292	96.82	30	6	17	34
		179521.398	179554.371	25	179476.398	179599.371	122.97	30	6	21	42
		179630.675	179655.758	45	179565.675	179720.758	155.08	40	6	26	52
		179692.955	179731.854	15	179657.955	179766.854	108.90	500	9	13	26
		179770.913	179787.999	15	179735.913	179822.999	87.09	30	6	15	30
		179840.326	179855.693	35	179785.326	179910.693	125.37	20	6	21	42
		179950.992	179965.953	0	179930.992	179985.953	54.96	20	6	10	20
		180014.486	180022.157	20	179974.486	180062.157	87.67	50	6	15	30
		180060.459	180091.908	15	180025.459	180126.908	101.45	60	6	17	34
		180137.121	180167.553	25	180092.121	180212.553	120.43	30	6	21	42
		180290.652	180317.312	45	180225.652	180382.312	156.66	80	6	27	54
		180421.799	180561.958	20	180381.799	180601.958	220.16	60	6	37	74
		180637.788	180741.264	20	180597.788	180781.264	183.48	60	6	31	62
		180818.425	180883.19	30	180768.425	180933.19	164.77	60	6	28	56
		180978.732	181082.676	20	180938.732	181122.676	183.94	45	6	31	62
		181230.604	181301.408	20	181190.604	181341.408	150.80	170	6	26	52
		181367.098	181403.999	15	181332.098	181438.999	106.90	30	6	18	36
		181481.844	181525.376	35	181426.844	181580.376	153.53	30	6	26	52
		181570.572	181577.045	20	181530.572	181617.045	86.47	60	6	15	30
		181616.496	181626.538	20	181576.496	181666.538	90.04	45	6	16	32
		181685.482	181717.812	15	181650.482	181752.812	102.33	30	6	18	36
		181747.848	181769.703	15	181712.848	181804.703	91.86	170	6	16	32
		181799.973	181820.153	25	181754.973	181865.153	110.18	30	6	19	38
		181910.36	181923.16	20	181870.360	181963.16	92.80	30	6	16	32
		181973.887	181979.042	15	181938.887	182014.042	75.15	50	6	13	26
		182019.664	182027.002	20	181979.664	182067.002	87.34	45	6	15	30
		182068.939	182074.903	25	182023.939	182119.903	95.96	50	6	16	32
		182116.212	182121.788	0	182096.212	182141.788	45.58	50	6	8	16
		182172.984	182183.645	20	182132.984	182223.645	90.66	30	6	16	32
		182238.757	182293.972	30	182188.757	182343.972	155.21	125	6	26	52
		182349.51	182364.153	20	182309.510	182404.153	94.64	30	6	16	32
					182392.536	182676.525	283.99		6	48	96
					182639.355	182773.025	133.67		6	23	46
					182892.836	182978.712	85.88		6	15	30
					182976.726	183072.345	95.62		6	16	32
					183072.079	183208.755	136.68		6	23	46
					183281.468	183398.013	116.55		6	20	40
					183329.279	183484.396	155.12		6	26	52
					183450.514	183575.429	124.92		6	21	42
					183626.218	183740.792	114.57		6	20	40
					183701.429	183798.647	97.22		6	17	34
					183759.792	183878.048	118.26		6	20	40
					183900.365	184055.609	155.24		6	26	52
					184063.906	184150.098	86.19		6	15	30
					184128.160	184271.355	143.20		6	24	48
					184232.026	184320.406	88.38		6	15	30
					184301.198	184479.672	178.47		6	30	60
					184456.681	184591.132	134.45		6	23	46
					184567.005	184693.71	126.70		6	22	44

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					
		184697.796	184735.664	15	184662.796	184770.664	107.87	30	6	18	36
		184796.022	184828.672	30	184746.022	184878.672	132.65	125	6	23	46
		184875.312	184909.581	25	184830.312	184954.581	124.27	70	6	21	42
		184976.617	185015.723	40	184916.617	185075.723	159.11	30	6	27	54
		185126.658	185264.411	15	185091.658	185299.411	207.75	70	6	35	70
		185334.793	185349.235	30	185284.793	185399.235	114.44	50	6	20	40
		185419.355	185427.433	30	185369.355	185477.433	108.08	70	6	19	38
		185555.25	185562.157	30	185505.250	185612.157	106.91	32	6	18	36
		185613.935	185642.501	20	185573.935	185682.501	108.57	20	6	19	38
		185729.591	185809.718	30	185679.591	185859.718	180.13	40	6	31	62
		185889.916	185922.184	0	185869.916	185942.184	72.27	20	6	13	26
		186038.958	186074.087	20	185998.958	186114.087	115.13	30	6	20	40
		186105.117	186125.223	15	186070.117	186160.223	90.11	170	6	16	32
		186152.917	186160.195	15	186117.917	186195.195	77.28	40	6	13	26
		186216.602	186237.76	25	186171.602	186282.76	111.16	30	6	19	38
		186290.68	186320.973	30	186240.680	186370.973	130.29	170	6	22	44
		186376.434	186409.333	15	186341.434	186444.333	102.90	50	6	18	36
		186452.734	186485.302	30	186402.734	186535.302	132.57	170	6	23	46
		186524.822	186555.656	25	186479.822	186600.656	120.83	30	6	21	42
		186616.031	186649.021	30	186566.031	186699.021	132.99	30	6	23	46
		186704.162	186714.783	20	186664.162	186754.783	90.62	80	6	16	32
		186780.687	186811.376	30	186730.687	186861.376	130.71	50	6	22	44
		186903.209	186932.896	30	186853.209	186982.896	129.69	50	6	22	44
		187077.79	187174.31	30	187027.790	187224.31	196.52	60	6	33	66
		187285.434	187328.568	20	187245.434	187368.568	123.13	30	6	21	42
		187411.23	187425.293	15	187376.230	187460.293	84.06	70	6	15	30
		187471.73	187504.841	25	187426.730	187549.841	123.11	200	6	21	42
		187561.848	187588.893	20	187521.848	187628.893	107.05	50	6	18	36
		187654.072	187671.676	30	187604.072	187721.676	117.60	125	6	20	40
		187733.733	187803.278	30	187683.733	187853.278	169.54	50	6	29	58
		187902.698	187962.695	0	187882.698	187982.695	100.00	30	6	17	34
		188054.399	188069.416	20	188014.399	188109.416	95.02	50	6	16	32
		188183.144	188228.352	15	188148.144	188263.352	115.21	25	6	20	40
		188270.214	188304.014	15	188235.214	188339.014	103.80	25	6	18	36
		188360.141	188381.661	25	188315.141	188426.661	111.52	40	6	19	38
		188434.277	188469.511	30	188384.277	188519.511	135.23	60	6	23	46
		188518.211	188529.15	0	188498.211	188549.15	50.94	45	6	9	18
		188586.542	188644.257	20	188546.542	188684.257	137.72	30	6	23	46
		188677.461	188718.194	30	188627.461	188768.194	140.73	170	6	24	48
		188757.147	188764.115	30	188707.147	188814.115	106.97	30	6	18	36
		188835.844	188844.446	35	188780.844	188899.446	118.60	30	6	20	40
		189022.194	189051.868	15	188987.194	189086.868	99.67	50	6	17	34
		189142.693	189182.499	20	189102.693	189222.499	119.81	50	6	20	40
		189343.238	189379.709	15	189308.238	189414.709	106.47	30	6	18	36
		189523.215	189553.81	25	189478.215	189598.81	120.60	50	6	21	42
		189638.036	189676.903	30	189588.036	189726.903	138.87	200	6	24	48
		189738	189749.199	30	189688.000	189799.199	111.20	80	6	19	38
					189764.953	189914.288	149.33		6	25	50
					189945.132	190103.687	158.55		6	27	54
					190244.661	190381.668	137.01		6	23	46
					190337.330	190424.174	86.84		6	15	30
					190391.478	190502.96	111.48		6	19	38
					190470.322	190596.801	126.48		6	22	44
					190551.378	190667.042	115.66		6	20	40
					190608.223	190713.343	105.12		6	18	36
					190664.349	190792.319	127.97		6	22	44
					190821.038	190947.799	126.76		6	22	44
					190907.862	191014.8	106.94		6	18	36
					190980.946	191106.526	125.58		6	21	42
					191072.034	191211.962	139.93		6	24	48
					191199.492	191333.168	133.68		6	23	46
					191305.990	191433.234	127.24		6	22	44
					191475.440	191621.13	145.69		6	25	50
					191589.850	191729.256	139.41		6	24	48
					191743.438	191875.016	131.58		6	22	44

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					
1	Horizontal curve :: Curve radii upto 450 , spacing =6m. Curve radii 451 to 750 , spacing =9m. Curve radii 751 to 2000m & critical sections, spacing =18m	191961.372	192010.425	20	191921.372	192050.425	129.05	100	6	22	44
		192282.368	192405.366	25	192237.368	192450.366	213.00	60	6	36	72
		192574.109	192592.519	30	192524.109	192642.519	118.41	170	6	20	40
		192657.818	192752.766	30	192607.818	192802.766	194.95	300	6	33	66
		192832.802	192901.946	20	192792.802	192941.946	149.14	200	6	25	50
		193008.495	193024.931	30	192958.495	193074.931	116.44	200	6	20	40
		193092.597	193104.592	30	193042.597	193154.592	111.99	170	6	19	38
		193275.716	193290.286	15	193240.716	193325.286	84.57	40	6	15	30
		193527.763	193606.34	30	193477.763	193656.34	178.58	40	6	30	60
		193655.853	193684.727	30	193605.853	193734.727	128.87	125	6	22	44
		193877.827	193921.653	35	193822.827	193976.653	153.83	150	6	26	52
		194184.368	194221.03	15	194149.368	194256.03	106.66	50	6	18	36
		194317.089	194343.932	15	194282.089	194378.932	96.84	70	6	17	34
		194411.462	194424.201	20	194371.462	194464.201	92.74	40	6	16	32
		194487.967	194500.117	20	194447.967	194540.117	92.15	40	6	16	32
		194636.469	194739.288	20	194596.469	194779.288	182.82	50	6	31	62
		194790.906	194826.023	30	194740.906	194876.023	135.12	30	6	23	46
		194865.287	194897.057	15	194830.287	194932.057	101.77	170	6	17	34
		194933.655	194967.683	15	194898.655	195002.683	104.03	30	6	18	36
		195028.19	195040.448	20	194988.190	195080.448	92.26	70	6	16	32
		195227.949	195330.287	30	195177.949	195380.287	202.34	50	6	34	68
		195445.867	195480.841	30	195395.867	195530.841	134.97	50	6	23	46

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					
		195532.406	195540.845	15	195497.406	195575.845	78.44	90	6	14	28
		195597.317	195618.84	30	195547.317	195668.84	121.52	70	6	21	42
		195733.801	195746.64	30	195683.801	195796.64	112.84	40	6	19	38
		195856.428	195883.985	25	195811.428	195928.985	117.56	40	6	20	40
		195952.816	196076.657	30	195902.816	196126.657	223.84	100	6	38	76
		196101.202	196137.875	25	196056.202	196182.875	126.67	300	6	22	44
		196153.204	196222.617	15	196118.204	196257.617	139.41	60	6	24	48
1	Horizontal curve :: Curve radii upto 450 , spacing =6m. Curve radii 451 to 750 , spacing =9m. Curve radii 751 to 2000m & critical sections, spacing =18m	196283.949	196333.444	25	196238.949	196378.444	139.49	30	6	24	48
		196477.952	196482.468	30	196427.952	196532.468	104.52	30	6	18	36
		196618.744	196649.14	15	196583.744	196684.14	100.40	30	6	17	34
		196726.626	196750.765	15	196691.626	196785.765	94.14	50	6	16	32
		196794.374	196806.992	30	196744.374	196856.992	112.62	60	6	19	38
		196824.944	196858.735	0	196804.944	196878.735	73.79	300	6	13	26
		196895.36	196920.656	30	196845.360	196970.656	125.30	40	6	21	42
		196985.973	196994.736	25	196940.973	197039.736	98.76	40	6	17	34
		197150.969	197167.065	25	197105.969	197212.065	106.10	70	6	18	36
		197343.201	197366.198					60			
		197429.072	197448.91					50			
		197489.923	197497.514					60			
		197559.33	197586.958					20			
		197630.144	197663.524					30			
		197865.799	197894.238					50			
		197983.528	197992.626					90			
		198055.714	198095.827					100			
		198453.923	198495.359					100			
		198609.705	198624.34					200			
		198785.06	198922.1					1000			
		199398.065	199504.434					500			
		199677.381	199706.74					50			
		199824.059	199861.237					70			
		200019.625	200047.003					30			
		200171.053	200202.409					30			
		200270.757	200282.449					30			
		200317.827	200462.028					170			
		200606.544	200623.159					40			
		200654.887	200741.045					300			
		200856.069	201100.084					200			
		201289.495	201328.315					100			
		202150.5	202345.045					1800			
		202920.556	202958.275					150			
		203335.114	203349.786					640			
		203536.033	203652.586					640			
1	Horizontal curve :: Curve radii upto 450 , spacing =6m. Curve radii 451 to 750 , spacing =9m. Curve radii 751 to	204130.182	204141.572					200			
		204473.531	204509.321					100			
		204609.712	204692.009					80			
		204855.604	204872.11					100			
		204969.268	204990.356					125			
		205116.341	205242.53					180			
		205331.07	205405.243					60			
3	Major/MinorBridge/R OB and all structures	205486.43	205553.543					300			
		205654.082	205787.224					800			
3	Major/MinorBridge/R OB and all structures	Structure length					235.00		9	27	54
4	Builtup sections						14805.19		18	823	1646
									Total=	4928	11556

Total no. of Road stud = 16484 nos.

CALCULATION FOR DELINEATOR														
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	169625.012	169671.516	30	6	46.504	8	4	1	1	1	1	1	1
9	Arc	169837.589	169927.718	85	8	90.129	11	6	1	1	1	0	0	0
10	Arc	169975.043	170030.157	30	6	55.114	9	5	1	1	1	1	0	1
11	Arc	170250.601	170261.764	30	6	11.163	2	1	1	1	1	1	1	0
18	Arc	170319.622	170336.736	40	6	17.114	3	1	1	1	1	1	0	0
19	Arc	170408.312	170428.221	30	6	19.909	3	2	1	1	1	1	0	0
20	Arc	170501.628	170563.56	40	6	61.932	10	5	1	1	1	1	0	1
21	Arc	170708.199	170745.639	30	6	37.440	6	3	1	1	1	0	1	0
22	Arc	170776.065	170800.043	30	6	23.978	4	2	1	1	1	0	0	0
23	Arc	170830.381	170866.187	30	6	35.806	6	3	1	1	1	1	0	0
24	Arc	170958.722	170984.117	30	6	25.395	4	2	1	1	1	1	0	0
25	Arc	171053.411	171085.768	30	6	32.357	5	3	1	1	1	0	0	0
26	Arc	171117.867	171150.481	170	12	32.614	3	1	0	0	1	0	0	0
27	Arc	171180.564	171197.669	30	6	17.105	3	1	1	1	1	1	0	0
28	Arc	171257.737	171284.234	35	6	26.497	4	2	1	1	1	1	0	0
29	Arc	171371.03	171377.371	110	12	6.341	1	0	1	0	1	0	0	0
30	Arc	171405.81	171435.454	300	25	29.644	1	1	0	0	1	0	0	0
31	Arc	171473.795	171527.733	50	8	53.938	7	3	1	1	1	0	0	0
32	Arc	171563.838	171576.193	80	8	12.355	2	1	1	1	1	1	0	0
33	Arc	171694.187	171749.072	25	6	54.885	9	5	1	1	1	1	0	1
34	Arc	171931.008	171945.432	30	6	14.424	2	1	1	1	1	0	1	0
35	Arc	171996.19	172005.378	50	8	9.188	1	1	1	1	1	0	0	0
36	Arc	172072.021	172114.829	30	6	42.808	7	4	1	1	1	1	0	0
37	Arc	172175.661	172182.51	30	6	6.849	1	1	1	1	1	1	0	0
38	Arc	172243.017	172277.479	30	6	34.462	6	3	1	1	1	1	0	0
39	Arc	172362.112	172368.668	35	6	6.556	1	1	1	1	1	1	0	1
40	Arc	172554.12	172645.981	60	8	91.861	11	6	1	1	1	1	1	0
41	Arc	172727.372	172806.759	45	6	79.387	13	7	1	1	1	1	0	1
42	Arc	173011.505	173043.896	50	8	32.391	4	2	1	1	1	0	1	0
43	Arc	173104.823	173136.137	170	12	31.314	3	1	1	0	1	0	0	0
44	Arc	173177.425	173209.521	30	6	32.096	5	3	1	1	1	1	0	0
45	Arc	173279.312	173321.037	30	6	41.725	7	3	1	1	1	1	0	0
46	Arc	173432.413	173470.712	30	6	38.299	6	3	1	1	1	0	0	0
47	Arc	173525.797	173531.773	40	6	5.976	1	0	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)											
48	Arc	173562.311	173583.517	300	25	21.206	1	0	0	0	1	0	0	0
49	Arc	173608.709	173681.478	40	6	72.769	12	6	1	1	1	1	0	1
50	Arc	173813.199	173888.522	70	8	75.323	9	5	1	1	1	1	0	0
51	Arc	173997.99	174077.801	50	8	79.811	10	5	1	1	1	1	0	0
52	Arc	174228.315	174249.964	35	6	21.649	4	2	1	1	1	1	1	1
53	Arc	174444.53	174515.436	60	8	70.906	9	4	1	1	1	1	1	1
54	Arc	174701.554	174719.045	50	8	17.491	2	1	1	1	1	0	1	0
55	Arc	174779.271	174813.641	125	12	34.370	3	1	1	1	1	0	0	0
56	Arc	174884.941	174900.658	50	8	15.717	2	1	1	1	1	1	0	0
57	Arc	175020.741	175043.874	30	6	23.133	4	2	1	1	1	0	0	0
58	Arc	175074.585	175119.569	170	12	44.984	4	2	0	0	1	0	0	0
59	Arc	175148.001	175162.869	40	6	14.868	2	1	1	1	1	0	0	0
60	Arc	175188.951	175224.242	170	12	35.291	3	1	0	0	1	0	0	0
61	Arc	175254.406	175262.966	35	6	8.560	1	1	1	1	1	0	0	0
62	Arc	175314.099	175320.46	45	6	6.361	1	1	1	1	1	1	0	0
63	Arc	175417.446	175454.604	20	6	37.158	6	3	1	1	1	0	0	0
64	Arc	175499.873	175537.472	170	12	37.599	3	2	1	1	1	0	0	0
65	Arc	175596.126	175649.225	125	12	53.099	4	2	1	0	1	0	0	0
66	Arc	175688.036	175724.547	100	12	36.511	3	2	0	0	1	0	0	0
67	Arc	175759.824	175788.397	300	25	28.573	1	1	0	1	1	0	0	0
68	Arc	175906.917	175919.625	100	12	12.708	1	1	1	1	1	0	0	0
69	Arc	175963.063	175975.036	100	12	11.973	1	0	1	1	1	0	0	0
70	Arc	176039.326	176070.887	30	6	31.561	5	3	1	1	1	1	0	0
71	Arc	176173.989	176210.281	300	25	36.292	1	1	1	0	1	0	0	0
72	Arc	176254.822	176281.677	300	25	26.855	1	1	0	0	1	0	0	0
73	Arc	176337.235	176385.156	30	6	47.921	8	4	1	1	1	1	0	0
74	Arc	176444.089	176457.535	10	6	13.446	2	1	1	1	1	0	0	0
75	Arc	176506.578	176681.252	135	12	174.674	15	7	1	1	1	0	0	0
76	Arc	176765.711	176935.531	200	20	169.820	8	4	1	1	1	0	0	0
77	Arc	177059.211	177123.246	30	6	64.035	11	5	1	1	1	1	0	1
78	Arc	177346.886	177393.728	300	25	46.842	2	1	1	1	1	0	0	0
79	Arc	177505.714	177548.332	300	25	42.618	2	1	1	1	1	0	0	0
80	Arc	177657.12	177685.621	300	25	28.501	1	1	1	0	1	0	0	0
81	Arc	177755.81	177770.481	200	20	14.671	1	0	0	1	1	0	0	0
82	Arc	177894.516	177934.417	125	12	39.901	3	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)											
83	Arc	178022.309	178135.321	150	12	113.012	9	5	1	1	1	0	0	0
84	Arc	178216.92	178401.635	200	20	184.715	9	5	1	0	1	0	0	0
85	Arc	178446.838	178477.145	30	6	30.307	5	3	1	1	1	1	0	0
86	Arc	178550.359	178581.723	30	6	31.364	5	3	1	1	1	1	0	0
87	Arc	178672.251	178704.397	25	6	32.146	5	3	1	1	1	0	0	0
88	Arc	178761.145	178779.549	125	12	18.404	2	1	1	1	1	1	0	0
89	Arc	178965.102	178972.014	80	8	6.912	1	0	1	1	1	1	1	0
90	Arc	179100.77	179130.566	20	6	29.796	5	2	1	1	1	1	0	1
91	Arc	179295.57	179366.605	50	8	71.035	9	4	1	1	1	0	0	0
92	Arc	179417.472	179444.292	30	6	26.820	4	2	1	1	1	1	0	0
93	Arc	179521.398	179554.371	30	6	32.973	5	3	1	1	1	1	0	0
94	Arc	179630.675	179655.758	40	6	25.083	4	2	1	1	1	1	0	0
95	Arc	179770.913	179787.999	30	6	17.086	3	1	1	1	1	0	0	0
96	Arc	179840.326	179855.693	20	6	15.367	3	1	1	1	1	1	0	0
97	Arc	179950.992	179965.953	20	6	14.961	2	1	1	1	1	0	0	0
98	Arc	180014.486	180022.157	50	8	7.671	1	0	1	1	1	0	0	0
99	Arc	180060.459	180091.908	60	8	31.449	4	2	1	1	1	0	0	0
100	Arc	180137.121	180167.553	30	6	30.432	5	3	1	1	1	1	0	0
101	Arc	180290.652	180317.312	80	8	26.660	3	2	1	1	1	1	0	0
102	Arc	180421.799	180561.958	60	8	140.159	18	9	1	1	1	0	0	0
103	Arc	180637.788	180741.264	60	8	103.476	13	6	1	1	1	1	0	0
104	Arc	180818.425	180883.19	60	8	64.765	8	4	1	1	1	1	0	0
105	Arc	180978.732	181082.676	45	6	103.944	17	9	1	1	1	1	0	1
106	Arc	181230.604	181301.408	170	12	70.804	6	3	1	1	1	0	0	0
107	Arc	181367.098	181403.999	30	6	36.901	6	3	1	1	1	1	0	0
108	Arc	181481.844	181525.376	30	6	43.532	7	4	1	1	1	0	0	0
109	Arc	181570.572	181577.045	60	8	6.473	1	0	1	1	1	0	0	0
110	Arc	181616.496	181626.538	45	6	10.042	2	1	1	1	1	1	0	0
111	Arc	181685.482	181717.812	30	6	32.330	5	3	1	1	1	0	0	0
112	Arc	181747.848	181769.703	170	12	21.855	2	1	0	0	1	0	0	0
113	Arc	181799.973	181820.153	30	6	20.180	3	2	1	1	1	1	0	0
114	Arc	181910.36	181923.16	30	6	12.800	2	1	1	1	1	0	0	0
115	Arc	181973.887	181979.042	50	8	5.155	1	0	1	1	1	0	0	0
116	Arc	182019.664	182027.002	45	6	7.338	1	1	1	1	1	0	0	0
117	Arc	182068.939	182074.903	50	8	5.964	1	0	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)											
118	Arc	182116.212	182121.788	50	8	5.576	1	0	1	1	1	0	0	0
119	Arc	182172.984	182183.645	30	6	10.661	2	1	1	1	1	0	0	0
120	Arc	182238.757	182293.972	125	12	55.215	5	2	1	1	1	0	0	0
121	Arc	182349.51	182364.153	30	6	14.643	2	1	1	1	1	1	0	0
122	Arc	182442.536	182626.525	85	8	183.989	23	11	1	1	1	0	0	0
123	Arc	182694.355	182718.025	80	8	23.670	3	1	1	1	1	1	0	1
124	Arc	182927.836	182943.712	125	12	15.876	1	1	1	1	1	0	0	0
125	Arc	183011.726	183037.345	30	6	25.619	4	2	1	1	1	0	0	0
126	Arc	183092.079	183188.755	60	8	96.676	12	6	1	1	1	1	0	0
127	Arc	183331.468	183348.013	30	6	16.545	3	1	1	1	1	0	1	0
128	Arc	183379.279	183434.396	300	25	55.117	2	1	0	0	1	0	0	0
129	Arc	183490.514	183535.429	50	8	44.915	6	3	1	1	1	1	0	0
130	Arc	183676.218	183690.792	60	8	14.574	2	1	1	1	1	0	0	0
131	Arc	183736.429	183763.647	300	25	27.218	1	1	0	0	1	0	0	0
132	Arc	183809.792	183828.048	30	6	18.256	3	2	1	1	1	1	0	0
133	Arc	183935.365	184020.609	40	6	85.244	14	7	1	1	1	1	0	0
134	Arc	184098.906	184115.098	30	6	16.192	3	1	1	1	1	0	0	0
135	Arc	184163.16	184236.355	300	25	73.195	3	1	0	0	1	0	0	0
136	Arc	184272.026	184280.406	60	8	8.380	1	1	1	1	1	0	0	0
137	Arc	184356.198	184424.672	50	8	68.474	9	4	1	1	1	1	0	0
138	Arc	184506.681	184541.132	50	8	34.451	4	2	1	1	1	0	0	0
139	Arc	184617.005	184643.71	100	12	26.705	2	1	1	1	1	0	0	0
140	Arc	184697.796	184735.664	30	6	37.868	6	3	1	1	1	1	0	0
141	Arc	184796.022	184828.672	125	12	32.650	3	1	1	1	1	0	0	0
142	Arc	184875.312	184909.581	70	8	34.269	4	2	1	1	1	0	0	0
143	Arc	184976.617	185015.723	30	6	39.106	7	3	1	1	1	1	0	0
144	Arc	185126.658	185264.411	70	8	137.753	17	9	1	1	1	0	0	0
145	Arc	185334.793	185349.235	50	8	14.442	2	1	1	1	1	0	0	0
146	Arc	185419.355	185427.433	70	8	8.078	1	1	1	1	1	1	0	0
147	Arc	185555.25	185562.157	32	6	6.907	1	1	1	1	1	0	0	0
148	Arc	185613.935	185642.501	20	6	28.566	5	2	1	1	1	1	0	0
149	Arc	185729.591	185809.718	40	6	80.127	13	7	1	1	1	1	0	0
150	Arc	185889.916	185922.184	20	6	32.268	5	3	1	1	1	1	0	0
151	Arc	186038.958	186074.087	30	6	35.129	6	3	1	1	1	0	0	0
152	Arc	186105.117	186125.223	170	12	20.106	2	1	0	0	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)											
153	Arc	186152.917	186160.195	40	6	7.278	1	1	1	1	1	0	0	0
154	Arc	186216.602	186237.76	30	6	21.158	4	2	1	1	1	0	0	0
155	Arc	186290.68	186320.973	170	12	30.293	3	1	1	1	1	0	0	0
156	Arc	186376.434	186409.333	50	8	32.899	4	2	1	1	1	0	0	0
157	Arc	186452.734	186485.302	170	12	32.568	3	1	1	0	1	0	0	0
158	Arc	186524.822	186555.656	30	6	30.834	5	3	1	1	1	1	0	0
159	Arc	186616.031	186649.021	30	6	32.990	5	3	1	1	1	0	0	0
160	Arc	186704.162	186714.783	80	8	10.621	1	1	1	1	1	0	0	0
161	Arc	186780.667	186811.376	50	8	30.709	4	2	1	1	1	1	0	0
162	Arc	186903.209	186932.896	50	8	29.687	4	2	1	1	1	1	0	0
163	Arc	187077.79	187174.31	60	8	96.520	12	6	1	1	1	1	0	0
164	Arc	187285.434	187328.568	30	6	43.134	7	4	1	1	1	1	0	0
165	Arc	187411.23	187425.293	70	8	14.063	2	1	1	1	1	0	0	0
166	Arc	187471.73	187504.841	200	20	33.111	2	1	0	0	1	0	0	0
167	Arc	187561.848	187588.893	50	8	27.045	3	2	1	1	1	0	0	0
168	Arc	187654.072	187671.676	125	12	17.604	1	1	1	1	1	0	0	0
169	Arc	187733.733	187803.278	50	8	69.545	9	4	1	1	1	1	0	0
170	Arc	187902.698	187962.695	30	6	59.997	10	5	1	1	1	1	0	0
171	Arc	188054.399	188069.416	50	8	15.017	2	1	1	1	1	1	0	0
172	Arc	188183.144	188228.352	25	6	45.208	8	4	1	1	1	0	0	0
173	Arc	188270.214	188304.014	25	6	33.800	6	3	1	1	1	0	0	0
174	Arc	188360.141	188381.661	40	6	21.520	4	2	1	1	1	0	0	0
175	Arc	188434.277	188469.511	60	8	35.234	4	2	1	1	1	0	0	0
176	Arc	188518.211	188529.15	45	6	10.939	2	1	1	1	1	0	0	0
177	Arc	188586.542	188644.257	30	6	57.715	10	5	1	1	1	0	0	0
178	Arc	188677.461	188718.194	170	12	40.733	3	2	0	0	1	0	0	0
179	Arc	188757.147	188764.115	30	6	6.968	1	1	1	1	1	1	0	0
180	Arc	188835.844	188844.446	30	6	8.602	1	1	1	1	1	1	0	1
181	Arc	189022.194	189051.868	50	8	29.674	4	2	1	1	1	1	1	0
182	Arc	189142.693	189182.499	50	8	39.806	5	2	1	1	1	1	0	0
183	Arc	189343.238	189379.709	30	6	36.471	6	3	1	1	1	1	1	1
184	Arc	189523.215	189553.81	50	8	30.595	4	2	1	1	1	1	0	0
185	Arc	189638.036	189676.903	200	20	38.867	2	1	1	0	1	0	0	0
186	Arc	189738	189749.199	80	8	11.199	1	1	1	1	1	0	0	0
187	Arc	189819.953	189859.288	50	8	39.335	5	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)											
188	Arc	190005.132	190043.687	30	6	38.555	6	3	1	1	1	1	1	1
189	Arc	190294.661	190331.668	100	12	37.007	3	2	1	1	1	0	0	0
190	Arc	190377.33	190384.174	90	8	6.844	1	0	1	1	1	0	0	0
191	Arc	190441.478	190452.96	70	8	11.482	1	1	1	1	1	0	0	0
192	Arc	190520.322	190546.801	70	8	26.479	3	2	1	1	1	0	0	0
193	Arc	190601.378	190617.042	125	12	15.664	1	1	1	0	1	0	0	0
194	Arc	190658.223	190663.343	40	6	5.120	1	0	1	1	1	0	0	0
195	Arc	190719.349	190737.319	30	6	17.970	3	1	1	1	1	1	0	1
196	Arc	190871.038	190897.799	30	6	26.761	4	2	1	1	1	1	1	0
197	Arc	190957.862	190964.8	30	6	6.938	1	1	1	1	1	1	0	0
198	Arc	191025.946	191061.526	30	6	35.580	6	3	1	1	1	1	0	0
199	Arc	191122.034	191161.962	30	6	39.928	7	3	1	1	1	1	0	0
200	Arc	191244.492	191288.168	30	6	43.676	7	4	1	1	1	1	0	0
201	Arc	191350.99	191388.234	30	6	37.244	6	3	1	1	1	1	0	1
202	Arc	191525.44	191571.13	30	6	45.690	8	4	1	1	1	1	1	0
203	Arc	191639.85	191679.256	30	6	39.406	7	3	1	1	1	1	0	0
204	Arc	191778.438	191840.016	70	8	61.578	8	4	1	1	1	1	0	0
205	Arc	191961.372	192010.425	100	12	49.053	4	2	1	1	1	1	0	1
206	Arc	192282.368	192405.366	60	8	122.998	15	8	1	1	1	1	1	0
207	Arc	192574.109	192592.519	170	12	18.410	2	1	1	1	1	0	0	0
208	Arc	192657.818	192752.766	300	25	94.948	4	2	0	0	1	0	0	0
209	Arc	192832.802	192901.946	200	20	69.144	3	2	1	1	1	0	0	0
210	Arc	193008.495	193024.931	200	20	16.436	1	0	1	0	1	0	0	0
211	Arc	193092.597	193104.592	170	12	11.995	1	0	1	1	1	1	0	0
212	Arc	193275.716	193290.286	40	6	14.570	2	1	1	1	1	1	1	1
213	Arc	193527.763	193606.34	40	6	78.577	13	7	1	1	1	0	1	0
214	Arc	193655.853	193684.727	125	12	28.874	2	1	1	1	1	1	0	0
215	Arc	193877.827	193921.653	150	12	43.826	4	2	1	1	1	1	0	1
216	Arc	194184.368	194221.03	50	8	36.662	5	2	1	1	1	1	1	0
217	Arc	194317.089	194343.932	70	8	26.843	3	2	1	1	1	0	0	0
218	Arc	194411.462	194424.201	40	6	12.739	2	1	1	1	1	1	0	0
219	Arc	194487.967	194500.117	40	6	12.150	2	1	1	1	1	1	0	1
220	Arc	194636.469	194739.288	50	8	102.819	13	6	1	1	1	0	0	0
221	Arc	194790.906	194826.023	30	6	35.117	6	3	1	1	1	0	0	0
222	Arc	194865.287	194897.057	170	12	31.770	3	1	0	0	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)											
223	Arc	194933.655	194967.683	30	6	34.028	6	3	1	1	1	1	0	0
224	Arc	195028.19	195040.448	70	8	12.258	2	1	1	1	1	1	0	1
225	Arc	195227.949	195330.287	50	8	102.338	13	6	1	1	1	1	1	0
226	Arc	195445.867	195480.841	50	8	34.974	4	2	1	1	1	0	0	0
227	Arc	195532.406	195540.845	90	8	8.439	1	1	1	1	1	0	0	0
228	Arc	195597.317	195618.84	70	8	21.523	3	1	1	1	1	1	0	0
229	Arc	195733.801	195746.64	40	6	12.839	2	1	1	1	1	1	0	0
230	Arc	195856.428	195883.985	40	6	27.557	5	2	1	1	1	1	0	0
231	Arc	195952.816	196076.657	100	12	123.841	10	5	1	0	1	0	0	0
232	Arc	196101.202	196137.875	300	25	36.673	1	1	0	0	1	0	0	0
233	Arc	196153.204	196222.617	60	8	69.413	9	4	0	1	1	0	0	0
234	Arc	196283.949	196333.444	30	6	49.495	8	4	1	1	1	1	0	1
235	Arc	196477.952	196482.468	30	6	4.516	1	0	1	1	1	1	1	1
236	Arc	196618.744	196649.14	30	6	30.396	5	3	1	1	1	1	1	0
237	Arc	196726.626	196750.765	50	8	24.139	3	2	1	1	1	0	0	0
238	Arc	196794.374	196806.992	60	8	12.618	2	1	1	0	1	0	0	0
239	Arc	196824.944	196858.735	300	25	33.791	1	1	0	0	1	0	0	0
240	Arc	196895.36	196920.656	40	6	25.296	4	2	1	1	1	1	0	0
241	Arc	196985.973	196994.736	40	6	8.763	1	1	1	1	1	1	0	1
242	Arc	197150.969	197167.065	70	8	16.096	2	1	1	1	1	1	0	1
243	Arc	197343.201	197366.198	60	8	22.997	3	1	1	1	1	0	1	0
244	Arc	197429.072	197448.91	50	8	19.838	2	1	1	1	1	0	0	0
245	Arc	197489.923	197497.514	60	8	7.591	1	0	1	1	1	0	0	0
246	Arc	197559.33	197586.958	20	6	27.628	5	2	1	1	1	0	0	0
247	Arc	197630.144	197663.524	30	6	33.380	6	3	1	1	1	1	0	1
248	Arc	197865.799	197894.238	50	8	28.439	4	2	1	1	1	1	1	0
249	Arc	197983.528	197992.626	90	8	9.098	1	1	1	1	1	0	0	0
250	Arc	198055.714	198095.827	100	12	40.113	3	2	1	1	1	1	0	1
251	Arc	198453.923	198495.359	100	12	41.436	3	2	1	1	1	0	1	0
252	Arc	198609.705	198624.34	200	20	14.635	1	0	1	1	1	1	0	1
253	Arc	199677.381	199706.74	50	8	29.359	4	2	1	1	1	1	1	0
254	Arc	199824.059	199861.237	70	8	37.178	5	2	1	1	1	1	0	0
255	Arc	200019.625	200047.003	30	6	27.378	5	2	1	1	1	1	1	0
256	Arc	200171.053	200202.409	30	6	31.356	5	3	1	1	1	1	0	0
257	Arc	200270.757	200282.449	30	6	11.692	2	1	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)											
258	Arc	200317.827	200462.028	170	12	144.201	12	6	0	1	1	1	0	0
259	Arc	200606.544	200623.159	40	6	16.615	3	1	1	1	1	0	1	0
260	Arc	200654.887	200741.045	300	25	86.158	3	2	0	1	1	0	0	0
261	Arc	200856.069	201100.084	200	20	244.015	12	6	1	1	1	0	0	0
262	Arc	201289.495	201328.315	100	12	38.820	3	2	1	1	1	1	0	1
263	Arc	202920.556	202958.275	150	12	37.719	3	2	1	1	1	1	1	1
264	Arc	204130.182	204141.572	200	20	11.390	1	0	1	1	1	1	1	0
265	Arc	204473.531	204509.321	100	12	35.790	3	1	1	1	1	0	1	0
266	Arc	204609.712	204692.009	80	8	82.297	10	5	1	1	1	1	0	0
267	Arc	204855.604	204872.11	100	12	16.506	1	1	1	1	1	0	0	0
268	Arc	204969.268	204990.356	125	12	21.088	2	1	1	1	1	1	0	0
269	Arc	205116.341	205242.53	180	12	126.189	11	5	1	1	1	0	0	0
270	Arc	205331.07	205405.243	60	8	74.173	9	5	1	1	1	1	0	0
271	Arc	205486.43	205553.543	300	25	67.113	3	1	0	0	1	0	0	0
				TOTAL =		10012.9	1185	600	234	227	258	122	32	32

Total no. of delineator = 2690 nos.

CALCULATION FOR STREET LIGHTING

Street light in Built Up Location:

Chainage (m)		Length of CD (m)	Net Length (m)	TCS No.	Side
From	To				
171250	171550	2.6	297.4	TCS-10	one
182650	182780		130.0	TCS-7	one
182780	182910	2.6	254.8	TCS-6	both
182910	183030	2.6	117.4	TCS-7	one
183030	183080		50.0	TCS-7B	one
183080	183160		80.0	TCS-7	one
183160	183210		50.0	TCS-7B	one
183210	183300	2.6	87.4	TCS-7	one
189120	189250		130.0	TCS-7B	one
189530	190060	27.37	502.6	TCS-7B	one
190060	190200	3.84	136.2	TCS-7	one
196260	196330		140.0	TCS-6	both
196330	196380	2.6	47.4	TCS-10	one
196380	197200	50.37	1539.3	TCS-6	both
197400	197800	24.53	750.9	TCS-6	both
200050	200200		300.0	TCS-1A	both
200200	200400	5.3	389.4	TCS-1	both
200580	202700	19.32	4201.4	TCS-1	both
203150	205974	23.48	5601.0	TCS-1	both
		Total =	14805.19		

Total length = 14805 m

Assuming , street lights @= 50m interval

for 14805 m 297 nos

Add for Bridge =
(@ 4nos per junction) 68 nos

At Busbay location=
(@ 4 nos per Busbay) 28 nos

Total nos of street light= 393 nos



Crash Barrier

Chainage (m)		Net Length (m)	Side
From	To		
169595	169702	107	Valley
169672	169853	181	Valley
169823	169943	120	Valley
169928	169960	32	Valley
169945	170060	115	Valley
170030	170251	220	Valley
170221	170292	71	Valley
170262	170325	63	Valley
170295	170362	67	Valley
170337	170403	67	Valley
170378	170458	80	Valley
170428	170507	78	Valley
170477	170589	112	Valley
170564	170718	155	Valley
170693	170761	67	Valley
170746	170776	30	Valley
170761	170815	54	Valley
170800	170830	30	Valley
170815	170881	66	Valley
170866	170944	78	Valley
170929	171014	85	Valley
170984	171053	69	Valley
171023	171116	92	Valley
171086	171148	62	Valley
171151	171228	77	Valley
171198	171258	60	Valley
171228	171314	86	Valley
171284	171381	97	Valley
171351	171397	46	Valley
171377	171426	48	Valley
171454	171548	94	Valley
171528	171569	41	Valley
171549	171591	42	Valley
171576	171689	113	Valley
171674	171769	95	Valley
171749	171921	172	Valley
171901	171975	74	Valley
171945	172006	61	Valley
171976	172025	49	Valley
172005	172062	57	Valley
172042	172145	103	Valley
172115	172176	61	Valley
172146	172213	67	Valley
172183	172243	61	Valley
172213	172307	94	Valley
172277	172362	85	Valley
172332	172399	67	Valley
172369	172569	200	Valley
172539	172661	122	Valley
172646	172722	76	Valley
172707	172827	119	Valley
172807	173012	205	Valley

172992	173064	72	Valley
173044	173125	81	Valley
173147	173240	92	Valley
173210	173279	70	Valley
173249	173351	102	Valley
173321	173432	111	Valley
173402	173501	98	Valley
173471	173531	60	Valley
173501	173557	56	Valley
173532	173587	56	Valley
173584	173706	123	Valley
173681	173823	142	Valley
173798	173904	105	Valley
173889	173993	104	Valley
173978	174098	120	Valley
174078	174218	141	Valley
174198	174280	82	Valley
174250	174440	190	Valley
174410	174550	141	Valley
174515	174697	181	Valley
174662	174759	97	Valley
174719	174804	85	Valley
174764	174829	64	Valley
174814	174860	46	Valley
174845	174941	96	Valley
174901	175031	130	Valley
174991	175074	83	Valley
175044	175105	61	Valley
175123	175188	65	Valley
175163	175214	51	Valley
175224	175293	69	Valley
175263	175324	61	Valley
175294	175340	46	Valley
175320	175417	97	Valley
175397	175475	77	Valley
175455	175520	65	Valley
175581	175664	83	Valley
175649	175683	34	Valley
175668	175745	77	Valley
175725	175780	55	Valley
175887	175940	53	Valley
175920	175963	43	Valley
175943	175995	52	Valley
175975	176029	54	Valley
176009	176101	92	Valley
176071	176204	133	Valley
176322	176400	78	Valley
176385	176459	74	Valley
Total =		8723.9	

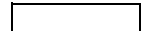
Total no. of Bridges on the project= 17 nos.
 Approach length on valley side for each bridge (25 m on both side) 50 m
 Hence, Crash barrier length for 17 bridges = 1700 m
Therefore, total length of crash barrier = 10424 m

**Reusable Sub-base Base Calculation
GSB Calculation**

	Required GSB Qty	Reusable GSB Quantity	
TCS-01	12230.4	4953.312	Cum
TCS-01A	360	145.800	Cum
TCS-02	1670.4	676.512	Cum
TCS-02A	839.256	339.899	Cum
TCS-03	36998.955	14984.577	Cum
TCS-03A	9854.635	3991.127	Cum
TCS-04	2371.04	960.271	Cum
TCS-05	2038.89	825.750	Cum
TCS-05A	1438.465	582.578	Cum
TCS-06	2686	1087.830	Cum
TCS-07	1102	446.310	Cum
TCS-07A	2400	972.000	Cum
TCS-07B	1466	593.730	Cum
TCS-08	196.735	79.678	Cum
TCS-10	881.475	356.997	Cum
TCS-11	350.035	141.764	Cum
TCS-11A	608	246.240	Cum
TCS-12	5136	2080.080	Cum
TCS-15	830	336.150	Cum
Busbay (2 Lane)	991.2	401.436	Cum
Diversion Work	41	16.605	Cum
Extra Widening on Flexible Pavement	3232.8	1309.284	Cum
Minor Junction	277.2	112.266	Cum
	88000	35640	Cum

Reuseable GSB Quantity= 41%

Total Dismantle Granular Quantity(cum)= **59317**
use 60% of Total Dismantle Granular Quantity for GSB (cum)= **35590**



Total Required GSB Qty (Cum)= **88000**
41 % of this required quantity will be bought from dismantle material i.e **35640**

Re Useable Quantity of GSB Material(cum)= **35640**
Remaining Quantity of GSB(cum) = **52360**



Quantity Calculation For Gabian Structure

Chainage		side	Length (m)
From	To		
178180	178400	Valley	220
180950	181150	Valley	200

Dimensions of Units		Total Area	Total Length (m)	Quantity (cum)
B	H			
6	1.2	7.2	420	15120
6	1.2	7.2		
5	1.2	6		
4	1.2	4.8		
3	1.2	3.6		
3	1.2	3.6		
3	1.2	3.6		
		36	420	15120

Total Quantity of Gabian Structure in valley side= 15120 Cum



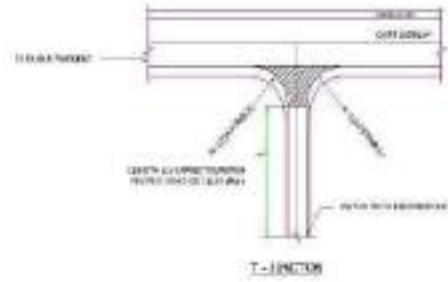
RAILING

Chainage (km)		Length(k m)	Side	Length of CD(m)	Net Length
From	To				
200050	200200	150	Both	0	300
200200	200400	200	Both	5.3	389.4
200580	202700	2120	Both	19.32	4201.36
203150	205974	2824	Both	23.48	5601.04
				Net Length	10492



Major Junction

Design Chainage	Survey Chainage	Total Area at Minor Junction (Sqm)	Unit	Type
205.700	214.000	1100.00	Sqm	3 Legged
Total Area		1100.00	sqm	



Variable Declaration

Major Junction

SI No	Variable Description	Variable	Dimension	Unit
1	Net Area of Major Junction	net_area	1100.000	sqm
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	Area of Single Marking(0.3m x 0.15m)	mark_area	0.045	sqm
8	Area of Island	area_is	84.790	sqm
9	Kerb Perimeter	peri_kerb	0.000	m
10	Width of Kerb	width_kerb	0.150	m
11	Height of Median Earthwork	ht_med	0.540	m
12	Total Area of Major Junction	tot_area	2345.830	sqm
13	GSB Reuse	gsb_per	41.000	
14	Total Painting Area	tot_paint	30.000	sqm
15	CTSB	ctsb	0.200	m



Variable Declaration



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	8.00		
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	46.00		
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	138.00		
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	15.00		
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	17.00		
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	58.02		



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	605.00		
8	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar	Cum	2,576.00		
9	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	390,055.00		
10	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	90,041.00		
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	90,911.00		
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	206,700.00		
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	77,707.64		
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	37,120.58		
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	2,548,434.40		
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	637,108.60		
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	51,147.74		
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	34,805.50		
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	93,765.69		
		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	370,766.00		
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	354,602.00		
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	26,612.04		



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	14,830.64		
		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	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	293.35		
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	203.85		
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	621.50		
4	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	2,486.00		



Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
5	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	2,486.00		
6	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	174.02		
7	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	99.44		



Bill No : 05. Junction Improvement (Major & Minor)

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
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	30.00		
		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	29.00		
3	08.04	Reinforced Cement Concrete M15 Boundary pillars of standard design, fixed in position including finishing but excluding painting	each	367.00		
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	255.00		
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	107.00		



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	14.00		
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	54.00		
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	11,474.53		



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	3,358.00		
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	6,300.00		
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	16,484.00		
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	393.00		



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	1,040.00		
14	16.09	Mild steel railling complete as per drawing and Technical Specifications	Rm	10,492.00		
		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	924.95		
2	10.16	Cement Plaster 12mm Thick in Cement Mortar 1:3	sqm	924.95		
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	138.72		
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	21.26		
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	14.09		
6	14.03/e/l	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M25Grade	cum	9.71		
7	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	1.17		
8	14/nsc2	Brick Flat Soling at Foundation	Sqm	188.13		
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	45.34		



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	58.12		
11	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	5.81		
		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	2,478.00		
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	584.81		
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	406.39		
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	1,239.00		



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	2,065.00		
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	4,956.00		
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	4,956.00		
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	346.92		



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	198.24		
		Total of Bill 08. Bus Bay				



Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1				44,932.30		
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	20,286.36		
3	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	2,724.77		
4	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	4,667.08		
5	14.03/b	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M20 Grade	cum	168.52		
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	390.66		
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	11,565.15		
8	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	578.26		



Bill No : 09. Longitudinal Drains

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	7,404.50		
10	24/i/b	Galvanised Mild steel J /L hook	kg	1,184.40		
11	40	Gextextile material (fine net)	sqm	1,332.45		
		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	2,925.80		
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	683.00		
3	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	2,646.55		
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	1,614.84		
5	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	894.65		
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	2,615.15		
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	234.66		
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	4,009.00		



		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	11,866.22		
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	2,966.56		
3	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	2,075.30		
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	602.51		
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	5,575.58		
6	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	2,588.09		
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	8,531.77		
8	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	4,425.81		
		Total of Bill 11. Breast wall				



Bill No : 12. Protection Work

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	15.12/Nsc	Supply and Installation of Mechanically woven double twisted hexagonal shaped steel wire mesh gabion boxes with Zinc + PVC coating having mesh size of 100 mm x 120 mm by using mesh wire 2.7 mm (Inner dia) and 3.7 (outer dia) with sledged wire 3.4 mm(inner dia) and 4.4 mm (outer dia) and lacing with 2.2mm inner dia and 3.3 mm outer dia.placing at indicated places in dry condition at easily accessible location as per direction of Engineer including tools, plant, labour etc. complete in all respect, carrying the material from nearest approach with all leads & lifts, manpower & machinery, materials, labor etc. complete as per detailed technical specifications and as directed by Engineer-In-Charge.	cum	15,120.00		
		Total of Bill 12. Protection Work				



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: 8	8	8.00	Each
			Total :	8.00	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: 46	46	46.00	Each
			Total :	46.00	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: 138	138	138.00	Each
			Total :	138.00	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: 15	15	15.00	Each
			Total :	15.00	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: 17	17	17.00	Each
			Total :	17.00	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: 58.02	58.02	58.02	Ha
			Total :	58.02	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: 605	605	605.00	cum
			Total :	605.00	cum
8	02.04/iii/b	Dismantling stone masonry b) Rubble stone masonry in cement mortar			
		Refer: Site Clearance and Dismantling Formula: 2576	2576	2,576.00	Cum
			Total :	2,576.00	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
9	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: 390055	390055	390,055.00	sqm
			Total :	390,055.00	sqm
10	02.04/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: 90041	90041	90,041.00	sqm
			Total :	90,041.00	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: 90911	90911	90,911.00	sqm
			Total :	90,911.00	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	206700.000	206,700.00	cum
			Total :	206,700.00	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-01 Formula: (cw+2*ps-ext_pav)*l*sg	$(7.000+2*2.500-7.000)*5096.000*0.500$	12,740.00	cum
		Refer: TCS-01A Formula: (cw+2*ps-ext_pav)*l*sg	$(7.000+2*2.500-0.000)*150.000*0.500$	900.00	cum
		Refer: TCS-02 Formula: (cw+2*ps+2*es-ext_pav+ (bc+dbm+wmm1+wmm2+gsb+0.5*sg)*1*2) *l*sg+es_area*2*l	$(7.000+2*1.500+2*1.000-7.000+(0.040+0.070+0.125+0.125+0.200+0.5*0.500)*1*2)*576.000*0.500+0.343*2*576.000$	2,301.70	cum
		Refer: TCS-02A Formula: (cw+2*ps+2*es-ext_pav+ (bc+dbm+wmm1+wmm2+gsb+0.5*sg)*1*2) *l*sg+es_area*2*l	$(7.000+2*1.500+2*1.000-0.000+(0.040+0.080+0.125+0.125+0.200+0.5*0.500)*1*2)*289.000*0.500+0.343*2*289.000$	2,169.23	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-03 Formula: $es\_area * 1 * l$	$0.315 * 1 * 14481.000$	4,561.52	cum
		Refer: TCS-03A Formula: $(cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb + 0.5 * sg) * 1 * 2) * l * sg + es\_area * 1 * l$	$(7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 + 0.5 * 0.500) * 1 * 2) * 3857.000 * 0.500 + 0.315 * 1 * 3857.000$	25,552.63	cum
		Refer: TCS-04 Formula: $es\_area * 1 * l + (cw + 2 * ps + 1 * es - ext\_pav) * sg * l$	$0.315 * 1 * 928.000 + (7.000 + 2 * 1.500 + 1 * 1.000 - 6.700) * 0.500 * 928.000$	2,287.52	cum
		Refer: TCS-05 Formula: $(cw + 2 * ps + 1 * es - ext\_pav + (bc + dbm + wmm1 + wmm2 + gsb + 0.5 * sg) * 1 * 2) * l * sg + es\_area * 1 * l$	$(7.000 + 2 * 1.500 + 1 * 1.000 - 6.700 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 + 0.5 * 0.500) * 1 * 2) * 798.000 * 0.500 + 0.315 * 1 * 798.000$	2,613.45	cum
		Refer: TCS-05A Formula: $es\_area * 1 * l$	$0.315 * 1 * 563.000$	177.35	cum
		Refer: TCS-07A Formula: $(cw + 2 * ps) * l * sg$	$(7.000 + 2 * 1.500) * 1200.000 * 0.500$	6,000.00	cum
		Refer: TCS-07B Formula: $(cw + 2 * ps) * l * sg$	$(7.000 + 2 * 1.500) * 733.000 * 0.500$	3,665.00	cum
		Refer: TCS-08 Formula: $(cw + 2 * ps + 1 * es - ext\_pav + (bc + dbm + wmm1 + wmm2 + gsb + 0.5 * sg) * 1 * 2) * l * sg + es\_area * 1 * l$	$(7.000 + 2 * 1.500 + 1 * 1.000 - 6.700 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 + 0.5 * 0.500) * 1 * 2) * 77.000 * 0.500 + 0.315 * 1 * 77.000$	252.18	cum
		Refer: TCS-10 Formula: $es\_area * 1 * l + (cw + 2 * ps + 1 * es - ext\_pav) * sg * l$	$0.315 * 1 * 345.000 + (7.000 + 2 * 1.500 + 1 * 1.000 - 6.700) * 0.500 * 345.000$	850.43	cum
		Refer: TCS-11 Formula: $es\_area * 1 * l + (cw + 2 * ps + 1 * es) * sg * l$	$0.315 * 1 * 137.000 + (7.000 + 2 * 1.500 + 1 * 1.000) * 0.500 * 137.000$	796.66	cum
		Refer: TCS-12 Formula: $(cw + 2 * ps) * l * sg$	$(7.000 + 2 * 1.500) * 2568.000 * 0.500$	12,840.00	cum
			Total :	77,707.64	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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-02 Formula: (cw+2*ps-ext_pav)*sg*I	(7.000+2*1.500-7.000)*0.500*576.000	864.00	cum
		Refer: TCS-03 Formula: (cw+2*ps-ext_pav)*sg*I	(7.000+2*1.500-6.700) *0.500*14481.000	23,893.65	cum
		Refer: TCS-04 Formula: (cw+2*ps-ext_pav)*sg*I	(7.000+2*1.500-6.700)*0.500*928.000	1,531.20	cum
		Refer: TCS-05 Formula: (ext_pav)*sg*I	(6.700)*0.500*798.000	2,673.30	cum
		Refer: TCS-05A Formula: (cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb+0.5*sg)*1*2)*sg	(7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200+0.5*0.500)*1*2)*563.000*0.500	3,552.53	cum
		Refer: TCS-06 Formula: (cw+2*ps-ext_pav)*sg*I	(7.000+2*1.500-6.700)*0.500*1343.000	2,215.95	cum
		Refer: TCS-07 Formula: (cw+2*ps-ext_pav)*sg*I	(7.000+2*1.500-6.700)*0.500*551.000	909.15	cum
		Refer: TCS-08 Formula: (ext_pav)*sg*I	(6.700)*0.500*77.000	257.95	cum
		Refer: TCS-10 Formula: (cw+2*ps-ext_pav)*sg*I	(7.000+2*1.500-6.700)*0.500*345.000	569.25	cum
		Refer: TCS-11A Formula: (cw+2*ps+es-ext_pav)*sg*I	(7.000+2*1.500+1.000-6.700)*0.500*304.000	653.60	cum
		Total :	37,120.58	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			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Earthwork Formula: $\text{tot\_cut} * (1 - \text{per\_rock} / 100)$	$3185543.000 * (1 - 20.000 / 100)$	2,548,434.40	cum
			Total :	2,548,434.40	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: $\text{tot\_cut} * (\text{per\_rock} / 100)$	$3185543.000 * (20.000 / 100)$	637,108.60	cum
			Total :	637,108.60	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 $ew\_area * gsb * (1 - gsb\_per / 100)$	$16164.000 * 0.200 * (1 - 41.000 / 100)$	1,907.35	Cum
		Refer: TCS-01 Formula: $(cw + 2 * ps) * gsb * (1 - gsb\_per / 100)$	$(7.000 + 2 * 2.500) * 0.200 * 5096.000 * (1 - 41.000 / 100)$	7,215.94	Cum
		Refer: TCS-01A Formula: $(cw + 2 * ps) * gsb * (1 - gsb\_per / 100)$	$(7.000 + 2 * 2.500) * 0.200 * 150.000 * (1 - 41.000 / 100)$	212.40	Cum
		Refer: TCS-02 Formula: $((cw + 2 * ps + 2 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 1 * 2) * l * gsb + es\_gsb * 2 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 2 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 1 * 2) * 576.000 * 0.200 + 0.158 * 2 * 576.000) * (1 - 41.000 / 100)$	985.54	Cum
		Refer: TCS-02A Formula: $((cw + 2 * ps + 2 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 1 * 2) * l * gsb + es\_gsb * 2 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 2 * 1.000 + (0.040 + 0.080 + 0.125 + 0.125 + 0.200 * 0.5) * 1 * 2) * 289.000 * 0.200 + 0.158 * 2 * 289.000) * (1 - 41.000 / 100)$	495.16	Cum
		Refer: TCS-03 Formula: $((cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 2 * 1) * l * gsb + es\_gsb * 1 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 2 * 1) * 14481.000 * 0.200 + 0.171 * 1 * 14481.000) * (1 - 41.000 / 100)$	21,829.38	Cum
		Refer: TCS-03A Formula: $((cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 2 * 1) * l * gsb + es\_gsb * 1 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 2 * 1) * 3857.000 * 0.200 + 0.171 * 1 * 3857.000) * (1 - 41.000 / 100)$	5,814.24	Cum
		Refer: TCS-04 Formula: $((cw + 2 * ps + 1 * es + (bc + dbm + wmm1 + wmm2 + gsb * 0.5) * 2 * 1) * l * gsb + es\_gsb * 1 * l) * (1 - gsb\_per / 100)$	$((7.000 + 2 * 1.500 + 1 * 1.000 + (0.040 + 0.070 + 0.125 + 0.125 + 0.200 * 0.5) * 2 * 1) * 928.000 * 0.200 + 0.171 * 1 * 928.000) * (1 - 41.000 / 100)$	1,398.91	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-05 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(1-gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*798.000*0.200+0.171*1*798.000)*(1-41.000/100)$	1,202.95	Cum
		Refer: TCS-05A Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(1-gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*563.000*0.200+0.171*1*563.000)*(1-41.000/100)$	848.69	Cum
		Refer: TCS-06 Formula: $(cw+2*ps)*gsb*I*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*1343.000*(1-41.000/100)$	1,584.74	Cum
		Refer: TCS-07 Formula: $(cw+2*ps)*gsb*I*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*551.000*(1-41.000/100)$	650.18	Cum
		Refer: TCS-07A Formula: $(cw+2*ps)*gsb*I*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*1200.000*(1-41.000/100)$	1,416.00	Cum
		Refer: TCS-07B Formula: $(cw+2*ps)*gsb*I*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*733.000*(1-41.000/100)$	864.94	Cum
		Refer: TCS-08 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(1-gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*77.000*0.200+0.171*1*77.000)*(1-41.000/100)$	116.07	Cum
		Refer: TCS-10 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(1-gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*345.000*0.200+0.171*1*345.000)*(1-41.000/100)$	520.07	Cum
		Refer: TCS-11 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(1-gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*137.000*0.200+0.171*1*137.000)*(1-41.000/100)$	206.52	Cum
		Refer: TCS-11A Formula: $(cw+2*ps)*gsb*I*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*304.000*(1-41.000/100)$	358.72	Cum
		Refer: TCS-12 Formula: $(cw+2*ps)*gsb*I*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*2568.000*(1-41.000/100)$	3,030.24	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-15 Formula: $(cw+2*ps)*gsb*(1-gsb\_per/100)$	$(7.000+2*1.500)*0.200*415.000*$ $(1-41.000/100)$	489.70	Cum
			Total :	51,147.74	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: Extra Widening on Flexible Formula: Pavement $ew\_area*gsb*(gsb\_per/100)$	$16164.000*0.200*(41.000/100)$	1,325.45	Cum
		Refer: TCS-01 Formula: $(cw+2*ps)*gsb*(gsb\_per/100)$	$(7.000+2*2.500)*0.200*5096.000*$ $(41.000/100)$	5,014.46	Cum
		Refer: TCS-01A Formula: $(cw+2*ps)*gsb*(gsb\_per/100)$	$(7.000+2*2.500)*0.200*150.000*$ $(41.000/100)$	147.60	Cum
		Refer: TCS-02 Formula: $((cw+2*ps+2*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*1*2)*gsb+es\_gsb*2*I)*(gsb\_per/100)$	$((7.000+2*1.500+2*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*1*2)*576.000*0.200+0.158*2*576.000)*(41.000/100)$	684.86	Cum
		Refer: TCS-02A Formula: $((cw+2*ps+2*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*1*2)*gsb+es\_gsb*2*I)*(gsb\_per/100)$	$((7.000+2*1.500+2*1.000+(0.040+0.080+0.125+0.125+0.200*0.5)*1*2)*289.000*0.200+0.158*2*289.000)*(41.000/100)$	344.10	Cum
		Refer: TCS-03 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*14481.000*0.200+0.171*1*14481.000)*(41.000/100)$	15,169.57	Cum
		Refer: TCS-03A Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*3857.000*0.200+0.171*1*3857.000)*(41.000/100)$	4,040.40	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-04 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*928.000*0.200+0.171*1*928.000)*(41.000/100)$	972.13	Cum
		Refer: TCS-05 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*798.000*0.200+0.171*1*798.000)*(41.000/100)$	835.95	Cum
		Refer: TCS-05A Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*563.000*0.200+0.171*1*563.000)*(41.000/100)$	589.77	Cum
		Refer: TCS-06 Formula: $(cw+2*ps-ext\_pav)*gsb*I*(gsb\_per/100)$	$(7.000+2*1.500-6.700)*0.200*1343.000*(41.000/100)$	363.42	Cum
		Refer: TCS-07 Formula: $(cw+2*ps)*gsb*I*(gsb\_per/100)$	$(7.000+2*1.500)*0.200*551.000*(41.000/100)$	451.82	Cum
		Refer: TCS-07A Formula: $(cw+2*ps)*gsb*I*(gsb\_per/100)$	$(7.000+2*1.500)*0.200*1200.000*(41.000/100)$	984.00	Cum
		Refer: TCS-07B Formula: $(cw+2*ps)*gsb*I*(gsb\_per/100)$	$(7.000+2*1.500)*0.200*733.000*(41.000/100)$	601.06	Cum
		Refer: TCS-08 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*77.000*0.200+0.171*1*77.000)*(41.000/100)$	80.66	Cum
		Refer: TCS-10 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*345.000*0.200+0.171*1*345.000)*(41.000/100)$	361.41	Cum
		Refer: TCS-11 Formula: $((cw+2*ps+1*es+(bc+dbm+wmm1+wmm2+gsb*0.5)*2*1)*gsb+es\_gsb*1*I)*(gsb\_per/100)$	$((7.000+2*1.500+1*1.000+(0.040+0.070+0.125+0.125+0.200*0.5)*2*1)*137.000*0.200+0.171*1*137.000)*(41.000/100)$	143.51	Cum
		Refer: TCS-11A Formula: $(cw+2*ps)*gsb*I*(gsb\_per/100)$	$(7.000+2*1.500)*0.200*304.000*(41.000/100)$	249.28	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-12 Formula: $(cw+2*ps)*gsb*I*(gsb\_per/100)$	$(7.000+2*1.500)*0.200*2568.000*$ $(41.000/100)$	2,105.76	Cum
		Refer: TCS-15 Formula: $(cw+2*ps)*gsb*I*(gsb\_per/100)$	$(7.000+2*1.500)*0.200*415.000*$ $(41.000/100)$	340.30	Cum
			Total :	34,805.50	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 Formula: Pavement $ew\_area*(wmm1+wmm2)$	$16164.000*(0.125+0.125)$	4,041.00	Cum
		Refer: TCS-01 Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*2.500)*0.125)+$ $((7.000+2*2.500)*0.125))*5096.000)$	15,288.00	Cum
		Refer: TCS-01A Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*2.500)*0.125)+$ $((7.000+2*2.500)*0.125))*150.000)$	450.00	Cum
		Refer: TCS-02 Formula: $((((cw+2*ps+0.125*2)*wmm1)+((cw+2*ps+0.250*2)*wmm2))*I)$	$((((7.000+2*1.500+0.125*2)*0.125)+$ $((7.000+2*1.500+0.250*2)*0.125))*576.000)$	1,494.00	Cum
		Refer: TCS-02A Formula: $((((cw+2*ps+0.125*2)*wmm1)+((cw+2*ps+0.250*2)*wmm2))*I)$	$((((7.000+2*1.500+0.125*2)*0.125)+$ $((7.000+2*1.500+0.250*2)*0.125))*289.000)$	749.59	Cum
		Refer: TCS-03 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+$ $((7.000+2*1.500+0.250*1)*0.125))*14481.000)$	36,881.30	Cum
		Refer: TCS-03A Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+$ $((7.000+2*1.500+0.250*1)*0.125))*3857.000)$	9,823.30	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-04 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*928.000)$	2,363.50	Cum
		Refer: TCS-05 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*798.000)$	2,032.41	Cum
		Refer: TCS-05A Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*563.000)$	1,433.89	Cum
		Refer: TCS-06 Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*1343.000)$	3,357.50	Cum
		Refer: TCS-07 Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*551.000)$	1,377.50	Cum
		Refer: TCS-07A Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*1200.000)$	3,000.00	Cum
		Refer: TCS-07B Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*733.000)$	1,832.50	Cum
		Refer: TCS-08 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*77.000)$	196.11	Cum
		Refer: TCS-10 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*345.000)$	878.67	Cum
		Refer: TCS-11 Formula: $((((cw+2*ps+0.125*1)*wmm1)+((cw+2*ps+0.250*1)*wmm2))*I)$	$((((7.000+2*1.500+0.125*1)*0.125)+((7.000+2*1.500+0.250*1)*0.125))*137.000)$	348.92	Cum
		Refer: TCS-11A Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*I)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*304.000)$	760.00	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-12 Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*i)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*2568.000)$	6,420.00	Cum
		Refer: TCS-15 Formula: $((((cw+2*ps)*wmm1)+((cw+2*ps)*wmm2))*i)$	$((((7.000+2*1.500)*0.125)+((7.000+2*1.500)*0.125))*415.000)$	1,037.50	Cum
			Total :	93,765.69	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	16164.000	16,164.00	sqm
		Refer: TCS-01 Formula: (cw+2*ps)*l	(7.000+2*2.500)*5096.000	61,152.00	sqm
		Refer: TCS-01A Formula: (cw+2*ps)*l	(7.000+2*2.500)*150.000	1,800.00	sqm
		Refer: TCS-02 Formula: (cw+2*ps)*l	(7.000+2*1.500)*576.000	5,760.00	sqm
		Refer: TCS-02A Formula: (cw+2*ps)*l	(7.000+2*1.500)*289.000	2,890.00	sqm
		Refer: TCS-03 Formula: (cw+2*ps)*l	(7.000+2*1.500)*14481.000	144,810.00	sqm
		Refer: TCS-03A Formula: (cw+2*ps)*l	(7.000+2*1.500)*3857.000	38,570.00	sqm
		Refer: TCS-04 Formula: (cw+2*ps)*l	(7.000+2*1.500)*928.000	9,280.00	sqm
		Refer: TCS-05 Formula: (cw+2*ps)*l	(7.000+2*1.500)*798.000	7,980.00	sqm
		Refer: TCS-05A Formula: (cw+2*ps)*l	(7.000+2*1.500)*563.000	5,630.00	sqm
		Refer: TCS-06 Formula: (cw+2*ps)*l	(7.000+2*1.500)*1343.000	13,430.00	sqm
		Refer: TCS-07 Formula: (cw+2*ps)*l	(7.000+2*1.500)*551.000	5,510.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-07A Formula: (cw+2*ps)*l	(7.000+2*1.500)*1200.000	12,000.00	sqm
		Refer: TCS-07B Formula: (cw+2*ps)*l	(7.000+2*1.500)*733.000	7,330.00	sqm
		Refer: TCS-08 Formula: (cw+2*ps)*l	(7.000+2*1.500)*77.000	770.00	sqm
		Refer: TCS-10 Formula: (cw+2*ps)*l	(7.000+2*1.500)*345.000	3,450.00	sqm
		Refer: TCS-11 Formula: (cw+2*ps)*l	(7.000+2*1.500)*137.000	1,370.00	sqm
		Refer: TCS-11A Formula: (cw+2*ps)*l	(7.000+2*1.500)*304.000	3,040.00	sqm
		Refer: TCS-12 Formula: (cw+2*ps)*l	(7.000+2*1.500)*2568.000	25,680.00	sqm
		Refer: TCS-15 Formula: (cw+2*ps)*l	(7.000+2*1.500)*415.000	4,150.00	sqm
			Total :	370,766.00	sqm
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-01 Formula: (cw+2*ps)*l	(7.000+2*2.500)*5096.000	61,152.00	sqm
		Refer: TCS-01A Formula: (cw+2*ps)*l	(7.000+2*2.500)*150.000	1,800.00	sqm
		Refer: TCS-02 Formula: (cw+2*ps)*l	(7.000+2*1.500)*576.000	5,760.00	sqm
		Refer: TCS-02A Formula: (cw+2*ps)*l	(7.000+2*1.500)*289.000	2,890.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-03 Formula: (cw+2*ps)*l	(7.000+2*1.500)*14481.000	144,810.00	sqm
		Refer: TCS-03A Formula: (cw+2*ps)*l	(7.000+2*1.500)*3857.000	38,570.00	sqm
		Refer: TCS-04 Formula: (cw+2*ps)*l	(7.000+2*1.500)*928.000	9,280.00	sqm
		Refer: TCS-05 Formula: (cw+2*ps)*l	(7.000+2*1.500)*798.000	7,980.00	sqm
		Refer: TCS-05A Formula: (cw+2*ps)*l	(7.000+2*1.500)*563.000	5,630.00	sqm
		Refer: TCS-06 Formula: (cw+2*ps)*l	(7.000+2*1.500)*1343.000	13,430.00	sqm
		Refer: TCS-07 Formula: (cw+2*ps)*l	(7.000+2*1.500)*551.000	5,510.00	sqm
		Refer: TCS-07A Formula: (cw+2*ps)*l	(7.000+2*1.500)*1200.000	12,000.00	sqm
		Refer: TCS-07B Formula: (cw+2*ps)*l	(7.000+2*1.500)*733.000	7,330.00	sqm
		Refer: TCS-08 Formula: (cw+2*ps)*l	(7.000+2*1.500)*77.000	770.00	sqm
		Refer: TCS-10 Formula: (cw+2*ps)*l	(7.000+2*1.500)*345.000	3,450.00	sqm
		Refer: TCS-11 Formula: (cw+2*ps)*l	(7.000+2*1.500)*137.000	1,370.00	sqm
		Refer: TCS-11A Formula: (cw+2*ps)*l	(7.000+2*1.500)*304.000	3,040.00	sqm
		Refer: TCS-12 Formula: (cw+2*ps)*l	(7.000+2*1.500)*2568.000	25,680.00	sqm

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-15 Formula: (cw+2*ps)*l	(7.000+2*1.500)*415.000	4,150.00	sqm
			Total :	354,602.00	sqm
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	16164.000*0.070	1,131.48	cum
		Refer: TCS-01 Formula: (cw+2*ps)*dbm*I	(7.000+2*2.500)*0.080*5096.000	4,892.16	cum
		Refer: TCS-01A Formula: (cw+2*ps)*dbm*I	(7.000+2*2.500)*0.080*150.000	144.00	cum
		Refer: TCS-02 Formula: (cw+2*ps)*dbm*I	(7.000+2*1.500)*0.070*576.000	403.20	cum
		Refer: TCS-02A Formula: (cw+2*ps)*dbm*I	(7.000+2*1.500)*0.080*289.000	231.20	cum
		Refer: TCS-03 Formula: (cw+2*ps)*dbm*I	(7.000+2*1.500)*0.070*14481.000	10,136.70	cum
		Refer: TCS-03A Formula: (cw+2*ps)*dbm*I	(7.000+2*1.500)*0.070*3857.000	2,699.90	cum
		Refer: TCS-04 Formula: (cw+2*ps)*dbm*I	(7.000+2*1.500)*0.070*928.000	649.60	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-05 Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*798.000$	558.60	cum
		Refer: TCS-05A Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*563.000$	394.10	cum
		Refer: TCS-06 Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*1343.000$	940.10	cum
		Refer: TCS-07 Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*551.000$	385.70	cum
		Refer: TCS-07A Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*1200.000$	840.00	cum
		Refer: TCS-07B Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*733.000$	513.10	cum
		Refer: TCS-08 Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*77.000$	53.90	cum
		Refer: TCS-10 Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*345.000$	241.50	cum
		Refer: TCS-11 Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*137.000$	95.90	cum
		Refer: TCS-11A Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*304.000$	212.80	cum
		Refer: TCS-12 Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*2568.000$	1,797.60	cum
		Refer: TCS-15 Formula: (cw+2*ps)*dbm*I	$(7.000+2*1.500)*0.070*415.000$	290.50	cum
			Total :	26,612.04	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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 $ew\_area * bc$	$16164.000 * 0.040$	646.56	cum
		Refer: TCS-01 Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 2.500) * 0.040 * 5096.000$	2,446.08	cum
		Refer: TCS-01A Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 2.500) * 0.040 * 150.000$	72.00	cum
		Refer: TCS-02 Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 1.500) * 0.040 * 576.000$	230.40	cum
		Refer: TCS-02A Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 1.500) * 0.040 * 289.000$	115.60	cum
		Refer: TCS-03 Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 1.500) * 0.040 * 14481.000$	5,792.40	cum
		Refer: TCS-03A Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 1.500) * 0.040 * 3857.000$	1,542.80	cum
		Refer: TCS-04 Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 1.500) * 0.040 * 928.000$	371.20	cum
		Refer: TCS-05 Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 1.500) * 0.040 * 798.000$	319.20	cum
		Refer: TCS-05A Formula: $(cw + 2 * ps) * bc * l$	$(7.000 + 2 * 1.500) * 0.040 * 563.000$	225.20	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-06 Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*1343.000$	537.20	cum
		Refer: TCS-07 Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*551.000$	220.40	cum
		Refer: TCS-07A Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*1200.000$	480.00	cum
		Refer: TCS-07B Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*733.000$	293.20	cum
		Refer: TCS-08 Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*77.000$	30.80	cum
		Refer: TCS-10 Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*345.000$	138.00	cum
		Refer: TCS-11 Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*137.000$	54.80	cum
		Refer: TCS-11A Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*304.000$	121.60	cum
		Refer: TCS-12 Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*2568.000$	1,027.20	cum
		Refer: TCS-15 Formula: (cw+2*ps)*bc*I	$(7.000+2*1.500)*0.040*415.000$	166.00	cum
			Total :	14,830.64	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: Major Junction Formula: $gsb*net\_area*(1-gsb\_per/100)$	$0.200*1100.000*(1-41.000/100)$	129.80	Cum
		Refer: Minor Junction Formula: $tot\_area*gsb*(1-gsb\_per/100)$	$1386.000*0.200*(1-41.000/100)$	163.55	Cum
			Total :	293.35	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: Major Junction Formula: $gsb*net\_area*(gsb\_per/100)$	$0.200*1100.000*(41.000/100)$	90.20	Cum
		Refer: Minor Junction Formula: $tot\_area*gsb*(gsb\_per/100)$	$1386.000*0.200*(41.000/100)$	113.65	Cum
			Total :	203.85	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.)			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Major Junction Formula: $\text{net\_area} * (\text{wmm1} + \text{wmm2})$	$1100.000 * (0.125 + 0.125)$	275.00	Cum
		Refer: Minor Junction Formula: $\text{tot\_area} * (\text{wmm1} + \text{wmm2})$	$1386.000 * (0.125 + 0.125)$	346.50	Cum
			Total :	621.50	Cum
4	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: Major Junction Formula: net_area	1100.000	1,100.00	sqm
		Refer: Minor Junction Formula: tot_area	1386.000	1,386.00	sqm
			Total :	2,486.00	sqm
5	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: Major Junction Formula: net_area	1100.000	1,100.00	sqm
		Refer: Minor Junction Formula: tot_area	1386.000	1,386.00	sqm
			Total :	2,486.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
6	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: Major Junction Formula: net_area*dbm	1100.000*0.070	77.00	cum
		Refer: Minor Junction Formula: tot_area*dbm	1386.000*0.070	97.02	cum
			Total :	174.02	cum
7	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: Major Junction Formula: net_area*bc	1100.000*0.040	44.00	cum
		Refer: Minor Junction Formula: tot_area*bc	1386.000*0.040	55.44	cum
			Total :	99.44	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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: Major Junction Formula: tot_paint	30.000	30.00	sqm
			Total :	30.00	sqm



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: 29	29	29.00	each
			Total :	29.00	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: 367	367	367.00	each
			Total :	367.00	each
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			
		Refer: Traffic Signs Formula: 255	255	255.00	each
			Total :	255.00	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: 107	107	107.00	each
			Total :	107.00	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: 14	14	14.00	each
			Total :	14.00	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: 54	54	54.00	each
			Total :	54.00	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-01 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((5096.000+6)/9)*3.000*0.100)+(2.000*5096.000*0.150)$	1,698.87	sqm
		Refer: TCS-01A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((150.000+6)/9)*3.000*0.100)+(2.000*150.000*0.150)$	50.20	sqm
		Refer: TCS-02 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((576.000+6)/9)*3.000*0.100)+(2.000*576.000*0.150)$	192.20	sqm
		Refer: TCS-02A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((289.000+6)/9)*3.000*0.100)+(2.000*289.000*0.150)$	96.53	sqm
		Refer: TCS-03 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((14481.000+6)/9)*3.000*0.100)+(2.000*14481.000*0.150)$	4,827.20	sqm
		Refer: TCS-03A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((3857.000+6)/9)*3.000*0.100)+(2.000*3857.000*0.150)$	1,285.87	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-04 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((928.000+6)/9)*3.000*0.100)+$ $(2.000*928.000*0.150)$	309.53	sqm
		Refer: TCS-05 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((798.000+6)/9)*3.000*0.100)+$ $(2.000*798.000*0.150)$	266.20	sqm
		Refer: TCS-05A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((563.000+6)/9)*3.000*0.100)+$ $(2.000*563.000*0.150)$	187.87	sqm
		Refer: TCS-06 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((1343.000+6)/9)*3.000*0.100)+$ $(2.000*1343.000*0.150)$	447.87	sqm
		Refer: TCS-07 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((551.000+6)/9)*3.000*0.100)+$ $(2.000*551.000*0.150)$	183.87	sqm
		Refer: TCS-07A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((1200.000+6)/9)*3.000*0.100)+$ $(2.000*1200.000*0.150)$	400.20	sqm
		Refer: TCS-07B Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((733.000+6)/9)*3.000*0.100)+$ $(2.000*733.000*0.150)$	244.53	sqm
		Refer: TCS-08 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((77.000+6)/9)*3.000*0.100)+$ $(2.000*77.000*0.150)$	25.87	sqm
		Refer: TCS-09A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((0.000+6)/9)*3.000*0.100)+$ $(2.000*0.000*0.150)$	0.20	sqm
		Refer: TCS-10 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((345.000+6)/9)*3.000*0.100)+$ $(2.000*345.000*0.150)$	115.20	sqm
		Refer: TCS-11 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((137.000+6)/9)*3.000*0.100)+$ $(2.000*137.000*0.150)$	45.87	sqm
		Refer: TCS-11A Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((304.000+6)/9)*3.000*0.100)+$ $(2.000*304.000*0.150)$	101.53	sqm
		Refer: TCS-12 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((2568.000+6)/9)*3.000*0.100)+$ $(2.000*2568.000*0.150)$	856.20	sqm
		Refer: TCS-14 Formula: $((l+6)/9)*lc*wc+(nc*l*wid\_mar)$	$((0.000+6)/9)*3.000*0.100)+$ $(2.000*0.000*0.150)$	0.20	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: TCS-15 Formula: $(((l+6)/9)*l*wc)+(nc*l*wid\_mar)$	$(((415.000+6)/9)*3.000*0.100)+$ $(2.000*415.000*0.150)$	138.53	sqm
			Total :	11,474.53	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: 3358	3358	3,358.00	each
			Total :	3,358.00	each
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: 6300	6300	6,300.00	Rm
			Total :	6,300.00	Rm

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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: 16484	16484	16,484.00	nos
			Total :	16,484.00	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: 393	393	393.00	nos
			Total :	393.00	nos
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: 1040	1040	1,040.00	sqm
			Total :	1,040.00	sqm
14	16.09	Mild steel railing complete as per drawing and Technical Specifications			
		Refer: Railing Formula: 10492	10492	10,492.00	Rm
			Total :	10,492.00	Rm



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: $((sw\_in*sw\_ht*2)+(w\_pass*sw\_ht*2)+(bw\_in*bw\_ht)+(l\_pass*bw\_ht)+(col\_l*fcol\_h*6)+(l\_pass*roof\_w)-(2*win\_n*win\_l*win\_h))*n$	$((1.875*3.830*2)+(2.000*3.830*2)+(5.800*2.350)+(6.000*2.350)+(0.250*2.650*6)+(6.000*1.530)-(2*2.000*1.250*0.900))*14.000$	924.95	sqm
			Total :	924.95	sqm
2	10.16	Cement Plaster 12mm Thick in Cement Mortar 1:3			
		Refer: Passenger Shelter Formula: $((sw\_in*sw\_ht*2)+(w\_pass*sw\_ht*2)+(bw\_in*bw\_ht)+(l\_pass*bw\_ht)+(col\_l*fcol\_h*6)+(l\_pass*roof\_w)-(2*win\_n*win\_l*win\_h))*n$	$((1.875*3.830*2)+(2.000*3.830*2)+(5.800*2.350)+(6.000*2.350)+(0.250*2.650*6)+(6.000*1.530)-(2*2.000*1.250*0.900))*14.000$	924.95	sqm
			Total :	924.95	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: $((a+0.25*2)*(b+0.25*2)*df*col\_n)+((l+2*0.1)*(w+2*0.1)*db))*n$	$((0.750+0.25*2)*(0.750+0.25*2)*0.750*6.000)+((13.500+2*0.1)*(0.500+2*0.1)*0.300))*14.000$	138.72	cum
			Total :	138.72	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: $((l*w*wbtm\_thk)+(l*fw\_wall*wtop\_thk))*n$	$((13.500*0.500*0.150)+(13.500*0.250*0.150))*14.000$	21.26	cum
			Total :	21.26	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: $(l_{pass}-2*w_{wall})*(w_{pass}-2*w_{wall})$ $*pcc\_thk*n$	$(6.000-2*0.125)*(2.000-2*0.125)$ $*0.100*14.000$	14.09	cum
			Total :	14.09	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: $((a*b*btm\_thk)+((a+col\_l)*0.5)*((b+col\_w)*0.5)*top\_thk+(col\_l*col\_w*(df-btm\_thk-top\_thk)))*col\_n*n$	$((0.750*0.750*0.100)+((0.750+0.250)*0.5)*((0.750+0.250)*0.5)*0.100)+$ $(0.250*0.250*(0.750-0.100-0.100))$ $*6.000*14.000$	9.71	cum
			Total :	9.71	cum
7	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification			
		Refer: Passenger Shelter Formula: $((a*b*btm\_thk)+((a+col\_l)*0.5)*((b+col\_w)*0.5)*top\_thk+(col\_l*col\_w*(df-btm\_thk-top\_thk)))*col\_n*n)/rf/1000$	$((0.750*0.750*0.100)+((0.750+0.250)*0.5)*((0.750+0.250)*0.5)*0.100)+$ $(0.250*0.250*(0.750-0.100-0.100))$ $*6.000*14.000)*120.000/1000$	1.17	MT
			Total :	1.17	MT
8	14/nsc2	Brick Flat Soling at Foundation			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Passenger Shelter Formula: $(((l_{pass}-2*w_{wall})*(w_{pass}-2*w_{wall}))+ (a*b*col_n))*n$	$(((6.000-2*0.125)*(2.000-2*0.125))+ (0.750*0.750*6.000))*14.000$	188.13	Sqm
			Total :	188.13	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: $(((l*w_{wall}*wall_h)+(sw_l*2*w_{wall}*sw_h) + (bw_l*4*w_{wall}*bw_h) + (rail_l*w_{wall}*rail_h))*n) - (win_l*w_{wall}*win_h*2*n)$	$(((13.500*0.125*0.550)+ (1.500*2*0.125*2.130)+ (2.650*4*0.125*0.950)+ (9.500*0.125*0.450))*14.000) - (1.250*0.125*0.900*2*14.000)$	45.34	cum
			Total :	45.34	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: $((col_l*col_w*fcoll_h*col_n*0.5)+ (col_l*col_w*bcoll_h*col_n*0.5)+ (sb_l*sb_w*sb_thk*2)+ (sb_a*sb_w*sb_thk*4)+ (l_{pass}*roof_w*roof_thk)+ (l_{pass}*fchj_w*roof_thk)+ (l_{pass}*bchj_w*roof_thk)+ (bch_l*bch_w*bch_thk))*n$	$((0.250*0.250*2.650*6.000*0.5)+ (0.250*0.250*2.100*6.000*0.5)+ (1.530*0.250*0.350*2)+ (3.000*0.250*0.350*4)+ (6.000*1.530*0.110)+ (6.000*0.680*0.110)+ (6.000*0.450*0.110)+ (5.000*0.500*0.075))*14.000$	58.12	cum
			Total :	58.12	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: $((col\_l * col\_w * fcol\_h * col\_n * 0.5) +$ $(col\_l * col\_w * bcol\_h * col\_n * 0.5) +$ $(sb\_l * sb\_w * sb\_thk * 2) +$ $(sb\_a * sb\_w * sb\_thk * 4) +$ $(l\_pass * roof\_w * roof\_thk) +$ $(l\_pass * fchj\_w * roof\_thk) +$ $(l\_pass * bchj\_w * roof\_thk) +$ $(bch\_l * bch\_w * bch\_thk)) * n * srf / 1000$	$((0.250 * 0.250 * 2.650 * 6.000 * 0.5) +$ $(0.250 * 0.250 * 2.100 * 6.000 * 0.5) +$ $(1.530 * 0.250 * 0.350 * 2) +$ $(3.000 * 0.250 * 0.350 * 4) +$ $(6.000 * 1.530 * 0.110) +$ $(6.000 * 0.680 * 0.110) +$ $(6.000 * 0.450 * 0.110) +$ $(5.000 * 0.500 * 0.075))$ $* 14.000 * 100.000 / 1000$	5.81	MT
			Total :	5.81	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: $((2*b+a)*(d+f))*n*sg$	$((2*22.000+15.000)*(3.500+2.500))*14.000*0.500$	2,478.00	cum
			Total :	2,478.00	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: $((2*b+a)*(d+f))*n*gsb*(1-gsb\_per/100)$	$((2*22.000+15.000)*(3.500+2.500))*14.000*0.200*(1-41.000/100)$	584.81	Cum
			Total :	584.81	Cum
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			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*gsb*(gsb\_per/100)$	$((2*22.000+15.000)*(3.500+2.500))*14.000*0.200*(41.000/100)$	406.39	Cum
			Total :	406.39	Cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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.)			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*(wmm1+wmm2)$	$((2*22.000+15.000)*(3.500+2.500))$ $*14.000*(0.125+0.125)$	1,239.00	Cum
			Total :	1,239.00	Cum
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.			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*f)*n$	$((2*22.000+15.000)*2.500)*14.000$	2,065.00	sqm
			Total :	2,065.00	sqm
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			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n$	$((2*22.000+15.000)*(3.500+2.500))$ $*14.000$	4,956.00	sqm
			Total :	4,956.00	sqm
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			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n$	$((2*22.000+15.000)*(3.500+2.500))$ $*14.000$	4,956.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	4,956.00	sqm
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			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*dbm$	$((2*22.000+15.000)*(3.500+2.500))*14.000*0.070$	346.92	cum
			Total :	346.92	cum
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			
		Refer: Busbay (2 Lane) Formula: $((2*b+a)*(d+f))*n*bc$	$((2*22.000+15.000)*(3.500+2.500))*14.000*0.040$	198.24	cum
			Total :	198.24	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1					
		Refer: Triangular Shaped Drain Formula: $(l_3+l_4)*l$	$(0.712+0.530)*35295.000$	43,836.39	
		Refer: Triangular Shaped Drain Formula: $(l_3+l_4)*t_4*l$	$(0.712+0.530)*0.025*35295.000$	1,095.91	
			Total :	44,932.30	
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			
		Refer: PCC Chut Drain Formula: $(a+2*wall\_thk+0.1*2)*f\_thk*l$	$(0.600+2*0.150+0.1*2)*0.100*1532.000$	168.52	cum
		Refer: RCC Cover Drain 1.0m Formula: $(t\_width+off*2)*((ht+b\_slab\_thk)/2)*l$	$(1.000+0.100*2)*((0.900+0.150)/2)*4313.000$	2,717.19	cum
		Refer: RCC Cover Drain 1.75m Formula: $(t\_width+off*2)*((ht+b\_slab\_thk)/2)*l$	$(1.750+0.100*2)*((0.900+0.150)/2)*10492.000$	10,741.19	cum
		Refer: Triangular Shaped Drain Formula: $0.5*l_4*l_3*l$	$0.5*0.530*0.712*35295.000$	6,659.46	cum
			Total :	20,286.36	cum
3	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: Triangular Shaped Drain Formula: $(l_1*t_1+(l_2-t_1)*t_1)*l$	$(0.530*0.100+(0.342-0.100)*0.100)*35295.000$	2,724.77	cum
			Total :	2,724.77	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
4	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: $(t\_width+off*2)*pcc\_thk*I$	$(1.000+0.100*2)*0.100*4313.000$	517.56	cum
		Refer: RCC Cover Drain 1.75m Formula: $(t\_width+off*2)*pcc\_thk*I$	$(1.750+0.100*2)*0.100*10492.000$	2,045.94	cum
		Refer: Triangular Shaped Drain Formula: $(l3*t2+(l4-t2)*t2)*I$	$(0.712*0.050+(0.530-0.050)*0.050)*35295.000$	2,103.58	cum
			Total :	4,667.08	cum
5	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: $(a+2*wall\_thk+0.1*2)*f\_thk*I$	$(0.600+2*0.150+0.1*2)*0.100*1532.000$	168.52	cum
			Total :	168.52	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: $((a+wall\_thk*2)*btm\_thk+ht*wall\_thk*2)*I$	$((0.600+0.150*2)*0.150+0.400*0.150*2)*1532.000$	390.66	cum
			Total :	390.66	cum

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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)*l	(0.900*0.200*2+1.000*0.150+1.000*0.125)*4313.000	2,738.76	cum
		Refer: RCC Cover Drain 1.75m Formula: (ht*w_thk*2+t_width*b_slab_thk+t_width*t_slab_thk)*l	(0.900*0.200*2+1.750*0.150+1.750*0.125)*10492.000	8,826.40	cum
			Total :	11,565.15	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+1.000*0.150+1.000*0.125)*4313.000*0.050	136.94	MT
		Refer: RCC Cover Drain 1.75m 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)*10492.000*0.050	441.32	MT
			Total :	578.26	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)	(4313.000/2+1)	2,157.50	Rm
		Refer: RCC Cover Drain 1.75m Formula: (l/2+1)	(10492.000/2+1)	5,247.00	Rm
			Total :	7,404.50	Rm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
10	24/i/b	Galvanised Mild steel J /L hook			
		Refer: RCC Cover Drain 1.0m Formula: $l/15*4*.3$	$4313.000/15*4*.3$	345.04	kg
		Refer: RCC Cover Drain 1.75m Formula: $l/15*4*.3$	$10492.000/15*4*.3$	839.36	kg
			Total :	1,184.40	kg
11	40	Gextextile material (fine net)			
		Refer: RCC Cover Drain 1.0m Formula: $(l/1)*4*(150*150/1000^2)$	$(4313.000/1)*4*(150*150/1000^2)$	388.17	sqm
		Refer: RCC Cover Drain 1.75m Formula: $(l/1)*4*(150*150/1000^2)$	$(10492.000/1)*4*(150*150/1000^2)$	944.28	sqm
			Total :	1,332.45	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))* (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))) *1367.000)*(1-0.200)	2,125.51	cum
		Refer: Retaining Wall 3.0m Formula: (((0.5*((pcc_thk+H2+d)+(pcc_thk+d))* (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))) *425.000)*(1-0.200)	800.29	cum
			Total :	2,925.80	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))* (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))) *1367.000)*0.200	531.38	cum
		Refer: Retaining Wall 3.0m Formula: (((0.5*((pcc_thk+H2+d)+(pcc_thk+d))* (B1+2*o))+((H2+d)*(mw-o)))*I)*p_c	(((0.5*((0.267+0.600)+(+0.600))* (1.600+2*0.150))+((0.267+0.600)* (0.600-0.150)))*425.000)*0.200	151.62	cum
			Total :	683.00	cum
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)*I	0.600*(0.211+2.000)*1367.000	1,813.46	cum
		Refer: Retaining Wall 3.0m Formula: mw*(H2+H1)*I	0.600*(0.267+3.000)*425.000	833.09	cum
			Total :	2,646.55	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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: $((0.5*(B1+e)*d)+(0.5*B1*H2))*l$	$((0.5*(1.270+1.067)*0.600)+(0.5*1.270*0.211))*1367.000$	1,141.56	cum
		Refer: Retaining Wall 3.0m Formula: $((0.5*(B1+B3)*d)+(0.5*B1*H2))*l$	$((0.5*(1.600+1.400)*0.600)+(0.5*1.600*0.267))*425.000$	473.28	cum
			Total :	1,614.84	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: $(B2+2*o)*pcc\_thk*l$	$(1.284+2*0.150)*0.300*1367.000$	649.60	cum
		Refer: Retaining Wall 3.0m Formula: $(B2+2*o)*pcc\_tH1k*l$	$(1.622+2*0.150)*0.300*425.000$	245.06	cum
			Total :	894.65	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: $(0.5*(T+e)*(H1-d))*l$	$(0.5*(0.600+1.067)*(2.000-0.600))*1367.000$	1,595.15	cum
		Refer: Retaining Wall 3.0m Formula: $(0.5*(T+B3)*(H1-d))*l$	$(0.5*(0.600+1.400)*(3.000-0.600))*425.000$	1,020.00	cum
			Total :	2,615.15	cum

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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: $(l-(l/10*gap))*para\_ht*para\_w$	$(1367.000-(1367.000/10*0.300))$ $*0.450*0.300$	179.01	cum
		Refer: Retaining Wall 3.0m Formula: $(l-(l/10*gap))*para\_ht*para\_w$	$(425.000-(425.000/10*0.300))$ $*0.450*0.300$	55.65	cum
			Total :	234.66	cum
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: $n*l$	$2.000*1367.000$	2,734.00	Rm
		Refer: Retaining Wall 3.0m Formula: $n*l$	$3.000*425.000$	1,275.00	Rm
			Total :	4,009.00	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 2.0m Ht Formula: $(h+2*0.5)*(e+f)*(1-p)*l$	$(1.890+2*0.5)*(0.850+0.300)*(1-0.200)*4463.000$	11,866.22	cum
			Total :	11,866.22	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 2.0m Ht Formula: $(h+2*0.5)*(e+f)*p*l$	$(1.890+2*0.5)*(0.850+0.300)*0.200*4463.000$	2,966.56	cum
			Total :	2,966.56	cum
3	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials			
		Refer: Breast Wall 2.0m Ht Formula: $c*b*l$	$1.550*0.300*4463.000$	2,075.30	cum
			Total :	2,075.30	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 2.0m Ht Formula: $d*b*l$	$0.450*0.300*4463.000$	602.51	cum
			Total :	602.51	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 2.0m Ht Formula: $0.5*(e+(e-(h/5)))*h*I$	$0.5*(0.850+(0.850-(1.890/5)))$ $*1.890*4463.000$	5,575.58	cum
			Total :	5,575.58	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 2.0m Ht Formula: $g*f*I$	$1.933*0.300*4463.000$	2,588.09	cum
			Total :	2,588.09	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 2.0m Ht Formula: $(0.5*((a+(c+d)/3)+a)*(d+c)+i*d+i*m)*I$	$(0.5*((0.600+(1.550+0.450)/3)+0.600)*$ $(0.450+1.550)$ $+0.100*0.450+0.100*0.000)*4463.000$	8,531.77	cum
			Total :	8,531.77	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 2.0m Ht Formula: $(l/1.2)*(h-j-i)$	$(4463.000/1.2)*(1.890-0.600-0.100)$	4,425.81	Rm
			Total :	4,425.81	Rm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
1	15.12/Nsc	Supply and Installation of Mechanically woven double twisted hexagonal shaped steel wire mesh gabion boxes with Zinc + PVC coating having mesh size of 100 mm x 120 mm by using mesh wire 2.7 mm (Inner dia) and 3.7 (outer dia) with sledged wire 3.4 mm(inner dia) and 4.4 mm (outer dia) and lacing with 2.2mm inner dia and 3.3 mm outer dia.placing at indicated places in dry condition at easily accessible location as per direction of Engineer including tools, plant, labour etc. complete in all respect, carrying the material from nearest approach with all leads & lifts, manpower & machinery, materials, labor etc. complete as per detailed technical specifications and as directed by Engineer-In-Charge.			
		Refer: Gabion Structure Formula: 15120	15120	15,120.00	cum
			Total :	15,120.00	cum



BILL OF QUANTITY (STRUCTURE PART)



Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
Foundation						
1	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	2,760.00		
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	20,895.00		
Sub Total of Foundation						
Sub Structure						
3	10.06/a	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Sub-Structure	Ton	1,277.00		
4	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	7,695.00		
5	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	10,786.00		
6	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	15,964.00		
7	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications				



Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			Rm	5,164.00		
Sub Total of			Sub Structure			
		Super Structure				
8	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	4,335.00		
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	173.00		
10	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	2,206.00		
11	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				



Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			m	862.00		
12	10.06/b	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Super-Structure	Ton	200.00		
13	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	2,501.00		
14	16.11	Drainage Spouts complete as per drawing and Technical specification	each	252.00		
15	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 10 sqm 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	4,335.00		
Sub Total of				Super Structure		
		Protection Work				
16	10.19	Dry Boulder pitching	cum	1,111.00		
17	13.01/a/i /Nsc	Earth work in excavation Ordinary soil For Protection Work	cum	6,411.00		



Bill No : 13. Culvert

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
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	1,823.00		
19	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	1,818.00		
Sub Total of			Protection Work			
		Miscellanneous Work				
20	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	2,206.00		
21	09.01/nsc 1	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row . B)1200 mm dia	Rm	112.00		
Sub Total of			Miscellanneous Work			
Total of Bill 13. Culvert						



Bill No : 14. 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	5,809.00		
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	2,005.00		
3	13.01/a/ii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Above 6 m depth	cum	68.00		
4	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade	cum	316.00		
5	14.03/g	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M30 Grade	cum	988.00		
6	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification	MT	119.00		
Sub Total of Foundation						
Sub Structure						
7	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials	cum	393.00		
8	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	1,723.00		



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
9	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .	cum	1,060.00		
10	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	1,883.00		
11	15.03/g/ii	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 Between 5 to 10 m height	cum	221.00		
12	15.03/h/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 M35 Grade Pedestal	cum	53.00		
13	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	223.00		
14	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	277,350.00		



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
15	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	9,200.00		
16	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications	Rm	1,294.00		
Sub Total of			Sub Structure			
		Super Structure				
17	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	2,592.00		
18	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	104.00		



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
19	14/nsc1/i	Filler joint i)Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.	m	228.00		
20	14/nsc1/i	Filler joint Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.	m	228.00		
21	14/nsc1/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	228.00		
22	14/nsc1/i	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	228.00		
23	16.01/b/i /c2/ii	RCC Grade M30 For solid slab super-structure Approach Slab	cum	1,529.00		
24	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications	MT	254.00		
25	16.11	Drainage Spouts complete as per drawing and Technical specification	each	60.00		
26	16.12/Ns c	Reinforced cement concrete approach slab M-30 including reinforcement and formwork complete as per drawing and Technical specification	cum	261.00		
27	16.13	PCC M15 ordinary Grade leveling course below approach slab complete as per drawing and Technical specification Below Approach Slab	cum	115.00		



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
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 anchorage assembly complete as per approved drawing and standard specification to be installed under supervision of a specialist manufacture	Rm	134.00		
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 10 sqm 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	2,592.00		
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	471.00		
31	13.01/a/i /Nsc	Earth work in excavation Ordinary soil For Protection Work				



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
			cum	1,534.00		
32	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	605.00		
33	17.01/a	laying apron complete as per drawing and Technical specification. Boulder	cum	1,061.00		
34	17.02	Filter material underneath pitching in slopes complete as per drawing and Technical specification	cum	409.00		
35	17.03/a	Pitching on slopes complete as per drawing and Technical specifications Stone	cum	160.00		
36	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	143.00		
Sub Total of Protection Work						
		Miscellaneous Work				
37	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	965.00		
Sub Total of Miscellaneous Work						
		Diversion Work				
38	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	630.00		



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
39	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	41.00		
40	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	69.00		
41	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	14.00		



Bill No : 14. Minor Bridge

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
42	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	275.00		
43	09.01/nsc1	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row . B)1200 mm dia	Rm	30.00		
Sub Total of Diversion Work						
		Total of Bill 14. Minor Bridge				



Bill No : 15. Repair and Rehabilitation

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
1	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	3,696.00		
2	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	148.00		
3	08.01	Precast Cement concrete M20 Kerb including fixing at site	rm	616.00		
4	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.	sqm	4,734.00		
5	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification	MT	55.00		
6	16.09	Mild steel railing complete as per drawing and Technical Specifications	Rm	616.00		

Bill No : 15. Repair and Rehabilitation

SI No	SOR Ref No	Description	Unit	Quantity	Rate(Rs)	Cost(Rs)
7	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	3,696.00		
8	18.01	Removal of existing cement concrete wearing coat manually or jack hammer including its disposal complete as per drawing and technical specification without causing any detrimental effect to any part of bridge structure	sqm	3,696.00		
9	18.04/a	Sealing of Cracks by Injection process through nipples complete as per technical specification with	cum	90.00		
Total of Bill 15. Repair and Rehabilitation						

QUANTITY CALCULATION (STRUCTURE PART)



Quantity Backup Calculation For Bill : 13. Culvert

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
Foundation					
1	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.			
		Refer: Structure Culvert Formula: 2760	2760	2,760.00	cum
			Total :	2,760.00	cum
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			
		Refer: Structure Culvert Formula: 20895	20895	20,895.00	cum
			Total :	20,895.00	cum
Sub Structure					
3	10.06/a	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Sub-Structure			
		Refer: Structure Culvert Formula: 1277	1277	1,277.00	Ton
			Total :	1,277.00	Ton
4	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			
		Refer: Structure Culvert Formula: 7695	7695	7,695.00	cum
			Total :	7,695.00	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
5	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			
		Refer: Structure Culvert Formula: 10786	10786	10,786.00	cum
			Total :	10,786.00	cum
6	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: Structure Culvert Formula: 15964	15964	15,964.00	cum
			Total :	15,964.00	cum
7	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications			
		Refer: Structure Culvert Formula: 5164	5164	5,164.00	Rm
			Total :	5,164.00	Rm
		Super Structure			
8	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: Structure Culvert Formula: 4335	4335	4,335.00	sqm
			Total :	4,335.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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			
		Refer: Structure Culvert Formula: 173	173	173.00	cum
			Total :	173.00	cum
10	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.			
		Refer: Structure Culvert Formula: 2206	2206	2,206.00	sqm
			Total :	2,206.00	sqm
11	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			
		Refer: Structure Culvert Formula: 862	862	862.00	m



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	862.00	m
12	10.06/b	Steel reinforcement for R.C.C. works including bending, binding and placing in position. A) for Super-Structure			
		Refer: Structure Culvert Formula: 200	200	200.00	Ton
			Total :	200.00	Ton
13	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: Structure Culvert Formula: 2501	2501	2,501.00	cum
			Total :	2,501.00	cum
14	16.11	Drainage Spouts complete as per drawing and Technical specification			
		Refer: Structure Culvert Formula: 252	252	252.00	each
			Total :	252.00	each
15	16.17	Mastic asphalt (providing and laying 12mm thik mastic asphalt wearing coures on top of deck slab excluding prime coat with paving grade bitumem 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 10 sqm and at an aproximate 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)			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Structure Culvert Formula: 4335	4335	4,335.00	sqm
			Total :	4,335.00	sqm
		Protection Work			
16	10.19	Dry Boulder pitching			
		Refer: Structure Culvert Formula: 1111	1111	1,111.00	cum
			Total :	1,111.00	cum
17	13.01/a/i/N sc	Earth work in excavation Ordinary soil For Protection Work			
		Refer: Structure Culvert Formula: 6411	6411	6,411.00	cum
			Total :	6,411.00	cum
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			
		Refer: Structure Culvert Formula: 1823	1823	1,823.00	cum
			Total :	1,823.00	cum
19	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			
		Refer: Structure Culvert Formula: 1818	1818	1,818.00	cum
			Total :	1,818.00	cum
		Miscellaneous Work			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
20	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.			
		Refer: Structure Culvert Formula: 2206	2206	2,206.00	sqm
			Total :	2,206.00	sqm
21	09.01/nsc1	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row . B)1200 mm dia			
		Refer: Structure Culvert Formula: 112	112	112.00	Rm
			Total :	112.00	Rm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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			
		Refer: Structure Minor Bridge Formula: 5809	5809	5,809.00	cum
			Total :	5,809.00	cum
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			
		Refer: Structure Minor Bridge Formula: 2005	2005	2,005.00	cum
			Total :	2,005.00	cum
3	13.01/a/iii	Earth work in excavation of foundation for structures as per drawing and technical specification Ordinary soil Above 6 m depth			
		Refer: Structure Minor Bridge Formula: 68	68	68.00	cum
			Total :	68.00	cum
4	14.03/a	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications PCC M15 Grade			
		Refer: Structure Minor Bridge Formula: 316	316	316.00	cum
			Total :	316.00	cum
5	14.03/g	cement concrete for Plain/Reinforced concrete in open foundation complete as per drawing and technical specifications RCC M30 Grade			
		Refer: Structure Minor Bridge Formula: 988	988	988.00	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	988.00	cum
6	14.08	HYSD bar reinforcement in foundation complete as per drawing and technical specification			
		Refer: Structure Minor Bridge Formula: 119	119	119.00	MT
			Total :	119.00	MT
		Sub Structure			
7	13.03/a	Backfilling abutment, wing wall and Return walls complete as per drawing and technical specification Granular materials			
		Refer: Structure Minor Bridge Formula: 393	393	393.00	cum
			Total :	393.00	cum
8	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: Structure Minor Bridge Formula: 1723	1723	1,723.00	cum
			Total :	1,723.00	cum
9	13.04	Filter medium behind abutment, wing wall and return wall complete as per drawing and technical specification .			
		Refer: Structure Minor Bridge Formula: 1060	1060	1,060.00	cum
			Total :	1,060.00	cum
10	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			
		Refer: Structure Minor Bridge Formula: 1883	1883	1,883.00	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	1,883.00	cum
11	15.03/g/ii	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 Between 5 to 10 m height			
		Refer: Structure Minor Bridge Formula: 221	221	221.00	cum
			Total :	221.00	cum
12	15.03/h/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 M35 Grade Pedestal			
		Refer: Structure Minor Bridge Formula: 53	53	53.00	cum
			Total :	53.00	cum
13	15.05	HYSD bar reinforcement in Sub-structure complete as per drawing and technical specification			
		Refer: Structure Minor Bridge Formula: 223	223	223.00	MT
			Total :	223.00	MT
14	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.			
		Refer: Structure Minor Bridge Formula: 277350	277350	277,350.00	cc
			Total :	277,350.00	cc



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
15	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.			
		Refer: Structure Minor Bridge Formula: 9200	9200	9,200.00	Ton
			Total :	9,200.00	Ton
16	15.12	Providing weep holes in concrete/Reinforced concrete abutment, wing wall/return wall Complete as per drawing and Technical specifications			
		Refer: Structure Minor Bridge Formula: 1294	1294	1,294.00	Rm
			Total :	1,294.00	Rm
		Super Structure			
17	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: Structure Minor Bridge Formula: 2592	2592	2,592.00	sqm
			Total :	2,592.00	sqm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
18	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: Structure Minor Bridge Formula: 104	104	104.00	cum
			Total :	104.00	cum
19	14/nsc1/i	Filler joint i)Providing & fixing 2 mm thick corrugated copper plate in expansion joint complete as per drawing & Technical Specification.			
		Refer: Structure Minor Bridge Formula: 228	228	228.00	m
			Total :	228.00	m
20	14/nsc1/ii	Filler joint Providing & fixing 20 mm thick compressible fibre board in expansion joint complete as per drawing & Technical Specification.			
		Refer: Structure Minor Bridge Formula: 228	228	228.00	m
			Total :	228.00	m
21	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.			



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
		Refer: Structure Minor Bridge Formula: 228	228	228.00	m
			Total :	228.00	m
22	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.			
		Refer: Structure Minor Bridge Formula: 228	228	228.00	m
			Total :	228.00	m
23	16.01/b/i/c 2/ii	RCC Grade M30 For solid slab super-structure Approach Slab			
		Refer: Structure Minor Bridge Formula: 1529	1529	1,529.00	cum
			Total :	1,529.00	cum
24	16.03	HYSD bar reinforcement in super-structure complete as per drawing and technical specifications			
		Refer: Structure Minor Bridge Formula: 254	254	254.00	MT
			Total :	254.00	MT
25	16.11	Drainage Spouts complete as per drawing and Technical specification			
		Refer: Structure Minor Bridge Formula: 60	60	60.00	each
			Total :	60.00	each
26	16.12/Nsc	Reinforced cement concrete approach slab M-30 including reinforcement and formwork complete as per drawing and Technical specification			
		Refer: Structure Minor Bridge Formula: 261	261	261.00	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	261.00	cum
27	16.13	PCC M15 ordinary Grade leveling course below approach slab complete as per drawing and Technical specification Below Approach Slab			
		Refer: Structure Minor Bridge Formula: 115	115	115.00	cum
			Total :	115.00	cum
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			
		Refer: Structure Minor Bridge Formula: 134	134	134.00	Rm
			Total :	134.00	Rm
29	16.17	Mastic asphalt (providing and laying 12mm thik mastic asphalt wearing courses on top of deck slab excluding prime coat with paving grade bitumem 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 10 sqm and at an aproximate 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)			
		Refer: Structure Minor Bridge Formula: 2592	2592	2,592.00	sqm
			Total :	2,592.00	sqm
		Protection Work			

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
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			
		Refer: Structure Minor Bridge Formula: 471	471	471.00	m
			Total :	471.00	m
31	13.01/a/i/N sc	Earth work in excavation Ordinary soil For Protection Work			
		Refer: Structure Minor Bridge Formula: 1534	1534	1,534.00	cum
			Total :	1,534.00	cum
32	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			
		Refer: Structure Minor Bridge Formula: 137+304+164	137+304+164	605.00	cum
			Total :	605.00	cum
33	17.01/a	laying apron complete as per drawing and Technical specification. Boulder			
		Refer: Structure Minor Bridge Formula: 829+232	829+232	1,061.00	cum



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	1,061.00	cum
34	17.02	Filter material underneath pitching in slopes complete as per drawing and Technical specification			
		Refer: Structure Minor Bridge Formula: 409	409	409.00	cum
			Total :	409.00	cum
35	17.03/a	Pitching on slopes complete as per drawing and Technical specifications Stone			
		Refer: Structure Minor Bridge Formula: 160	160	160.00	cum
			Total :	160.00	cum
36	17/nsc1	Flexible Apron - Construction of flexible apron 750mm thick comprising of loose stone boulders weighing not less than 40 kg beyond curtain wall.			
		Refer: Structure Minor Bridge Formula: 143	143	143.00	cum
			Total :	143.00	cum
		Miscellaneous Work			
37	08.05	Painting two coat after filling the surface with synthetic enamel paint in all shades on new plastered concrete surface.			
		Refer: Structure Minor Bridge Formula: 965	965	965.00	sqm
			Total :	965.00	sqm
		Diversion Work			
38	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: Diversion Work Formula: 630	630	630.00	cum

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	630.00	cum
39	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: Diversion Work Formula: 41	41	41.00	Cum
			Total :	41.00	Cum
40	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.			
		Refer: Diversion Work Formula: 69	69	69.00	cum
			Total :	69.00	cum

SI No	SOR Ref No	Description	Calculation	Quantity	Unit
41	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: Diversion Work Formula: 14	14	14.00	cum
			Total :	14.00	cum
42	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: Diversion Work Formula: 275	275	275.00	cum
			Total :	275.00	cum
43	09.01/nsc1	Laying Reinforced Cement Concrete Pipe NP4 / Prestressed Concrete Pipe on First Class Bedding in Single Row . B)1200 mm dia			
		Refer: Diversion Work Formula: 30	30	30.00	Rm



SI No	SOR Ref No	Description	Calculation	Quantity	Unit
			Total :	30.00	Rm



SUMMARY FOR BOX CULVERT		Span(m) x Height(m)=	TYPE-1 2.0X2.0m_TW- 10_Catchpit with stepped_NC	TYPE-2 2.0X2.0m_TW- 10_Catchpit with stepped_SE-4.7%	TYPE-3 2.0X2.0m_TW- 10_Catchpit with stepped_SE-7%	TYPE-4 2.0X2.0m_TW- 11_Catchpit with stepped_NC	TYPE-5 2.0X2.0m_TW- 11_Catchpit with stepped_SE-3.2%	TYPE-6 2.0X2.0m_TW- 11_Catchpit with stepped_SE-3.6%	TYPE-7 2.0X2.0m_TW- 11_Catchpit with stepped_SE-4%	TYPE-8 2.0X2.0m_TW- 11_Catchpit with stepped_SE-4.7%	TYPE-9 2.0X2.0m_TW- 11_Catchpit with stepped_SE-5.9%	TYPE-10 2.0X2.0m_TW- 11_Catchpit with stepped_SE-6.7%	TYPE-11 2.0X2.0m_TW- 11_Catchpit with stepped_SE-7%
SI No.	Description	Unit	9	1	3	52	1	1	1	1	2	1	22
1	Excavation	cum	82.56	87.42	101.46	86.38	100.53	101.15	101.77	104.66	104.66	105.90	111.27
2	PCC-M15	cum	11.01	12.03	14.47	11.55	14.05	14.17	14.30	14.89	14.89	15.14	15.99
3	RCC-Substructure	cum	45.52	50.56	60.89	48.11	58.76	59.39	60.02	63.02	63.02	64.32	68.77
4	Steel	ton	3.64	4.05	4.87	3.85	4.70	4.75	4.80	5.04	5.04	5.15	5.50
5	Weep holes	nos	18.00	22.00	33.00	18.00	18.00	22.00	22.00	22.00	22.00	33.00	36.00
6	Filter media	cum	36.65	44.26	48.23	38.69	44.60	45.36	46.13	49.84	49.84	51.46	56.01
7	Sand Filling in Foundation Trenches	cum	36.14	38.12	42.64	37.27	42.06	42.28	42.51	43.55	43.55	44.00	45.69
8	RCC-Superstructure(up to 5m)	cum	10.79	9.33	9.33	12.05	10.26	10.26	10.26	10.26	10.26	10.26	11.19
9	Steel	ton	0.86	0.75	0.75	0.96	0.82	0.82	0.82	0.82	0.82	0.82	0.90
10	Bituminous Concrete	cum	0.94	0.94	0.94	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.14
11	Mastic Asphalt	sqm	23.40	23.40	23.40	26.00	26.00	26.00	26.00	26.00	26.00	26.00	28.60
12	Tack Coat	sqm	23.40	23.40	23.40	26.00	26.00	26.00	26.00	26.00	26.00	26.00	28.60
13	RCC M-40 Crash Barrier	m	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20
14	Drainage Spout	nos	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
16	Curtain Wall PCC M-20	cum	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55	12.55
17	Excavation in Soil	cum	43.85	43.85	43.85	43.85	43.85	43.85	43.85	43.85	43.85	43.85	43.85
18	PCC M-15 Below Curtain Wall	cum	11.64	11.64	11.64	11.64	11.64	11.64	11.64	11.64	11.64	11.64	11.64
19	300 mm Boulder Pitching	cum	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
20	Painting	sqm	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30

SUMMARY FOR BOX CULVERT		Span(m) x Height(m)=	TYPE-12 2.0X2.0m_TW- 12_Catchpit with stepped_NC	TYPE-13 2.0X3.0m_TW- 10_Catchpit with stepped_NC	TYPE-14 2.0X3.0m_TW- 11_Catchpit with stepped_NC
Sl No.	Description	Unit	4	2	14
1	Excavation	cum	90.20	121.08	126.56
2	PCC-M15	cum	12.09	16.78	17.57
3	RCC-Substructure	cum	50.70	83.62	87.96
4	Steel	ton	4.06	6.69	7.04
5	Weep holes	nos	20.00	33.00	33.00
6	Filter media	cum	40.73	67.59	70.83
7	Sand Filling in Foundation Trenches	cum	38.40	49.95	51.60
8	RCC-Superstructure(up to 5m)	cum	14.19	11.73	13.09
9	Steel	ton	1.14	0.94	1.05
10	Bituminous Concrete	cum	1.14	0.97	1.08
11	Mastic Asphalt	sqm	28.60	24.30	27.00
12	Tack Coat	sqm	28.60	24.30	27.00
13	RCC M-40 Crash Barrier	m	5.20	5.40	5.40
14	Drainage Spout	nos	2.00	2.00	2.00
16	Curtain Wall PCC M-20	cum	12.55	12.55	12.55
17	Excavation in Soil	cum	43.85	43.85	43.85
18	PCC M-15 Below Curtain Wall	cum	11.64	11.64	11.64
19	300 mm Boulder Pitching	cum	7.00	7.00	7.00
20	Painting	sqm	13.30	13.81	13.81

SUMMARY FOR BOX CULVERT		Span(m) x Height(m)=	TYPE-15 2.0X3.0m_TW- 11_Catchpit with stepped_SE-3.7%	TYPE-16 2.0X3.0m_TW- 10_Catchpit with stepped_SE-5.7%	TYPE-17 2.0X3.0m_TW- 11_Catchpit with stepped_SE-7%	TYPE-18 2.0X3.0m_TW- 12_Catchpit with stepped_NC	TYPE-19 2.0X3.0m_TW- 12_Catchpit with stepped_SE-7%	TYPE-20 3.0X3.0m_TW- 10_Catchpit with stepped_NC	TYPE-21 3.0X3.0m_TW- 10_Catchpit with stepped_SE-3.6%	TYPE-22 3.0X3.0m_TW- 11_Catchpit with stepped_NC	TYPE-23 3.0X3.0m_TW- 11_Catchpit with stepped_SE-3.7%	TYPE-24 3.0X3.0m_TW- 11_Catchpit with stepped_SE-5.7%	TYPE-25 3.0X3.0m_TW- 11_Catchpit with stepped_SE-7%
SI No.	Description	Unit	2	1	1	1	1	3	1	17	1	1	1
1	Excavation	cum	151.88	156.21	159.09	132.05	166.01	130.08	156.46	135.86	163.24	167.57	170.31
2	PCC-M15	cum	20.97	21.75	22.27	18.37	23.33	18.32	21.79	19.16	22.82	23.61	24.10
3	RCC-Substructure	cum	108.93	113.84	117.13	92.31	123.45	91.33	112.98	96.24	119.20	124.28	127.56
4	Steel	ton	8.71	9.11	9.37	7.38	9.88	7.31	9.04	7.70	9.54	9.94	10.21
5	Weep holes	nos	33.00	33.00	52.00	36.00	56.00	33.00	33.00	33.00	33.00	33.00	52.00
6	Filter media	cum	79.67	84.68	88.05	74.07	93.53	69.04	76.74	72.28	81.33	86.40	89.73
7	Sand Filling in Foundation Trenches	cum	59.58	60.96	61.87	53.25	63.98	49.91	58.04	51.32	59.78	61.15	62.03
8	RCC-Superstructure(up to 5m)	cum	11.24	11.24	11.24	14.49	12.26	18.51	16.35	20.63	17.99	17.99	17.99
9	Steel	ton	0.90	0.90	0.90	1.16	0.98	1.48	1.31	1.65	1.44	1.44	1.44
10	Bituminous Concrete	cum	1.08	1.08	1.08	1.19	1.19	1.38	1.38	1.54	1.54	1.54	1.54
11	Mastic Asphalt	sqm	27.00	27.00	27.00	29.70	29.70	34.56	34.56	38.40	38.40	38.40	38.40
12	Tack Coat	sqm	27.00	27.00	27.00	29.70	29.70	34.56	34.56	38.40	38.40	38.40	38.40
13	RCC M-40 Crash Barrier	m	5.40	5.40	5.40	5.40	5.40	7.68	7.68	7.68	7.68	7.68	7.68
14	Drainage Spout	nos	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
16	Curtain Wall PCC M-20	cum	12.55	12.55	12.55	12.55	12.55	13.91	13.91	13.91	13.91	13.91	13.91
17	Excavation in Soil	cum	43.85	43.85	43.85	43.85	43.85	50.80	50.80	50.80	50.80	50.80	50.80
18	PCC M-15 Below Curtain Wall	cum	11.64	11.64	11.64	11.64	11.64	14.22	14.22	14.22	14.22	14.22	14.22
19	300 mm Boulder Pitching	cum	7.00	7.00	7.00	7.00	7.00	8.96	8.96	8.96	8.96	8.96	8.96
20	Painting	sqm	13.81	13.81	13.81	13.81	13.81	19.65	19.65	19.65	19.65	19.65	19.65

SUMMARY FOR BOX CULVERT		Span(m) x Height(m)=	TYPE-26 3.0X3.0m_TW- 12_Catchpit with stepped_NC	TYPE-27 3.0X4.0m_TW- 10_Catchpit with stepped_NC	TYPE-28 3.0X4.0m_TW- 11_Catchpit with stepped_NC	TYPE-29 3.0X4.0m_TW- 11_Catchpit with stepped_SE-5.6%	TYPE-30 3.0X4.0m_TW- 11_Catchpit with stepped_SE-7%	TYPE-31 3.0X4.0m_TW- 11_Catchpit with stepped_SE- 7%_EC	TYPE-32 3.0X4.0m_TW- 12_Catchpit with stepped_NC	TYPE-33 4.0X3.0m_TW- 10_Catchpit with stepped_NC	TYPE-34 4.0X3.0m_TW- 11_Catchpit with stepped_NC	TYPE-35 4.0X3.0m_TW- 12_Catchpit with stepped_NC	TYPE-36 4.0X4.0m_TW- 11_Catchpit with stepped_NC
SI No.	Description	Unit	3	4	7	1	1	1	2	1	1	1	1
1	Excavation	cum	141.63	183.72	191.46	212.90	184.19	444.89	199.20	141.02	147.48	140.16	206.05
2	PCC-M15	cum	20.01	25.15	26.24	28.97	25.76	44.75	27.34	19.67	20.54	19.08	27.90
3	RCC-Substructure	cum	101.15	150.34	157.56	185.12	143.83	369.91	164.77	103.84	109.77	105.48	176.19
4	Steel	ton	8.09	12.03	12.60	14.81	11.51	29.59	13.18	8.31	8.78	8.44	14.10
5	Weep holes	nos	36.00	52.00	52.00	52.00	52.00	68.00	56.00	33.00	33.00	36.00	52.00
6	Filter media	cum	75.52	108.07	112.51	129.41	90.59	186.55	116.95	69.79	73.03	76.27	113.39
7	Sand Filling in Foundation Trenches	cum	52.73	66.61	68.56	74.88	60.37	171.10	70.51	48.28	49.47	46.87	66.91
8	RCC-Superstructure(up to 5m)	cum	22.79	20.07	22.35	19.65	25.00	33.31	24.67	25.54	28.44	31.40	30.68
9	Steel	ton	1.82	1.61	1.79	1.57	2.00	2.66	1.97	2.04	2.27	2.51	2.45
10	Bituminous Concrete	cum	1.69	1.41	1.57	1.57	2.00		1.72	1.80	2.00	2.20	2.04
11	Mastic Asphalt	sqm	42.24	35.28	39.20	39.20	50.00		43.12	45.00	50.00	55.00	51.00
12	Tack Coat	sqm	42.24	35.28	39.20	39.20	50.00		43.12	45.00	50.00	55.00	51.00
13	RCC M-40 Crash Barrier	m	7.68	7.84	7.84	7.84	10.00		7.84	10.00	10.00	10.00	10.20
14	Drainage Spout	nos	2.00	2.00	2.00	2.00	2.00		2.00	2.00	2.00	2.00	2.00
16	Curtain Wall PCC M-20	cum	13.91	13.91	13.91	13.91	15.27	13.91	13.91	15.27	15.27	15.27	15.27
17	Excavation in Soil	cum	50.80	50.80	50.80	50.80	57.74	52.56	50.80	57.74	57.74	57.74	57.74
18	PCC M-15 Below Curtain Wall	cum	14.22	14.22	14.22	14.22	16.80	14.22	14.22	16.80	16.80	16.80	16.80
19	300 mm Boulder Pitching	cum	8.96	8.96	8.96	8.96	10.93	8.96	8.96	10.93	10.93	10.93	10.93
20	Painting	sqm	19.65	20.05	20.05	20.05	25.58		20.05	25.58	25.58	25.58	26.09

SUMMARY FOR BOX CULVERT		Span(m) x Height(m)=	TYPE-37 4.0X4.0m_TW- 11_Catchpit with stepped_SE-7%	TYPE-38 4.0X5.0m_TW- 11_Catchpit with stepped_NC	TYPE-39 5.0X3.0m_TW- 11_Catchpit with stepped_SE-5.7%	TYPE-40 5.0X3.0m_TW- 11_Catchpit with stepped_SE-7%	TYPE-41 5.0X4.0m_TW- 11_Catchpit with stepped_NC	TYPE-42 5.0X4.0m_TW- 11_Catchpit with stepped_SE- 5.9%_EC	TYPE-43 5.0X5.0m_TW- 11_Catchpit with stepped_SE-7%	TYPE-44 5.0X5.0m_TW- 10_Catchpit with stepped_SE- 7%_EC	TYPE-45 5.0X5.0m_TW- 11_Catchpit with stepped_SE- 7%_EC	Total
			1	3	1	1	3	1	3	1	2	183
SI No.	Description	Unit										
1	Excavation	cum	231.63	255.86	200.75	203.49	230.37	502.35	357.77	674.74	566.49	20895
2	PCC-M15	cum	31.24	33.39	27.30	27.80	30.19	49.09	42.87	59.94	55.22	2760
3	RCC-Substructure	cum	210.44	253.63	158.27	161.85	203.69	427.10	362.71	655.07	531.88	15964
4	Steel	ton	16.84	20.29	12.66	12.95	16.30	34.17	29.02	52.41	42.55	1277
5	Weep holes	nos	65.00	75.00	39.00	52.00	52.00	68.00	90.00	85.00	85.00	5164
6	Filter media	cum	134.80	162.14	88.55	91.94	115.09	194.64	190.04	252.00	258.46	10786
7	Sand Filling in Foundation Trenches	cum	74.19	79.66	60.42	61.25	68.59	167.97	99.90	215.84	186.81	7695
8	RCC-Superstructure(up to 5m)	cum	27.18	33.95	34.02	34.02	40.23	56.58	41.08	57.01	60.70	2501
9	Steel	ton	2.17	2.72	2.72	2.72	3.22	4.53	3.29	4.56	4.86	200
10	Bituminous Concrete	cum		2.10	2.46	2.46	2.50		2.56			173
11	Mastic Asphalt	sqm		52.60	61.40	61.40	62.40		64.00			4335
12	Tack Coat	sqm		52.60	61.40	61.40	62.40		64.00			4335
13	RCC M-40 Crash Barrier	m		10.52	12.28	12.28	12.48		12.80			862
14	Drainage Spout	nos		2.00	2.00	2.00	2.00		2.00			252
16	Curtain Wall PCC M-20	cum	51.00	15.27	16.64	16.64	16.64	16.64	16.64	16.64	16.64	1823
17	Excavation in Soil	cum	2.04	57.74	64.68	64.68	64.68	67.24	64.68	67.24	67.24	6411
18	PCC M-15 Below Curtain Wall	cum	51.00	16.80	19.39	19.39	19.39	19.39	19.39	19.39	19.39	1818
19	300 mm Boulder Pitching	cum	10.20	10.93	12.89	12.89	12.89	12.89	12.89	12.89	12.89	1111
20	Painting	sqm		26.91	31.41	31.41	31.92		32.74			2206

ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	11.000	0.830	42.00
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	3.510	3.500	0.550	27.03
						Total	82.56

2	PCC-M15						
	Box culvert	cum	1	3.600	7.760	0.150	4.19
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.110	2.700	0.150	5.04
						Total	11.01

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	10.000	0.380	13.68
	Box Side Wall	cum	2	10.00	2.000	0.300	12.00
	Base slab of Return wall II	cum	4	3.010	2.500	0.250	7.53
	Return wall I	cum	4	0.500	2.350	0.250	1.18
	Return wall II	cum	4	3.010	0.225	2.480	6.72
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	45.52

4	Steel						
	@ 80 Kg per cum of concrete	ton					3.64
						Total	3.64

5	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 = $9.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $1.7/1 =$					2	
	No of weep holes in horizontal direction per return wall = $3/2 =$					2	
	No of weep holes in vertical direction per return wall = $1.7/1 =$					2	
	Total no of Weep holes per abutment = 5×2					10	
	Total no of Weep holes per return wall = 2×2					4	
	Total mtrs of weep holes = $10 \times 2 + 4 \times 4$					Total	18.00

6	Filter media						
	Behind Abutment	cum	2	9.500	0.600	1.700	19.38
	Behind Return Wall	cum	4	3.510	0.600	2.050	17.27
						Total	36.65

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					82.56
	Less for PCC	cum					11.01
	Less for Bottom Slab RCC	cum					13.68
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					7.53
	Less for Return Wall-II Stem Wall	cum	4	3.010	0.250	0.430	1.29
	Less for Box above Invert upto EGL	cum	1	2.60	11.000	0.300	8.58
						Total	36.14

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	10.000	0.406	10.56
	(+)Haunch	cum	2	10.00	0.01125		0.23
						Total	10.79



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.86
						Total	0.86
10	Bituminous Concrete						
		cum	1	2.60	9.00	0.04	0.94
						Total	0.94
11	Mastic Asphalt						
		sqm	1	2.60	9.00		23.40
						Total	23.40
12	Tack Coat						
		sqm	1	2.60	9.00		23.40
						Total	23.40
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	11.000	0.830	42.00
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	4.140	3.500	0.550	31.88
						Total	87.42

2	PCC-M15						
	Box culvert	cum	1	3.600	7.760	0.150	4.19
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.740	2.700	0.150	6.06
						Total	12.03

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	10.000	0.380	13.68
	Box Side Wall	cum	2	10.00	2.212	0.300	13.27
	Base slab of Return wall II	cum	4	3.640	2.500	0.250	9.10
	Return wall I	cum	4	0.500	2.562	0.250	1.28
	Return wall II	cum	4	3.640	0.225	2.692	8.82
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	50.56

4	Steel						
	@ 80 Kg per cum of concrete	ton					4.05
						Total	4.05

5	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 = $9.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $1.9/1 =$					2	
	No of weep holes in horizontal direction per return wall = $3/2 =$					3	
	No of weep holes in vertical direction per return wall = $1.9/1 =$					2	
	Total no of Weep holes per abutment = 5×2					10	
	Total no of Weep holes per return wall = 3×2					6	
	Total mtrs of weep holes = $10 \times 2 + 6 \times 4$					Total	22.00

6	Filter media						
	Behind Abutment	cum	2	9.500	0.600	1.912	21.79
	Behind Return Wall	cum	4	4.140	0.600	2.262	22.47
						Total	44.26

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					87.42
	Less for PCC	cum					12.03
	Less for Bottom Slab RCC	cum					13.68
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					9.10
	Less for Return Wall-II Stem Wall	cum	4	3.640	0.250	0.430	1.57
	Less for Box above Invert upto EGL	cum	1	2.60	11.000	0.300	8.58
						Total	38.12

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	10.000	0.350	9.10
	(+)Haunch	cum	2	10.00	0.01125		0.23
						Total	9.33



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.75
						Total	0.75
10	Bituminous Concrete						
		cum	1	2.60	9.00	0.04	0.94
						Total	0.94
11	Mastic Asphalt						
		sqm	1	2.60	9.00		23.40
						Total	23.40
12	Tack Coat						
		sqm	1	2.60	9.00		23.40
						Total	23.40
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	11.000	0.830	42.00
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	4.450	4.300	0.600	45.92
						Total	101.46

2	PCC-M15						
	Box culvert	cum	1	3.600	7.760	0.150	4.19
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	4.050	3.500	0.150	8.51
						Total	14.47

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	10.000	0.380	13.68
	Box Side Wall	cum	2	10.00	2.315	0.300	13.89
	Base slab of Return wall II	cum	4	3.950	3.300	0.300	15.64
	Return wall I	cum	4	0.500	2.665	0.250	1.33
	Return wall II	cum	4	3.950	0.275	2.745	11.93
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	60.89

4	Steel						
	@ 80 Kg per cum of concrete	ton					4.87
						Total	4.87

5	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 = $9.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $2/1 =$					3	
	No of weep holes in horizontal direction per return wall = $3/2 =$					3	
	No of weep holes in vertical direction per return wall = $2/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	9.500	0.600	2.015	22.97
	Behind Return Wall	cum	4	4.450	0.600	2.365	25.26
						Total	48.23

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					101.46
	Less for PCC	cum					14.47
	Less for Bottom Slab RCC	cum					13.68
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					15.64
	Less for Return Wall-II Stem Wall	cum	4	3.950	0.350	0.380	2.10
	Less for Box above Invert upto EGL	cum	1	2.60	11.000	0.300	8.58
						Total	42.64

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	10.000	0.350	9.10
	(+)Haunch	cum	2	10.00	0.01125		0.23
						Total	9.33



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.75
						Total	0.75
10	Bituminous Concrete						
		cum	1	2.60	9.00	0.04	0.94
						Total	0.94
11	Mastic Asphalt						
		sqm	1	2.60	9.00		23.40
						Total	23.40
12	Tack Coat						
		sqm	1	2.60	9.00		23.40
						Total	23.40
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	12.000	0.830	45.82
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	3.510	3.500	0.550	27.03
						Total	86.38
2	PCC-M15						
	Box culvert	cum	1	3.600	8.760	0.150	4.73
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.110	2.700	0.150	5.04
						Total	11.55

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	11.000	0.380	15.05
	Box Side Wall	cum	2	11.00	2.000	0.300	13.20
	Base slab of Return wall II	cum	4	3.010	2.500	0.250	7.53
	Return wall I	cum	4	0.500	2.350	0.250	1.18
	Return wall II	cum	4	3.010	0.225	2.480	6.72
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	48.11

4	Steel						
	@ 80 Kg per cum of concrete	ton					3.85
						Total	3.85

5	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 =10.5/2 =					5	
	No of weep holes in vertical direction per abutment =1.7/1 =					2	
	No of weep holes in horizontal direction per return wall =3/2 =					2	
	No of weep holes in vertical direction per return wall =1.7/1 =					2	
	Total no of Weep holes per abutment = 5 x 2					10	
	Total no of Weep holes per return wall = 2 x 2					4	
	Total mtrs of weep holes = 10 x 2 + 4 x 4					Total	18.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	1.700	21.42
	Behind Return Wall	cum	4	3.510	0.600	2.050	17.27
						Total	38.69

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					86.38
	Less for PCC	cum					11.55
	Less for Bottom Slab RCC	cum					15.05
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					7.53
	Less for Return Wall-II Stem Wall	cum	4	3.010	0.250	0.430	1.29
	Less for Box above Invert upto EGL	cum	1	2.60	12.000	0.300	9.36
						Total	37.27

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	11.000	0.413	11.80
	(+)-Haunch	cum	2	11.00	0.01125		0.25
						Total	12.05



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.96
						Total	0.96
10	Bituminous Concrete						
		cum	1	2.60	10.00	0.04	1.04
						Total	1.04
11	Mastic Asphalt						
		sqm	1	2.60	10.00		26.00
						Total	26.00
12	Tack Coat						
		sqm	1	2.60	10.00		26.00
						Total	26.00
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	12.000	0.830	45.82
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	3.990	4.300	0.600	41.18
						Total	100.53

2	PCC-M15						
	Box culvert	cum	1	3.600	8.760	0.150	4.73
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.590	3.500	0.150	7.54
						Total	14.05

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	11.000	0.380	15.05
	Box Side Wall	cum	2	11.00	2.160	0.300	14.26
	Base slab of Return wall II	cum	4	3.490	3.300	0.300	13.82
	Return wall I	cum	4	0.500	2.510	0.250	1.26
	Return wall II	cum	4	3.490	0.275	2.590	9.94
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	58.76

4	Steel						
	@ 80 Kg per cum of concrete	ton					4.70
						Total	4.70

5	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 =10.5/2 =					5	
	No of weep holes in vertical direction per abutment =1.9/1 =					2	
	No of weep holes in horizontal direction per return wall =3/2 =					2	
	No of weep holes in vertical direction per return wall =1.9/1 =					2	
	Total no of Weep holes per abutment = 5 x 2					10	
	Total no of Weep holes per return wall = 2 x 2					4	
	Total mtrs of weep holes = 10 x 2 + 4 x 4					Total	18.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	1.860	23.44
	Behind Return Wall	cum	4	3.990	0.600	2.210	21.16
						Total	44.60

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					100.53
	Less for PCC	cum					14.05
	Less for Bottom Slab RCC	cum					15.05
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					13.82
	Less for Return Wall-II Stem Wall	cum	4	3.490	0.350	0.380	1.86
	Less for Box above Invert upto EGL	cum	1	2.60	12.000	0.300	9.36
						Total	42.06

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	11.000	0.350	10.01
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	10.26



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.82
						Total	0.82
10	Bituminous Concrete						
		cum	1	2.60	10.00	0.04	1.04
						Total	1.04
11	Mastic Asphalt						
		sqm	1	2.60	10.00		26.00
						Total	26.00
12	Tack Coat						
		sqm	1	2.60	10.00		26.00
						Total	26.00
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	12.000	0.830	45.82
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	4.050	4.300	0.600	41.80
						Total	101.15

2	PCC-M15						
	Box culvert	cum	1	3.600	8.760	0.150	4.73
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.650	3.500	0.150	7.67
						Total	14.17

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	11.000	0.380	15.05
	Box Side Wall	cum	2	11.00	2.180	0.300	14.39
	Base slab of Return wall II	cum	4	3.550	3.300	0.300	14.06
	Return wall I	cum	4	0.500	2.530	0.250	1.27
	Return wall II	cum	4	3.550	0.275	2.610	10.19
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	59.39

4	Steel						
	@ 80 Kg per cum of concrete	ton					4.75
						Total	4.75

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $1.9/1 =$					2	
	No of weep holes in horizontal direction per return wall = $3/2 =$					3	
	No of weep holes in vertical direction per return wall = $1.9/1 =$					2	
	Total no of Weep holes per abutment = 5×2					10	
	Total no of Weep holes per return wall = 3×2					6	
	Total mtrs of weep holes = $10 \times 2 + 6 \times 4$					Total	22.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	1.880	23.69
	Behind Return Wall	cum	4	4.050	0.600	2.230	21.68
						Total	45.36

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					101.15
	Less for PCC	cum					14.17
	Less for Bottom Slab RCC	cum					15.05
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					14.06
	Less for Return Wall-II Stem Wall	cum	4	3.550	0.350	0.380	1.89
	Less for Box above Invert upto EGL	cum	1	2.60	12.000	0.300	9.36
						Total	42.28

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	11.000	0.350	10.01
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	10.26



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.82
						Total	0.82
10	Bituminous Concrete						
		cum	1	2.60	10.00	0.04	1.04
						Total	1.04
11	Mastic Asphalt						
		sqm	1	2.60	10.00		26.00
						Total	26.00
12	Tack Coat						
		sqm	1	2.60	10.00		26.00
						Total	26.00
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	12.000	0.830	45.82
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	4.110	4.300	0.600	42.42
						Total	101.77

2	PCC-M15						
	Box culvert	cum	1	3.600	8.760	0.150	4.73
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.710	3.500	0.150	7.79
						Total	14.30

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	11.000	0.380	15.05
	Box Side Wall	cum	2	11.00	2.200	0.300	14.52
	Base slab of Return wall II	cum	4	3.610	3.300	0.300	14.30
	Return wall I	cum	4	0.500	2.550	0.250	1.28
	Return wall II	cum	4	3.610	0.275	2.630	10.44
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	60.02

4	Steel						
	@ 80 Kg per cum of concrete	ton					4.80
						Total	4.80

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $1.9/1 =$					2	
	No of weep holes in horizontal direction per return wall = $3/2 =$					3	
	No of weep holes in vertical direction per return wall = $1.9/1 =$					2	
	Total no of Weep holes per abutment = 5×2					10	
	Total no of Weep holes per return wall = 3×2					6	
	Total mtrs of weep holes = $10 \times 2 + 6 \times 4$					Total	22.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	1.900	23.94
	Behind Return Wall	cum	4	4.110	0.600	2.250	22.19
						Total	46.13

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					101.77
	Less for PCC	cum					14.30
	Less for Bottom Slab RCC	cum					15.05
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					14.30
	Less for Return Wall-II Stem Wall	cum	4	3.610	0.350	0.380	1.92
	Less for Box above Invert upto EGL	cum	1	2.60	12.000	0.300	9.36
						Total	42.51

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	11.000	0.350	10.01
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	10.26



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.82
						Total	0.82
10	Bituminous Concrete						
		cum	1	2.60	10.00	0.04	1.04
						Total	1.04
11	Mastic Asphalt						
		sqm	1	2.60	10.00		26.00
						Total	26.00
12	Tack Coat						
		sqm	1	2.60	10.00		26.00
						Total	26.00
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	12.000	0.830	45.82
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	4.390	4.300	0.600	45.30
						Total	104.66

2	PCC-M15						
	Box culvert	cum	1	3.600	8.760	0.150	4.73
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.990	3.500	0.150	8.38
						Total	14.89

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	11.000	0.380	15.05
	Box Side Wall	cum	2	11.00	2.295	0.300	15.15
	Base slab of Return wall II	cum	4	3.890	3.300	0.300	15.40
	Return wall I	cum	4	0.500	2.645	0.250	1.32
	Return wall II	cum	4	3.890	0.275	2.725	11.66
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	63.02

4	Steel						
	@ 80 Kg per cum of concrete	ton					5.04
						Total	5.04

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $2/1 =$					2	
	No of weep holes in horizontal direction per return wall = $3/2 =$					3	
	No of weep holes in vertical direction per return wall = $2/1 =$					2	
	Total no of Weep holes per abutment = 5×2					10	
	Total no of Weep holes per return wall = 3×2					6	
	Total mtrs of weep holes = $10 \times 2 + 6 \times 4$					Total	22.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	1.995	25.14
	Behind Return Wall	cum	4	4.390	0.600	2.345	24.71
						Total	49.84

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					104.66
	Less for PCC	cum					14.89
	Less for Bottom Slab RCC	cum					15.05
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					15.40
	Less for Return Wall-II Stem Wall	cum	4	3.890	0.350	0.380	2.07
	Less for Box above Invert upto EGL	cum	1	2.60	12.000	0.300	9.36
						Total	43.55

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	11.000	0.350	10.01
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	10.26



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.82
						Total	0.82
10	Bituminous Concrete						
		cum	1	2.60	10.00	0.04	1.04
						Total	1.04
11	Mastic Asphalt						
		sqm	1	2.60	10.00		26.00
						Total	26.00
12	Tack Coat						
		sqm	1	2.60	10.00		26.00
						Total	26.00
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	12.000	0.830	45.82
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	4.390	4.300	0.600	45.30
						Total	104.66

2	PCC-M15						
	Box culvert	cum	1	3.600	8.760	0.150	4.73
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.990	3.500	0.150	8.38
						Total	14.89

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	11.000	0.380	15.05
	Box Side Wall	cum	2	11.00	2.295	0.300	15.15
	Base slab of Return wall II	cum	4	3.890	3.300	0.300	15.40
	Return wall I	cum	4	0.500	2.645	0.250	1.32
	Return wall II	cum	4	3.890	0.275	2.725	11.66
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	63.02

4	Steel						
	@ 80 Kg per cum of concrete	ton					5.04
						Total	5.04

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $2/1 =$					2	
	No of weep holes in horizontal direction per return wall = $3/2 =$					3	
	No of weep holes in vertical direction per return wall = $2/1 =$					2	
	Total no of Weep holes per abutment = 5×2					10	
	Total no of Weep holes per return wall = 3×2					6	
	Total mtrs of weep holes = $10 \times 2 + 6 \times 4$					Total	22.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	1.995	25.14
	Behind Return Wall	cum	4	4.390	0.600	2.345	24.71
						Total	49.84

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					104.66
	Less for PCC	cum					14.89
	Less for Bottom Slab RCC	cum					15.05
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					15.40
	Less for Return Wall-II Stem Wall	cum	4	3.890	0.350	0.380	2.07
	Less for Box above Invert upto EGL	cum	1	2.60	12.000	0.300	9.36
						Total	43.55

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	11.000	0.350	10.01
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	10.26



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.82
						Total	0.82
10	Bituminous Concrete						
		cum	1	2.60	10.00	0.04	1.04
						Total	1.04
11	Mastic Asphalt						
		sqm	1	2.60	10.00		26.00
						Total	26.00
12	Tack Coat						
		sqm	1	2.60	10.00		26.00
						Total	26.00
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	12.000	0.830	45.82
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	4.510	4.300	0.600	46.54
						Total	105.90

2	PCC-M15						
	Box culvert	cum	1	3.600	8.760	0.150	4.73
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	4.110	3.500	0.150	8.63
						Total	15.14

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	11.000	0.380	15.05
	Box Side Wall	cum	2	11.00	2.335	0.300	15.41
	Base slab of Return wall II	cum	4	4.010	3.300	0.300	15.88
	Return wall I	cum	4	0.500	2.685	0.250	1.34
	Return wall II	cum	4	4.010	0.275	2.765	12.20
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	64.32

4	Steel						
	@ 80 Kg per cum of concrete	ton					5.15
						Total	5.15

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $2/1 =$					3	
	No of weep holes in horizontal direction per return wall = $3/2 =$					3	
	No of weep holes in vertical direction per return wall = $2/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	2.035	25.64
	Behind Return Wall	cum	4	4.510	0.600	2.385	25.82
						Total	51.46

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					105.90
	Less for PCC	cum					15.14
	Less for Bottom Slab RCC	cum					15.05
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					15.88
	Less for Return Wall-II Stem Wall	cum	4	4.010	0.350	0.380	2.13
	Less for Box above Invert upto EGL	cum	1	2.60	12.000	0.300	9.36
						Total	44.00

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	11.000	0.350	10.01
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	10.26



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.82
						Total	0.82
10	Bituminous Concrete						
		cum	1	2.60	10.00	0.04	1.04
						Total	1.04
11	Mastic Asphalt						
		sqm	1	2.60	10.00		26.00
						Total	26.00
12	Tack Coat						
		sqm	1	2.60	10.00		26.00
						Total	26.00
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	13.000	0.830	49.63
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	4.660	4.300	0.600	48.09
						Total	111.27

2	PCC-M15						
	Box culvert	cum	1	3.600	9.760	0.150	5.27
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	4.260	3.500	0.150	8.95
						Total	15.99

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	12.000	0.380	16.42
	Box Side Wall	cum	2	12.00	2.385	0.300	17.17
	Base slab of Return wall II	cum	4	4.160	3.300	0.300	16.47
	Return wall I	cum	4	0.500	2.735	0.250	1.37
	Return wall II	cum	4	4.160	0.275	2.815	12.88
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	12.000	0.01125		0.27
						Total=	68.77

4	Steel						
	@ 80 Kg per cum of concrete	ton					5.50
						Total	5.50

5	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 = $11.5/2 =$					6	
	No of weep holes in vertical direction per abutment = $2.1/1 =$					3	
	No of weep holes in horizontal direction per return wall = $3/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.1/1 =$					3	
	Total no of Weep holes per abutment = 6×3					18	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $18 \times 2 + 9 \times 4$					Total	36.00

6	Filter media						
	Behind Abutment	cum	2	11.500	0.600	2.085	28.77
	Behind Return Wall	cum	4	4.660	0.600	2.435	27.23
						Total	56.01

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					111.27
	Less for PCC	cum					15.99
	Less for Bottom Slab RCC	cum					16.42
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					16.47
	Less for Return Wall-II Stem Wall	cum	4	4.160	0.350	0.380	2.21
	Less for Box above Invert upto EGL	cum	1	2.60	13.000	0.300	10.14
						Total	45.69

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	12.000	0.350	10.92
	(+)Haunch	cum	2	12.00	0.01125		0.27
						Total	11.19



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.90
						Total	0.90
10	Bituminous Concrete						
		cum	1	2.60	11.00	0.04	1.14
						Total	1.14
11	Mastic Asphalt						
		sqm	1	2.60	11.00		28.60
						Total	28.60
12	Tack Coat						
		sqm	1	2.60	11.00		28.60
						Total	28.60
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	4.600	13.000	0.830	49.63
	Shear Key	cum	2	4.800	1.720	0.820	13.54
	Return Wall II	cum	4	3.510	3.500	0.550	27.03
						Total	90.20

2	PCC-M15						
	Box culvert	cum	1	3.600	9.760	0.150	5.27
	Shear Key	cum	2	3.800	1.560	0.150	1.78
	Return Wall II	cum	4	3.110	2.700	0.150	5.04
						Total	12.09

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	3.600	12.000	0.380	16.42
	Box Side Wall	cum	2	12.00	2.000	0.300	14.40
	Base slab of Return wall II	cum	4	3.010	2.500	0.250	7.53
	Return wall I	cum	4	0.500	2.350	0.250	1.18
	Return wall II	cum	4	3.010	0.225	2.480	6.72
	Shear Key	cum	2	3.600	0.58220		4.19
	Haunch	cum	2	12.000	0.01125		0.27
						Total=	50.70

4	Steel						
	@ 80 Kg per cum of concrete	ton					4.06
						Total	4.06

5	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 = $11.5/2 =$					6	
	No of weep holes in vertical direction per abutment = $1.7/1 =$					2	
	No of weep holes in horizontal direction per return wall = $3/2 =$					2	
	No of weep holes in vertical direction per return wall = $1.7/1 =$					2	
	Total no of Weep holes per abutment = 6×2					12	
	Total no of Weep holes per return wall = 2×2					4	
	Total mtrs of weep holes = $12 \times 2 + 4 \times 4$					Total	20.00

6	Filter media						
	Behind Abutment	cum	2	11.500	0.600	1.700	23.46
	Behind Return Wall	cum	4	3.510	0.600	2.050	17.27
						Total	40.73

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					90.20
	Less for PCC	cum					12.09
	Less for Bottom Slab RCC	cum					16.42
	Less for Shear Key RCC	cum					4.19
	Less for Return Wall-I RCC	cum	4	0.500	0.250	0.300	0.15
	Less for Return Wall-II Base Slab	cum					7.53
	Less for Return Wall-II Stem Wall	cum	4	3.010	0.250	0.430	1.29
	Less for Box above Invert upto EGL	cum	1	2.60	13.000	0.300	10.14
						Total	38.40

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.600	12.000	0.446	13.92
	(+)Haunch	cum	2	12.00	0.01125		0.27
						Total	14.19



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.14
						Total	1.14
10	Bituminous Concrete						
		cum	1	2.60	11.00	0.04	1.14
						Total	1.14
11	Mastic Asphalt						
		sqm	1	2.60	11.00		28.60
						Total	28.60
12	Tack Coat						
		sqm	1	2.60	11.00		28.60
						Total	28.60
13	RCC M-40 Crash Barrier	m	2	2.60			5.20
						Total	5.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/22/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.60	2.558		13.30
						Total	13.30



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.300	11.000	0.870	60.29
	Shear Key	cum	2	6.500	1.680	0.780	17.04
	Return Wall II	cum	4	4.240	4.300	0.600	43.76
						Total	121.08

2	PCC-M15						
	Box culvert	cum	1	5.300	7.840	0.150	6.23
	Shear Key	cum	2	5.500	1.503	0.150	2.48
	Return Wall II	cum	4	3.840	3.500	0.150	8.06
						Total	16.78

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.300	10.000	0.420	22.26
	Box Side Wall	cum	2	10.00	3.000	0.350	21.00
	Base slab of Return wall II	cum	4	3.740	3.300	0.300	14.81
	Return wall I	cum	4	1.300	3.370	0.300	5.26
	Return wall II	cum	4	3.740	0.275	3.490	14.36
	Shear Key	cum	2	5.300	0.53820		5.70
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	83.62

4	Steel						
	@ 80 Kg per cum of concrete	ton					6.69
						Total	6.69

5	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 = $9.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $2.7/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.7/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	9.400	0.600	2.700	30.46
	Behind Return Wall	cum	4	5.040	0.600	3.070	37.13
						Total	67.59

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					121.08
	Less for PCC	cum					16.78
	Less for Bottom Slab RCC	cum					22.26
	Less for Shear Key RCC	cum					5.70
	Less for Return Wall-I RCC	cum	4	1.300	0.300	0.300	0.47
	Less for Return Wall-II Base Slab	cum					14.81
	Less for Return Wall-II Stem Wall	cum	4	3.740	0.350	0.420	2.20
	Less for Box above Invert upto EGL	cum	1	2.70	11.000	0.300	8.91
						Total	49.95

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.700	10.000	0.426	11.51
	(+)Haunch	cum	2	10.00	0.01125		0.23
						Total	11.73



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.94
						Total	0.94
10	Bituminous Concrete						
		cum	1	2.70	9.00	0.04	0.97
						Total	0.97
11	Mastic Asphalt						
		sqm	1	2.70	9.00		24.30
						Total	24.30
12	Tack Coat						
		sqm	1	2.70	9.00		24.30
						Total	24.30
13	RCC M-40 Crash Barrier	m	2	2.70			5.40
						Total	5.40
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.70	2.558		13.81
						Total	13.81



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.300	12.000	0.870	65.77
	Shear Key	cum	2	6.500	1.680	0.780	17.04
	Return Wall II	cum	4	4.240	4.300	0.600	43.76
						Total	126.56

2	PCC-M15						
	Box culvert	cum	1	5.300	8.840	0.150	7.03
	Shear Key	cum	2	5.500	1.503	0.150	2.48
	Return Wall II	cum	4	3.840	3.500	0.150	8.06
						Total	17.57

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.300	11.000	0.420	24.49
	Box Side Wall	cum	2	11.00	3.000	0.350	23.10
	Base slab of Return wall II	cum	4	3.740	3.300	0.300	14.81
	Return wall I	cum	4	1.300	3.370	0.300	5.26
	Return wall II	cum	4	3.740	0.275	3.490	14.36
	Shear Key	cum	2	5.300	0.53820		5.70
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	87.96

4	Steel						
	@ 80 Kg per cum of concrete	ton					7.04
						Total	7.04

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $2.7/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.7/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	2.700	33.70
	Behind Return Wall	cum	4	5.040	0.600	3.070	37.13
						Total	70.83

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					126.56
	Less for PCC	cum					17.57
	Less for Bottom Slab RCC	cum					24.49
	Less for Shear Key RCC	cum					5.70
	Less for Return Wall-I RCC	cum	4	1.300	0.300	0.300	0.47
	Less for Return Wall-II Base Slab	cum					14.81
	Less for Return Wall-II Stem Wall	cum	4	3.740	0.350	0.420	2.20
	Less for Box above Invert upto EGL	cum	1	2.70	12.000	0.300	9.72
						Total	51.60

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.700	11.000	0.433	12.85
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	13.09



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.05
						Total	1.05
10	Bituminous Concrete						
		cum	1	2.70	10.00	0.04	1.08
						Total	1.08
11	Mastic Asphalt						
		sqm	1	2.70	10.00		27.00
						Total	27.00
12	Tack Coat						
		sqm	1	2.70	10.00		27.00
						Total	27.00
13	RCC M-40 Crash Barrier	m	2	2.70			5.40
						Total	5.40
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.70	2.558		13.81
						Total	13.81



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.300	12.000	0.870	65.77
	Shear Key	cum	2	6.500	1.680	0.780	17.04
	Return Wall II	cum	4	4.790	5.150	0.700	69.07
						Total	151.88

2	PCC-M15						
	Box culvert	cum	1	5.300	8.840	0.150	7.03
	Shear Key	cum	2	5.500	1.503	0.150	2.48
	Return Wall II	cum	4	4.390	4.350	0.150	11.46
						Total	20.97

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.300	11.000	0.420	24.49
	Box Side Wall	cum	2	11.00	3.185	0.350	24.52
	Base slab of Return wall II	cum	4	4.290	4.150	0.400	28.49
	Return wall I	cum	4	1.300	3.555	0.300	5.55
	Return wall II	cum	4	4.290	0.325	3.575	19.94
	Shear Key	cum	2	5.300	0.53820		5.70
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	108.93

4	Steel						
	@ 80 Kg per cum of concrete	ton					8.71
						Total	8.71

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $2.9/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.9/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	2.885	36.00
	Behind Return Wall	cum	4	5.590	0.600	3.255	43.67
						Total	79.67

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					151.88
	Less for PCC	cum					20.97
	Less for Bottom Slab RCC	cum					24.49
	Less for Shear Key RCC	cum					5.70
	Less for Return Wall-I RCC	cum	4	1.300	0.300	0.300	0.47
	Less for Return Wall-II Base Slab	cum					28.49
	Less for Return Wall-II Stem Wall	cum	4	4.290	0.450	0.320	2.47
	Less for Box above Invert upto EGL	cum	1	2.70	12.000	0.300	9.72
						Total	59.58

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.700	11.000	0.370	10.99
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	11.24



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.90
						Total	0.90
10	Bituminous Concrete						
		cum	1	2.70	10.00	0.04	1.08
						Total	1.08
11	Mastic Asphalt						
		sqm	1	2.70	10.00		27.00
						Total	27.00
12	Tack Coat						
		sqm	1	2.70	10.00		27.00
						Total	27.00
13	RCC M-40 Crash Barrier	m	2	2.70			5.40
						Total	5.40
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.70	2.558		13.81
						Total	13.81



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.300	12.000	0.870	65.77
	Shear Key	cum	2	6.500	1.680	0.780	17.04
	Return Wall II	cum	4	5.090	5.150	0.700	73.40
						Total	156.21

2	PCC-M15						
	Box culvert	cum	1	5.300	8.840	0.150	7.03
	Shear Key	cum	2	5.500	1.503	0.150	2.48
	Return Wall II	cum	4	4.690	4.350	0.150	12.24
						Total	21.75

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.300	11.000	0.420	24.49
	Box Side Wall	cum	2	11.00	3.285	0.350	25.29
	Base slab of Return wall II	cum	4	4.590	4.150	0.400	30.48
	Return wall I	cum	4	1.300	3.655	0.300	5.70
	Return wall II	cum	4	4.590	0.325	3.675	21.93
	Shear Key	cum	2	5.300	0.53820		5.70
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	113.84

4	Steel						
	@ 80 Kg per cum of concrete	ton					9.11
						Total	9.11

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $3/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $3/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	2.985	37.25
	Behind Return Wall	cum	4	5.890	0.600	3.355	47.43
						Total	84.68

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					156.21
	Less for PCC	cum					21.75
	Less for Bottom Slab RCC	cum					24.49
	Less for Shear Key RCC	cum					5.70
	Less for Return Wall-I RCC	cum	4	1.300	0.300	0.300	0.47
	Less for Return Wall-II Base Slab	cum					30.48
	Less for Return Wall-II Stem Wall	cum	4	4.590	0.450	0.320	2.64
	Less for Box above Invert upto EGL	cum	1	2.70	12.000	0.300	9.72
						Total	60.96

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.700	11.000	0.370	10.99
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	11.24



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.90
						Total	0.90
10	Bituminous Concrete						
		cum	1	2.70	10.00	0.04	1.08
						Total	1.08
11	Mastic Asphalt						
		sqm	1	2.70	10.00		27.00
						Total	27.00
12	Tack Coat						
		sqm	1	2.70	10.00		27.00
						Total	27.00
13	RCC M-40 Crash Barrier	m	2	2.70			5.40
						Total	5.40
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.70	2.558		13.81
						Total	13.81



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.300	12.000	0.870	65.77
	Shear Key	cum	2	6.500	1.680	0.780	17.04
	Return Wall II	cum	4	5.290	5.150	0.700	76.28
						Total	159.09

2	PCC-M15						
	Box culvert	cum	1	5.300	8.840	0.150	7.03
	Shear Key	cum	2	5.500	1.503	0.150	2.48
	Return Wall II	cum	4	4.890	4.350	0.150	12.76
						Total	22.27

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.300	11.000	0.420	24.49
	Box Side Wall	cum	2	11.00	3.350	0.350	25.80
	Base slab of Return wall II	cum	4	4.790	4.150	0.400	31.81
	Return wall I	cum	4	1.300	3.720	0.300	5.80
	Return wall II	cum	4	4.790	0.325	3.740	23.29
	Shear Key	cum	2	5.300	0.53820		5.70
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	117.13

4	Steel						
	@ 80 Kg per cum of concrete	ton					9.37
						Total	9.37

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $3.1/1 =$					4	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					4	
	No of weep holes in vertical direction per return wall = $3.1/1 =$					4	
	Total no of Weep holes per abutment = 5×4					20	
	Total no of Weep holes per return wall = 4×4					16	
	Total mtrs of weep holes = $20 \times 2 + 16 \times 4$					Total	52.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	3.050	38.06
	Behind Return Wall	cum	4	6.090	0.600	3.420	49.99
						Total	88.05

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					159.09
	Less for PCC	cum					22.27
	Less for Bottom Slab RCC	cum					24.49
	Less for Shear Key RCC	cum					5.70
	Less for Return Wall-I RCC	cum	4	1.300	0.300	0.300	0.47
	Less for Return Wall-II Base Slab	cum					31.81
	Less for Return Wall-II Stem Wall	cum	4	4.790	0.450	0.320	2.76
	Less for Box above Invert upto EGL	cum	1	2.70	12.000	0.300	9.72
						Total	61.87

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.700	11.000	0.370	10.99
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	11.24



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.90
						Total	0.90
10	Bituminous Concrete						
		cum	1	2.70	10.00	0.04	1.08
						Total	1.08
11	Mastic Asphalt						
		sqm	1	2.70	10.00		27.00
						Total	27.00
12	Tack Coat						
		sqm	1	2.70	10.00		27.00
						Total	27.00
13	RCC M-40 Crash Barrier	m	2	2.70			5.40
						Total	5.40
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallal to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.70	2.558		13.81
						Total	13.81



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.300	13.000	0.870	71.25
	Shear Key	cum	2	6.500	1.680	0.780	17.04
	Return Wall II	cum	4	4.240	4.300	0.600	43.76
						Total	132.05

2	PCC-M15						
	Box culvert	cum	1	5.300	9.840	0.150	7.82
	Shear Key	cum	2	5.500	1.503	0.150	2.48
	Return Wall II	cum	4	3.840	3.500	0.150	8.06
						Total	18.37

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.300	12.000	0.420	26.71
	Box Side Wall	cum	2	12.00	3.000	0.350	25.20
	Base slab of Return wall II	cum	4	3.740	3.300	0.300	14.81
	Return wall I	cum	4	1.300	3.370	0.300	5.26
	Return wall II	cum	4	3.740	0.275	3.490	14.36
	Shear Key	cum	2	5.300	0.53820		5.70
	Haunch	cum	2	12.000	0.01125		0.27
						Total=	92.31

4	Steel						
	@ 80 Kg per cum of concrete	ton					7.38
						Total	7.38

5	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 = $11.4/2 =$					6	
	No of weep holes in vertical direction per abutment = $2.7/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.7/1 =$					3	
	Total no of Weep holes per abutment = 6×3					18	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $18 \times 2 + 9 \times 4$					Total	36.00

6	Filter media						
	Behind Abutment	cum	2	11.400	0.600	2.700	36.94
	Behind Return Wall	cum	4	5.040	0.600	3.070	37.13
						Total	74.07

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					132.05
	Less for PCC	cum					18.37
	Less for Bottom Slab RCC	cum					26.71
	Less for Shear Key RCC	cum					5.70
	Less for Return Wall-I RCC	cum	4	1.300	0.300	0.300	0.47
	Less for Return Wall-II Base Slab	cum					14.81
	Less for Return Wall-II Stem Wall	cum	4	3.740	0.350	0.420	2.20
	Less for Box above Invert upto EGL	cum	1	2.70	13.000	0.300	10.53
						Total	53.25

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.700	12.000	0.439	14.22
	(+)Haunch	cum	2	12.00	0.01125		0.27
						Total	14.49



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.16
						Total	1.16
10	Bituminous Concrete						
		cum	1	2.70	11.00	0.04	1.19
						Total	1.19
11	Mastic Asphalt						
		sqm	1	2.70	11.00		29.70
						Total	29.70
12	Tack Coat						
		sqm	1	2.70	11.00		29.70
						Total	29.70
13	RCC M-40 Crash Barrier	m	2	2.70			5.40
						Total	5.40
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.70	2.558		13.81
						Total	13.81



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.300	13.000	0.870	71.25
	Shear Key	cum	2	6.500	1.680	0.780	17.04
	Return Wall II	cum	4	5.390	5.150	0.700	77.72
						Total	166.01

2	PCC-M15						
	Box culvert	cum	1	5.300	9.840	0.150	7.82
	Shear Key	cum	2	5.500	1.503	0.150	2.48
	Return Wall II	cum	4	4.990	4.350	0.150	13.02
						Total	23.33

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.300	12.000	0.420	26.71
	Box Side Wall	cum	2	12.00	3.385	0.350	28.43
	Base slab of Return wall II	cum	4	4.890	4.150	0.400	32.47
	Return wall I	cum	4	1.300	3.755	0.300	5.86
	Return wall II	cum	4	4.890	0.325	3.775	24.00
	Shear Key	cum	2	5.300	0.53820		5.70
	Haunch	cum	2	12.000	0.01125		0.27
						Total=	123.45

4	Steel						
	@ 80 Kg per cum of concrete	ton					9.88
						Total	9.88

5	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 = $11.4/2 =$					6	
	No of weep holes in vertical direction per abutment = $3.1/1 =$					4	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					4	
	No of weep holes in vertical direction per return wall = $3.1/1 =$					4	
	Total no of Weep holes per abutment = 6×4					24	
	Total no of Weep holes per return wall = 4×4					16	
	Total mtrs of weep holes = $24 \times 2 + 16 \times 4$					Total	56.00

6	Filter media						
	Behind Abutment	cum	2	11.400	0.600	3.085	42.20
	Behind Return Wall	cum	4	6.190	0.600	3.455	51.33
						Total	93.53

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					166.01
	Less for PCC	cum					23.33
	Less for Bottom Slab RCC	cum					26.71
	Less for Shear Key RCC	cum					5.70
	Less for Return Wall-I RCC	cum	4	1.300	0.300	0.300	0.47
	Less for Return Wall-II Base Slab	cum					32.47
	Less for Return Wall-II Stem Wall	cum	4	4.890	0.450	0.320	2.82
	Less for Box above Invert upto EGL	cum	1	2.70	13.000	0.300	10.53
						Total	63.98

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	2.700	12.000	0.370	11.99
	(+)-Haunch	cum	2	12.00	0.01125		0.27
						Total	12.26



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					0.98
						Total	0.98
10	Bituminous Concrete						
		cum	1	2.70	11.00	0.04	1.19
						Total	1.19
11	Mastic Asphalt						
		sqm	1	2.70	11.00		29.70
						Total	29.70
12	Tack Coat						
		sqm	1	2.70	11.00		29.70
						Total	29.70
13	RCC M-40 Crash Barrier	m	2	2.70			5.40
						Total	5.40
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	3.400	2.00	0.30	2.04
						Total	2.04
16	PCC M 15 below Catch Pit						
		cum	1	2.400	1.50	0.30	1.08
						Total	1.08
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	2.400	0.360		0.86
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	1.94
18	300 mm Boulder Pitching						
		cum	1	1.800	1.50	0.30	0.81
		cum	1	2.666	1.50	0.30	1.20
						Total	2.01
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/23/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	7.727	0.95	0.150	1.10
	For PCC wall						
		cum	1	3.184	0.35	1.000	1.11
		cum	1	4.569	0.35	1.600	2.56
		cum	1	5.955	0.35	1.600	3.33
	Below PCC Wall						
		cum	1	3.384	0.55	0.100	0.19
		cum	1	4.769	0.55	0.100	0.26
		cum	1	6.155	0.55	0.100	0.34
	On trades						
		cum	1	2.491	0.85	0.100	0.21
		cum	1	3.876	0.85	0.100	0.33
		cum	1	5.262	0.85	0.100	0.45
		cum	1	6.734	1.00	0.100	0.67
						Total	10.56
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	8.327	1.55	1.95	25.17
	Stone Pitching and side wall	cum	1	5.014	3.320		16.64
						Total	41.81
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	7.427	1.003		7.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	9.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	2.491	0.85	0.300	0.64
		cum	1	3.876	0.85	0.300	0.99
		cum	1	5.262	0.85	0.300	1.34
		cum	1	6.734	1.00	0.300	2.02
						Total	4.99
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	2.70	2.558		13.81
						Total	13.81



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.640	11.000	0.870	63.54
	Shear Key	cum	2	6.840	1.680	0.780	17.93
	Return Wall II	cum	4	4.710	4.300	0.600	48.61
						Total	130.08

2	PCC-M15						
	Box culvert	cum	1	5.640	7.840	0.150	6.63
	Shear Key	cum	2	5.840	1.503	0.150	2.63
	Return Wall II	cum	4	4.310	3.500	0.150	9.05
						Total	18.32

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.640	10.000	0.420	23.69
	Box Side Wall	cum	2	10.00	3.000	0.420	25.20
	Base slab of Return wall II	cum	4	4.210	3.300	0.300	16.67
	Return wall I	cum	4	0.900	3.420	0.250	3.08
	Return wall II	cum	4	4.210	0.275	3.540	16.39
	Shear Key	cum	2	5.640	0.53820		6.07
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	91.33

4	Steel						
	@ 80 Kg per cum of concrete	ton					7.31
						Total	7.31

5	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 = $9.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $2.7/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.7/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	9.500	0.600	2.700	30.78
	Behind Return Wall	cum	4	5.110	0.600	3.120	38.26
						Total	69.04

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					130.08
	Less for PCC	cum					18.32
	Less for Bottom Slab RCC	cum					23.69
	Less for Shear Key RCC	cum					6.07
	Less for Return Wall-I RCC	cum	4	0.900	0.250	0.300	0.27
	Less for Return Wall-II Base Slab	cum					16.67
	Less for Return Wall-II Stem Wall	cum	4	4.210	0.350	0.420	2.48
	Less for Box above Invert upto EGL	cum	1	3.84	11.000	0.300	12.67
						Total	49.91

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.840	10.000	0.476	18.29
	(+)Haunch	cum	2	10.00	0.01125		0.23
						Total	18.51



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.48
						Total	1.48
10	Bituminous Concrete						
		cum	1	3.84	9.00	0.04	1.38
						Total	1.38
11	Mastic Asphalt						
		sqm	1	3.84	9.00		34.56
						Total	34.56
12	Tack Coat						
		sqm	1	3.84	9.00		34.56
						Total	34.56
13	RCC M-40 Crash Barrier	m	2	3.84			7.68
						Total	7.68
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.84	2.558		19.65
						Total	19.65



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.640	11.000	0.870	63.54
	Shear Key	cum	2	6.840	1.680	0.780	17.93
	Return Wall II	cum	4	5.200	5.150	0.700	74.98
						Total	156.46

2	PCC-M15						
	Box culvert	cum	1	5.640	7.840	0.150	6.63
	Shear Key	cum	2	5.840	1.503	0.150	2.63
	Return Wall II	cum	4	4.800	4.350	0.150	12.53
						Total	21.79

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.640	10.000	0.420	23.69
	Box Side Wall	cum	2	10.00	3.162	0.420	26.56
	Base slab of Return wall II	cum	4	4.700	4.150	0.400	31.21
	Return wall I	cum	4	0.900	3.582	0.250	3.22
	Return wall II	cum	4	4.700	0.325	3.602	22.01
	Shear Key	cum	2	5.640	0.53820		6.07
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	112.98

4	Steel						
	@ 80 Kg per cum of concrete	ton					9.04
						Total	9.04

5	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 = $9.5/2 =$					5	
	No of weep holes in horizontal direction per abutment = $2.9/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.9/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	9.500	0.600	2.862	32.63
	Behind Return Wall	cum	4	5.600	0.600	3.282	44.11
						Total	76.74

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					156.46
	Less for PCC	cum					21.79
	Less for Bottom Slab RCC	cum					23.69
	Less for Shear Key RCC	cum					6.07
	Less for Return Wall-I RCC	cum	4	0.900	0.250	0.300	0.27
	Less for Return Wall-II Base Slab	cum					31.21
	Less for Return Wall-II Stem Wall	cum	4	4.700	0.450	0.320	2.71
	Less for Box above Invert upto EGL	cum	1	3.84	11.000	0.300	12.67
						Total	58.04

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.840	10.000	0.420	16.13
	(+)Haunch	cum	2	10.00	0.01125		0.23
						Total	16.35



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.31
						Total	1.31
10	Bituminous Concrete						
		cum	1	3.84	9.00	0.04	1.38
						Total	1.38
11	Mastic Asphalt						
		sqm	1	3.84	9.00		34.56
						Total	34.56
12	Tack Coat						
		sqm	1	3.84	9.00		34.56
						Total	34.56
13	RCC M-40 Crash Barrier	m	2	3.84			7.68
						Total	7.68
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.84	2.558		19.65
						Total	19.65



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.640	12.000	0.870	69.32
	Shear Key	cum	2	6.840	1.680	0.780	17.93
	Return Wall II	cum	4	4.710	4.300	0.600	48.61
						Total	135.86

2	PCC-M15						
	Box culvert	cum	1	5.640	8.840	0.150	7.48
	Shear Key	cum	2	5.840	1.503	0.150	2.63
	Return Wall II	cum	4	4.310	3.500	0.150	9.05
						Total	19.16

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.640	11.000	0.420	26.06
	Box Side Wall	cum	2	11.00	3.000	0.420	27.72
	Base slab of Return wall II	cum	4	4.210	3.300	0.300	16.67
	Return wall I	cum	4	0.900	3.420	0.250	3.08
	Return wall II	cum	4	4.210	0.275	3.540	16.39
	Shear Key	cum	2	5.640	0.53820		6.07
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	96.24

4	Steel						
	@ 80 Kg per cum of concrete	ton					7.70
						Total	7.70

5	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 =10.5/2 =					5	
	No of weep holes in vertical direction per abutment =2.7/1 =					3	
	No of weep holes in horizontal direction per return wall =4.5/2 =					3	
	No of weep holes in vertical direction per return wall =2.7/1 =					3	
	Total no of Weep holes per abutment = 5 x 3					15	
	Total no of Weep holes per return wall = 3 x 3					9	
	Total mtrs of weep holes = 15 x 2 + 9 x 4					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	2.700	34.02
	Behind Return Wall	cum	4	5.110	0.600	3.120	38.26
						Total	72.28

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					135.86
	Less for PCC	cum					19.16
	Less for Bottom Slab RCC	cum					26.06
	Less for Shear Key RCC	cum					6.07
	Less for Return Wall-I RCC	cum	4	0.900	0.250	0.300	0.27
	Less for Return Wall-II Base Slab	cum					16.67
	Less for Return Wall-II Stem Wall	cum	4	4.210	0.350	0.420	2.48
	Less for Box above Invert upto EGL	cum	1	3.84	12.000	0.300	13.82
						Total	51.32

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.840	11.000	0.483	20.38
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	20.63



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.65
						Total	1.65
10	Bituminous Concrete						
		cum	1	3.84	10.00	0.04	1.54
						Total	1.54
11	Mastic Asphalt						
		sqm	1	3.84	10.00		38.40
						Total	38.40
12	Tack Coat						
		sqm	1	3.84	10.00		38.40
						Total	38.40
13	RCC M-40 Crash Barrier	m	2	3.84			7.68
						Total	7.68
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.84	2.558		19.65
						Total	19.65



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.640	12.000	0.870	69.32
	Shear Key	cum	2	6.840	1.680	0.780	17.93
	Return Wall II	cum	4	5.270	5.150	0.700	75.99
						Total	163.24

2	PCC-M15						
	Box culvert	cum	1	5.640	8.840	0.150	7.48
	Shear Key	cum	2	5.840	1.503	0.150	2.63
	Return Wall II	cum	4	4.870	4.350	0.150	12.71
						Total	22.82

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.640	11.000	0.420	26.06
	Box Side Wall	cum	2	11.00	3.185	0.420	29.43
	Base slab of Return wall II	cum	4	4.770	4.150	0.400	31.67
	Return wall I	cum	4	0.900	3.605	0.250	3.24
	Return wall II	cum	4	4.770	0.325	3.625	22.48
	Shear Key	cum	2	5.640	0.53820		6.07
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	119.20

4	Steel						
	@ 80 Kg per cum of concrete	ton					9.54
						Total	9.54

5	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 =10.5/2 =					5	
	No of weep holes in vertical direction per abutment =2.9/1 =					3	
	No of weep holes in horizontal direction per return wall =4.5/2 =					3	
	No of weep holes in vertical direction per return wall =2.9/1 =					3	
	Total no of Weep holes per abutment = 5 x 3					15	
	Total no of Weep holes per return wall = 3 x 3					9	
	Total mtrs of weep holes = 15 x 2 + 9 x 4					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	2.885	36.35
	Behind Return Wall	cum	4	5.670	0.600	3.305	44.97
						Total	81.33

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					163.24
	Less for PCC	cum					22.82
	Less for Bottom Slab RCC	cum					26.06
	Less for Shear Key RCC	cum					6.07
	Less for Return Wall-I RCC	cum	4	0.900	0.250	0.300	0.27
	Less for Return Wall-II Base Slab	cum					31.67
	Less for Return Wall-II Stem Wall	cum	4	4.770	0.450	0.320	2.75
	Less for Box above Invert upto EGL	cum	1	3.84	12.000	0.300	13.82
						Total	59.78

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.840	11.000	0.420	17.74
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	17.99



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.44
						Total	1.44
10	Bituminous Concrete						
		cum	1	3.84	10.00	0.04	1.54
						Total	1.54
11	Mastic Asphalt						
		sqm	1	3.84	10.00		38.40
						Total	38.40
12	Tack Coat						
		sqm	1	3.84	10.00		38.40
						Total	38.40
13	RCC M-40 Crash Barrier	m	2	3.84			7.68
						Total	7.68
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.84	2.558		19.65
						Total	19.65



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.640	12.000	0.870	69.32
	Shear Key	cum	2	6.840	1.680	0.780	17.93
	Return Wall II	cum	4	5.570	5.150	0.700	80.32
						Total	167.57

2	PCC-M15						
	Box culvert	cum	1	5.640	8.840	0.150	7.48
	Shear Key	cum	2	5.840	1.503	0.150	2.63
	Return Wall II	cum	4	5.170	4.350	0.150	13.49
						Total	23.61

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.640	11.000	0.420	26.06
	Box Side Wall	cum	2	11.00	3.285	0.420	30.35
	Base slab of Return wall II	cum	4	5.070	4.150	0.400	33.66
	Return wall I	cum	4	0.900	3.705	0.250	3.33
	Return wall II	cum	4	5.070	0.325	3.725	24.55
	Shear Key	cum	2	5.640	0.53820		6.07
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	124.28

4	Steel						
	@ 80 Kg per cum of concrete	ton					9.94
						Total	9.94

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $3/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $3/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	2.985	37.61
	Behind Return Wall	cum	4	5.970	0.600	3.405	48.79
						Total	86.40

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					167.57
	Less for PCC	cum					23.61
	Less for Bottom Slab RCC	cum					26.06
	Less for Shear Key RCC	cum					6.07
	Less for Return Wall-I RCC	cum	4	0.900	0.250	0.300	0.27
	Less for Return Wall-II Base Slab	cum					33.66
	Less for Return Wall-II Stem Wall	cum	4	5.070	0.450	0.320	2.92
	Less for Box above Invert upto EGL	cum	1	3.84	12.000	0.300	13.82
						Total	61.15

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.840	11.000	0.420	17.74
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	17.99



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.44
						Total	1.44
10	Bituminous Concrete						
		cum	1	3.84	10.00	0.04	1.54
						Total	1.54
11	Mastic Asphalt						
		sqm	1	3.84	10.00		38.40
						Total	38.40
12	Tack Coat						
		sqm	1	3.84	10.00		38.40
						Total	38.40
13	RCC M-40 Crash Barrier	m	2	3.84			7.68
						Total	7.68
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.84	2.558		19.65
						Total	19.65



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.640	12.000	0.870	69.32
	Shear Key	cum	2	6.840	1.680	0.780	17.93
	Return Wall II	cum	4	5.760	5.150	0.700	83.06
						Total	170.31

2	PCC-M15						
	Box culvert	cum	1	5.640	8.840	0.150	7.48
	Shear Key	cum	2	5.840	1.503	0.150	2.63
	Return Wall II	cum	4	5.360	4.350	0.150	13.99
						Total	24.10

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.640	11.000	0.420	26.06
	Box Side Wall	cum	2	11.00	3.350	0.420	30.95
	Base slab of Return wall II	cum	4	5.260	4.150	0.400	34.93
	Return wall I	cum	4	0.900	3.770	0.250	3.39
	Return wall II	cum	4	5.260	0.325	3.790	25.92
	Shear Key	cum	2	5.640	0.53820		6.07
	Haunch	cum	2	11.000	0.01125		0.25
					Total=	127.56	

4	Steel						
	@ 80 Kg per cum of concrete	ton					10.21
						Total	10.21

5	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 = $10.5/2 =$				5	
	No of weep holes in vertical direction per abutment = $3.1/1 =$				4	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$				4	
	No of weep holes in vertical direction per return wall = $3.1/1 =$				4	
	Total no of Weep holes per abutment = 5×4				20	
	Total no of Weep holes per return wall = 4×4				16	
	Total mtrs of weep holes = $20 \times 2 + 16 \times 4$				Total	52.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	3.050	38.43
	Behind Return Wall	cum	4	6.160	0.600	3.470	51.30
						Total	89.73

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					170.31
	Less for PCC	cum					24.10
	Less for Bottom Slab RCC	cum					26.06
	Less for Shear Key RCC	cum					6.07
	Less for Return Wall-I RCC	cum	4	0.900	0.250	0.300	0.27
	Less for Return Wall-II Base Slab	cum					34.93
	Less for Return Wall-II Stem Wall	cum	4	5.260	0.450	0.320	3.03
	Less for Box above Invert upto EGL	cum	1	3.84	12.000	0.300	13.82
					Total	62.03	

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.840	11.000	0.420	17.74
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	17.99

ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.44
						Total	1.44
10	Bituminous Concrete						
		cum	1	3.84	10.00	0.04	1.54
						Total	1.54
11	Mastic Asphalt						
		sqm	1	3.84	10.00		38.40
						Total	38.40
12	Tack Coat						
		sqm	1	3.84	10.00		38.40
						Total	38.40
13	RCC M-40 Crash Barrier	m	2	3.84			7.68
						Total	7.68
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.84	2.558		19.65
						Total	19.65



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.640	13.000	0.870	75.10
	Shear Key	cum	2	6.840	1.680	0.780	17.93
	Return Wall II	cum	4	4.710	4.300	0.600	48.61
						Total	141.63

2	PCC-M15						
	Box culvert	cum	1	5.640	9.840	0.150	8.32
	Shear Key	cum	2	5.840	1.503	0.150	2.63
	Return Wall II	cum	4	4.310	3.500	0.150	9.05
						Total	20.01

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.640	12.000	0.420	28.43
	Box Side Wall	cum	2	12.00	3.000	0.420	30.24
	Base slab of Return wall II	cum	4	4.210	3.300	0.300	16.67
	Return wall I	cum	4	0.900	3.420	0.250	3.08
	Return wall II	cum	4	4.210	0.275	3.540	16.39
	Shear Key	cum	2	5.640	0.53820		6.07
	Haunch	cum	2	12.000	0.01125		0.27
						Total=	101.15

4	Steel						
	@ 80 Kg per cum of concrete	ton					8.09
						Total	8.09

5	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 =11.5/2 =					6	
	No of weep holes in vertical direction per abutment =2.7/1 =					3	
	No of weep holes in horizontal direction per return wall =4.5/2 =					3	
	No of weep holes in vertical direction per return wall =2.7/1 =					3	
	Total no of Weep holes per abutment = 6 x 3					18	
	Total no of Weep holes per return wall = 3 x 3					9	
	Total mtrs of weep holes = 18 x 2 + 9 x 4					Total	36.00

6	Filter media						
	Behind Abutment	cum	2	11.500	0.600	2.700	37.26
	Behind Return Wall	cum	4	5.110	0.600	3.120	38.26
						Total	75.52

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					141.63
	Less for PCC	cum					20.01
	Less for Bottom Slab RCC	cum					28.43
	Less for Shear Key RCC	cum					6.07
	Less for Return Wall-I RCC	cum	4	0.900	0.250	0.300	0.27
	Less for Return Wall-II Base Slab	cum					16.67
	Less for Return Wall-II Stem Wall	cum	4	4.210	0.350	0.420	2.48
	Less for Box above Invert upto EGL	cum	1	3.84	13.000	0.300	14.98
						Total	52.73

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.840	12.000	0.489	22.52
	(+)Haunch	cum	2	12.00	0.01125		0.27
						Total	22.79



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.82
						Total	1.82
10	Bituminous Concrete						
		cum	1	3.84	11.00	0.04	1.69
						Total	1.69
11	Mastic Asphalt						
		sqm	1	3.84	11.00		42.24
						Total	42.24
12	Tack Coat						
		sqm	1	3.84	11.00		42.24
						Total	42.24
13	RCC M-40 Crash Barrier	m	2	3.84			7.68
						Total	7.68
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/33/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.84	2.558		19.65
						Total	19.65



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	8.320	11.000	0.930	85.11
	Shear Key	cum	2	8.520	1.620	0.720	19.88
	Return Wall II	cum	4	5.460	5.150	0.700	78.73
						Total	183.72

2	PCC-M15						
	Box culvert	cum	1	7.320	7.960	0.150	8.74
	Shear Key	cum	2	7.520	1.418	0.150	3.20
	Return Wall II	cum	4	5.060	4.350	0.150	13.21
						Total	25.15

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	7.320	10.000	0.480	35.14
	Box Side Wall	cum	2	10.00	4.000	0.460	36.80
	Base slab of Return wall II	cum	4	4.960	4.150	0.400	32.93
	Return wall I	cum	4	1.700	4.450	0.300	9.08
	Return wall II	cum	4	4.960	0.325	4.530	29.21
	Shear Key	cum	2	7.320	0.47520		6.96
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	150.34

4	Steel						
	@ 80 Kg per cum of concrete	ton					12.03
						Total	12.03

5	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 = $9.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $3.7/1 =$					4	
	No of weep holes in horizontal direction per return wall = $6/2 =$					4	
	No of weep holes in vertical direction per return wall = $3.7/1 =$					4	
	Total no of Weep holes per abutment = 5×4					20	
	Total no of Weep holes per return wall = 4×4					16	
	Total mtrs of weep holes = $20 \times 2 + 16 \times 4$					Total	52.00

6	Filter media						
	Behind Abutment	cum	2	9.400	0.600	3.700	41.74
	Behind Return Wall	cum	4	6.660	0.600	4.150	66.33
						Total	108.07

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					183.72
	Less for PCC	cum					25.15
	Less for Bottom Slab RCC	cum					35.14
	Less for Shear Key RCC	cum					6.96
	Less for Return Wall-I RCC	cum	4	1.700	0.300	0.300	0.61
	Less for Return Wall-II Base Slab	cum					32.93
	Less for Return Wall-II Stem Wall	cum	4	4.960	0.450	0.380	3.39
	Less for Box above Invert upto EGL	cum	1	3.92	11.000	0.300	12.94
						Total	66.61

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.920	10.000	0.506	19.85
	(+)Haunch	cum	2	10.00	0.01125		0.23
						Total	20.07



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.61
						Total	1.61
10	Bituminous Concrete						
		cum	1	3.92	9.00	0.04	1.41
						Total	1.41
11	Mastic Asphalt						
		sqm	1	3.92	9.00		35.28
						Total	35.28
12	Tack Coat						
		sqm	1	3.92	9.00		35.28
						Total	35.28
13	RCC M-40 Crash Barrier	m	2	3.92			7.84
						Total	7.84
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.92	2.558		20.05
						Total	20.05



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	8.320	12.000	0.930	92.85
	Shear Key	cum	2	8.520	1.620	0.720	19.88
	Return Wall II	cum	4	5.460	5.150	0.700	78.73
						Total	191.46

2	PCC-M15						
	Box culvert	cum	1	7.320	8.960	0.150	9.84
	Shear Key	cum	2	7.520	1.418	0.150	3.20
	Return Wall II	cum	4	5.060	4.350	0.150	13.21
						Total	26.24

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	7.320	11.000	0.480	38.65
	Box Side Wall	cum	2	11.00	4.000	0.460	40.48
	Base slab of Return wall II	cum	4	4.960	4.150	0.400	32.93
	Return wall I	cum	4	1.700	4.450	0.300	9.08
	Return wall II	cum	4	4.960	0.325	4.530	29.21
	Shear Key	cum	2	7.320	0.47520		6.96
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	157.56

4	Steel						
	@ 80 Kg per cum of concrete	ton					12.60
						Total	12.60

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $3.7/1 =$					4	
	No of weep holes in horizontal direction per return wall = $6/2 =$					4	
	No of weep holes in vertical direction per return wall = $3.7/1 =$					4	
	Total no of Weep holes per abutment = 5×4					20	
	Total no of Weep holes per return wall = 4×4					16	
	Total mtrs of weep holes = $20 \times 2 + 16 \times 4$					Total	52.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	3.700	46.18
	Behind Return Wall	cum	4	6.660	0.600	4.150	66.33
						Total	112.51

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					191.46
	Less for PCC	cum					26.24
	Less for Bottom Slab RCC	cum					38.65
	Less for Shear Key RCC	cum					6.96
	Less for Return Wall-I RCC	cum	4	1.700	0.300	0.300	0.61
	Less for Return Wall-II Base Slab	cum					32.93
	Less for Return Wall-II Stem Wall	cum	4	4.960	0.450	0.380	3.39
	Less for Box above Invert upto EGL	cum	1	3.92	12.000	0.300	14.11
						Total	68.56

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.920	11.000	0.513	22.10
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	22.35



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.79
						Total	1.79
10	Bituminous Concrete						
		cum	1	3.92	10.00	0.04	1.57
						Total	1.57
11	Mastic Asphalt						
		sqm	1	3.92	10.00		39.20
						Total	39.20
12	Tack Coat						
		sqm	1	3.92	10.00		39.20
						Total	39.20
13	RCC M-40 Crash Barrier	m	2	3.92			7.84
						Total	7.84
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallal to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.92	2.558		20.05
						Total	20.05



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	8.320	12.000	0.930	92.85
	Shear Key	cum	2	8.520	1.620	0.720	19.88
	Return Wall II	cum	4	6.300	5.300	0.750	100.17
						Total	212.90

2	PCC-M15						
	Box culvert	cum	1	7.320	8.960	0.150	9.84
	Shear Key	cum	2	7.520	1.418	0.150	3.20
	Return Wall II	cum	4	5.900	4.500	0.150	15.93
						Total	28.97

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	7.320	11.000	0.480	38.65
	Box Side Wall	cum	2	11.00	4.280	0.460	43.31
	Base slab of Return wall II	cum	4	5.800	4.300	0.450	44.89
	Return wall I	cum	4	1.700	4.730	0.300	9.65
	Return wall II	cum	4	5.800	0.375	4.760	41.41
	Shear Key	cum	2	7.320	0.47520		6.96
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	185.12

4	Steel						
	@ 80 Kg per cum of concrete	ton					14.81
						Total	14.81

5	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 =10.4/2 =					5	
	No of weep holes in vertical direction per abutment =4/1 =					4	
	No of weep holes in horizontal direction per return wall =6/2 =					4	
	No of weep holes in vertical direction per return wall =4/1 =					4	
	Total no of Weep holes per abutment = 5 x 4					20	
	Total no of Weep holes per return wall = 4 x 4					16	
	Total mtrs of weep holes = 20 x 2 + 16 x 4					Total	52.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	3.980	49.67
	Behind Return Wall	cum	4	7.500	0.600	4.430	79.74
						Total	129.41

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					212.90
	Less for PCC	cum					28.97
	Less for Bottom Slab RCC	cum					38.65
	Less for Shear Key RCC	cum					6.96
	Less for Return Wall-I RCC	cum	4	1.700	0.300	0.300	0.61
	Less for Return Wall-II Base Slab	cum					44.89
	Less for Return Wall-II Stem Wall	cum	4	5.800	0.500	0.330	3.83
	Less for Box above Invert upto EGL	cum	1	3.92	12.000	0.300	14.11
						Total	74.88

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.920	11.000	0.450	19.40
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	19.65



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.57
						Total	1.57
10	Bituminous Concrete						
		cum	1	3.92	10.00	0.04	1.57
						Total	1.57
11	Mastic Asphalt						
		sqm	1	3.92	10.00		39.20
						Total	39.20
12	Tack Coat						
		sqm	1	3.92	10.00		39.20
						Total	39.20
13	RCC M-40 Crash Barrier	m	2	3.92			7.84
						Total	7.84
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallal to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.92	2.558		20.05
						Total	20.05



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.800	12.000	0.950	77.52
	Shear Key	cum	2	7.000	1.600	0.700	15.68
	Return Wall II	cum	4	6.310	5.150	0.700	90.99
						Total	184.19

2	PCC-M15						
	Box culvert	cum	1	5.800	9.000	0.150	7.83
	Shear Key	cum	2	6.000	1.390	0.150	2.50
	Return Wall II	cum	4	5.910	4.350	0.150	15.43
						Total	25.76

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.800	11.000	0.500	31.90
	Box Side Wall	cum	2	11.00	3.350	0.500	36.85
	Base slab of Return wall II	cum	4	5.810	4.150	0.400	38.58
	Return wall I	cum	4	0.400	3.800	0.250	1.52
	Return wall II	cum	4	5.810	0.325	3.900	29.46
	Shear Key	cum	2	5.800	0.45500		5.28
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	143.83

4	Steel						
	@ 80 Kg per cum of concrete	ton					11.51
						Total	11.51

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $3.1/1 =$					4	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					4	
	No of weep holes in vertical direction per return wall = $3.1/1 =$					4	
	Total no of Weep holes per abutment = 5×4					20	
	Total no of Weep holes per return wall = 4×4					16	
	Total mtrs of weep holes = $20 \times 2 + 16 \times 4$					Total	52.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	3.050	38.43
	Behind Return Wall	cum	4	6.210	0.600	3.500	52.16
						Total	90.59

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					184.19
	Less for PCC	cum					25.76
	Less for Bottom Slab RCC	cum					31.90
	Less for Shear Key RCC	cum					5.28
	Less for Return Wall-I RCC	cum	4	0.400	0.250	0.300	0.12
	Less for Return Wall-II Base Slab	cum					38.58
	Less for Return Wall-II Stem Wall	cum	4	5.810	0.450	0.400	4.18
	Less for Box above Invert upto EGL	cum	1	5.00	12.000	0.300	18.00
						Total	60.37

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	5.000	11.000	0.450	24.75
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	25.00



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.00
						Total	2.00
10	Bituminous Concrete						
		cum	1	5.00	10.00	0.04	2.00
						Total	2.00
11	Mastic Asphalt						
		sqm	1	5.00	10.00		50.00
						Total	50.00
12	Tack Coat						
		sqm	1	5.00	10.00		50.00
						Total	50.00
13	RCC M-40 Crash Barrier	m	2	5.00			10.00
						Total	10.00
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	5.400	2.00	0.30	3.24
						Total	3.24
16	PCC M 15 below Catch Pit						
		cum	1	4.400	1.50	0.30	1.98
						Total	1.98
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	4.400	0.360		1.58
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.66
18	300 mm Boulder Pitching						
		cum	1	3.800	1.50	0.30	1.71
		cum	1	4.666	1.50	0.30	2.10
						Total	3.81
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	9.727	0.95	0.150	1.39
	For PCC wall						
		cum	1	5.184	0.35	1.000	1.81
		cum	1	6.569	0.35	1.600	3.68
		cum	1	7.955	0.35	1.600	4.45
	Below PCC Wall						
		cum	1	5.384	0.55	0.100	0.30
		cum	1	6.769	0.55	0.100	0.37
		cum	1	8.155	0.55	0.100	0.45
	On trades						
		cum	1	4.491	0.85	0.100	0.38
		cum	1	5.876	0.85	0.100	0.50
		cum	1	7.262	0.85	0.100	0.62
		cum	1	8.734	1.00	0.100	0.87
						Total	14.82
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	10.327	1.55	1.95	31.21
	Stone Pitching and side wall	cum	1	7.014	3.320		23.28
						Total	54.50
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	9.427	1.003		9.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	11.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	4.491	0.85	0.300	1.15
		cum	1	5.876	0.85	0.300	1.50
		cum	1	7.262	0.85	0.300	1.85
		cum	1	8.734	1.00	0.300	2.62
						Total	7.12
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	5.00	2.558		25.58
						Total	25.58



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/3 (W=11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	7.760	12.000	1.120	104.29
	Shear Key	cum	2	7.960	1.630	0.730	18.94
	Return Wall II	cum	4	9.190	7.000	1.250	321.65
						Total	444.89
2	PCC-M15						
	Box culvert	cum	1	6.760	8.940	0.150	9.07
	Shear Key	cum	2	6.960	1.432	0.150	2.99
	Return Wall II	cum	4	8.790	6.200	0.150	32.70
						Total	44.75

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	6.760	11.000	0.470	34.95
	Box Side Wall	cum	2	11.00	4.000	0.480	42.24
	Base slab of Return wall II	cum	4	8.690	6.000	0.750	156.42
	Return wall I	cum	4	1.400	4.390	0.300	7.37
	Return wall II	cum	4	8.690	0.575	6.110	122.12
	Shear Key	cum	2	6.760	0.48545		6.56
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	369.91
4	Steel						
	@ 80 Kg per cum of concrete	ton					29.59
						Total	29.59

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $3.7/1 =$					4	
	No of weep holes in horizontal direction per return wall = $6/2 =$					6	
	No of weep holes in vertical direction per return wall = $3.5/1 =$					4	
	Total no of Weep holes per abutment = 5×4					20	
	Total no of Weep holes per return wall = 6×4					24	
	Total mtrs of weep holes = $20 \times 2 + 24 \times 4$						
						Total	68.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	3.520	43.93
	Behind Return Wall	cum	4	10.090	0.600	5.890	142.63
						Total	186.55

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					444.89
	Less for PCC	cum					44.75
	Less for Bottom Slab RCC	cum					34.95
	Less for Shear Key RCC	cum					6.56
	Less for Return Wall-I RCC	cum	4	1.400	0.300	0.500	0.84
	Less for Return Wall-II Base Slab	cum					156.42
	Less for Return Wall-II Stem Wall	cum	4	8.690	0.850	0.220	6.50
	Less for Box above Invert upto EGL	cum	1	3.96	12.000	0.500	23.76
						Total	171.10

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.960	11.000	0.390	16.98
	(+)Haunch	cum	2	11.00	0.01125		0.25
	(+)RCC Wall	cum	2	6.760	2.900	0.300	11.76
	(+)RCC Column	cum	4	0.600	0.900	2.000	4.32
						Total	33.31



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/3 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.66
						Total	2.66

PROTECTION WORK

Upstream side

10	Earthwork for excavation						
		cum	1	4.400	2.00	0.50	4.40
						Total	4.40

11	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53

12	Catch Pit Stone Masonry/PCC M15						
	Side wall length parallal to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30

13	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91

14	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/3 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
15	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
16	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
17	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
18	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	8.320	13.000	0.930	100.59
	Shear Key	cum	2	8.520	1.620	0.720	19.88
	Return Wall II	cum	4	5.460	5.150	0.700	78.73
						Total	199.20

2	PCC-M15						
	Box culvert	cum	1	7.320	9.960	0.150	10.94
	Shear Key	cum	2	7.520	1.418	0.150	3.20
	Return Wall II	cum	4	5.060	4.350	0.150	13.21
						Total	27.34

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	7.320	12.000	0.480	42.16
	Box Side Wall	cum	2	12.00	4.000	0.460	44.16
	Base slab of Return wall II	cum	4	4.960	4.150	0.400	32.93
	Return wall I	cum	4	1.700	4.450	0.300	9.08
	Return wall II	cum	4	4.960	0.325	4.530	29.21
	Shear Key	cum	2	7.320	0.47520		6.96
	Haunch	cum	2	12.000	0.01125		0.27
						Total=	164.77

4	Steel						
	@ 80 Kg per cum of concrete	ton					13.18
						Total	13.18

5	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 =					6	
	No of weep holes in vertical direction per abutment =3.7/1 =					4	
	No of weep holes in horizontal direction per return wall =6/2 =					4	
	No of weep holes in vertical direction per return wall =3.7/1 =					4	
	Total no of Weep holes per abutment = 6 x 4					24	
	Total no of Weep holes per return wall = 4 x 4					16	
	Total mtrs of weep holes = 24 x 2 + 16 x 4					Total	56.00

6	Filter media						
	Behind Abutment	cum	2	11.400	0.600	3.700	50.62
	Behind Return Wall	cum	4	6.660	0.600	4.150	66.33
						Total	116.95

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					199.20
	Less for PCC	cum					27.34
	Less for Bottom Slab RCC	cum					42.16
	Less for Shear Key RCC	cum					6.96
	Less for Return Wall-I RCC	cum	4	1.700	0.300	0.300	0.61
	Less for Return Wall-II Base Slab	cum					32.93
	Less for Return Wall-II Stem Wall	cum	4	4.960	0.450	0.380	3.39
	Less for Box above Invert upto EGL	cum	1	3.92	13.000	0.300	15.29
						Total	70.51

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	3.920	12.000	0.519	24.40
	(+)Haunch	cum	2	12.00	0.01125		0.27
						Total	24.67



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					1.97
						Total	1.97
10	Bituminous Concrete						
		cum	1	3.92	11.00	0.04	1.72
						Total	1.72
11	Mastic Asphalt						
		sqm	1	3.92	11.00		43.12
						Total	43.12
12	Tack Coat						
		sqm	1	3.92	11.00		43.12
						Total	43.12
13	RCC M-40 Crash Barrier	m	2	3.92			7.84
						Total	7.84
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	4.400	2.00	0.30	2.64
						Total	2.64
16	PCC M 15 below Catch Pit						
		cum	1	3.400	1.50	0.30	1.53
						Total	1.53
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	3.400	0.360		1.22
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.30
18	300 mm Boulder Pitching						
		cum	1	2.800	1.50	0.30	1.26
		cum	1	3.666	1.50	0.30	1.65
						Total	2.91
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/34/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	8.727	0.95	0.150	1.24
	For PCC wall						
		cum	1	4.184	0.35	1.000	1.46
		cum	1	5.569	0.35	1.600	3.12
		cum	1	6.955	0.35	1.600	3.89
	Below PCC Wall						
		cum	1	4.384	0.55	0.100	0.24
		cum	1	5.769	0.55	0.100	0.32
		cum	1	7.155	0.55	0.100	0.39
	On trades						
		cum	1	3.491	0.85	0.100	0.30
		cum	1	4.876	0.85	0.100	0.41
		cum	1	6.262	0.85	0.100	0.53
		cum	1	7.734	1.00	0.100	0.77
						Total	12.69
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	9.327	1.55	1.95	28.19
	Stone Pitching and side wall	cum	1	6.014	3.320		19.96
						Total	48.16
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	8.427	1.003		8.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	10.44
23	300 mm Boulder Pitching						
	Below trades	cum	1	3.491	0.85	0.300	0.89
		cum	1	4.876	0.85	0.300	1.24
		cum	1	6.262	0.85	0.300	1.60
		cum	1	7.734	1.00	0.300	2.32
						Total	6.05
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	3.92	2.558		20.05
						Total	20.05



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.800	11.000	0.950	71.06
	Shear Key	cum	2	7.000	1.600	0.700	15.68
	Return Wall II	cum	4	5.260	4.300	0.600	54.28
						Total	141.02

2	PCC-M15						
	Box culvert	cum	1	5.800	8.000	0.150	6.96
	Shear Key	cum	2	6.000	1.390	0.150	2.50
	Return Wall II	cum	4	4.860	3.500	0.150	10.21
						Total	19.67

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.800	10.000	0.500	29.00
	Box Side Wall	cum	2	10.00	3.000	0.500	30.00
	Base slab of Return wall II	cum	4	4.760	3.300	0.300	18.85
	Return wall I	cum	4	0.400	3.450	0.250	1.38
	Return wall II	cum	4	4.760	0.275	3.650	19.11
	Shear Key	cum	2	5.800	0.45500		5.28
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	103.84

4	Steel						
	@ 80 Kg per cum of concrete	ton					8.31
						Total	8.31

5	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 = $9.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $2.7/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.7/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $15 \times 2 + 9 \times 4$					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	9.500	0.600	2.700	30.78
	Behind Return Wall	cum	4	5.160	0.600	3.150	39.01
						Total	69.79

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					141.02
	Less for PCC	cum					19.67
	Less for Bottom Slab RCC	cum					29.00
	Less for Shear Key RCC	cum					5.28
	Less for Return Wall-I RCC	cum	4	0.400	0.250	0.300	0.12
	Less for Return Wall-II Base Slab	cum					18.85
	Less for Return Wall-II Stem Wall	cum	4	4.760	0.350	0.500	3.33
	Less for Box above Invert upto EGL	cum	1	5.00	11.000	0.300	16.50
						Total	48.28

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	5.000	10.000	0.506	25.31
	(+)Haunch	cum	2	10.00	0.01125		0.23
						Total	25.54



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.04
						Total	2.04
10	Bituminous Concrete						
		cum	1	5.00	9.00	0.04	1.80
						Total	1.80
11	Mastic Asphalt						
		sqm	1	5.00	9.00		45.00
						Total	45.00
12	Tack Coat						
		sqm	1	5.00	9.00		45.00
						Total	45.00
13	RCC M-40 Crash Barrier	m	2	5.00			10.00
						Total	10.00
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	5.400	2.00	0.30	3.24
						Total	3.24
16	PCC M 15 below Catch Pit						
		cum	1	4.400	1.50	0.30	1.98
						Total	1.98
17	Curtain Wall PCC M-20						
	Side wall length parallal to road	cum	1	4.400	0.360		1.58
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.66
18	300 mm Boulder Pitching						
		cum	1	3.800	1.50	0.30	1.71
		cum	1	4.666	1.50	0.30	2.10
						Total	3.81
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	9.727	0.95	0.150	1.39
	For PCC wall						
		cum	1	5.184	0.35	1.000	1.81
		cum	1	6.569	0.35	1.600	3.68
		cum	1	7.955	0.35	1.600	4.45
	Below PCC Wall						
		cum	1	5.384	0.55	0.100	0.30
		cum	1	6.769	0.55	0.100	0.37
		cum	1	8.155	0.55	0.100	0.45
	On trades						
		cum	1	4.491	0.85	0.100	0.38
		cum	1	5.876	0.85	0.100	0.50
		cum	1	7.262	0.85	0.100	0.62
		cum	1	8.734	1.00	0.100	0.87
						Total	14.82
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	10.327	1.55	1.95	31.21
	Stone Pitching and side wall	cum	1	7.014	3.320		23.28
						Total	54.50
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	9.427	1.003		9.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	11.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	4.491	0.85	0.300	1.15
		cum	1	5.876	0.85	0.300	1.50
		cum	1	7.262	0.85	0.300	1.85
		cum	1	8.734	1.00	0.300	2.62
						Total	7.12
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	5.00	2.558		25.58
						Total	25.58



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.800	12.000	0.950	77.52
	Shear Key	cum	2	7.000	1.600	0.700	15.68
	Return Wall II	cum	4	5.260	4.300	0.600	54.28
						Total	147.48

2	PCC-M15						
	Box culvert	cum	1	5.800	9.000	0.150	7.83
	Shear Key	cum	2	6.000	1.390	0.150	2.50
	Return Wall II	cum	4	4.860	3.500	0.150	10.21
						Total	20.54

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.800	11.000	0.500	31.90
	Box Side Wall	cum	2	11.00	3.000	0.500	33.00
	Base slab of Return wall II	cum	4	4.760	3.300	0.300	18.85
	Return wall I	cum	4	0.400	3.450	0.250	1.38
	Return wall II	cum	4	4.760	0.275	3.650	19.11
	Shear Key	cum	2	5.800	0.45500		5.28
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	109.77

4	Steel						
	@ 80 Kg per cum of concrete	ton					8.78
						Total	8.78

5	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 =10.5/2 =					5	
	No of weep holes in vertical direction per abutment =2.7/1 =					3	
	No of weep holes in horizontal direction per return wall =4.5/2 =					3	
	No of weep holes in vertical direction per return wall =2.7/1 =					3	
	Total no of Weep holes per abutment = 5 x 3					15	
	Total no of Weep holes per return wall = 3 x 3					9	
	Total mtrs of weep holes = 15 x 2 + 9 x 4					Total	33.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	2.700	34.02
	Behind Return Wall	cum	4	5.160	0.600	3.150	39.01
						Total	73.03

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					147.48
	Less for PCC	cum					20.54
	Less for Bottom Slab RCC	cum					31.90
	Less for Shear Key RCC	cum					5.28
	Less for Return Wall-I RCC	cum	4	0.400	0.250	0.300	0.12
	Less for Return Wall-II Base Slab	cum					18.85
	Less for Return Wall-II Stem Wall	cum	4	4.760	0.350	0.500	3.33
	Less for Box above Invert upto EGL	cum	1	5.00	12.000	0.300	18.00
						Total	49.47

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	5.000	11.000	0.513	28.19
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	28.44



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.27
						Total	2.27
10	Bituminous Concrete						
		cum	1	5.00	10.00	0.04	2.00
						Total	2.00
11	Mastic Asphalt						
		sqm	1	5.00	10.00		50.00
						Total	50.00
12	Tack Coat						
		sqm	1	5.00	10.00		50.00
						Total	50.00
13	RCC M-40 Crash Barrier	m	2	5.00			10.00
						Total	10.00
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	5.400	2.00	0.30	3.24
						Total	3.24
16	PCC M 15 below Catch Pit						
		cum	1	4.400	1.50	0.30	1.98
						Total	1.98
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	4.400	0.360		1.58
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.66
18	300 mm Boulder Pitching						
		cum	1	3.800	1.50	0.30	1.71
		cum	1	4.666	1.50	0.30	2.10
						Total	3.81
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	9.727	0.95	0.150	1.39
	For PCC wall						
		cum	1	5.184	0.35	1.000	1.81
		cum	1	6.569	0.35	1.600	3.68
		cum	1	7.955	0.35	1.600	4.45
	Below PCC Wall						
		cum	1	5.384	0.55	0.100	0.30
		cum	1	6.769	0.55	0.100	0.37
		cum	1	8.155	0.55	0.100	0.45
	On trades						
		cum	1	4.491	0.85	0.100	0.38
		cum	1	5.876	0.85	0.100	0.50
		cum	1	7.262	0.85	0.100	0.62
		cum	1	8.734	1.00	0.100	0.87
						Total	14.82
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	10.327	1.55	1.95	31.21
	Stone Pitching and side wall	cum	1	7.014	3.320		23.28
						Total	54.50
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	9.427	1.003		9.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	11.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	4.491	0.85	0.300	1.15
		cum	1	5.876	0.85	0.300	1.50
		cum	1	7.262	0.85	0.300	1.85
		cum	1	8.734	1.00	0.300	2.62
						Total	7.12
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	5.00	2.558		25.58
						Total	25.58



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	6.800	13.000	0.950	83.98
	Shear Key	cum	2	7.000	1.600	0.700	15.68
	Return Wall II	cum	4	5.260	3.500	0.550	40.50
						Total	140.16

2	PCC-M15						
	Box culvert	cum	1	5.800	10.000	0.150	8.70
	Shear Key	cum	2	6.000	1.390	0.150	2.50
	Return Wall II	cum	4	4.860	2.700	0.150	7.87
						Total	19.08

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	5.800	12.000	0.500	34.80
	Box Side Wall	cum	2	12.00	3.000	0.500	36.00
	Base slab of Return wall II	cum	4	4.760	2.500	0.250	11.90
	Return wall I	cum	4	0.400	3.450	0.250	1.38
	Return wall II	cum	4	4.760	0.225	3.700	15.85
	Shear Key	cum	2	5.800	0.45500		5.28
	Haunch	cum	2	12.000	0.01125		0.27
						Total=	105.48

4	Steel						
	@ 80 Kg per cum of concrete	ton					8.44
						Total	8.44

5	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 = $11.5/2 =$					6	
	No of weep holes in vertical direction per abutment = $2.7/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					3	
	No of weep holes in vertical direction per return wall = $2.7/1 =$					3	
	Total no of Weep holes per abutment = 6×3					18	
	Total no of Weep holes per return wall = 3×3					9	
	Total mtrs of weep holes = $18 \times 2 + 9 \times 4$					Total	36.00

6	Filter media						
	Behind Abutment	cum	2	11.500	0.600	2.700	37.26
	Behind Return Wall	cum	4	5.160	0.600	3.150	39.01
						Total	76.27

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					140.16
	Less for PCC	cum					19.08
	Less for Bottom Slab RCC	cum					34.80
	Less for Shear Key RCC	cum					5.28
	Less for Return Wall-I RCC	cum	4	0.400	0.250	0.300	0.12
	Less for Return Wall-II Base Slab	cum					11.90
	Less for Return Wall-II Stem Wall	cum	4	4.760	0.250	0.550	2.62
	Less for Box above Invert upto EGL	cum	1	5.00	13.000	0.300	19.50
						Total	46.87

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	5.000	12.000	0.519	31.13
	(+)Haunch	cum	2	12.00	0.01125		0.27
						Total	31.40



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.51
						Total	2.51
10	Bituminous Concrete						
		cum	1	5.00	11.00	0.04	2.20
						Total	2.20
11	Mastic Asphalt						
		sqm	1	5.00	11.00		55.00
						Total	55.00
12	Tack Coat						
		sqm	1	5.00	11.00		55.00
						Total	55.00
13	RCC M-40 Crash Barrier	m	2	5.00			10.00
						Total	10.00
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	5.400	2.00	0.30	3.24
						Total	3.24
16	PCC M 15 below Catch Pit						
		cum	1	4.400	1.50	0.30	1.98
						Total	1.98
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	4.400	0.360		1.58
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.66
18	300 mm Boulder Pitching						
		cum	1	3.800	1.50	0.30	1.71
		cum	1	4.666	1.50	0.30	2.10
						Total	3.81
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/43/0 (W =12 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	9.727	0.95	0.150	1.39
	For PCC wall						
		cum	1	5.184	0.35	1.000	1.81
		cum	1	6.569	0.35	1.600	3.68
		cum	1	7.955	0.35	1.600	4.45
	Below PCC Wall						
		cum	1	5.384	0.55	0.100	0.30
		cum	1	6.769	0.55	0.100	0.37
		cum	1	8.155	0.55	0.100	0.45
	On trades						
		cum	1	4.491	0.85	0.100	0.38
		cum	1	5.876	0.85	0.100	0.50
		cum	1	7.262	0.85	0.100	0.62
		cum	1	8.734	1.00	0.100	0.87
						Total	14.82
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	10.327	1.55	1.95	31.21
	Stone Pitching and side wall	cum	1	7.014	3.320		23.28
						Total	54.50
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	9.427	1.003		9.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	11.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	4.491	0.85	0.300	1.15
		cum	1	5.876	0.85	0.300	1.50
		cum	1	7.262	0.85	0.300	1.85
		cum	1	8.734	1.00	0.300	2.62
						Total	7.12
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	5.00	2.558		25.58
						Total	25.58



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/44/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	8.500	12.000	1.000	102.00
	Shear Key	cum	2	8.700	1.550	0.650	17.53
	Return Wall II	cum	4	6.000	5.150	0.700	86.52
						Total	206.05

2	PCC-M15						
	Box culvert	cum	1	7.500	9.100	0.150	10.24
	Shear Key	cum	2	7.700	1.319	0.150	3.05
	Return Wall II	cum	4	5.600	4.350	0.150	14.62
						Total	27.90

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	7.500	11.000	0.550	45.38
	Box Side Wall	cum	2	11.00	4.000	0.550	48.40
	Base slab of Return wall II	cum	4	5.500	4.150	0.400	36.52
	Return wall I	cum	4	1.200	4.480	0.300	6.45
	Return wall II	cum	4	5.500	0.325	4.630	33.10
	Shear Key	cum	2	7.500	0.40625		6.09
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	176.19

4	Steel						
	@ 80 Kg per cum of concrete	ton					14.10
						Total	14.10

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $3.7/1 =$					4	
	No of weep holes in horizontal direction per return wall = $6/2 =$					4	
	No of weep holes in vertical direction per return wall = $3.7/1 =$					4	
	Total no of Weep holes per abutment = 5×4					20	
	Total no of Weep holes per return wall = 4×4					16	
	Total mtrs of weep holes = $20 \times 2 + 16 \times 4$					Total	52.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	3.700	46.18
	Behind Return Wall	cum	4	6.700	0.600	4.180	67.21
						Total	113.39

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					206.05
	Less for PCC	cum					27.90
	Less for Bottom Slab RCC	cum					45.38
	Less for Shear Key RCC	cum					6.09
	Less for Return Wall-I RCC	cum	4	1.200	0.300	0.300	0.43
	Less for Return Wall-II Base Slab	cum					36.52
	Less for Return Wall-II Stem Wall	cum	4	5.500	0.450	0.450	4.46
	Less for Box above Invert upto EGL	cum	1	5.10	12.000	0.300	18.36
						Total	66.91

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	5.100	11.000	0.543	30.43
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	30.68



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/44/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.45
						Total	2.45
10	Bituminous Concrete						
		cum	1	5.10	10.00	0.04	2.04
						Total	2.04
11	Mastic Asphalt						
		sqm	1	5.10	10.00		51.00
						Total	51.00
12	Tack Coat						
		sqm	1	5.10	10.00		51.00
						Total	51.00
13	RCC M-40 Crash Barrier	m	2	5.10			10.20
						Total	10.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	5.400	2.00	0.30	3.24
						Total	3.24
16	PCC M 15 below Catch Pit						
		cum	1	4.400	1.50	0.30	1.98
						Total	1.98
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	4.400	0.360		1.58
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.66
18	300 mm Boulder Pitching						
		cum	1	3.800	1.50	0.30	1.71
		cum	1	4.666	1.50	0.30	2.10
						Total	3.81
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/44/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	9.727	0.95	0.150	1.39
	For PCC wall						
		cum	1	5.184	0.35	1.000	1.81
		cum	1	6.569	0.35	1.600	3.68
		cum	1	7.955	0.35	1.600	4.45
	Below PCC Wall						
		cum	1	5.384	0.55	0.100	0.30
		cum	1	6.769	0.55	0.100	0.37
		cum	1	8.155	0.55	0.100	0.45
	On trades						
		cum	1	4.491	0.85	0.100	0.38
		cum	1	5.876	0.85	0.100	0.50
		cum	1	7.262	0.85	0.100	0.62
		cum	1	8.734	1.00	0.100	0.87
						Total	14.82
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	10.327	1.55	1.95	31.21
	Stone Pitching and side wall	cum	1	7.014	3.320		23.28
						Total	54.50
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	9.427	1.003		9.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	11.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	4.491	0.85	0.300	1.15
		cum	1	5.876	0.85	0.300	1.50
		cum	1	7.262	0.85	0.300	1.85
		cum	1	8.734	1.00	0.300	2.62
						Total	7.12
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	5.10	2.558		26.09
						Total	26.09



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/44/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	8.500	12.000	1.000	102.00
	Shear Key	cum	2	8.700	1.550	0.650	17.53
	Return Wall II	cum	4	7.050	5.300	0.750	112.10
						Total	231.63

2	PCC-M15						
	Box culvert	cum	1	7.500	9.100	0.150	10.24
	Shear Key	cum	2	7.700	1.319	0.150	3.05
	Return Wall II	cum	4	6.650	4.500	0.150	17.96
						Total	31.24

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	7.500	11.000	0.550	45.38
	Box Side Wall	cum	2	11.00	4.350	0.550	52.64
	Base slab of Return wall II	cum	4	6.550	4.300	0.450	50.70
	Return wall I	cum	4	1.200	4.830	0.300	6.96
	Return wall II	cum	4	6.550	0.375	4.930	48.44
	Shear Key	cum	2	7.500	0.40625		6.09
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	210.44

4	Steel						
	@ 80 Kg per cum of concrete	ton					16.84
						Total	16.84

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $4.1/1 =$					5	
	No of weep holes in horizontal direction per return wall = $6/2 =$					4	
	No of weep holes in vertical direction per return wall = $4.1/1 =$					5	
	Total no of Weep holes per abutment = 5×5					25	
	Total no of Weep holes per return wall = 4×5					20	
	Total mtrs of weep holes = $25 \times 2 + 20 \times 4$					Total	65.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	4.050	50.54
	Behind Return Wall	cum	4	7.750	0.600	4.530	84.26
						Total	134.80

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					231.63
	Less for PCC	cum					31.24
	Less for Bottom Slab RCC	cum					45.38
	Less for Shear Key RCC	cum					6.09
	Less for Return Wall-I RCC	cum	4	1.200	0.300	0.300	0.43
	Less for Return Wall-II Base Slab	cum					50.70
	Less for Return Wall-II Stem Wall	cum	4	6.550	0.500	0.400	5.24
	Less for Box above Invert upto EGL	cum	1	5.10	12.000	0.300	18.36
						Total	74.19

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	5.100	11.000	0.480	26.93
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	27.18



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/44/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.17
						Total	2.17
10	Bituminous Concrete						
		cum	1	5.10	10.00	0.04	2.04
						Total	2.04
11	Mastic Asphalt						
		sqm	1	5.10	10.00		51.00
						Total	51.00
12	Tack Coat						
		sqm	1	5.10	10.00		51.00
						Total	51.00
13	RCC M-40 Crash Barrier	m	2	5.10			10.20
						Total	10.20
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	5.400	2.00	0.30	3.24
						Total	3.24
16	PCC M 15 below Catch Pit						
		cum	1	4.400	1.50	0.30	1.98
						Total	1.98
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	4.400	0.360		1.58
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.66
18	300 mm Boulder Pitching						
		cum	1	3.800	1.50	0.30	1.71
		cum	1	4.666	1.50	0.30	2.10
						Total	3.81
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/44/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	9.727	0.95	0.150	1.39
	For PCC wall						
		cum	1	5.184	0.35	1.000	1.81
		cum	1	6.569	0.35	1.600	3.68
		cum	1	7.955	0.35	1.600	4.45
	Below PCC Wall						
		cum	1	5.384	0.55	0.100	0.30
		cum	1	6.769	0.55	0.100	0.37
		cum	1	8.155	0.55	0.100	0.45
	On trades						
		cum	1	4.491	0.85	0.100	0.38
		cum	1	5.876	0.85	0.100	0.50
		cum	1	7.262	0.85	0.100	0.62
		cum	1	8.734	1.00	0.100	0.87
						Total	14.82
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	10.327	1.55	1.95	31.21
	Stone Pitching and side wall	cum	1	7.014	3.320		23.28
						Total	54.50
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	9.427	1.003		9.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	11.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	4.491	0.85	0.300	1.15
		cum	1	5.876	0.85	0.300	1.50
		cum	1	7.262	0.85	0.300	1.85
		cum	1	8.734	1.00	0.300	2.62
						Total	7.12
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	5.10	2.558		26.09
						Total	26.09



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/45/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	10.060	12.000	1.070	129.17
	Shear Key	cum	2	10.260	1.480	0.580	17.61
	Return Wall II	cum	4	6.860	5.300	0.750	109.07
						Total	255.86

2	PCC-M15						
	Box culvert	cum	1	9.060	9.240	0.150	12.56
	Shear Key	cum	2	9.260	1.220	0.150	3.39
	Return Wall II	cum	4	6.460	4.500	0.150	17.44
						Total	33.39

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	9.060	11.000	0.620	61.79
	Box Side Wall	cum	2	11.00	5.000	0.630	69.30
	Base slab of Return wall II	cum	4	6.360	4.300	0.450	49.23
	Return wall I	cum	4	1.900	5.520	0.300	12.59
	Return wall II	cum	4	6.360	0.375	5.690	54.28
	Shear Key	cum	2	9.060	0.34220		6.20
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	253.63

4	Steel						
	@ 80 Kg per cum of concrete	ton					20.29
						Total	20.29

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $4.7/1 =$					5	
	No of weep holes in horizontal direction per return wall = $7.5/2 =$					5	
	No of weep holes in vertical direction per return wall = $4.7/1 =$					5	
	Total no of Weep holes per abutment = 5×5					25	
	Total no of Weep holes per return wall = 5×5					25	
	Total mtrs of weep holes = $25 \times 2 + 25 \times 4$					Total	75.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	4.700	58.66
	Behind Return Wall	cum	4	8.260	0.600	5.220	103.48
						Total	162.14

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					255.86
	Less for PCC	cum					33.39
	Less for Bottom Slab RCC	cum					61.79
	Less for Shear Key RCC	cum					6.20
	Less for Return Wall-I RCC	cum	4	1.900	0.300	0.300	0.68
	Less for Return Wall-II Base Slab	cum					49.23
	Less for Return Wall-II Stem Wall	cum	4	6.360	0.500	0.470	5.98
	Less for Box above Invert upto EGL	cum	1	5.26	12.000	0.300	18.94
						Total	79.66

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	5.260	11.000	0.583	33.70
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	33.95



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/45/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.72
						Total	2.72
10	Bituminous Concrete						
		cum	1	5.26	10.00	0.04	2.10
						Total	2.10
11	Mastic Asphalt						
		sqm	1	5.26	10.00		52.60
						Total	52.60
12	Tack Coat						
		sqm	1	5.26	10.00		52.60
						Total	52.60
13	RCC M-40 Crash Barrier	m	2	5.26			10.52
						Total	10.52
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	5.400	2.00	0.30	3.24
						Total	3.24
16	PCC M 15 below Catch Pit						
		cum	1	4.400	1.50	0.30	1.98
						Total	1.98
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	4.400	0.360		1.58
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	2.66
18	300 mm Boulder Pitching						
		cum	1	3.800	1.50	0.30	1.71
		cum	1	4.666	1.50	0.30	2.10
						Total	3.81
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/45/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	9.727	0.95	0.150	1.39
	For PCC wall						
		cum	1	5.184	0.35	1.000	1.81
		cum	1	6.569	0.35	1.600	3.68
		cum	1	7.955	0.35	1.600	4.45
	Below PCC Wall						
		cum	1	5.384	0.55	0.100	0.30
		cum	1	6.769	0.55	0.100	0.37
		cum	1	8.155	0.55	0.100	0.45
	On trades						
		cum	1	4.491	0.85	0.100	0.38
		cum	1	5.876	0.85	0.100	0.50
		cum	1	7.262	0.85	0.100	0.62
		cum	1	8.734	1.00	0.100	0.87
						Total	14.82
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	10.327	1.55	1.95	31.21
	Stone Pitching and side wall	cum	1	7.014	3.320		23.28
						Total	54.50
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	9.427	1.003		9.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	11.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	4.491	0.85	0.300	1.15
		cum	1	5.876	0.85	0.300	1.50
		cum	1	7.262	0.85	0.300	1.85
		cum	1	8.734	1.00	0.300	2.62
						Total	7.12
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	5.26	2.558		26.91
						Total	26.91



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/53/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	7.740	12.000	1.020	94.74
	Shear Key	cum	2	7.940	1.530	0.630	15.31
	Return Wall II	cum	4	6.290	5.150	0.700	90.70
						Total	200.75

2	PCC-M15						
	Box culvert	cum	1	6.740	9.140	0.150	9.24
	Shear Key	cum	2	6.940	1.291	0.150	2.69
	Return Wall II	cum	4	5.890	4.350	0.150	15.37
						Total	27.30

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	6.740	11.000	0.570	42.26
	Box Side Wall	cum	2	11.00	3.285	0.570	41.19
	Base slab of Return wall II	cum	4	5.790	4.150	0.400	38.45
	Return wall I	cum	4	0.300	3.785	0.250	1.14
	Return wall II	cum	4	5.790	0.325	3.955	29.77
	Shear Key	cum	2	6.740	0.38745		5.22
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	158.27

4	Steel						
	@ 80 Kg per cum of concrete	ton					12.66
						Total	12.66

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $3/1 =$					3	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					4	
	No of weep holes in vertical direction per return wall = $3/1 =$					3	
	Total no of Weep holes per abutment = 5×3					15	
	Total no of Weep holes per return wall = 4×3					12	
	Total mtrs of weep holes = $15 \times 2 + 12 \times 4$					Total	39.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	2.985	37.61
	Behind Return Wall	cum	4	6.090	0.600	3.485	50.94
						Total	88.55

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					200.75
	Less for PCC	cum					27.30
	Less for Bottom Slab RCC	cum					42.26
	Less for Shear Key RCC	cum					5.22
	Less for Return Wall-I RCC	cum	4	0.300	0.250	0.300	0.09
	Less for Return Wall-II Base Slab	cum					38.45
	Less for Return Wall-II Stem Wall	cum	4	5.790	0.450	0.470	4.90
	Less for Box above Invert upto EGL	cum	1	6.14	12.000	0.300	22.10
						Total	60.42

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	6.140	11.000	0.500	33.77
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	34.02



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/53/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.72
						Total	2.72
10	Bituminous Concrete						
		cum	1	6.14	10.00	0.04	2.46
						Total	2.46
11	Mastic Asphalt						
		sqm	1	6.14	10.00		61.40
						Total	61.40
12	Tack Coat						
		sqm	1	6.14	10.00		61.40
						Total	61.40
13	RCC M-40 Crash Barrier	m	2	6.14			12.28
						Total	12.28
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	6.400	2.00	0.30	3.84
						Total	3.84
16	PCC M 15 below Catch Pit						
		cum	1	5.400	1.50	0.30	2.43
						Total	2.43
17	Curtain Wall PCC M-20						
	Side wall length parallal to road	cum	1	5.400	0.360		1.94
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	3.02
18	300 mm Boulder Pitching						
		cum	1	4.800	1.50	0.30	2.16
		cum	1	5.666	1.50	0.30	2.55
						Total	4.71
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/53/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	10.727	0.95	0.150	1.53
	For PCC wall						
		cum	1	6.184	0.35	1.000	2.16
		cum	1	7.569	0.35	1.600	4.24
		cum	1	8.955	0.35	1.600	5.01
	Below PCC Wall						
		cum	1	6.384	0.55	0.100	0.35
		cum	1	7.769	0.55	0.100	0.43
		cum	1	9.155	0.55	0.100	0.50
	On trades						
		cum	1	5.491	0.85	0.100	0.47
		cum	1	6.876	0.85	0.100	0.58
		cum	1	8.262	0.85	0.100	0.70
		cum	1	9.734	1.00	0.100	0.97
						Total	16.96
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	11.327	1.55	1.95	34.24
	Stone Pitching and side wall	cum	1	8.014	3.320		26.60
						Total	60.84
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	10.427	1.003		10.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	12.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	5.491	0.85	0.300	1.40
		cum	1	6.876	0.85	0.300	1.75
		cum	1	8.262	0.85	0.300	2.11
		cum	1	9.734	1.00	0.300	2.92
						Total	8.18
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	6.14	2.558		31.41
						Total	31.41



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/53/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	7.740	12.000	1.020	94.74
	Shear Key	cum	2	7.940	1.530	0.630	15.31
	Return Wall II	cum	4	6.480	5.150	0.700	93.44
						Total	203.49

2	PCC-M15						
	Box culvert	cum	1	6.740	9.140	0.150	9.24
	Shear Key	cum	2	6.940	1.291	0.150	2.69
	Return Wall II	cum	4	6.080	4.350	0.150	15.87
						Total	27.80

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	6.740	11.000	0.570	42.26
	Box Side Wall	cum	2	11.00	3.350	0.570	42.01
	Base slab of Return wall II	cum	4	5.980	4.150	0.400	39.71
	Return wall I	cum	4	0.300	3.850	0.250	1.16
	Return wall II	cum	4	5.980	0.325	4.020	31.25
	Shear Key	cum	2	6.740	0.38745		5.22
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	161.85

4	Steel						
	@ 80 Kg per cum of concrete	ton					12.95
						Total	12.95

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $3.1/1 =$					4	
	No of weep holes in horizontal direction per return wall = $4.5/2 =$					4	
	No of weep holes in vertical direction per return wall = $3.1/1 =$					4	
	Total no of Weep holes per abutment = 5×4					20	
	Total no of Weep holes per return wall = 4×4					16	
	Total mtrs of weep holes = $20 \times 2 + 16 \times 4$					Total	52.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	3.050	38.43
	Behind Return Wall	cum	4	6.280	0.600	3.550	53.51
						Total	91.94

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					203.49
	Less for PCC	cum					27.80
	Less for Bottom Slab RCC	cum					42.26
	Less for Shear Key RCC	cum					5.22
	Less for Return Wall-I RCC	cum	4	0.300	0.250	0.300	0.09
	Less for Return Wall-II Base Slab	cum					39.71
	Less for Return Wall-II Stem Wall	cum	4	5.980	0.450	0.470	5.06
	Less for Box above Invert upto EGL	cum	1	6.14	12.000	0.300	22.10
						Total	61.25

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	6.140	11.000	0.500	33.77
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	34.02



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/53/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					2.72
						Total	2.72
10	Bituminous Concrete						
		cum	1	6.14	10.00	0.04	2.46
						Total	2.46
11	Mastic Asphalt						
		sqm	1	6.14	10.00		61.40
						Total	61.40
12	Tack Coat						
		sqm	1	6.14	10.00		61.40
						Total	61.40
13	RCC M-40 Crash Barrier	m	2	6.14			12.28
						Total	12.28
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	6.400	2.00	0.30	3.84
						Total	3.84
16	PCC M 15 below Catch Pit						
		cum	1	5.400	1.50	0.30	2.43
						Total	2.43
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	5.400	0.360		1.94
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	3.02
18	300 mm Boulder Pitching						
		cum	1	4.800	1.50	0.30	2.16
		cum	1	5.666	1.50	0.30	2.55
						Total	4.71
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/53/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	10.727	0.95	0.150	1.53
	For PCC wall						
		cum	1	6.184	0.35	1.000	2.16
		cum	1	7.569	0.35	1.600	4.24
		cum	1	8.955	0.35	1.600	5.01
	Below PCC Wall						
		cum	1	6.384	0.55	0.100	0.35
		cum	1	7.769	0.55	0.100	0.43
		cum	1	9.155	0.55	0.100	0.50
	On trades						
		cum	1	5.491	0.85	0.100	0.47
		cum	1	6.876	0.85	0.100	0.58
		cum	1	8.262	0.85	0.100	0.70
		cum	1	9.734	1.00	0.100	0.97
						Total	16.96
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	11.327	1.55	1.95	34.24
	Stone Pitching and side wall	cum	1	8.014	3.320		26.60
						Total	60.84
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	10.427	1.003		10.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	12.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	5.491	0.85	0.300	1.40
		cum	1	6.876	0.85	0.300	1.75
		cum	1	8.262	0.85	0.300	2.11
		cum	1	9.734	1.00	0.300	2.92
						Total	8.18
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	6.14	2.558		31.41
						Total	31.41



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/54/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	8.840	12.000	1.050	111.38
	Shear Key	cum	2	9.040	1.500	0.600	16.27
	Return Wall II	cum	4	6.460	5.300	0.750	102.71
						Total	230.37

2	PCC-M15						
	Box culvert	cum	1	7.840	9.200	0.150	10.82
	Shear Key	cum	2	8.040	1.249	0.150	3.01
	Return Wall II	cum	4	6.060	4.500	0.150	16.36
						Total	30.19

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	7.840	11.000	0.600	51.74
	Box Side Wall	cum	2	11.00	4.000	0.620	54.56
	Base slab of Return wall II	cum	4	5.960	4.300	0.450	46.13
	Return wall I	cum	4	0.800	4.520	0.250	3.62
	Return wall II	cum	4	5.960	0.375	4.670	41.75
	Shear Key	cum	2	7.840	0.36000		5.64
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	203.69

4	Steel						
	@ 80 Kg per cum of concrete	ton					16.30
						Total	16.30

5	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 =10.5/2 =					5	
	No of weep holes in vertical direction per abutment =3.7/1 =					4	
	No of weep holes in horizontal direction per return wall =6/2 =					4	
	No of weep holes in vertical direction per return wall =3.7/1 =					4	
	Total no of Weep holes per abutment = 5 x 4					20	
	Total no of Weep holes per return wall = 4 x 4					16	
	Total mtrs of weep holes = 20 x 2 + 16 x 4					Total	52.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	3.700	46.62
	Behind Return Wall	cum	4	6.760	0.600	4.220	68.47
						Total	115.09

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					230.37
	Less for PCC	cum					30.19
	Less for Bottom Slab RCC	cum					51.74
	Less for Shear Key RCC	cum					5.64
	Less for Return Wall-I RCC	cum	4	0.800	0.250	0.300	0.24
	Less for Return Wall-II Base Slab	cum					46.13
	Less for Return Wall-II Stem Wall	cum	4	5.960	0.500	0.450	5.36
	Less for Box above Invert upto EGL	cum	1	6.24	12.000	0.300	22.46
						Total	68.59

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	6.240	11.000	0.583	39.98
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	40.23



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/54/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					3.22
						Total	3.22
10	Bituminous Concrete						
		cum	1	6.24	10.00	0.04	2.50
						Total	2.50
11	Mastic Asphalt						
		sqm	1	6.24	10.00		62.40
						Total	62.40
12	Tack Coat						
		sqm	1	6.24	10.00		62.40
						Total	62.40
13	RCC M-40 Crash Barrier	m	2	6.24			12.48
						Total	12.48
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	6.400	2.00	0.30	3.84
						Total	3.84
16	PCC M 15 below Catch Pit						
		cum	1	5.400	1.50	0.30	2.43
						Total	2.43
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	5.400	0.360		1.94
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	3.02
18	300 mm Boulder Pitching						
		cum	1	4.800	1.50	0.30	2.16
		cum	1	5.666	1.50	0.30	2.55
						Total	4.71
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/54/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	10.727	0.95	0.150	1.53
	For PCC wall						
		cum	1	6.184	0.35	1.000	2.16
		cum	1	7.569	0.35	1.600	4.24
		cum	1	8.955	0.35	1.600	5.01
	Below PCC Wall						
		cum	1	6.384	0.55	0.100	0.35
		cum	1	7.769	0.55	0.100	0.43
		cum	1	9.155	0.55	0.100	0.50
	On trades						
		cum	1	5.491	0.85	0.100	0.47
		cum	1	6.876	0.85	0.100	0.58
		cum	1	8.262	0.85	0.100	0.70
		cum	1	9.734	1.00	0.100	0.97
						Total	16.96
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	11.327	1.55	1.95	34.24
	Stone Pitching and side wall	cum	1	8.014	3.320		26.60
						Total	60.84
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	10.427	1.003		10.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	12.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	5.491	0.85	0.300	1.40
		cum	1	6.876	0.85	0.300	1.75
		cum	1	8.262	0.85	0.300	2.11
		cum	1	9.734	1.00	0.300	2.92
						Total	8.18
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	6.24	2.558		31.92
						Total	31.92



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/54/3 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	8.660	12.000	1.350	140.29
	Shear Key	cum	2	8.860	1.400	0.500	12.40
	Return Wall II	cum	4	9.990	7.000	1.250	349.65
						Total	502.35

2	PCC-M15						
	Box culvert	cum	1	7.660	9.400	0.150	10.80
	Shear Key	cum	2	7.860	1.107	0.150	2.61
	Return Wall II	cum	4	9.590	6.200	0.150	35.67
						Total	49.09

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	7.660	11.000	0.700	58.98
	Box Side Wall	cum	2	11.00	4.000	0.530	46.64
	Base slab of Return wall II	cum	4	9.490	6.000	0.750	170.82
	Return wall I	cum	4	0.800	4.580	0.250	3.66
	Return wall II	cum	4	9.490	0.575	6.530	142.54
	Shear Key	cum	2	7.660	0.27500		4.21
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	427.10

4	Steel						
	@ 80 Kg per cum of concrete	ton					34.17
						Total	34.17

5	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 = $10.5/2 =$					5	
	No of weep holes in vertical direction per abutment = $3.7/1 =$					4	
	No of weep holes in horizontal direction per return wall = $6/2 =$					6	
	No of weep holes in vertical direction per return wall = $3.5/1 =$					4	
	Total no of Weep holes per abutment = 5×4					20	
	Total no of Weep holes per return wall = 6×4					24	
	Total mtrs of weep holes = $20 \times 2 + 24 \times 4$					Total	68.00

6	Filter media						
	Behind Abutment	cum	2	10.500	0.600	3.530	44.48
	Behind Return Wall	cum	4	10.290	0.600	6.080	150.16
						Total	194.64

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					502.35
	Less for PCC	cum					49.09
	Less for Bottom Slab RCC	cum					58.98
	Less for Shear Key RCC	cum					4.21
	Less for Return Wall-I RCC	cum	4	0.800	0.250	0.500	0.40
	Less for Return Wall-II Base Slab	cum					170.82
	Less for Return Wall-II Stem Wall	cum	4	9.490	0.850	0.450	14.52
	Less for Box above Invert upto EGL	cum	1	6.06	12.000	0.500	36.36
						Total	167.97

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	6.060	11.000	0.580	38.68
	(+)Haunch	cum	2	11.00	0.01125		0.25
	(+)RCC Wall	cum	2	7.660	2.900	0.300	13.33
	(+)RCC Column	cum	4	0.600	0.900	2.000	4.32
						Total	56.58



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/54/3 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					4.53
						Total	4.53

PROTECTION WORK

Upstream side

10	Earthwork for excavation						
		cum	1	6.400	2.00	0.50	6.40
						Total	6.40

11	PCC M 15 below Catch Pit						
		cum	1	5.400	1.50	0.30	2.43
						Total	2.43

12	Catch Pit Stone Masonry/PCC M15						
	Side wall length parallal to road	cum	1	5.400	0.360		1.94
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	3.02

13	300 mm Boulder Pitching						
		cum	1	4.800	1.50	0.30	2.16
		cum	1	5.666	1.50	0.30	2.55
						Total	4.71

14	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/54/3 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
15	PCC M15 Downstream side						
	Below curtain wall	cum	1	10.727	0.95	0.150	1.53
	For PCC wall						
		cum	1	6.184	0.35	1.000	2.16
		cum	1	7.569	0.35	1.600	4.24
		cum	1	8.955	0.35	1.600	5.01
	Below PCC Wall						
		cum	1	6.384	0.55	0.100	0.35
		cum	1	7.769	0.55	0.100	0.43
		cum	1	9.155	0.55	0.100	0.50
	On trades						
		cum	1	5.491	0.85	0.100	0.47
		cum	1	6.876	0.85	0.100	0.58
		cum	1	8.262	0.85	0.100	0.70
		cum	1	9.734	1.00	0.100	0.97
						Total	16.96
16	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	11.327	1.55	1.95	34.24
	Stone Pitching and side wall	cum	1	8.014	3.320		26.60
						Total	60.84
17	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	10.427	1.003		10.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	12.45
18	300 mm Boulder Pitching						
	Below trades	cum	1	5.491	0.85	0.300	1.40
		cum	1	6.876	0.85	0.300	1.75
		cum	1	8.262	0.85	0.300	2.11
		cum	1	9.734	1.00	0.300	2.92
						Total	8.18



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	10.400	12.000	1.130	141.02
	Shear Key	cum	2	10.600	1.420	0.520	15.65
	Return Wall II	cum	4	8.400	6.300	0.950	201.10
						Total	357.77

2	PCC-M15						
	Box culvert	cum	1	9.400	9.360	0.150	13.20
	Shear Key	cum	2	9.600	1.135	0.150	3.27
	Return Wall II	cum	4	8.000	5.500	0.150	26.40
						Total	42.87

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	9.400	11.000	0.680	70.31
	Box Side Wall	cum	2	11.00	5.350	0.700	82.39
	Base slab of Return wall II	cum	4	7.900	5.300	0.650	108.86
	Return wall I	cum	4	1.500	5.930	0.300	10.67
	Return wall II	cum	4	7.900	0.450	5.960	84.75
	Shear Key	cum	2	9.400	0.29120		5.47
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	362.71

4	Steel						
	@ 80 Kg per cum of concrete	ton					29.02
						Total	29.02

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $5.1/1 =$					6	
	No of weep holes in horizontal direction per return wall = $7.5/2 =$					5	
	No of weep holes in vertical direction per return wall = $5.1/1 =$					6	
	Total no of Weep holes per abutment = 5×6					30	
	Total no of Weep holes per return wall = 5×6					30	
	Total mtrs of weep holes = $30 \times 2 + 30 \times 4$					Total	90.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	5.050	63.02
	Behind Return Wall	cum	4	9.400	0.600	5.630	127.01
						Total	190.04

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					357.77
	Less for PCC	cum					42.87
	Less for Bottom Slab RCC	cum					70.31
	Less for Shear Key RCC	cum					5.47
	Less for Return Wall-I RCC	cum	4	1.500	0.300	0.300	0.54
	Less for Return Wall-II Base Slab	cum					108.86
	Less for Return Wall-II Stem Wall	cum	4	7.900	0.650	0.330	6.78
	Less for Box above Invert upto EGL	cum	1	6.40	12.000	0.300	23.04
						Total	99.90

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	6.400	11.000	0.580	40.83
	(+)Haunch	cum	2	11.00	0.01125		0.25
						Total	41.08



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					3.29
						Total	3.29
10	Bituminous Concrete						
		cum	1	6.40	10.00	0.04	2.56
						Total	2.56
11	Mastic Asphalt						
		sqm	1	6.40	10.00		64.00
						Total	64.00
12	Tack Coat						
		sqm	1	6.40	10.00		64.00
						Total	64.00
13	RCC M-40 Crash Barrier	m	2	6.40			12.80
						Total	12.80
14	Drainage Spout	nos.	2				2.0

PROTECTION WORK

Upstream side

15	Earthwork for excavation						
		cum	1	6.400	2.00	0.30	3.84
						Total	3.84
16	PCC M 15 below Catch Pit						
		cum	1	5.400	1.50	0.30	2.43
						Total	2.43
17	Curtain Wall PCC M-20						
	Side wall length parallel to road	cum	1	5.400	0.360		1.94
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	3.02
18	300 mm Boulder Pitching						
		cum	1	4.800	1.50	0.30	2.16
		cum	1	5.666	1.50	0.30	2.55
						Total	4.71
19	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/0 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
20	PCC M15 Downstream side						
	Below curtain wall	cum	1	10.727	0.95	0.150	1.53
	For PCC wall						
		cum	1	6.184	0.35	1.000	2.16
		cum	1	7.569	0.35	1.600	4.24
		cum	1	8.955	0.35	1.600	5.01
	Below PCC Wall						
		cum	1	6.384	0.55	0.100	0.35
		cum	1	7.769	0.55	0.100	0.43
		cum	1	9.155	0.55	0.100	0.50
	On trades						
		cum	1	5.491	0.85	0.100	0.47
		cum	1	6.876	0.85	0.100	0.58
		cum	1	8.262	0.85	0.100	0.70
		cum	1	9.734	1.00	0.100	0.97
						Total	16.96
21	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	11.327	1.55	1.95	34.24
	Stone Pitching and side wall	cum	1	8.014	3.320		26.60
						Total	60.84
22	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	10.427	1.003		10.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	12.45
23	300 mm Boulder Pitching						
	Below trades	cum	1	5.491	0.85	0.300	1.40
		cum	1	6.876	0.85	0.300	1.75
		cum	1	8.262	0.85	0.300	2.11
		cum	1	9.734	1.00	0.300	2.92
						Total	8.18
Miscellaneous							
24	Painting						
	Crash Barrier	sqm	2	6.40	2.558		32.74
						Total	32.74



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/3 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	10.100	11.000	1.400	155.54
	Shear Key	cum	2	10.300	1.350	0.450	12.51
	Return Wall II	cum	4	10.920	8.000	1.450	506.69
						Total	674.74

2	PCC-M15						
	Box culvert	cum	1	9.100	8.500	0.150	11.60
	Shear Key	cum	2	9.300	1.036	0.150	2.89
	Return Wall II	cum	4	10.520	7.200	0.150	45.45
						Total	59.94

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	9.100	10.000	0.750	68.25
	Box Side Wall	cum	2	10.00	5.000	0.650	65.00
	Base slab of Return wall II	cum	4	10.420	7.000	0.950	277.17
	Return wall I	cum	4	1.400	5.582	0.300	9.38
	Return wall II	cum	4	10.420	0.750	7.382	230.75
	Shear Key	cum	2	9.100	0.23625		4.30
	Haunch	cum	2	10.000	0.01125		0.23
						Total=	655.07

4	Steel						
	@ 80 Kg per cum of concrete	ton					52.41
						Total	52.41

5	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 = $9.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $4.7/1 =$					5	
	No of weep holes in horizontal direction per return wall = $7.5/2 =$					6	
	No of weep holes in vertical direction per return wall = $4.5/1 =$					5	
	Total no of Weep holes per abutment = 5 x 5					25	
	Total no of Weep holes per return wall = 6 x 5					30	
	Total mtrs of weep holes = 25 x 2 + 30 x 4					Total	85.00

6	Filter media						
	Behind Abutment	cum	2	9.400	0.600	4.532	51.12
	Behind Return Wall	cum	4	11.820	0.600	7.082	200.89
						Total	252.00

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					674.74
	Less for PCC	cum					59.94
	Less for Bottom Slab RCC	cum					68.25
	Less for Shear Key RCC	cum					4.30
	Less for Return Wall-I RCC	cum	4	1.400	0.300	0.500	0.84
	Less for Return Wall-II Base Slab	cum					277.17
	Less for Return Wall-II Stem Wall	cum	4	10.420	1.100	0.300	13.75
	Less for Box above Invert upto EGL	cum	1	6.30	11.000	0.500	34.65
						Total	215.84

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	6.300	10.000	0.582	36.63
	(+)Haunch	cum	2	10.00	0.01125		0.23
	(+)RCC Wall	cum	2	9.100	2.900	0.300	15.83
	(+)RCC Column	cum	4	0.600	0.900	2.000	4.32
						Total	57.01



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/3 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					4.56
						Total	4.56

PROTECTION WORK

Upstream side

10	Earthwork for excavation						
		cum	1	6.400	2.00	0.50	6.40
						Total	6.40

11	PCC M 15 below Catch Pit						
		cum	1	5.400	1.50	0.30	2.43
						Total	2.43

12	Catch Pit Stone Masonry/PCC M15						
	Side wall length parallal to road	cum	1	5.400	0.360		1.94
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	3.02

13	300 mm Boulder Pitching						
		cum	1	4.800	1.50	0.30	2.16
		cum	1	5.666	1.50	0.30	2.55
						Total	4.71

14	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/3 (W =10 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
15	PCC M15 Downstream side						
	Below curtain wall	cum	1	10.727	0.95	0.150	1.53
	For PCC wall						
		cum	1	6.184	0.35	1.000	2.16
		cum	1	7.569	0.35	1.600	4.24
		cum	1	8.955	0.35	1.600	5.01
	Below PCC Wall						
		cum	1	6.384	0.55	0.100	0.35
		cum	1	7.769	0.55	0.100	0.43
		cum	1	9.155	0.55	0.100	0.50
	On trades						
		cum	1	5.491	0.85	0.100	0.47
		cum	1	6.876	0.85	0.100	0.58
		cum	1	8.262	0.85	0.100	0.70
		cum	1	9.734	1.00	0.100	0.97
						Total	16.96
16	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	11.327	1.55	1.95	34.24
	Stone Pitching and side wall	cum	1	8.014	3.320		26.60
						Total	60.84
17	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	10.427	1.003		10.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	12.45
18	300 mm Boulder Pitching						
	Below trades	cum	1	5.491	0.85	0.300	1.40
		cum	1	6.876	0.85	0.300	1.75
		cum	1	8.262	0.85	0.300	2.11
		cum	1	9.734	1.00	0.300	2.92
						Total	8.18



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/3 (W=11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	10.100	12.000	1.400	169.68
	Shear Key	cum	2	10.300	1.350	0.450	12.51
	Return Wall II	cum	4	10.980	7.000	1.250	384.30
						Total	566.49

2	PCC-M15						
	Box culvert	cum	1	9.100	9.500	0.150	12.97
	Shear Key	cum	2	9.300	1.036	0.150	2.89
	Return Wall II	cum	4	10.580	6.200	0.150	39.36
						Total	55.22

SUBSTRUCTURE

3	RCC-Substructure						
	Bottom Slab	cum	1	9.100	11.000	0.750	75.08
	Box Side Wall	cum	2	11.00	5.000	0.650	71.50
	Base slab of Return wall II	cum	4	10.480	6.000	0.750	188.64
	Return wall I	cum	4	1.400	5.582	0.300	9.38
	Return wall II	cum	4	10.480	0.575	7.582	182.74
	Shear Key	cum	2	9.100	0.23625		4.30
	Haunch	cum	2	11.000	0.01125		0.25
						Total=	531.88

4	Steel						
	@ 80 Kg per cum of concrete	ton					42.55
						Total	42.55

5	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 = $10.4/2 =$					5	
	No of weep holes in vertical direction per abutment = $4.7/1 =$					5	
	No of weep holes in horizontal direction per return wall = $7.5/2 =$					6	
	No of weep holes in vertical direction per return wall = $4.5/1 =$					5	
	Total no of Weep holes per abutment = 5×5					25	
	Total no of Weep holes per return wall = 6×5					30	
	Total mtrs of weep holes = $25 \times 2 + 30 \times 4$					Total	85.00

6	Filter media						
	Behind Abutment	cum	2	10.400	0.600	4.532	56.55
	Behind Return Wall	cum	4	11.880	0.600	7.082	201.91
						Total	258.46

7	Sand Filling in Foundation Trenches						
	Total Cutting Volume	cum					566.49
	Less for PCC	cum					55.22
	Less for Bottom Slab RCC	cum					75.08
	Less for Shear Key RCC	cum					4.30
	Less for Return Wall-I RCC	cum	4	1.400	0.300	0.500	0.84
	Less for Return Wall-II Base Slab	cum					188.64
	Less for Return Wall-II Stem Wall	cum	4	10.480	0.850	0.500	17.82
	Less for Box above Invert upto EGL	cum	1	6.30	12.000	0.500	37.80
						Total	186.81

SUPERSTRUCTURE

8	RCC-Superstructure(up to 5m)						
	Top Slab	cum	1	6.300	11.000	0.582	40.30
	(+)Haunch	cum	2	11.00	0.01125		0.25
	(+)RCC Wall	cum	2	9.100	2.900	0.300	15.83
	(+)RCC Column	cum	4	0.600	0.900	2.000	4.32
						Total	60.70



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/3 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
9	Steel						
	@ 80 Kg per cum of concrete	ton					4.86
						Total	4.86

PROTECTION WORK

Upstream side

10	Earthwork for excavation						
		cum	1	6.400	2.00	0.50	6.40
						Total	6.40

11	PCC M 15 below Catch Pit						
		cum	1	5.400	1.50	0.30	2.43
						Total	2.43

12	Catch Pit Stone Masonry/PCC M15						
	Side wall length parallal to road	cum	1	5.400	0.360		1.94
	Side wall length perpendicular to road	cum	2	1.500	0.360		1.08
						Total	3.02

13	300 mm Boulder Pitching						
		cum	1	4.800	1.50	0.30	2.16
		cum	1	5.666	1.50	0.30	2.55
						Total	4.71

14	Guide wall-Stone Masonry/ PCC						
		cum	2	3.232	0.60	0.30	1.16
						Total	1.16



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 01/55/3 (W =11 m)

Catch Pit and Stepped Protection

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
Downstream side							
15	PCC M15 Downstream side						
	Below curtain wall	cum	1	10.727	0.95	0.150	1.53
	For PCC wall						
		cum	1	6.184	0.35	1.000	2.16
		cum	1	7.569	0.35	1.600	4.24
		cum	1	8.955	0.35	1.600	5.01
	Below PCC Wall						
		cum	1	6.384	0.55	0.100	0.35
		cum	1	7.769	0.55	0.100	0.43
		cum	1	9.155	0.55	0.100	0.50
	On trades						
		cum	1	5.491	0.85	0.100	0.47
		cum	1	6.876	0.85	0.100	0.58
		cum	1	8.262	0.85	0.100	0.70
		cum	1	9.734	1.00	0.100	0.97
						Total	16.96
16	Earth work for excavation						
	Curtain Wall Down stream side	cum	1	11.327	1.55	1.95	34.24
	Stone Pitching and side wall	cum	1	8.014	3.320		26.60
						Total	60.84
17	Curtain Wall & Guide wall-Stone Masonry/PCC						
	Curtain Wall Down stream side	cum	1	10.427	1.003		10.45
	Guide Wall	cum	2	5.543	0.60	0.300	2.00
						Total	12.45
18	300 mm Boulder Pitching						
	Below trades	cum	1	5.491	0.85	0.300	1.40
		cum	1	6.876	0.85	0.300	1.75
		cum	1	8.262	0.85	0.300	2.11
		cum	1	9.734	1.00	0.300	2.92
						Total	8.18



Summary sheet of Minor Bridges (Quantities)

		CHAINAGE	189.355	189.895	191.368	194.258	195.104	197.055	197.226	197.644
		Span(m) x Height(m)=	6.0m x 5.0m_1 cell (7%SE)	1 x 21m RCC T Beam_25D Skew	6.0m x 4.0m_1 cell (7%SE)	1 x 10m RCC Solid Slab	5.0m x 5.0m_1 cell (NC)	2 x 24m RCC T Beam	1 x 24m RCC T Beam	6.0m x 3.0m_2 cell (7%SE)
ITEM NO.	Description	Unit								
	A. Foundation									
Item no 1(a)	Excavation (upto 3 m depth)	cum	448.72	734.43	388.15	399.00	511.14	908.94	670.32	535.15
Item no 1(b)	Excavation (3 m to 6 m depth in soil)	cum		688.16		15.76		567.17	519.95	
Item no 1(c)	Excavation (above 6 m depth in soil)	cum		30.85				37.20	0.00	
Item no 2	R.C.C M30 (Foundation)	cum		250.00		78.72		206.47	226.57	
Item no 3	P.C.C (M-15)	cum	29.60	32.04	25.65	16.25	37.79	39.23	29.11	38.47
Item no 4	Steel (Foundation)	ton		30.00		9.45		24.78	27.19	
	B. SubStructure									
Item no 1(a)	R.C.C M30 (Substructure) upto 5m	cum	267.07	102.62	213.42	87.74	270.68	174.50	135.36	248.85
Item no 1(b)	R.C.C M30 (Substructure) from 5m to 10m	cum		25.95		0.00		94.98	25.10	0.00
Item no 1(c)	R.C.C M30 (Substructure) above 10m	cum		0.00				0.00	0.00	
Item no 2	R.C.C. M35 for Pedestals	cum		13.47		0.00		16.17	11.61	
Item no 2	Steel (Substructure)	ton	18.69	21.31	14.94	13.16	18.95	42.85	25.81	17.42
Item no 3	Weep Holes	no	196.00	72.00	166.00	80.00	202.00	108.00	94.00	126.00
Item no 4	Backfilling - Granular Material	cum	38.64	46.14	35.18	22.49	41.35	37.90	43.47	41.82
Item no 5	Backfilling - Sandy Material	cum		316.12		205.88		413.62	360.50	
Item no 6	Filter Media	cum	141.34	92.13	101.29	63.53	138.90	123.97	111.68	76.10
Item no 8	Pot cum PTFE type Bearing	Ton		2000.00				4000.00	1600.00	
Item no 10	Elastomeric Bearing	cucm		57810.00				115620.00	51960.00	
	C. Super Structure									
Item no 1(a)	R.C.C M30 (Superstructure)	cum	61.47	173.82	61.47	101.40	79.03	420.11	210.06	99.90
Item no 2	Steel (Superstructure)	ton	4.61	34.76	4.61	20.28	5.93	84.02	42.01	7.49
Item no 3(a)	Bituminous Concrete Wearing Coat(65mm)	cum	3.30	13.67	3.30	7.99	5.06	25.85	14.63	9.15
Item no 3(b)	Mastic Asphalt	sqm	82.50	341.68	82.50	199.76	126.50	646.36	365.86	228.80
Item no 3(c)	Tack Coat	sqm	82.50	341.68	82.50	199.76	126.50	646.36	365.86	228.80
Item no 3(d)	Cement Concrete Wearing Course	cum								
Item no 4	RCC railing	metre								
Item no 5	Crash Barrier	metre	15.00	62.12	15.00	36.32	23.00	117.52	66.52	41.60
Item no 6	Drainage Spout	each	4.00	8.00	4.00	4.00	4.00	12.00	8.00	4.00
Item no 7	PCC below approach slab	cum	11.53	12.49	11.53	11.32	11.53	11.32	11.32	11.53
Item no 8	R.C.C. Approach Slab with steel (M30)	cum	23.94	31.81	23.94	23.44	23.94	28.83	28.83	23.94
Item no 9	Strip Seal Expansion Joint	metre		26.48		24.00		36.00	24.00	
Item no 10	Filler Joint									
	(i) copper plate	metre	22.80	24.72	22.80	22.40	22.80	22.40	22.40	22.80
	(ii) fibar board	metre	22.80	24.72	22.80	22.40	22.80	22.40	22.40	22.80
	(iii) 20mm thick premoulded joint filler	metre	22.80	24.72	22.80	22.40	22.80	22.40	22.40	22.80
	(iv) joint sealing compound	metre	22.80	24.72	22.80	22.40	22.80	22.40	22.40	22.80

Summary sheet of Minor Bridges (Quantities)

		CHAINAGE	189.355	189.895	191.368	194.258	195.104	197.055	197.226	197.644
		Span(m) x Height(m)=	6.0m x 5.0m_1 cell (7%SE)	1 x 21m RCC T Beam_25D Skew	6.0m x 4.0m_1 cell (7%SE)	1 x 10m RCC Solid Slab	5.0m x 5.0m_1 cell (NC)	2 x 24m RCC T Beam	1 x 24m RCC T Beam	6.0m x 3.0m_2 cell (7%SE)
ITEM NO.	Description	Unit								
	D. Protection Work									
Item no 1a	Boulder Pitching	cum		52.38		110.34		194.97	175.16	
Item no 1b	Filter Blanket	cum		26.19		53.84		96.15	86.25	
Item no 2	Falling Apron on River Bed	cum		37.14		38.91		49.30	47.29	
Item no 3	Toe Wall	cum		19.93		23.23		29.64	28.32	
Item no 4	300 mm thick Rubble stone flooring laid over 100mm thick cement concrete bedding	cum	32.38		29.68		34.01			31.57
Item no 5	750 mm thick Flexible apron	cum	28.91		25.54		32.29			27.90
Item no 6	Curtain Wall- PCC (M-20)	cum	61.29		56.85		64.73			59.96
Item no 7	Excavation in soil	cum	310.27		292.00		317.46			304.79
Item no 9	PCC M15 (Below Curtain Wall)	cum	33.36		32.01		32.58			32.96
	E. Miscellaneous									
Item no 1	Painting	sqm	38.37	158.03	38.37	92.40		298.97	169.23	
	F. Diversion Work									
Item no 1	Earth filling for Approach Road	cum				629.75				
Item no 2	GRANULAR MATERIAL	cum								
Item no 3	Hume Pipe	m				30.00				
Item no 4	Pavement Composition									
4.1	BC	cum				275.00				
4.2	DBM	cum				13.75				
4.3	WBM	cum				68.75				
4.4	GSB	cum				41.25				

Summary sheet of Minor Bridges (Quantities)

		CHAINAGE	197.776	198.573	
		Span(m) x Height(m)=	6.0m x 3.0m_2 cell (NC)	1 x 24m RCC T Beam	Total Quantity
ITEM NO.	Description	Unit			
	A. Foundation				
Item no 1(a)	Excavation (upto 3 m depth)	cum	542.68	670.32	5809
Item no 1(b)	Excavation (3 m to 6 m depth in soil)	cum		214.06	2005
Item no 1(c)	Excavation (avove 6 m depth in soil)	cum		0.00	68
Item no 2	R.C.C M30 (Foundation)	cum		226.57	988
Item no 3	P.C.C (M-15)	cum	39.02	29.11	316
Item no 4	Steel (Foundation)	ton		27.19	119
	B. SubStructure				
Item no 1(a)	R.C.C M30 (Substructure) upto 5m	cum	250.36	132.00	1883
Item no 1(b)	R.C.C M30 (Substructure) from 5m to 10m	cum		75.07	221
Item no 1(c)	R.C.C M30 (Substructure) above 10m	cum		0.00	0
Item no 2	R.C.C. M35 for Pedestals	cum		11.61	53
Item no 2	Steel (Substructure)	ton	17.53	32.80	223
Item no 3	Weep Holes	no	142.00	108.00	1294
Item no 4	Backfilling - Granular Material	cum	42.34	43.47	393
Item no 5	Backfilling - Sandy Material	cum		426.81	1723
Item no 6	Filter Media	cum	80.91	130.40	1060
Item no 8	Pot cum PTFE type Bearing	Ton		1600.00	9200
Item no 10	Elastomeric Bearing	cucm		51960.00	277350
	C. Super Structure				
Item no 1(a)	R.C.C M30 (Superstructure)	cum	111.29	210.06	1529
Item no 2	Steel (Superstructure)	ton	8.35	42.01	254
Item no 3(a)	Bituminous Concrete Wearing Coat(65mm)	cum	6.07	14.63	104
Item no 3(b)	Mastic Asphalt	sqm	151.80	365.86	2592
Item no 3(c)	Tack Coat	sqm	151.80	365.86	2592
Item no 3(d)	Cement Concrete Wearing Course	cum			0
Item no 4	RCC railing	metre			0
Item no 5	Crash Barrier	metre	27.60	66.52	471
Item no 6	Drainage Spout	each	4.00	8.00	60
Item no 7	PCC below approach slab	cum	11.53	11.32	115
Item no 8	R.C.C. Approach Slab with steel (M30)	cum	23.94	28.83	261
Item no 9	Strip Seal Expansion Joint	metre		24.00	134
Item no 10	Filler Joint				
	(i) copper plate	metre	22.80	22.40	228
	(ii) fibar board	metre	22.80	22.40	228
	(iii) 20mm thick premoulded joint filler	metre	22.80	22.40	228
	(iv) joint sealing compound	metre	22.80	22.40	228

Summary sheet of Minor Bridges (Quantities)

		CHAINAGE	197.776	198.573	Total Quantity
		Span(m) x Height(m)=	6.0m x 3.0m_2 cell (NC)	1 x 24m RCC T Beam	
ITEM NO.	Description	Unit			
	D. Protection Work				
Item no 1a	Boulder Pitching	cum		295.87	829
Item no 1b	Filter Blanket	cum		146.60	409
Item no 2	Falling Apron on River Bed	cum		59.11	232
Item no 3	Toe Wall	cum		36.08	137
Item no 4	300 mm thick Rubble stone flooring laid over 100mm thick cement concrete bedding	cum	32.29		160
Item no 5	750 mm thick Flexible apron	cum	28.80		143
Item no 6	Curtain Wall- PCC (M-20)	cum	61.14		304
Item no 7	Excavation in soil	cum	309.66		1534
Item no 9	PCC M15 (Below Curtain Wall)	cum	33.32		164
	E. Miscellaneous				
Item no 1	Painting	sqm		169.23	965
	F. Diversion Work				
Item no 1	Earth filling for Approach Road	cum			630
Item no 2	GRANULAR MATERIAL	cum			0
Item no 3	Hume Pipe	m			30
Item no 4	Pavement Composition				
4.1	BC	cum			275
4.2	DBM	cum			14
4.3	WBM	cum			69
4.4	GSB	cum			41

ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 1 cell of 6m x5m
6.0x5.0x1 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	10.70	13.00	1.900	264.29
	Shear Key	cum	2	10.90	1.350	0.450	13.24
	Return Wall II	cum	2	8.500	5.30	1.900	171.19
	Total						448.72

2	PCC-M15						
	Box culvert	cum	1	9.70	10.50	0.15	15.28
	Shear Key	cum	2	9.90	1.036	0.15	3.08
	Return Wall II	cum	2	8.15	4.60	0.15	11.25
	Total						29.60

SUBSTRUCTURE

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 side wall = $11.4/2+1 =$					7	
	No of weep holes in vertical direction per side wall = $5/1+1 =$					6	
	No of weep holes in horizontal direction per return wall I = $1.1/2+1 =$					2	
	No of weep holes in vertical direction per return wall I = $6.1/1+1 =$					8	
	No of weep holes in horizontal direction per return wall II = $8/2 =$					4	
	No of weep holes in vertical direction per return wall II = $5.93/1 =$					6	
	Total no of Weep holes per side wall = 7×6					42	
	Total no of Weep holes per return wall I = 2×8					16	
	Total no of Weep holes per return wall II = 4×6					24	
	Total no. of weep holes = $42 \times 2 + 16 \times 4 + 24 \times 2$						196.00

4	RCC-M30						
	Bottom Slab	cum	1	9.70	12.00	0.75	87.30
	Box Side Wall	cum	2	12.00	0.75	5.385	96.93
	Base slab of return wall II	cum	2	8.000	4.30	0.50	34.40
	Return wall I	cum	4	1.100	0.30	6.07	8.01
	Return wall II	cum	2	8.000	0.38	5.93	35.58
	Shear key	cum	2	9.700	0.236		4.58
	Haunch	cum	2	12.000	0.011		0.27
	Total=						267.07

5	Steel						
	@70 Kg per cum of concrete	ton					18.695
	Total						18.695

6	Filter media						
	Behind Side Wall	cum	2	11.400	0.60	5.000	68.40
	Behind Return Wall I	cum	4	1.100	0.60	6.065	16.01
	Behind Return Wall II	cum	2	8.000	0.60	5.930	56.93
	Total						141.34

7	Backfilling by granular material						
	Box culvert	cum	1	22.70		0.90	20.43
	Shear Key	cum	2	4.85		0.45	4.37
	Return Wall II	cum	2	10.65		0.65	13.85
	Total						38.64



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 1 cell of 6m x5m
6.0x5.0x1 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

SUPERSTRUCTURE

8	RCC-M30(up to 5m)						
	Top Slab	cum	1	7.500	12.000	0.680	61.200
	(+)Haunch	cum	2	12.000	0.011		0.270
Total							61.470

9	Steel						
	@ 75 Kg per cum of concrete	ton					4.610
Total							4.610

10	Crash Barrier	m	2	7.50			15.00
Total							15.00

11	Drainage Spout	nos.	4				4.00

12	Bituminas Concrete Wearing Coat						
		cum	1	7.50	11.00	0.040	3.30
Total							3.30

13	Tack Coat						
		sqm	1	7.50	11.00		82.50
Total							82.50

14	Mastic Asphalt						
		sqm	1	7.50	11.00		82.50
Total							82.50

15	PCC below Approach Slab						
		cum	2	3.37	11.40	0.15	11.53
Total							11.53

16	Approach Slab						
		cum	2	3.50	11.40	0.30	23.94
Total							23.94

17	Filler Joint						
	(i) copper plate	m	2	11.400			22.800
	(ii) fibar board	m	2	11.400			22.800
	(iii) 20mm thick premoulded joint filler	m	2	11.400			22.800
		m	2	11.400			22.800

PROTECTION WORK

Upstream side

18	Eatrh work for excavation						
	Curtain Wall	cum	1	32.70	2.50	2.15	175.76
	Flexible apron	cum	1	25.70	0.25	0.75	4.82
	Rigid apron	cum	1	25.70	1.75	0.30	13.49
Total							194.07

19	750 mm thick Flexible apron						
		cum	1	25.70	1.50	0.75	28.91
Total							28.91

20	300 mm thick Rigid apron (over 100mm thick PCC)						
		cum	1	25.70	3.00	0.30	23.13
Total							23.13



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 1 cell of 6m x5m
6.0x5.0x1 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
21	Curtain Wall- PCC (M-20)						
		cum	1	31.70	1.480		46.92
Total=							46.92

22	PCC (M-15)						
	Below Curtain Wall	cum	2	31.70	1.50	0.15	14.27
Total=							14.27

Downstream side

23	PCC M15 Down stream side						
	Below curtain wall						
		cum	1	11.812	0.95	0.15	1.68
	For PCC wall						
		cum	1	7.184	0.35	1.00	2.51
		cum	1	8.569	0.35	1.60	4.80
		cum	1	9.955	0.35	1.60	5.57
	Below PCC Wall						
		cum	1	7.38	0.55	0.10	0.41
		cum	1	8.77	0.55	0.10	0.48
		cum	1	10.15	0.55	0.10	0.56
	On trades						
		cum	1	6.491	0.85	0.10	0.55
		cum	1	7.876	0.85	0.10	0.67
		cum	1	9.262	0.85	0.10	0.79
		cum	1	10.734	1.00	0.10	1.07
Total							19.10

24	Eathr work for excavation						
	Curtain Wall	cum	1	12.812	1.95	2.65	66.20
		cum	1	8.03		1.100	8.83
	stone Pitching	cum	1	9.69		1.700	16.48
		cum	1	11.36		1.700	19.31
		cum	1	10.73		0.500	5.37
Total							116.19

25	Curtain Wall & guide wall- PCC (M-20)						
	Curtain Wall	cum	1	11.812	1.003		11.841
	Guide wall	cum	2	4.22		0.300	2.533
Total							14.374

26	300 MM thk stone pitching						
	Below trades						
		cum	1	6.491	0.85	0.30	1.66
		cum	1	7.876	0.85	0.30	2.01
		cum	1	9.262	0.85	0.30	2.36
		cum	1	10.734	1.00	0.30	3.22
Total							9.25

Miscellaneous

27	Painting						
	Crash Barrier	sqm	2	7.50	2.558		38.37
Total							38.37



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_189.895 Km

1 span of 21 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

1	Excavation (up to 3m)						
	Foundation A1	cum	1	14.572	8.400	3.000	367.214
	Foundation A2	cum	1	14.572	8.400	3.000	367.214
						Total	734.428

2	Excavation (3 m to 6 m depth)						
	Foundation A1	cum	1	14.572	8.400	3.000	367.214
	Foundation A2	cum	1	14.572	8.400	2.622	320.945
						Total	688.159

3	Foundation slab RCC-M30						
	Toe side (trapezoidal part)	cum	2	13.572	3.480		94.461
	Heel side (trapezoidal part)	cum	2	13.572	4.080		110.748
	Middle portion (rectangular)	cum	2	13.572	1.100	1.500	44.788
						Total	249.997

4	Levelling Course M15						
	Below Foundation slabs	cum	2	13.872	7.700	0.150	32.044
						Total	32.044

5	Steel Reinforcement (HYSD) for Foundation						
	@ 120 kg/cum of concrete volume for foundation slab	ton		30.000			30.000
						Total	30.000



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_189.895 Km

1 span of 21 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

6	RCC M30 for Substructure upto 5 m						
	Abutment wall	cum	2	1.100	13.241	1.900	55.347
	Abutment Cap	cum	2	1.100	13.241	1.000	29.130
						Total	102.621

7	RCC M30 for Substructure (5 - 10) m						
	Fin wall	cum	4	3.884	0.400	2.174	13.510
	Dirt wall	cum	2	0.397	12.000	0.838	7.984
	Bracket	cum	2	0.199		11.200	4.458
						Total	25.952

8	RCC M-35 for Pedestal & Seismic Arrestor Blocks height upto 5.0m						
	Pedestal at Abutment	cum	5	0.800	0.800	0.300	0.960
		cum	5	0.800	0.800	0.375	1.200
	Block RB2	cum	10	1.000	0.550	1.300	7.150
	Block RB1	cum	4	0.800	1.000	1.300	4.160
						Total	13.470

9	Steel reinforcement (HYSD Bars) for substructure						
	150 kg/cum	ton			21.306		21.306
						Total	21.306

10	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 = $13.2/2+1 =$					8	
	No of weep holes in vertical direction per abutment = $1.9/1 +1 =$					3	
	No of weep holes in vertical direction per Fin wall = $2.174/2+1 =$					2	
	No of weep holes in horizontal direction per fin wall = $3.88/2+1 =$					3	
	Total no of Weep holes per abutment = 8×3					24	
	Total no of Weep holes per fin wall = 2×3					6	
	Total nos of weep holes = $24 \times 2 + 6 \times 4$						72.00

11	Backfilling(Granular Material)						
	Foundations	cum	2	21.972		1.050	46.141
						Total	46.141

12	Backfilling(Sandy Material)						
	Behind Abutment & Fin wall	cum	2	2.920	12.441	5.619	408.251
	Deduction for filter media	cum					-92.131
						Total	316.120

13	Filter media						
	Behind Abutment	cum	2	12.358	0.600	5.354	70.200
	Deduction for bracket portion	cum	2	12.358	0.135		
	Behind fin Wall	cum	4	3.884	0.600	1.724	
						Total	

ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_189.895 Km

1 span of 21 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
14	Pot cum PTFE Bearing						
		ton capacity	10	200.00			2000.00
Total=							2000.00

15	Elastomeric Bearing						
	B2	cucm	4	35.00	42.50	4.80	28560.00
	B3	cucm	10	25.00	30.00	3.90	29250.00
Total=							57810.00

C. SUPERSTRUCTURE

16	RCC-M30						
	Long girder middle portion	cum	1	17.260	7.300		125.998
	Long girder end straight portion	cum	2	1.000	9.260		18.520
	Long girder end varrying portion	cum	2	1.200	8.280		19.872
	End cross girder	cum	2	0.331	9.000		5.958
	Intermediate cross girder	cum	1	0.331	10.484		3.470
Total							173.818

17	Superstructure Steel (HYSD Bars)						
	200 kg/cum	Ton		34.764			34.764
Total							34.764

18	Bituminus concrete wearing course						
		cum	1	31.062	11.000	0.040	13.667
Total							13.667

19	Wearing Course (Mastic Asphalt)						
		sqm	1	31.062	11.000		341.682
Total							341.682

20	Tack Coat						
		sqm	1	31.062	11.000		341.682
Total							341.682

21	Crash Barrier (RCC M40)	m	2	31.062			62.124
Total							62.124

22	Drainage Spout	nos.	8				8.000
Total							8.000



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_189.895 Km

1 span of 21 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
23	PCC below Approach Slab						
		cum	2	12.358	3.370	0.150	12.494
Total							12.494

24	Approach Slab						
		cum	2	12.314	3.500	0.369	31.807
Total							31.807

25	Strip Seal Expansion Joint						
		m	2	13.241			26.482
Total							26.482

26	Filler Joint						
	(i) copper plate	m	2	12.358			24.716
	(ii) fibar board	m	2	12.358			24.716
	(iii) 20mm thick premoulded joint filler	m	2	12.358			24.716
	(iv) joint sealing compound	m	2	12.358			24.716

D. MISCELLANEOUS

27	Painting						
	Crash Barrier	sqm	2	2.544		31.06	158.03
Total							158.030

E.PROTECTION WORK

28	Boulder Pitching						
	A1 side	cum	2	33.781		0.300	20.269
	A2 side	cum	2	53.510		0.300	32.106
Total							52.375

29	Filter Blanket 150mm thick below pitching						
	A1 side	cum	2	33.781		0.150	10.134
	A2 side	cum	2	53.510		0.150	16.053
Total							26.187

30	Floor Protection(A-1 & A-2 side) with stone blanket						
	A1 side	cum	2	8.409	1.050		17.659
	A2 side	cum	2	9.275	1.050		19.478
Total							37.137

31	PCC(M15) Toe Wall						
	A1 side	cum	2	13.577	0.345		9.368
	A2 side	cum	2	15.309	0.345		10.563
Total							19.931



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 1 cell of 6m x4m
6.0x4.0x1 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	9.10	13.00	1.870	221.22
	Shear Key	cum	2	9.30	1.380	0.480	12.32
	Return Wall II	cum	2	7.800	5.30	1.870	154.61
	Total						388.15

2	PCC-M15						
	Box culvert	cum	1	8.10	10.44	0.15	12.68
	Shear Key	cum	2	8.30	1.079	0.15	2.69
	Return Wall II	cum	2	7.45	4.60	0.15	10.28
	Total						25.65

SUBSTRUCTURE

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 side wall = $11.4/2+1 =$					7	
	No of weep holes in vertical direction per side wall = $4/1+1 =$					5	
	No of weep holes in horizontal direction per return wall I = $0.3/2+1 =$					2	
	No of weep holes in vertical direction per return wall I = $5.1/1+1 =$					7	
	No of weep holes in horizontal direction per return wall II = $7.3/2 =$					4	
	No of weep holes in vertical direction per return wall II = $4.9/1 =$					5	
	Total no of Weep holes per side wall = 7×5					35	
	Total no of Weep holes per return wall I = 2×7					14	
	Total no of Weep holes per return wall II = 4×5					20	
	Total no. of weep holes = $35 \times 2 + 14 \times 4 + 20 \times 2$						166.00

4	RCC-M30						
	Bottom Slab	cum	1	8.10	12.00	0.72	69.98
	Box Side Wall	cum	2	12.00	0.75	4.385	78.93
	Base slab of return wall II	cum	2	7.300	4.30	0.50	31.39
	Return wall I	cum	4	0.300	0.30	5.07	1.82
	Return wall II	cum	2	7.300	0.38	4.90	26.83
	Shear key	cum	2	8.100	0.259		4.20
	Haunch	cum	2	12.000	0.011		0.27
	Total=						213.42

5	Steel						
	@70 Kg per cum of concrete	ton					14.940
	Total						14.940

6	Filter media						
	Behind Side Wall	cum	2	11.400	0.60	4.000	54.72
	Behind Return Wall I	cum	4	0.300	0.60	5.065	3.65
	Behind Return Wall II	cum	2	7.300	0.60	4.900	42.92
	Total						101.29

7	Backfilling by granular material						
	Box culvert	cum	1	21.10		0.87	18.36
	Shear Key	cum	2	4.05		0.48	3.89
	Return Wall II	cum	2	9.95		0.65	12.94
	Total						35.18



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 1 cell of 6m x4m
6.0x4.0x1 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

SUPERSTRUCTURE

8	RCC-M30(up to 5m)						
	Top Slab	cum	1	7.500	12.000	0.680	61.200
	(+)Haunch	cum	2	12.000	0.011		0.270
Total							61.470

9	Steel						
	@ 75 Kg per cum of concrete	ton					4.610
Total							4.610

10	Crash Barrier	m	2	7.50			15.00
Total							15.00

11	Drainage Spout	nos.	4				4.00

12	Bituminas Concrete Wearing Coat						
		cum	1	7.50	11.00	0.040	3.30
Total							3.30

13	Tack Coat						
		sqm	1	7.50	11.00		82.50
Total							82.50

14	Mastic Asphalt						
		sqm	1	7.50	11.00		82.50
Total							82.50

15	PCC below Approach Slab						
		cum	2	3.37	11.40	0.15	11.53
Total							11.53

16	Approach Slab						
		cum	2	3.50	11.40	0.30	23.94
Total							23.94

17	Filler Joint						
	(i) copper plate	m	2	11.400			22.800
	(ii) fibar board	m	2	11.400			22.800
	(iii) 20mm thick premoulded joint filler	m	2	11.400			22.800
	(iv) joint sealing compound	m	2	11.400			22.800

PROTECTION WORK

Upstream side

18	Eatrh work for excavation						
	Curtain Wall	cum	1	29.70	2.50	2.15	159.64
	Flexible apron	cum	1	22.70	0.25	0.75	4.26
	Rigid apron	cum	1	22.70	1.75	0.30	11.92
Total							175.81

19	750 mm thick Flexible apron						
		cum	1	22.70	1.50	0.75	25.54
Total							25.54

20	300 mm thick Rigid apron (over 100mm thick PCC)						
		cum	1	22.70	3.00	0.30	20.43
Total							20.43



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 1 cell of 6m x4m
6.0x4.0x1 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
21	Curtain Wall- PCC (M-20)						
		cum	1	28.70	1.480		42.48
Total=							42.48

22	PCC (M-15)						
	Below Curtain Wall	cum	2	28.70	1.50	0.15	12.92
Total=							12.92

Downstream side

23	PCC M15 Down stream side						
	Below curtain wall						
		cum	1	11.812	0.95	0.15	1.68
	For PCC wall						
		cum	1	7.184	0.35	1.00	2.51
		cum	1	8.569	0.35	1.60	4.80
		cum	1	9.955	0.35	1.60	5.57
	Below PCC Wall						
		cum	1	7.38	0.55	0.10	0.41
		cum	1	8.77	0.55	0.10	0.48
		cum	1	10.15	0.55	0.10	0.56
	On trades						
		cum	1	6.491	0.85	0.10	0.55
		cum	1	7.876	0.85	0.10	0.67
		cum	1	9.262	0.85	0.10	0.79
		cum	1	10.734	1.00	0.10	1.07
Total							19.10

24	Eathr work for excavation						
	Curtain Wall	cum	1	12.812	1.95	2.65	66.20
		cum	1	8.03		1.100	8.83
	stone Pitching	cum	1	9.69		1.700	16.48
		cum	1	11.36		1.700	19.31
		cum	1	10.73		0.500	5.37
Total							116.19

25	Curtain Wall & guide wall- PCC (M-20)						
	Curtain Wall	cum	1	11.812	1.003		11.841
	Guide wall	cum	2	4.22		0.300	2.533
Total							14.374

26	300 MM thk stone pitching						
	Below trades						
		cum	1	6.491	0.85	0.30	1.66
		cum	1	7.876	0.85	0.30	2.01
		cum	1	9.262	0.85	0.30	2.36
		cum	1	10.734	1.00	0.30	3.22
Total							9.25

Miscellaneous

27	Painting						
	Crash Barrier	sqm	2	7.50	2.558		38.37
Total							38.37



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_194.258 Km

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

1	Excavation (up to 3m)						
	Foundation A1	cum	1	13.300	5.000	3.000	199.500
	Foundation A2	cum	1	13.300	5.000	3.000	199.500
						Total	399.000

2	Excavation (3 m to 6 m depth)						
	Foundation A1	cum	1	13.300	5.000	0.200	13.300
	Foundation A2	cum	1	13.300	5.000	0.037	2.461
						Total	15.761

3	Foundation slab RCC-M30						
	Toe side (trapezoidal part)	cum	2	12.300	1.200		29.520
	Heel side (trapezoidal part)	cum	2	12.300	1.200		29.520
	Middle portion (rectangular)	cum	2	12.300	0.800	1.000	19.680
						Total	78.720

4	Levelling Course M15						
	Below Foundation slabs	cum	2	12.600	4.300	0.150	16.254
						Total	16.254

5	Steel Reinforcement (HYSD) for Foundation						
	@ 120 kg/cum of concrete volume for foundation slab	ton			9.446		9.446
						Total	9.446

B. SUBSTRUCTURE

6	RCC M30 for Substructure upto 5 m						
	Abutment wall	cum	2	0.800	12.000	2.700	51.840
	Abutment Cap	cum	2	0.800	12.000	0.800	15.360
	Fin wall	cum	4	3.520	0.400	1.674	9.428
	Dirt wall	cum	2	0.360	12.000	0.819	7.076
	Bracket	cum	2	0.180		11.200	4.032
						Total	87.736



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_194.258 Km

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

7	Steel reinforcement (HYSD Bars) for substructure						
	150 kg/cum	ton		13.160			13.160
						Total	13.160

8	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 = $12/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $2.7/1 +1 =$					4	
	No of weep holes in vertical direction per Fin wall = $1.674/2+1 =$					2	
	No of weep holes in horizontal direction per fin wall = $3.52/2+1 =$					3	
	Total no of Weep holes per abutment = 7×4					28	
	Total no of Weep holes per fin wall = 2×3					6	
	Total nos of weep holes = $28 \times 2 + 6 \times 4$						80.00

9	Backfilling(Granular Material)						
	Foundations	cum	2	17.300		0.650	22.490
						Total	22.490

10	Backfilling(Sandy Material)						
	Behind Abutment & Fin wall	cum	2	2.920	11.200	4.119	269.416
	Deduction for filter media	cum					-63.534
						Total	205.882

11	Filter media						
	Behind Abutment	cum	2	12.000	0.600	3.904	56.218
	Deduction for bracket portion	cum	2	11.200	0.135		-3.024
	Behind fin Wall	cum	4	3.520	0.600	1.224	10.340
						Total	63.534



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_194.258 Km

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

C. SUPERSTRUCTURE

12	RCC-M30 (Up to 5M)						
	Slab	cum	1	10.400	9.750		101.400
Total							101.400

13	Superstructure Steel (HYSD Bars)						
	200 kg/cum	Ton		20.280			20.280
Total							20.280

14	Bituminous concrete wearing course						
		cum	1	18.160	11.000	0.040	7.990
Total							7.990

15	Wearing Course (Mastic Asphalt)						
		sqm	1	18.160	11.000		199.760
Total							199.760

16	Tack Coat						
		sqm	1	18.160	11.000		199.760
Total							199.760

17	Crash Barrier (RCC M40)	m	2	18.160			36.320
Total							36.320

18	Drainage Spout	nos.	4				4.000
Total							4.000

19	PCC below Approach Slab						
		cum	2	11.200	3.370	0.150	11.323
Total							11.323

20	Approach Slab						
		cum	2	11.160	3.500	0.300	23.436
Total							23.436

21	Strip Seal Expansion Joint						
		m	2	12.000			24.000
Total							24.000



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_194.258 Km

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
22	Filler Joint						
	(i) copper plate	m	2	11.200			22.400
	(ii) fibar board	m	2	11.200			22.400
	(iii) 20mm thick pre moulded joint filler	m	2	11.200			22.400
	(iv) joint sealing compound	m	2	11.200			22.400

D. MISCELLANEOUS

23	Painting						
	Crash Barrier	sqm	2	2.544		18.16	92.40
						Total	92.400

E.PROTECTION WORK

24	Boulder Pitching						
	A1 side	cum	2	69.731		0.300	41.839
	A2 side	cum	2	75.618		0.300	45.371
	Bank protection (A1 side)	cum	1	38.556		0.300	11.567
	Bank protection (A2 side)	cum	1	38.556		0.300	11.567
						Total	110.344

25	Filter Blanket 150mm thick below pitching						
	A1 side	cum	2	69.731		0.150	20.919
	A2 side	cum	2	75.618		0.150	22.685
	Bank protection (A1 side)	cum	1	34.116		0.150	5.117
	Bank protection (A2 side)	cum	1	34.116		0.150	5.117
						Total	53.838

26	Floor Protection(A-1 & A-2 side) with stone blanket						
	A1 side	cum	2	9.303	1.016		18.904
	A2 side	cum	2	9.527	1.050		20.007
						Total	38.911

27	PCC(M15) Toe Wall						
	A1 side	cum	2	16.606	0.345		11.458
	A2 side	cum	2	17.054	0.345		11.767
						Total	23.225



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_194.258 Km

1 span of 10 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

F.DIVERSION ROAD

28	Total Earth Filling						
		cum	1	50.000	5.500	2.290	629.750
						Total	629.750

29	Pavement Composition						
29.1	BC	sqm	1	50.000	5.500		275.000
29.2	DBM	cum	1	50.000	5.500	0.050	13.750
29.3	WBM	cum	1	50.000	5.500	0.250	68.750
29.4	GSB	cum	1	50.000	5.500	0.150	41.250

30	Hume Pipe (1.2m Dia)						
		m	3	10.000			30.000
						Total	30.000



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 5m x5m
5.0x5.0x2 Cell_With Flexible pavement_Step Protection_Normal Camber

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	15.50	13.00	1.700	342.55
	Shear Key	cum	2	15.70	1.550	0.650	31.64
	Return Wall II	cum	2	7.600	5.30	1.700	136.95
Total							511.14

2	PCC-M15						
	Box culvert	cum	1	14.50	10.10	0.15	21.97
	Shear Key	cum	2	14.70	1.319	0.15	5.82
	Return Wall II	cum	2	7.25	4.60	0.15	10.01
Total							37.79

SUBSTRUCTURE

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 side wall = $11.4/2+1 =$					7	
	No of weep holes in vertical direction per side wall = $5.1/1+1 =$					7	
	No of weep holes in horizontal direction per return wall I = $1.5/2+1 =$					2	
	No of weep holes in vertical direction per return wall I = $6/1+1 =$					7	
	No of weep holes in horizontal direction per return wall II = $7.1/2 =$					4	
	No of weep holes in vertical direction per return wall II = $5.629/1 =$					6	
	Total no of Weep holes per side wall = 7×7					49	
	Total no of Weep holes per return wall I = 2×7					14	
	Total no of Weep holes per return wall II = 4×6					24	
	Total no. of weep holes = $49 \times 2 + 14 \times 4 + 24 \times 2$						202.00

4	RCC-M30						
	Bottom Slab	cum	1	14.50	12.00	0.55	95.70
	Box Side Wall	cum	2	12.00	0.50	5.08	60.95
	Box middle Wall	cum	1	12.00	0.50	5.08	30.47
	Base slab of return wall II	cum	2	7.100	4.30	0.50	30.53
	Return wall I	cum	4	1.500	0.30	5.96	10.73
	Return wall II	cum	2	7.100	0.38	5.63	29.97
	Shear key	cum	2	14.500	0.406		11.78
	Haunch	cum	4	12.000	0.011		0.54
Total=							270.68

5	Steel						
	@70 Kg per cum of concrete	ton					18.947
Total							18.947

6	Filter media						
	Behind Side Wall	cum	2	11.400	0.60	5.079	69.48
	Behind Return Wall I	cum	4	1.500	0.60	5.964	21.47
	Behind Return Wall II	cum	2	7.100	0.60	5.629	47.96
Total							138.90

7	Backfilling by granular material						
	Box culvert	cum	1	27.50		0.70	19.25
	Shear Key	cum	2	7.25		0.65	9.43
	Return Wall II	cum	2	9.75		0.65	12.68
Total							41.35



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 5m x5m
5.0x5.0x2 Cell_With Flexible pavement_Step Protection_Normal Camber

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

SUPERSTRUCTURE

8	RCC-M30(up to 5m)						
	Top Slab	cum	1	11.500	12.000	0.569	78.488
	(+)Haunch	cum	4	12.000	0.011		0.540
Total							79.028

9	Steel						
	@ 75 Kg per cum of concrete	ton					5.927
Total							5.927

10	Crash Barrier	m	2	11.50			23.00
Total							23.00

11	Drainage Spout	nos.	4				4.00

12	Bituminas Concrete Wearing Coat						
		cum	1	11.50	11.00	0.040	5.06
Total							5.06

13	Tack Coat						
		sqm	1	11.50	11.00		126.50
Total							126.50

14	Mastic Asphalt						
		sqm	1	11.50	11.00		126.50
Total							126.50

15	PCC below Approach Slab						
		cum	2	3.37	11.40	0.15	11.53
Total							11.53

16	Approach Slab						
		cum	2	3.50	11.40	0.30	23.94
Total							23.94

17	Filler Joint						
	(i) copper plate	m	2	11.400			22.800
	(ii) fibre board	m	2	11.400			22.800
	(iii) 20mm thick premoulded joint filler	m	2	11.400			22.800
(iv) joint sealing compound		m	2	11.400			22.800

PROTECTION WORK

Upstream side

18	Eatrh work for excavation						
	Curtain Wall	cum	1	35.70	2.50	2.15	191.89
	Flexible apron	cum	1	28.70	0.25	0.75	5.38
	Rigid apron	cum	1	28.70	1.75	0.30	15.07
Total							212.34

19	750 mm thick Flexible apron						
		cum	1	28.70	1.50	0.75	32.29
Total							32.29

20	300 mm thick Rigid apron (over 100mm thick PCC)						
		cum	1	28.70	3.00	0.30	25.83
Total							25.83



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 5m x5m
5.0x5.0x2 Cell_With Flexible pavement_Step Protection_Normal Camber

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
21	Curtain Wall- PCC (M-20)						
		cum	1	34.70	1.480		51.36
Total=							51.36

22	PCC (M-15)						
	Below Curtain Wall	cum	2	34.70	1.50	0.15	15.62
Total=							15.62

Downstream side

23	PCC M15 Down stream side						
	Below curtain wall						
		cum	1	10.812	0.95	0.15	1.54
	For PCC wall						
		cum	1	6.184	0.35	1.00	2.16
		cum	1	7.569	0.35	1.60	4.24
		cum	1	8.955	0.35	1.60	5.01
	Below PCC Wall						
		cum	1	6.38	0.55	0.10	0.35
		cum	1	7.77	0.55	0.10	0.43
		cum	1	9.15	0.55	0.10	0.50
	On trades						
		cum	1	5.491	0.85	0.10	0.47
		cum	1	6.876	0.85	0.10	0.58
		cum	1	8.262	0.85	0.10	0.70
		cum	1	9.734	1.00	0.10	0.97
Total							16.97

24	Eathr work for excavation						
	Curtain Wall	cum	1	11.812	1.95	2.65	61.04
		cum	1	6.83		1.100	7.51
	stone Pitching	cum	1	8.49		1.700	14.44
		cum	1	10.16		1.700	17.27
		cum	1	9.73		0.500	4.87
Total							105.13

25	Curtain Wall & guide wall- PCC (M-20)						
	Curtain Wall	cum	1	10.812	1.003		10.839
	Guide wall	cum	2	4.22		0.300	2.533
Total							13.372

26	300 MM thk stone pitching						
	Below trades						
		cum	1	5.491	0.85	0.30	1.40
		cum	1	6.876	0.85	0.30	1.75
		cum	1	8.262	0.85	0.30	2.11
		cum	1	9.734	1.00	0.30	2.92
Total							8.18

Miscellaneous

27	Painting						
	Crash Barrier	sqm	2	11.50	2.558		58.83
Total							58.83



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.055 Km

2 span of 24 m RCC T Beam

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

1	Excavation (up to 3m)						
	Foundation A1	cum	1	13.300	8.400	3.000	335.160
	Foundation P1	cum	1	9.700	8.200	3.000	238.620
	Foundation A2	cum	1	13.300	8.400	3.000	335.160
	Total						908.940

2	Excavation (3 m to 6 m depth)						
	Foundation A1	cum	1	13.300	8.400	1.824	203.777
	Foundation P1	cum	1	9.700	8.200	0.355	28.237
	Foundation A2	cum	1	13.300	8.400	3.000	335.160
	Total						567.174

3	Excavation (above 6 m depth)						
	Foundation A2	cum	1	13.300	8.400	0.333	37.203
	Total						37.203

4	Foundation slab RCC-M30						
Abt.	Rectangular part	cum	2	12.300	7.400	0.500	91.020
	Trapezoidal part	cum	2	12.300	4.250	0.600	62.730
Pier	Rectangular part	cum	1	8.700	7.200	0.500	31.320
	Trapezoidal part	cum	1	8.700	4.100	0.600	21.402
	Total						206.472

5	Levelling Course M15						
	Below Abutment Foundation slabs	cum	2	12.600	7.700	0.150	29.106
	Below Pier Foundation slabs	cum	1	9.000	7.500	0.150	10.125
	Total						39.231

6	Steel Reinforcement (HYSD) for Foundation						
	@ 120 kg/cum of concrete volume for foundation slab	ton			24.777		24.777
	Total						24.777



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.055 Km

2 span of 24 m RCC T Beam

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

7	RCC M30 for Substructure upto 5 m						
	Abutment wall	cum	2	1.100	12.000	4.500	118.800
	Abutment Cap	cum	2	1.100	12.000	0.500	13.200
	Pier Shaft	cum	1	1.000	8.500	5.000	42.500
	Pier Cap(Rectangular Portion)	cum	1	2.600	12.000		
	Pier Cap(trapezoidal Portion)	cum	1	1.800	10.250		
	Return wall-I	cum	4				
	Fin wall	cum	4	3.520	0.400	1.924	
	Triangular portion	cum		1.194	0.400	0.796	
	Dirt wall	cum	2	0.360	12.000		
	Bracket	cum	2			11.200	
	Haunch	cum					
Total							174.500

8	RCC M30 for Substructure (5 - 10) m						
	Abutment Cap	cum	2	1.890	12.000	0.500	22.680
	Pier Shaft	cum	1	1.000	8.500	0.100	0.850
	Pier Cap(Rectangular Portion)	cum	1	2.600	12.000	1.000	31.200
	Fin wall	cum	4	3.520	0.400	1.924	10.836
	Dirt wall	cum	2	0.360	12.000	2.938	25.384
	Bracket	cum	2	0.180		11.200	4.032
Total							94.982

9	RCC M-35 for Pedestal & Seismic Arrestor Blocks height upto 5.0m						
	Pedestal at Abutment	cum	20	0.800	0.800	0.300	3.840
	Block RB1	cum	8	0.800	1.060		6.784
	Block RB2	cum	10	0.340	0.700	1.200	2.856
	Block RB3	cum	5	0.640	0.700	1.200	2.688
Total							16.168

10	Steel reinforcement (HYSD Bars) for substructure						
	150 kg/cum	ton		42.848			42.848
Total							42.848

11	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 = $12/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $4.5/1 +1 =$					6	
	No of weep holes in vertical direction per Fin wall = $1.924/2+1 =$					2	
	No of weep holes in horizontal direction per fin wall = $3.52/2+1 =$					3	
	Total no of Weep holes per abutment = 7×6					42	
	Total no of Weep holes per fin wall = 2×3					6	
	Total nos of weep holes = $42 \times 2 + 6 \times 4$						108.00



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.055 Km

2 span of 24 m RCC T Beam

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

12	Backfilling(Granular Material)						
	At Abutment Foundation	cum	2	20.700		0.650	26.910
	At Pier Foundation	cum	1	16.900		0.650	10.985
						Total	37.895

13	Backfilling(Sandy Material)						
	Behind Abutment & Fin wall	cum	2	2.920	11.200	8.219	537.588
	Deduction for filter media	cum					-123.966
						Total	413.622

14	Filter media						
	Behind Abutment	cum	2	12.000	0.600	7.954	114.538
	Deduction for bracket portion	cum	2	11.200	0.135		-3.024
	Behind fin Wall	cum	4	3.520	0.600	1.474	12.452
						Total	123.966

15	Pot cum PTFE Bearing						
		ton capacity	20	200.00			4000.00
						Total=	4000.00

16	Elastomeric Bearing						
	B2	cucm	8	35.00	42.50	4.80	57120.00
	B3	cucm	20	25.00	30.00	3.90	58500.00
						Total=	115620.00

C. SUPERSTRUCTURE

17	RCC-M30						
	Long girder middle portion	cum	2	20.260	7.780		315.246
	Long girder end straight portion	cum	4	1.000	10.200		40.800
	Long girder end varying portion	cum	4	1.200	8.990		43.152
	End cross girder	cum	4	0.300	11.000		13.200
	Intermediate cross girder	cum	2	0.300	12.852		7.711
						Total	420.109

18	Superstructure Steel (HYSD Bars)						
	200 kg/cum	Ton		84.022			84.022
						Total	84.022

19	Bituminous concrete wearing course						
		cum	1	58.760	11.000	0.040	25.854
						Total	25.854



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.055 Km

2 span of 24 m RCC T Beam

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
20	Wearing Course (Mastic Asphalt)						
		sqm	1	58.760	11.000		646.360
						Total	646.360
21	Tack Coat						
		sqm	1	58.760	11.000		646.360
						Total	646.360
22	Crash Barrier (RCC M40)	m	2	58.760			117.520
						Total	117.520
23	Drainage Spout	nos.	12			Total	12.000
24	PCC below Approach Slab						
		cum	2	11.200	3.370	0.150	11.323
						Total	11.323
25	Approach Slab						
		cum	2	11.160	3.500	0.369	28.826
						Total	28.826
26	Strip Seal Expansion Joint						
		m	3	12.000			36.000
						Total	36.000
27	Filler Joint						
	(i) copper plate	m	2	11.200			22.400
	(ii) fibar board	m	2	11.200			22.400
	(iii) 20mm thick premodoued joint filler	m	2	11.200			22.400
	(iv) joint sealing compound	m	2	11.200			22.400




ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.055 Km

2 span of 24 m RCC T Beam

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

D. MISCELLANEOUS

28	Painting						
	Crash Barrier	sqm	2	2.544		58.76	298.97
						Total	298.970

E.PROTECTION WORK

29	Boulder Pitching						
	A1 side	cum	2	177.523		0.300	106.514
	A2 side	cum	2	108.876		0.300	65.326
	Bank protection (A1 side)	cum	1	38.556		0.300	11.567
	Bank protection (A2 side)	cum	1	38.556		0.300	11.567
						Total	194.974

30	Filter Blanket 150mm thick below pitching						
	A1 side	cum	2	177.523		0.150	53.257
	A2 side	cum	2	108.876		0.150	32.663
	Bank protection (A1 side)	cum	1	34.116		0.150	5.117
	Bank protection (A2 side)	cum	1	34.116		0.150	5.117
						Total	96.154

31	Floor Protection(A-1 & A-2 side) with stone blanket						
	A1 side	cum	2	12.775	1.050		26.828
	A2 side	cum	2	10.701	1.050		22.472
						Total	49.300

32	PCC(M15) Toe Wall						
	A1 side	cum	2	23.550	0.345		16.250
	A2 side	cum	2	19.401	0.345		13.387
						Total	29.637



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.226 Km

1 span of 24 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

1	Excavation (up to 3m)						
	Foundation A1	cum	1	13.300	8.400	3.000	335.160
	Foundation A2	cum	1	13.300	8.400	3.000	335.160
						Total	670.320

2	Excavation (3 m to 6 m depth)						
	Foundation A1	cum	1	13.300	8.400	1.868	208.693
	Foundation A2	cum	1	13.300	8.400	2.786	311.252
						Total	519.945

3	Foundation slab RCC-M30						
	Toe side (trapezoidal part)	cum	2	12.300	3.480		85.608
	Heel side (trapezoidal part)	cum	2	12.300	4.080		100.368
	Middle portion (rectangular)	cum	2	12.300	1.100	1.500	40.590
						Total	226.566

4	Levelling Course M15						
	Below Foundation slabs	cum	2	12.600	7.700	0.150	29.106
						Total	29.106

5	Steel Reinforcement (HYSD) for Foundation						
	@ 120 kg/cum of concrete volume for foundation slab	ton		27.188			27.188
						Total	27.188



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.226 Km

1 span of 24 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

6	RCC M30 for Substructure upto 5 m						
	Abutment wall	cum	2	1.100	12.000	3.500	92.400
	Abutment Cap	cum	2	1.100	12.000	1.000	26.400
	Fin wall	cum	4	3.520	0.400	2.174	12.244
	Dirt wall	cum	2	0.360	12.000	0.500	4.320
						Total	135.364

7	RCC M30 for Substructure (5 - 10) m						
	Dirt wall	cum	2	0.360	12.000	2.438	21.064
	Bracket	cum	2	0.180		11.200	4.032
						Total	25.096

8	RCC M-35 for Pedestal & Seismic Arrestor Blocks height upto 5.0m						
	Pedestal at Abutment	cum	4	0.800	0.800	0.300	0.768
		cum	4	0.800	0.800	0.375	0.960
	Block RB2	cum	8	1.000	0.550	1.300	5.720
	Block RB1	cum	4	0.800	1.000	1.300	4.160
						Total	11.608

9	Steel reinforcement (HYSD Bars) for substructure						
	150 kg/cum	ton			25.810		25.810
						Total	25.810

10	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 = $12/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $3.5/1 +1 =$					5	
	No of weep holes in vertical direction per Fin wall = $2.174/2+1 =$					2	
	No of weep holes in horizontal direction per fin wall = $3.52/2+1 =$					3	
	Total no of Weep holes per abutment = 7×5					35	
	Total no of Weep holes per fin wall = 2×3					6	
	Total nos of weep holes = $35 \times 2 + 6 \times 4$						94.00

11	Backfilling(Granular Material)						
	Foundations	cum	2	20.700		1.050	43.470
						Total	43.470

12	Backfilling(Sandy Material)						
	Behind Abutment & Fin wall	cum	2	2.920	11.200	7.219	472.180
	Deduction for filter media	cum					-111.678
						Total	360.502

13	Filter media						
	Behind Abutment	cum	2	12.000	0.600	6.954	
	Deduction for bracket portion	cum	2	11.200	0.135		
	Behind fin Wall	cum	4	3.520	0.600	1.724	
						Total	111.678

ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.226 Km

1 span of 24 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
14	Pot cum PTFE Bearing						
		ton capacity	8	200.00			1600.00
Total=							1600.00

15	Elastomeric Bearing						
	B2	cucm	4	35.00	42.50	4.80	28560.00
	B3	cucm	8	25.00	30.00	3.90	23400.00
Total=							51960.00

C. SUPERSTRUCTURE

16	RCC-M30						
	Long girder middle portion	cum	1	20.260	7.780		157.623
	Long girder end straight portion	cum	2	1.000	10.200		20.400
	Long girder end varrying portion	cum	2	1.200	8.990		21.576
	End cross girder	cum	2	0.300	11.000		6.600
	Intermediate cross girder	cum	1	0.300	12.852		3.856
Total							210.055

17	Superstructure Steel (HYSD Bars)						
	200 kg/cum	Ton		42.011			42.011
Total							42.011

18	Bituminus concrete wearing course						
		cum	1	33.260	11.000	0.040	14.634
Total							14.634

19	Wearing Course (Mastic Asphalt)						
		sqm	1	33.260	11.000		365.860
Total							365.860

20	Tack Coat						
		sqm	1	33.260	11.000		365.860
Total							365.860

21	Crash Barrier (RCC M40)	m	2	33.260			66.520
Total							66.520

22	Drainage Spout	nos.	8			Total	8.000



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_197.226 Km

1 span of 24 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
23	PCC below Approach Slab						
		cum	2	11.200	3.370	0.150	11.323
Total							11.323

24	Approach Slab						
		cum	2	11.160	3.500	0.369	28.826
Total							28.826

25	Strip Seal Expansion Joint						
		m	2	12.000			24.000
Total							24.000

26	Filler Joint						
	(i) copper plate	m	2	11.200			22.400
	(ii) fibar board	m	2	11.200			22.400
	(iii) 20mm thick premoulded joint filler	m	2	11.200			22.400
	(iv) joint sealing compound	m	2	11.200			22.400

D. MISCELLANEOUS

27	Painting						
	Crash Barrier	sqm	2	2.544		33.26	169.23
Total							169.230

E.PROTECTION WORK

28	Boulder Pitching						
	A1 side	cum	2	146.684		0.300	88.010
	A2 side	cum	2	106.697		0.300	64.018
	Bank protection (A1 side)	cum	1	38.556		0.300	11.567
	Bank protection (A2 side)	cum	1	38.556		0.300	11.567
Total							175.162

29	Filter Blanket 150mm thick below pitching						
	A1 side	cum	2	146.684		0.150	44.005
	A2 side	cum	2	106.697		0.150	32.009
	Bank protection (A1 side)	cum	1	34.116		0.150	5.117
	Bank protection (A2 side)	cum	1	34.116		0.150	5.117
Total							86.248

30	Floor Protection(A-1 & A-2 side) with stone blanket						
	A1 side	cum	2	11.890	1.050		24.969
	A2 side	cum	2	10.628	1.050		22.319
Total							47.288

31	PCC(M15) Toe Wall						
	A1 side	cum	2	21.779	0.345		
	A2 side	cum	2	19.256	0.345		
Total							28.315



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 6m x3m
6.0x3.0x2 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	18.40	13.00	1.775	424.58
	Shear Key	cum	2	18.60	1.475	0.575	31.55
	Return Wall II	cum	2	4.200	5.30	1.775	79.02
Total							535.15

2	PCC-M15						
	Box culvert	cum	1	17.40	10.25	0.15	26.75
	Shear Key	cum	2	17.60	1.213	0.15	6.41
	Return Wall II	cum	2	3.85	4.60	0.15	5.31
Total							38.47

SUBSTRUCTURE

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 side wall = $11.4/2+1 =$					7	
	No of weep holes in vertical direction per side wall = $3.1/1+1 =$					5	
	No of weep holes in horizontal direction per return wall I = $1.8/2+1 =$					2	
	No of weep holes in vertical direction per return wall I = $4/1+1 =$					5	
	No of weep holes in horizontal direction per return wall II = $3.7/2 =$					2	
	No of weep holes in vertical direction per return wall II = $3.795/1 =$					4	
	Total no of Weep holes per side wall = 7×5					35	
	Total no of Weep holes per return wall I = 2×5					10	
	Total no of Weep holes per return wall II = 2×4					8	
	Total no. of weep holes = $35 \times 2 + 10 \times 4 + 8 \times 2$						126.00

4	RCC-M30						
	Bottom Slab	cum	1	17.40	12.00	0.63	130.50
	Box Side Wall	cum	2	12.00	0.60	3.394	48.88
	Box middle Wall	cum	1	12.00	0.60	3.07	22.10
	Base slab of return wall II	cum	2	3.700	4.30	0.50	15.91
	Return wall I	cum	4	1.800	0.30	3.99	8.63
	Return wall II	cum	2	3.700	0.38	3.79	10.53
	Shear key	cum	2	17.400	0.338		11.76
	Haunch	cum	4	12.000	0.011		0.54
Total=							248.85

5	Steel						
	@70 Kg per cum of concrete	ton					17.419
Total							17.419

6	Filter media						
	Behind Side Wall	cum	2	11.400	0.60	3.070	42.00
	Behind Return Wall I	cum	4	1.800	0.60	3.994	17.26
	Behind Return Wall II	cum	2	3.700	0.60	3.795	16.85
Total							76.10

7	Backfilling by granular material						
	Box culvert	cum	1	30.40		0.78	23.56
	Shear Key	cum	2	8.70		0.58	10.01
	Return Wall II	cum	2	6.35		0.65	8.26
Total							41.82



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 6m x3m
6.0x3.0x2 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

SUPERSTRUCTURE

8	RCC-M30(up to 5m)						
	Top Slab	cum	1	13.800	12.000	0.600	99.360
	(+)Haunch	cum	4	12.000	0.011		0.540
Total							99.900

9	Steel						
	@ 75 Kg per cum of concrete	ton					7.493
Total							7.493

10	Crash Barrier	m	2	20.80			41.60
Total							41.60

11	Drainage Spout	nos.	4				4.00

12	Bituminas Concrete Wearing Coat						
		cum	1	20.80	11.00	0.040	9.15
Total							9.15

13	Tack Coat						
		sqm	1	20.80	11.00		228.80
Total							228.80

14	Mastic Asphalt						
		sqm	1	20.80	11.00		228.80
Total							228.80

15	PCC below Approach Slab						
		cum	2	3.37	11.40	0.15	11.53
Total							11.53

16	Approach Slab						
		cum	2	3.50	11.40	0.30	23.94
Total							23.94

17	Filler Joint						
	(i) copper plate	m	2	11.400			22.800
	(ii) fibar board	m	2	11.400			22.800
	(iii) 20mm thick premoulded joint filler	m	2	11.400			22.800
		(iv) joint sealing compound	m	2	11.400		22.800

PROTECTION WORK

Upstream side

18	Eatrh work for excavation						
	Curtain Wall	cum	1	31.80	2.50	2.15	170.93
	Flexible apron	cum	1	24.80	0.25	0.75	4.65
	Rigid apron	cum	1	24.80	1.75	0.30	13.02
Total							188.60

19	750 mm thick Flexible apron						
		cum	1	24.80	1.50	0.75	27.90
Total							27.90

20	300 mm thick Rigid apron (over 100mm thick PCC)						
		cum	1	24.80	3.00	0.30	22.32
Total							22.32



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 6m x3m
6.0x3.0x2 Cell_With Flexible pavement_Step Protection_Superelevation

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
21	Curtain Wall- PCC (M-20)						
		cum	1	30.80	1.480		45.58
Total=							45.58

22	PCC (M-15)						
	Below Curtain Wall	cum	2	30.80	1.50	0.15	13.86
Total=							13.86

Downstream side

23	PCC M15 Down stream side						
	Below curtain wall						
		cum	1	11.812	0.95	0.15	1.68
	For PCC wall						
		cum	1	7.184	0.35	1.00	2.51
		cum	1	8.569	0.35	1.60	4.80
		cum	1	9.955	0.35	1.60	5.57
	Below PCC Wall						
		cum	1	7.38	0.55	0.10	0.41
		cum	1	8.77	0.55	0.10	0.48
		cum	1	10.15	0.55	0.10	0.56
	On trades						
		cum	1	6.491	0.85	0.10	0.55
		cum	1	7.876	0.85	0.10	0.67
		cum	1	9.262	0.85	0.10	0.79
		cum	1	10.734	1.00	0.10	1.07
Total							19.10

24	Eathr work for excavation						
	Curtain Wall	cum	1	12.812	1.95	2.65	66.20
		cum	1	8.03		1.100	8.83
	stone Pitching	cum	1	9.69		1.700	16.48
		cum	1	11.36		1.700	19.31
		cum	1	10.73		0.500	5.37
Total							116.19

25	Curtain Wall & guide wall- PCC (M-20)						
	Curtain Wall	cum	1	11.812	1.003		11.841
	Guide wall	cum	2	4.22		0.300	2.533
Total							14.374

26	300 MM thk stone pitching						
	Below trades						
		cum	1	6.491	0.85	0.30	1.66
		cum	1	7.876	0.85	0.30	2.01
		cum	1	9.262	0.85	0.30	2.36
		cum	1	10.734	1.00	0.30	3.22
Total							9.25

Miscellaneous

27	Painting						
	Crash Barrier	sqm	2	13.80	2.558		70.60
Total							70.60



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 6m x3m
6.0x3.0x2 Cell_With Flexible pavement_Step Protection_Normal Camber

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

FOUNDATION

1	Excavation						
	Box culvert	cum	1	18.40	13.00	1.775	424.58
	Shear Key	cum	2	18.60	1.475	0.575	31.55
	Return Wall II	cum	2	4.600	5.30	1.775	86.55
Total							542.68

2	PCC-M15						
	Box culvert	cum	1	17.40	10.25	0.15	26.75
	Shear Key	cum	2	17.60	1.213	0.15	6.41
	Return Wall II	cum	2	4.25	4.60	0.15	5.87
Total							39.02

SUBSTRUCTURE

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 side wall = $11.4/2+1 =$					7	
	No of weep holes in vertical direction per side wall = $3.2/1+1 =$					5	
	No of weep holes in horizontal direction per return wall I = $1.8/2+1 =$					2	
	No of weep holes in vertical direction per return wall I = $4.2/1+1 =$					6	
	No of weep holes in horizontal direction per return wall II = $4.1/2 =$					3	
	No of weep holes in vertical direction per return wall II = $3.914/1 =$					4	
	Total no of Weep holes per side wall = 7×5					35	
	Total no of Weep holes per return wall I = 2×6					12	
	Total no of Weep holes per return wall II = 3×4					12	
	Total no. of weep holes = $35 \times 2 + 12 \times 4 + 12 \times 2$						142.00

4	RCC-M30						
	Bottom Slab	cum	1	17.40	12.00	0.63	130.50
	Box Side Wall	cum	2	12.00	0.60	3.19	45.92
	Box middle Wall	cum	1	12.00	0.60	3.19	22.96
	Base slab of return wall II	cum	2	4.100	4.30	0.50	17.63
	Return wall I	cum	4	1.800	0.30	4.17	9.02
	Return wall II	cum	2	4.100	0.38	3.91	12.04
	Shear key	cum	2	17.400	0.338		11.76
	Haunch	cum	4	12.000	0.011		0.54
Total=							250.36

5	Steel						
	@70 Kg per cum of concrete	ton					17.525
Total							17.525

6	Filter media						
	Behind Side Wall	cum	2	11.400	0.60	3.189	43.63
	Behind Return Wall I	cum	4	1.800	0.60	4.174	18.03
	Behind Return Wall II	cum	2	4.100	0.60	3.914	19.26
Total							80.91

7	Backfilling by granular material						
	Box culvert	cum	1	30.40		0.78	23.56
	Shear Key	cum	2	8.70		0.58	10.01
	Return Wall II	cum	2	6.75		0.65	8.78
Total							42.34



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 6m x3m
6.0x3.0x2 Cell_With Flexible pavement_Step Protection_Normal Camber

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

SUPERSTRUCTURE

8	RCC-M30(up to 5m)						
	Top Slab	cum	1	13.800	12.000	0.669	110.745
	(+)Haunch	cum	4	12.000		0.011	0.540
Total							111.285

9	Steel						
	@ 75 Kg per cum of concrete	ton					8.346
Total							8.346

10	Crash Barrier	m	2	13.80			27.60
Total							27.60

11	Drainage Spout	nos.	4				4.00

12	Bituminas Concrete Wearing Coat						
		cum	1	13.80	11.00	0.040	6.07
Total							6.07

13	Tack Coat						
		sqm	1	13.80	11.00		151.80
Total							151.80

14	Mastic Asphalt						
		sqm	1	13.80	11.00		151.80
Total							151.80

15	PCC below Approach Slab						
		cum	2	3.37	11.40	0.15	11.53
Total							11.53

16	Approach Slab						
		cum	2	3.50	11.40	0.30	23.94
Total							23.94

17	Filler Joint						
	(i) copper plate	m	2	11.400			22.800
	(ii) fibre board	m	2	11.400			22.800
	(iii) 20mm thick premoulded joint filler	m	2	11.400			22.800
		(iv) joint sealing compound	m	2	11.400		22.800

PROTECTION WORK

Upstream side

18	Eatrh work for excavation						
	Curtain Wall	cum	1	32.60	2.50	2.15	175.23
	Flexible apron	cum	1	25.60	0.25	0.75	4.80
	Rigid apron	cum	1	25.60	1.75	0.30	13.44
Total							193.47

19	750 mm thick Flexible apron						
		cum	1	25.60	1.50	0.75	28.80
Total							28.80

20	300 mm thick Rigid apron (over 100mm thick PCC)						
		cum	1	25.60	3.00	0.30	23.04
Total							23.04



ESTIMATE OF QUANTITY OF BOX CULVERT

Box Size:- 2 cell of 6m x3m
6.0x3.0x2 Cell_With Flexible pavement_Step Protection_Normal Camber

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
21	Curtain Wall- PCC (M-20)						
		cum	1	31.60	1.480		46.77
Total=							46.77

22	PCC (M-15)						
	Below Curtain Wall	cum	2	31.60	1.50	0.15	14.22
Total=							14.22

Downstream side

23	PCC M15 Down stream side						
	Below curtain wall						
		cum	1	11.812	0.95	0.15	1.68
	For PCC wall						
		cum	1	7.184	0.35	1.00	2.51
		cum	1	8.569	0.35	1.60	4.80
		cum	1	9.955	0.35	1.60	5.57
	Below PCC Wall						
		cum	1	7.38	0.55	0.10	0.41
		cum	1	8.77	0.55	0.10	0.48
		cum	1	10.15	0.55	0.10	0.56
	On trades						
		cum	1	6.491	0.85	0.10	0.55
		cum	1	7.876	0.85	0.10	0.67
		cum	1	9.262	0.85	0.10	0.79
		cum	1	10.734	1.00	0.10	1.07
Total							19.10

24	Eathr work for excavation						
	Curtain Wall	cum	1	12.812	1.95	2.65	66.20
		cum	1	8.03		1.100	8.83
	stone Pitching	cum	1	9.69		1.700	16.48
		cum	1	11.36		1.700	19.31
		cum	1	10.73		0.500	5.37
Total							116.19

25	Curtain Wall & guide wall- PCC (M-20)						
	Curtain Wall	cum	1	11.812	1.003		11.841
	Guide wall	cum	2	4.22		0.300	2.533
Total							14.374

26	300 MM thk stone pitching						
	Below trades						
		cum	1	6.491	0.85	0.30	1.66
		cum	1	7.876	0.85	0.30	2.01
		cum	1	9.262	0.85	0.30	2.36
		cum	1	10.734	1.00	0.30	3.22
Total							9.25

Miscellaneous

27	Painting						
	Crash Barrier	sqm	2	13.80	2.558		70.60
Total							70.60



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_198.573 Km

1 span of 24 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

A. FOUNDATION

1	Excavation (up to 3m)						
	Foundation A1	cum	1	13.300	8.400	3.000	335.160
	Foundation A2	cum	1	13.300	8.400	3.000	335.160
						Total	670.320

2	Excavation (3 m to 6 m depth)						
	Foundation A1	cum	1	13.300	8.400		
	Foundation A2	cum	1	13.300	8.400	1.916	214.056
						Total	214.056

3	Foundation slab RCC-M30						
	Toe side (trapezoidal part)	cum	2	12.300	3.480		85.608
	Heel side (trapezoidal part)	cum	2	12.300	4.080		100.368
	Middle portion (rectangular)	cum	2	12.300	1.100	1.500	40.590
						Total	226.566

4	Levelling Course M15						
	Below Foundation slabs	cum	2	12.600	7.700	0.150	29.106
						Total	29.106

5	Steel Reinforcement (HYSD) for Foundation						
	@ 120 kg/cum of concrete volume for foundation slab	ton		27.188			27.188
						Total	27.188



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_198.573 Km

1 span of 24 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity

B. SUBSTRUCTURE

6	RCC M30 for Substructure upto 5 m						
	Abutment wall	cum	2	1.100	12.000	4.800	126.720
	Abutment Cap	cum	2	1.100	12.000	0.200	5.280
						Total	132.000

7	RCC M30 for Substructure (5 - 10) m						
	Abutment Cap	cum	2	1.740	12.000	0.800	33.408
	Fin wall	cum	4	3.520	0.400	2.174	12.244
	Dirt wall	cum	2	0.360	12.000	2.938	25.384
	Bracket	cum	2	0.180		11.200	4.032
						Total	75.068

8	RCC M-35 for Pedestal & Seismic Arrestor Blocks height upto 5.0m						
	Pedestal at Abutment	cum	4	0.800	0.800	0.300	0.768
		cum	4	0.800	0.800	0.375	0.960
	Block RB2	cum	8	1.000	0.550	1.300	5.720
	Block RB1	cum	4	0.800	1.000	1.300	4.160
						Total	11.608

9	Steel reinforcement (HYSD Bars) for substructure						
	150 kg/cum	ton			32.801		32.801
						Total	32.801

10	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 = $12/2+1 =$					7	
	No of weep holes in vertical direction per abutment = $4.8/1 +1 =$					6	
	No of weep holes in vertical direction per Fin wall = $2.174/2+1 =$					2	
	No of weep holes in horizontal direction per fin wall = $3.52/2+1 =$					3	
	Total no of Weep holes per abutment = 7×6					42	
	Total no of Weep holes per fin wall = 2×3					6	
	Total nos of weep holes = $42 \times 2 + 6 \times 4$						108.00

11	Backfilling(Granular Material)						
	Foundations	cum	2	20.700		1.050	43.470
						Total	43.470

12	Backfilling(Sandy Material)						
	Behind Abutment & Fin wall	cum	2	2.920	11.200	8.519	557.211
	Deduction for filter media	cum					-130.398
						Total	426.813

13	Filter media						
	Behind Abutment	cum	2	12.000	0.600	8.254	
	Deduction for bracket portion	cum	2	11.200	0.135		
	Behind fin Wall	cum	4	3.520	0.600	1.724	
						Total	130.398



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_198.573 Km

1 span of 24 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
14	Pot cum PTFE Bearing						
		ton capacity	8	200.00			1600.00
Total=							1600.00

15	Elastomeric Bearing						
	B2	cucm	4	35.00	42.50	4.80	28560.00
	B3	cucm	8	25.00	30.00	3.90	23400.00
Total=							51960.00

C. SUPERSTRUCTURE

16	RCC-M30						
	Long girder middle portion	cum	1	20.260	7.780		157.623
	Long girder end straight portion	cum	2	1.000	10.200		20.400
	Long girder end varrying portion	cum	2	1.200	8.990		21.576
	End cross girder	cum	2	0.300	11.000		6.600
	Intermediate cross girder	cum	1	0.300	12.852		3.856
Total							210.055

17	Superstructure Steel (HYSD Bars)						
	200 kg/cum	Ton		42.011			42.011
Total							42.011

18	Bituminus concrete wearing course						
		cum	1	33.260	11.000	0.040	14.634
Total							14.634

19	Wearing Course (Mastic Asphalt)						
		sqm	1	33.260	11.000		365.860
Total							365.860

20	Tack Coat						
		sqm	1	33.260	11.000		365.860
Total							365.860

21	Crash Barrier (RCC M40)	m	2	33.260			66.520
Total							66.520

22	Drainage Spout	nos.	8			Total	8.000



ESTIMATE OF QUANTITY OF RCC SOLID SLAB BRIDGE

Chainage_198.573 Km

1 span of 24 m Slab

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
23	PCC below Approach Slab						
		cum	2	11.200	3.370	0.150	11.323
Total							11.323

24	Approach Slab						
		cum	2	11.160	3.500	0.369	28.826
Total							28.826

25	Strip Seal Expansion Joint						
		m	2	12.000			24.000
Total							24.000

26	Filler Joint						
	(i) copper plate	m	2	11.200			22.400
	(ii) fibar board	m	2	11.200			22.400
	(iii) 20mm thick premoulded joint filler	m	2	11.200			22.400
	(iv) joint sealing compound	m	2	11.200			22.400

D. MISCELLANEOUS

27	Painting						
	Crash Barrier	sqm	2	2.544		33.26	169.23
Total							169.230

E.PROTECTION WORK

28	Boulder Pitching						
	A1 side	cum	2	245.807		0.300	147.484
	A2 side	cum	2	208.747		0.300	125.248
	Bank protection (A1 side)	cum	1	38.556		0.300	11.567
	Bank protection (A2 side)	cum	1	38.556		0.300	11.567
Total							295.866

29	Filter Blanket 150mm thick below pitching						
	A1 side	cum	2	245.807		0.150	73.742
	A2 side	cum	2	208.747		0.150	62.624
	Bank protection (A1 side)	cum	1	34.116		0.150	5.117
	Bank protection (A2 side)	cum	1	34.116		0.150	5.117
Total							146.600

30	Floor Protection(A-1 & A-2 side) with stone blanket						
	A1 side	cum	2	14.538	1.050		30.530
	A2 side	cum	2	13.611	1.050		28.583
Total							59.113

31	PCC(M15) Toe Wall						
	A1 side	cum	2	27.076	0.345		
	A2 side	cum	2	25.221	0.345		
Total							36.084



SUMMARY QTY. REPAIR & REHABILITATION NH37

ITEM NO.	Description	Unit	MINOR BRIDGE				TOTAL
			2	3	1	1	
			1 x 41m RCC Bridge	1 x 31m RCC Bridge	1 x 24.5m RCC Bridge	1 x 46.6m RCC Bridge	
1	Grouting using Concrete	cum	15.0	10.0	10.0	15.0	85
2	Removal of existing wearing coat	sqm	600.0	480.0	396.0	600.0	3636
3	Laying of wearing Course (Bituminous Concrete)	cum	24.0	19.2	15.8	24.0	145
4	Laying of wearing Course (Mastic Asphalt)	sqm	600.0	480.0	396.0	600.0	3636
5	Laying of wearing Course (Tack Coat)	sqm	600.0	480.0	396.0	600.0	3636
6	Repairing of kerb below railing	m	100.0	80.0	66.0	100.0	606
7	Repairing of railing	metre	100.0	80.0	66.0	100.0	606
8	Reinforcement HYSD	Ton	9.0	7.2	5.9	9.0	55
	MISCELLANEOUS						
12	Painting on concrete surface	sqm	487.354	717.664	570.473	929.080	4627

ESTIMATE OF QUANTITY FOR REPAIRING AND REHABILITATION WORK OF BRIDGE

Chainage= 182.272 Km

SPAN =1 x 41m_ Slab Bridge

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
1	Grouting using Concrete						
		cum	1	15.000			15.000
						Total	15.000

2	Removal of existing wearing coat						
		sqm	1	50.000	12.000		600.000
						Total	600.000

3	Laying of wearing Course (Bituminas Concrete)						
		cum	1	50.000	12.000	0.040	24.000
						Total=	24.000

4	Laying of wearing Course (Mastic Asphalt)					
		sqm	1	50.000	12.000	600.000
					Total=	600.000

5	Laying of wearing Course (Tack Coat)						
		sqm	1	50.000	12.000		600.000
						Total=	600.000

6	Replacement of kerb below railing						
		m	2	50.000			100.000
						Total=	100.000

7	Replacement of RCC Railing						
		metre	2	50.000			100.000
						Total	100.000

7a	Reinforcement						
		ton					9.000
						Total	9.000

8	Painting						
	Kerb below railing	sqm	2	50.0	1.4		140.000
	Deck bottom	sqm	1	41.0	13.0		533.000
	Side of Deck Slab	sqm	2	41.0	0.7		57.400
	Railing post	sqm	52	0.8		1.0	41.600
	Railing beam	sqm	4	0.8		50.0	157.080
						Total=	929.080

ESTIMATE OF QUANTITY FOR REPAIRING AND REHABILITATION WORK OF BRIDGE

Chainage= 184.109 Km

SPAN =1 x 31m_ Slab Bridge

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
1	Grouting using Concrete						
		cum	1	10.000			10.000
						Total	10.000
2	Removal of existing wearing coat						
		sqm	1	40.000	12.000		480.000
						Total	480.000
3	Laying of wearing Course (Bituminas Concrete)						
		cum	1	40.000	12.000	0.040	19.200
						Total=	19.200
4	Laying of wearing Course (Mastic Asphalt)						
		sqm	1	40.000	12.000		480.000
						Total=	480.000
5	Laying of wearing Course (Tack Coat)						
		sqm	1	40.000	12.000		480.000
						Total=	480.000
6	Replacrement of kerb below railing						
		m	2	40.000			80.000
						Total=	80.000
7	Replacement of RCC Railing						
		metre	2	40.000			80.000
						Total	80.000
7a	Reinforcement						
		ton					7.200
						Total	7.200

8	Painting						
	Kerb below railing	sqm	2	40.0	1.4		112.000
	Deck bottom	sqm	1	31.0	13.0		403.000
	Side of Deck Slab	sqm	2	31.0	0.7		43.400
	Railing post	sqm	42	0.8		1.0	33.600
	Railing beam	sqm	4	0.8		40.0	125.664
						Total=	717.664

ESTIMATE OF QUANTITY FOR REPAIRING AND REHABILITATION WORK OF BRIDGE

Chainage=

SPAN =1 x24.5m_ Slab Bridge

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
1	Grouting using Concrete						
		cum	1	10.000			10.000
						Total	10.000

2	Removal of existing wearing coat						
		sqm	1	33.000	12.000		396.000
						Total	396.000

3	Laying of wearing Course (Bituminas Concrete)						
		cum	1	33.000	12.000	0.040	15.840
						Total=	15.840

4	Laying of wearing Course (Mastic Asphalt)					
		sqm	1	33.000	12.000	396.000
Total=						396.000

5	Laying of wearing Course (Tack Coat)						
		sqm	1	33.000	12.000		396.000
						Total=	396.000

6	Replacement of kerb below railing						
		m	2	33.000			66.000
						Total=	66.000

7	Replacement of RCC Railing						
		metre	2	33.000			66.000
						Total	66.000

7a	Reinforcement						
		ton					5.940
						Total	5.940

8	Painting						
	Kerb below railing	sqm	2	33.0	1.4		92.400
	Deck bottom	sqm	1	24.0	13.0		312.000
	Side of Deck Slab	sqm	2	24.0	0.7		33.600
	Railing post	sqm	36	0.8		1.0	28.800
	Railing beam	sqm	4	0.8		33.0	103.673
						Total=	570.473

ESTIMATE OF QUANTITY FOR REPAIRING AND REHABILITATION WORK OF BRIDGE

Chainage= 182.272 Km

SPAN =1 x 41m_ Slab Bridge

Item No.	Description	Unit	nos	Length (m)	Breadth (m)	Height (m)	Quantity
1	Grouting using Concrete						
		cum	1	15.000			15.000
						Total	15.000

2	Removal of existing wearing coat						
		sqm	1	50.000	12.000		600.000
						Total	600.000

3	Laying of wearing Course (Bituminas Concrete)						
		cum	1	50.000	12.000	0.040	24.000
						Total=	24.000

4	Laying of wearing Course (Mastic Asphalt)					
		sqm	1	50.000	12.000	600.000
					Total=	600.000

5	Laying of wearing Course (Tack Coat)						
		sqm	1	50.000	12.000		600.000
						Total=	600.000

6	Replacement of kerb below railing						
		m	2	50.000			100.000
						Total=	100.000

7	Replacement of RCC Railing						
		metre	2	50.000			100.000
						Total	100.000

7a	Reinforcement						
		ton					9.000
						Total	9.000

8	Painting						
	Kerb below railing	sqm	2	50.0	1.4		140.000
	Deck bottom	sqm	1	41.0	13.0		533.000
	Side of Deck Slab	sqm	2	41.0	0.7		57.400
	Railing post	sqm	52	0.8		1.0	41.600
	Railing beam	sqm	4	0.8		50.0	157.080
						Total=	929.080

**COST COMPARISON B/W
CEMENT TREATED METHOD AND CONVENTIONAL METHOD**



Comparison Summary of Cement Treated and Conventional Method.

Method	Civil Cost in Cr.	Civil Cost / km	% variation
Conventional Method	358.23	9.84	0
CT BASE & SUBBASE	329.42	9.05	-8.02 %
CTSB -Granular coarse	329.40	9.05	-8.02 %
SAMI-CTB-CTSB	333.13	9.15	-7.01%

Reason For Using Conventional Method

Imphal Jiribam road is one of the most important road of the Manipur state and carries high volume of traffic. The cement treated pavement needs a curing period of 28 Days. In this busy road, it is quite difficult to manage such curing period while maintaining the traffic. The diversion of traffic would be major challenging task. This may cause quality issue. Though cement treated pavement is a cheaper alternative with respect to construction cost; considering quality and traffic management factors, the vehicle operating cost and traffic management would be high. Also the quality of work may get affected.

Considering the above facts, Conventional pavement has been adopted for this road.



Road name- IMPHAL-JIRIBAM ROAD SECTION OF NH-37 (OLD NH-53)
PKG-VII
(FROM DESIGN CH KM 169+570 to KM 205+974)

GENERAL ABSTRACT OF COST

Length of Road (KM)

: 36.404

DESCRIPTION OF WORKS		Conventional		CT BASE & SUBBASE		CTSB -Granular coarse		SAMI-CTB-CTSB	
		TOTAL COST (IN Cr.)	COST PER KM. OF TOTAL ROAD LENGTH (IN Cr.)	TOTAL COST (IN Cr.)	COST PER KM. OF TOTAL ROAD LENGTH	TOTAL COST (IN Cr.)	COST PER KM. OF TOTAL ROAD LENGTH	TOTAL COST (IN Cr.)	COST PER KM. OF TOTAL ROAD LENGTH
A.	ROAD WORKS								
1	Site Clearance and Dismantling	2.47	0.07	2.47	0.07	2.47	0.07	2.47	0.07
2	Earth work ,Subgrade and Erosion control	83.02	2.28	83.02	2.28	83.02	2.28	83.02	2.28
3	Sub-Base & Base	69.61	1.91	70.57	1.94	57.43	1.58	62.17	1.71
4	Bituminous Courses	55.19	1.52	27.68	0.76	40.38	1.11	40.38	1.11
5	Junction Improvement	0.80	0.02	0.40	0.01	0.54	0.01	0.38	0.01
6	Traffic signs, Road marking & other road appurtenances	11.99	0.33	11.99	0.33	11.99	0.33	11.99	0.33
7	Passenger Shelter	0.30	0.01	0.30	0.01	0.30	0.01	0.30	0.01
8	Busbay	2.00	0.05	0.98	0.03	1.26	0.03	0.30	0.01
	Drainage and Protective Works								
9	Longitudinal Drains	27.70	0.76	27.70	0.76	27.70	0.76	27.70	0.76
11	Retaining wall	5.44	0.15	5.44	0.15	5.44	0.15	5.44	0.15
12	Breast wall	15.46	0.42	15.46	0.42	15.46	0.42	15.46	0.42
13	Protection Work	2.58	0.07	2.58	0.07	2.58	0.07	2.58	0.07
B.	BRIDGES & CULVERTS								
13	Culvert	46.73	1.28	46.73	1.28	46.73	1.28	46.73	1.28
14	Minor Bridge	17.12	0.47	17.12	0.47	17.12	0.47	17.12	0.47
15	Bridge Repair & Maintanance Work	5.13	0.14	5.13	0.14	5.13	0.14	5.13	0.14
C.	Utility Shifting								
	Utility Shifting(Electrical+PHE)	2.32	0.06	2.32	0.06	2.32	0.06	2.32	0.06
D.	COST OF CIVIL WORKS IN LAKHS (AS PER SOR 2018)	347.86	9.56	319.89	8.79	319.87	8.79	323.49	8.89
E.	Escalation @ 3% WPI (3% of A+B Only)	10.37		9.53		9.53		9.64	
F.	Total Civil Cost (D+E)	358.23	9.84	329.42	9.05	329.40	9.05	333.13	9.15

