SUB-SECTION–E-59

CIVIL WORKS WITH ANNEXURE-I

QA CIVIL WORKS

1.0 SAMPLING AND TESTING OF CONSTRUCTION MATERIALS

a) Before execution of any civil work the contractor shall conduct full-scale suitability tests on various construction and building material such as soil, fine and coarse aggregates, cement, construction chemicals, supplementary cementitious materials and construction water to ascertain their suitability for use and the concrete mix designs conducted from reputed institutes such as NCCBM-Ballabgarh, CSMRS-Delhi, selected IIT's as agreed by the Employer. The test samples for such full-scale testing shall be jointly sampled and sealed by the Employer and contractor, thereafter these shall be sent to the concerned laboratory through the covering letter signed by field quality assurance department (FQA) representative of the Employer.

b) The contractor shall timely initiate the action with regard to the evaluation of aggregates and other building material including concrete mix design, so as to ensure completion of these tests before start of civil works at site, thereby not affecting any project work. The test reports and recommendations for suitability of the materials including concrete mix design shall be promptly submitted by the contractor to the Engineer-in-charge (EIC)/Head of Field Quality Assurance (FQA) Department of Employer.

2.0 LABORATORY AND FIELD TESTING

a) The field laboratory for QA and QC activities shall be established and installed with the adequate facilities to meet the requirement of envisaged day to day tests during execution of the work. Temperature and humidity controls shall be available wherever necessary during testing of samples. The contractor shall furnish a comprehensive list of testing equipment/ instrument required to meet the planned/scheduled tests for the execution of works for EIC acceptance/ approval. The contractor shall establish the requisite laboratory equipment/set up and skilled QA&QC manpower within 30 days from the mobilization date of Main contractor at site.
The tests which cannot be carried out/do not have facilities for testing in the field laboratory shall be done at Employer acceptable third-party testing laboratory.

b) All equipment and instruments in the field shall be calibrated before the commencement of tests and then at regular intervals, as per the manufacturer's recommendation and as directed by the EIC. The calibration certificates shall specify the fitness of the equipment and instruments within the limit of tolerance for use. Contractor shall arrange for calibration of equipment and instruments by NABL or such accrediting agency complying with ISO/IEC-17025 accreditation and the calibration reports shall be submitted to EIC for their review and acceptance.

c) The QA and QC activities (include all works, activities, equipment, instrument, personnel, material etc. whatsoever associated to comply with sampling, testing and quality assurance requirements) in all respects as specified in the technical specifications/ drawings / data sheets / quality plans / relevant standard codes / contract documents shall be carried out at no extra cost to the Employer.

d) The contractor shall carry out testing in accordance with the relevant IS/standards /codes and in line with the requirements of the technical specifications / quality plans. Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the directions of the EIC.

3.0 FIELD QUALITY PLAN

a) Well before the start of the work, the contractor shall prepare and submit the Field Quality Plans (FQP) and obtain approval of Employer, which shall detail out for all the works, equipment, services, quality practices and procedures etc. in line with the requirement of the technical specifications to be followed by the contractor at site. This FQP shall cover for all the items / activities covered in the contract / schedule of items required, right from material procurement to completion of the work at site. An Indicative Field Quality Plan for civil works is enclosed at **Annexure I** for reference purpose.

4.0 PURCHASE AND SERVICE

a) To facilitate advance planning of material testing/ approval of bought out items (BOI), well before the start of activity as per L-2 network, representative samples shall be procured by the contractor from approved sub-vendors and submitted to the EIC for his approval before bulk procurement. In case of manufacturers test certificate (MTC) is submitted for acceptance, it shall be clearly traceable and correlated with the consignment received at site. MTC of all bought out items (BOI) shall essentially contain all the test parameters / characteristics specified in the technical specifications / standards / codes. In case the manufacturer's test certificate does not mention these details, sample from each lot shall be tested at the Employer acceptable third-party lab. Approval of material / sample by the Employer shall not relieve the contractor of his responsibility, for their conformance to the specification, as well as the requisite performance and quality of material.

b) Structural steel (plates and rolled sections i.e. channels, beams & angles) conforming to IS 2062 and Reinforcement steel conforming to IS 1786 supply if in the scope of the contractor shall be procured from Primary Steel Producers (Refer NOTE below). Currently, Primary Steel Producers acceptable are SAIL, JSW Steel Ltd, Jindal Steel & Power, Tata steel Ltd. (for Reinforcement steel/TMT bars), RINL (for long products/Rolled sections and Reinforcement steel/TMT bars), Arcelormittal Nippon Steel India Ltd. (for Flat products/ Steel Plates), ESL Steel Ltd. (for Reinforcement steel/TMT bars) and JSW Ispat Special Products Ltd. (for long products/Rolled sections and Reinforcement steel/TMT bars). Subsequently, if any new Primary Steel Producer/s are proposed during execution of contract, the same may be considered for acceptance subject to meeting the following qualifying requirements:

i) The proposed supplier should be a Primary Steel Producer, having a minimum production capacity of one million tons per annum (MTPA).

ii) The proposed supplier should be a regular manufacturer of Steel Plates and / or Rolled Sections and / or Reinforcement Steel for the last two years as on date of submission of proposal.

iii) The proposed supplier should also be a registered licensee with Bureau of Indian Standards for BIS: 1786/2062 at the time of submission of proposal.

NOTE: The "Primary Steel Producer" shall mean Steel Producer of any capacity, irrespective of process route, starting their operations from iron making using iron ore, virgin or processed, with necessary refining facilities and rolling/processing facilities, at a single location or else in multiple locations provided that the entire gamut of iron & steel production, from iron making to finished steel production, is owned by the same company or its subsidiary company(ies). Provided that the iron making capacity is sufficiently matching the steel making capacity. Further, downstream units should use material from the upstream units of the same company or its subsidiaries.

In case of non-availability of certain steel section/s i.e. Angle smaller than 100x100x10 mm, MS flats, rounds, square bars and chequered plate from above

acceptable primary steel producers, an option is given to the Main contractor to source these sections directly from SAIL Conversion/Wet Leasing agent subject to the conditions given at point no. A) below:

A) Approval conditions for procurement of structural steel sections through SAIL Conversion/Wet Leasing agent:
1. Main Contractor to ensure continuity of BIS license of the manufacturer for the sections being manufactured for Employer supply.
2. Billets shall be procured from Employer approved Main Steel Producers. Proper records for traceability from raw material to final product shall be maintained.
3. 100% chemical analysis of the raw material (Billets) shall be carried out as per IS: 2830. Testing of one sample per 40 MT for each type of section or part thereof shall be carried out as per IS: 2062 on finished product.
4. Each lot of delivery of finished product shall be accompanied with co-relatable Manufacturer's Test Certificate (MTC). MTC of finished sections shall be correlated with original MTC for Billets received from Main Steel Producer and Manufacturer Test Report of chemical analysis of Billets mentioned at point no.3. MTC of finished sections shall include the reference of MTC for Billets from Main Steel Producer.
5. Employer will have access to carry out the surveillance checks for in-process stage.
6. In case of any defects are seen in the material, Main Contractor will replace the material without any cost implication to Employer.

In case of non-availability of certain size/s of steel tubes conforming to IS:1161 and Hollow (square and rectangular) steel sections conforming to IS: 4923 from above acceptable primary steel producers, the same may be sourced from BIS approved sources having valid BIS license subject to the conditions given at point no. B) below:

B) Approval conditions for procurement of Steel tubes conforming to IS: 1161 and Hollow (square and rectangular) steel sections conforming to IS: 4923 from BIS approved sources:
1. Main Contractor to ensure continuity of BIS license of the manufacturer for the sections being manufactured for Employer supply.
2. Raw materials shall be procured from Employer approved Main Steel Producers.
3. 100% chemical analysis of the raw material (steel) shall be carried out as per IS: 228. Testing of samples of steel tubes and hollow sections from each lot shall be carried out as per IS: 1161 & IS: 4923 respectively on finished product.
4. Each lot of delivery of finished product shall be accompanied with co-relatable Manufacturer's Test Certificate (MTC).
5. Employer will have access to carry out the surveillance checks for in-process stage.
6. In case of any defects are seen in the material, Main Contractor will replace the material without any cost implication to Employer.

The specific methodology to be followed for above procurement through conversion route/BIS approved sources route shall be subject to approval by Employer in advance.

5.0 **CW LINER/DUCT**

The following tests / checks shall be carried out for CW Liner works:

A. Fabrication Works

SL. NO.	TESTS / CHECKS	QUANTUM / STANDARD
(I) CW Liner/ Pipes Fabricated using Steel Plates with Longitudinal & Circumferential Weld Joints at i) Site (Field Shop) or ii) Factory		
Option-1		
1.	WPS, PQR& welder's Qualification	100%
2.	DPT on root run	100% for pipes up to 1200mm diameter
3.	DPT after back gouging	100% for pipes above 1200mm diameter
4.	UT	Not recommended.
5.	RT	5%
6.	DPT on finished butt welds	10%
7.	Hydro test	1.5 times the design pressure or 2 times the working pressure whichever is higher.
Option-2		
1.	WPS, PQR& welder's Qualification	100%
2.	DPT on root run	100% for pipes up to 1200mm diameter
3.	DPT after back gouging	100% for pipes above 1200mm diameter
4.	UT	Not recommended
5.	RT	- 100 % RT on circumferential joints in the bottom 1/3 portion of CW liner for weld length as per Fig 1 - 5% RT on top 2/3 portion of circumferential joints and - 5% RT on longitudinal joints
6.	DPT on finished butt welds	10%
7.	Hydro test	No Hydro test
(II) CW Liner/ Pipes Fabricated using H.R. coils with spiral weld joints at i) Factory		
1.	WPS, PQR& welder's Qualification	100%
2.	DPT on root run	100% DPT for pipes up to 1200mm diameter
3.	UT	Not recommended.
4.	RT	5% RT
5.	DPT on finished butt welds	10% DPT
6.	Hydro test	Hydro test at 1.5 times the design pressure or 2 times the working pressure whichever is higher.

SL. NO.	TESTS / CHECKS	QUANTUM / STANDARD
B. Erection Works at site		
Tests for CW Liner erection at site		
1.	WPS, PQR& welder's Qualification	100%
2.	DPT on root run	100% for pipes unto 1200mm diameter
3.	DPT after back gouging	100% for pipes above 1200mm diameter
4.	UT	Not recommended.
5.	RT	5%
6.	DPT on finished butt welds	10%
7.	Hydro test	1.5 times the design pressure or 2 times the working pressure whichever is higher. In exceptional cases where hydraulic test is not possible the same may be substituted with 100% RT as per the instruction/discretion of EIC.

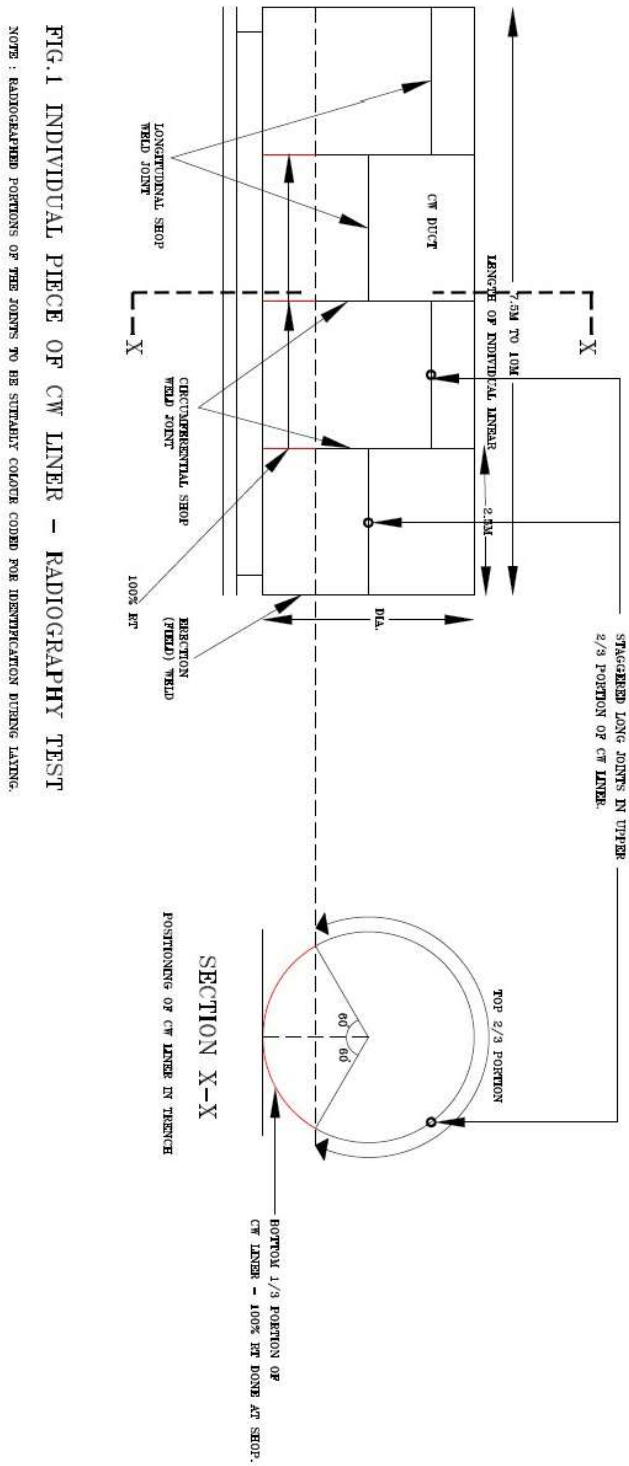

FIG.1 INDIVIDUAL PIECE OF CW LINER - RADIOGRAPHY TEST

NOTE : RADIOGRAPHED PORTIONS OF THE JOINTS TO BE SUITABLY COLOUR CODED FOR IDENTIFICATION DURING LAYING.

INDICATIVE FIELD QUALITY PLAN

Annexure I

SUPPLIERS NAME AND ADDRESS	ITEM : Civil Work	QP NO. :	PROJECT:	LARA STPP STAGE-II (2X800 MW)
		REV. NO. :	PACKAGE:	EPC PACKAGE
	SUB-SYSTEM : GEOTECH INVESTIGATION, FOUNDATIONS, EXCAVATION & FILL, SITE LEVELLING, CONCRETE, ROAD, BUILDING ETC.	DATE :	CONTRACT NO. :	
		PAGE :	MAIN CONTRACTOR :	

Sl. No	Activity and operation	Characteristics / instruments		Class of check	Type of Check	Quantum Of check	Reference Document	Acceptance Norms	Format of Record	D*	Remarks
1	2	3		4	5	6	7	8	9	D*	10
1	**GENERAL REQUIREMENTS**										
A	Setting up of Field QA&QC laboratory, Availability of requisite laboratory set up and equipment in good working condition & duly calibrated well before commencement of concerned activity.		As agreed / required	B	Physical	Once prior to start of work and thereof monthly	Tech Specs and Const. Drawings		SR	√	The contractor shall establish the mobilize the requisite laboratory equipment/set up and skilled QA&QC manpower within 30 days from the mobilization date of Main contractor at site. Functioning & calibration status of laboratory equipment in proper working condition to be verified on monthly basis.
B	Submission of QA & QC manpower deployment schedule and availability of manpower		As agreed / required	B	Physical	Manpower shall be deployed progressively as per the work front and discipline wise progress	Tech Specs and Const. Drawings		SR	√	
C	Sampling for testing of construction materials (Coarse aggregate, fine aggregate etc.), materials for concrete mix design etc.		As agreed / required	A	Physical	Once per each source	Tech Specs and Const. Drawings		SR/TR	√	Test report along with the recommendations from Employer acceptable laboratories to be submitted to EIC/FQA head for their review and acceptance.
D	Submission of Monthly Test/QA reports/data		As agreed / required	A	Physical	Monthly	Tech Specs and Const. Drawings		SR/TR	√	
E	Stacking and storage of construction materials and components at site		As per IS:4082	B	Physical	Random in each week	Tech Specs and Const. Drawings, Manufacturer's guidelines and IS 4082		SR		
F	Survey										
	Construction of Bench Mark / Grid Pillars	To mark reference co-ordinate & elevation	As required / agreed	B	Physical	Each Bench Mark/ Grid Pillars	As per technical specifications/approved drawings		SR	√	Joint protocol for co-ordinate and elevation
2	**EXCAVATION, FILLING/BACKFILLING AND COMPACTION WORKS**										
2.1	**Excavations-**										
i		Nature, type of soil/rock before and during excavations	As agreed / required	B	Visual	Random	Tech Specs and Const. Drawings		SR		
ii		Initial ground level before start of excavations, shape, Dimensions of excavations & Side slope of final excavation and Final excavation levels.	As agreed / required	B	Measurement	100%	Tech Specs and Const. Drawings		SR	√	
2.2	**Excavation in Hard Rock- If required**										
i		Receipt, Storage, accountability of Explosive	As agreed / required	B	Physical	Random in each week	Indian Explosive Act 1940/all statutory norms, Tech Specs and Const. Drawings		SR	√	Employer approved specialist blasting agency such as CMRI, NIRM shall be deployed at site for trial blasts, design blasts, blast vibration monitoring etc. Seismographs shall be deployed at site for monitoring of blast operation vibrations.
ii		Execution of Blasting Operation	As agreed / required	B	Physical	Random in each shift	IS:4081, Tech Specs and Const. Drawings/ scheme		SR		
iii		Submission of Blasting report to EIC	As agreed / required	B	Physical	Each blast	Tech Specs and Const. Drawings			√	
iv		Excavation in Hard Rock (Blasting Prohibited)	As agreed / required	B	Physical	100%	As per approved drawing/ scheme, Tech Specs and Const. Drawings		SR	√	
2.3	**Filling/ Backfilling**										
i	Suitability of fill material	Grain size analysis, Organic Matter, Liquid Limit, plastic limit, Shrinkage limit & Free Swell Index and chemical analysis(like Organic Matter, Calcium carbonate, pH value, Total soluble sulphate etc.) as required in TS	As per IS: 2720	B	Physical	Once per each type of source or change of source subject to a min. of 2 samples	IS:2720 (Pt.IV), IS:2720 Pt.XXII, IS:2720 (Pt.XI)/relevant part, Tech Specs and Const. Drawings		SR/TR	√	Test report along with the recommendations regarding suitability of the fill material from NTPC acceptable laboratories to be submitted to EIC for review and acceptance. Geo technical investigation report may also be considered as basis for suitability of fill material if available as per the discretion of EIC.
2.4	**Standard proctor Test**	Optimum moisture content (OMC) and max. dry density (MDD) of filling/backfilling materials	As per IS: 2720	A	Physical	One in every 10000 cum for each type and source of fill materials	IS 2720 (Pt.VII), Tech Specs and Const. Drawings		SR/TR	√	
2.5	**Compaction of Filling / Backfilling Works**										
i	Moisture content	Moisture content of fill before compaction	As per IS: 2720	B	Physical	Random	IS 2720 (Pt.II), Tech Specs and Const. Drawings		SR/TR	√	
ii		Dry density by core cutter method --- OR--- Dry density in place by sand replacement method --- OR--- any other method as per IS 2720	As per IS: 2720	A	Physical	i) For foundation back fill: one for every 10 foundations for each compacted layer. ii) For area filling: one every 1000 SQM area for each compacted layer.	IS 2720 (Pt. XXIX)/ IS 2720 (Pt. XXVIII)/ IS 2720 Relevant Part/ Tech Specs and Const. Drawings		SR / TR	√	
iii		Relative density (Density Index)	As per IS: 2720	A	Physical	----do---- (i) & (ii) above	IS 2720 (Pt. XIV), Tech Specs and Const. Drawings		SR/TR	√	
3	**RAW MATERIALS FOR CONCRETE**										
3.1	**CEMENT**										
i	Material	Physical and chemical properties as per relevant IS codes	As required/ agreed	A	Review of MTC/ test reports	for each manufacturing Week number	IS : 269/ IS:1489/ IS:455, Tech Specs and Const. Drawings		MTC	√	To be procured from BIS approved source having valid BIS License. Each consignment of cement shall be duly correlated with manufacturers' TC.
ii		Testing of cement for Setting time (Initial & Final) and compressive strength	As per IS:4031	A	Physical	one for each manufacturing Week number	IS : 269/ IS:1489/ IS:455, Tech Specs and Const. Drawings		SR/Test Report	√	Additionally, If the cement is stored more than 90 days in godown of contractor then the same shall be retested for Setting time & Comp. Strength.
3.1 b	**Fly ash**										
		Physical and chemical properties as per IS 3812 Part I (Table 1 and 2)	As per IS 3812 Part I	A	Physical	once in a week or change of source whichever is earlier	IS:3812 Part I and Tech. Spec./Design mix.		SR/Test Report	√	Batching plant shall have facility for mixing of fly ash.
3.2	**Coarse Aggregate**										
i		Moisture content	IS:2386	B	Physical	To be done every day before start of work	IS : 456/IS : 383/IS: 2386 Part-III/Tech Spec		SR/LB	√	During monsoon, frequency may be increased and accordingly water content in concrete will be adjusted.
ii		Sieve analysis, flakiness index, elongation index	IS:2386	B	Physical	One per 100 cum. or part thereof	IS: 2386 Part-I, IS:383 / Tech Spec		SR/LB/TR	√	
iii		Specific gravity, Soundness, Water absorption, Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale, Total of % of all deleterious materials),	IS:2386	A	Physical	Once for each source & for every change of source	IS: 2386 Part-III, IS: 2386 Part-II, IS: 2386 Part-V, IS:456, IS:383/Tech Spec		SR/LB/ TR	√	During Design mix, these tests may be carried out.
iv		Alkali aggregate reactivity and Petrographic examination	IS 2386	A	Physical	-do-	IS: 2386 (Part-VII/VIII), IS:383 /Tech Spec/ASTM C-1260 / ASTM 1293		SR/LB/ TR	√	
v		Crushing value, Abrasion value and Impact value	IS:2386	A	Physical	-do-	IS:383, IS-2386 Part IV/Tech Spec		SR/LB/ TR	√	
3.3	**Fine Aggregate**										
i		Moisture content	IS:2386	B	Physical	To be done every day before start of work	IS : 456/IS : 383/IS: 2386 Part-III/Tech Spec		SR/LB	√	During monsoon, frequency may be increased and accordingly water content in concrete will be adjusted.
ii		Sieve analysis, Silt content	As agreed / required	B	Physical	One per 100 cum. or part thereof	Tech Spec/ IS 2386 / IS 456/ IS 383		SR/LB/ TR	√	

iii		Specific gravity, Soundness, Water absorption, Deleterious materials (coal & lignite, clay lumps, material finer than 75 micron sieve, soft fragment, shale, Total of % of all deleterious materials (excluded mica as well as included mica content)), organic impurities	IS:2386	A	Physical	Once for each source & for every change of source	IS: 2386 Part-III, IS: 2386 Part-II, IS: 2386 Part-V, IS:456, IS:383/Tech Spec	SR/LB/ TR	√	During Design mix, these tests may be carried out.
iv		Alkali aggregate reactivity and Petrographic examination	IS 2386	A	Physical	-do-	IS: 2386 (Part-VII/VIII), IS:383 /Tech Spec/ASTM C-1260 / ASTM 1293	SR/LB/ TR	√	
3.4	**Water**	Complete Testing as per IS:456-2000	As per IS:456	B	Testing	Once for each source and thereafter yearly in case of borewell. If water is used from open source like river, stream, canal etc., then water testing is to be done quarterly.	IS:456-2000/ Tech. spec.	TR	√	
3.5	**Admixtures for Concrete**	Material/Type of admixture and its suitability	As per IS:9103	A	Review of MTC/ test reports	For each lot received at site	As per Designed mix and IS:9103/ Tech. Spec.	Test Report/ MTC	√	
4	**CONCRETING (MIXING, CONVEYING, PLACEMENT, COMPACTION, CURING & TESTING)**									
4.1	**Batching Plant (if installed)**									
i		Calibration of Batching Plant		A	Physical	To be calibrated at the time of starting and subsequently once in three months in house, and shall conform to IS:4925	Review of calibration chart/ Certificate/IS 4925	Calibration Certificate	√	Batching Plant shall be calibrated regularly at least once in a 3 months in-house. The weights for batching plant calibration to be calibrated once in year by NPL/NABL accredited lab./Weights & Measures Dept.
4.2	**CONCRETE**									
i		4 Trial mixes to ascertain the workability and cube strength	After receiving the recommended mix design	A	Physical	4 trial mix. for each mix proportion	Tech. Spec., IS 456/IS 10262	SR/LB	√	The concrete for field trials shall be produced by methods of actual concrete production.
ii		Concrete Cube strength Test	IS:516	A	Physical	One set of 6 cubes per 50 Cum or part thereof for each grade of concrete per shift whichever is earlier.	IS:516, IS:456, Tech. Spec.	SR/LB/ TR	√	Min. of 6 cubes for each mix, 3 specimen shall be tested at 7 days & remaining 3 shall be for 28 days Comp. Strength.
iii		Workability - slump test	IS:1199	B	Physical	At the time of concrete pouring at site every two hrs.	IS:456/Tech. Spec.	SR/LB/ TR	√	
iv		Temperature Control of Concrete as per Tech. spec./IS standard	Thermometer	B	Physical	100%	Temperature as per technical specification/Relevant standard	SR	√	
v		Water Cement Ratio		B	Physical	For each batch of concrete	As per approved Design Mix	SR/Batch slip	√	
vi		Placement of concrete, Compacting, Curing	As required	B	Physical	At Random	IS:456, Period of curing as per IS 456	SR		
4.3	**TESTS / CHECKS ON RCC STRUCTURE IN HARDENDED CONDITION**									
i		Visual inspection of concrete surface just after removal of shuttering	As agreed / required	B	Visual	100%	As per IS:456/ tech. Specification.	SR		
ii		Dimensional check on finished structures	As agreed / required	B	Measurement	100%	As per IS:456/ tech. Specification and Const. Drawings	SR/LB	√	
iii		Position and alignment of embedded parts and inserts	As agreed / required	B	Visual	100%	As per provisions and tolerances of equipment supplier, Tech Specs and Const. Drawings			
iv		Embedment of inserts in concrete shall be checked for gap if any using hammer for all dynamic foundations	As agreed / required	B	Physical	100%	As per Technical Specification	SR	√	No hollow sound
v		Submission of grouting / repair methodology to EIC for approval if concrete surface / position and alignment of embedded parts / inserts are found defective	--	B	Review and approval	once for each type of defect	As per provisions and tolerances, Tech Specs and Const. Drawings		√	
vi		UPV Tests on top deck of TG foundation, Columns & Other Foundations as per Technical Spec.	IS:13311	A	Physical	As per Tech. Spec.	IS:13311/As per Technical Specification	Test Report	√	
vii		Core Test	IS:516	A	Physical	As required by Employer EIC.	As per IS:456, IS 516	SR/LB/ TR	√	Compressive strength based on core test is required to be carried out in case of doubt regarding the grade of concrete used, either due to poor workmanship or based on the results of cube strength test as per 3,5 ii) above and as per discretion of EIC.
viii		Rebound Hammer test	IS:13311	A	physical	As required by Employer EIC.	As per relevant Standard/ tech. Specification.	SR/LB/ TR	√	This test may be carried out to assess the strength of concrete in case of non-critical and lightly loaded structures as per the discretions of EIC
ix		Water Tightness Test of liquid retaining structure/ tanks	As required	A	Test	100%	IS:3370/ Tech. Specification	SR/LB	√	
5	**REINFORCEMENT STEEL AND ITS PLACEMENT**									
i	Material	Physical and chemical properties as per relevant IS codes and Tech spec.	As agreed/required	A	Review of MTC	Each batch/lot of delivery	As per IS 1786, IS 432, IS 1566, tech spec and cont. drawing	MTC	√	To be procured from Employer approved source.
ii		Freedom from cracks surface flaws, Lamination & excessive rust.	As agreed / required	B	Visual	Random in each shift	IS: 1852, IS:432, IS:1786, Tech Specs and Const. Drawings	SR		To be checked at site. Steel collected from source should be free from excessive rust. To be stored as per Technical Specs.
iii		Bar bending schedule with necessary lap, Spacers & Chairs	As agreed / required	B	Physical & Measurement	Random in each shift	Approved Drawings, Tech Specs and Const. Drawings, IS:2502	SR	√	
iv		Acceptance - disposition of cage w.r.t. reference axes, cover, spacing of bars, spacers and chairs after the reinforcement cage is put inside the formwork	Measuring tape & as required	B	Visual & Measurement	Random in each shift*	IS 456, Tech Specs and Const. Drawings	SR	√	* for foundations, frequency shall be Each foundation
6	**FOUNDATION SYSTEM**									
i		Foundation casting - Layout, Shape, dimensions, Reinforcement, concreting, curing etc.	As required / agreed	B	Physical	Each foundation	As per technical specifications and construction drawings	SR	√	lines and levels to be checked. Concrete Grade to be checked as per Mix Design
7	**STAGING AND FORMS**									
i		Materials and accessories	As agreed / required	B	Visual	Once before start of work	As per relevant IS, Tech Specs and Const. Drawings	SR		
ii		Soundness of staging, shuttering and scaffolding including application of mould oil / release agent	As agreed / required	B	Visual	Once before start of work	As per manufacturer's spec.and as per 3696,4014, 4990, Tech Specs and Const, Drawings	SR		
iii		Acceptance of formwork before start of concreting : disposition w.r.t. reference axes, size, etc.	Measuring tape & as required	B	Physical / visual	Before start of each concreting	As per provisions and tolerances in IS 456, Tech Specs and Const. Drawings	SR	√	
8	**SLIPFORM SHUTTERING**									
i		Submission of Slip form Work system to be used	As required / agreed	B	Submission	Before Commencement of work	As per specifications	SR	√	
ii		Check for the Slip form shutters	As required / agreed	B	Physical	Before Commencement of work	As per specifications	SR		Check for water level system, Controls, Walkways etc.
iii		Details Positions and arrangement of Jack rods	-	B	Approval	Before Commencement of work	As per specifications	SR	√	Submitted to EIC for approval
iv		Details of Proposed arrangement for continuous readings	-	B	Approval	Before Commencement of work	As per specifications	SR	√	Submitted to EIC for approval
v		Check for All type of openings, Chases, Fixing of Blocks and similar built-up features	As required / agreed	B	Physical	100% during execution	Construction Drawings and specifications	SR		No any type of openings ,chases , blocks other than shown in the construction drawings or approved by EIC shall be executed in the concrete.
vi		Details of proposed method for concrete curing and protection	-	B	Approval	Before Commencement of work	Construction Drawings and specifications	SR	√	Submitted to EIC for approval

vii		Check of Concrete Curing and Protection	As required / agreed	B	Physical	At Random	Construction Drawings and specifications	SR	√	Concrete shall not remain uncured for period longer than 12 hours
viii		Check for Sliding Operation & Monitoring of Sliding Portion	As required / agreed	B	Physical	Each Sliding	As per specifications	SR		Rate of Sliding, Delays in sliding, Discontinuity or stop start sliding to be checked
ix		Progress Height	As required / agreed	B	Physical	Once per shift	As per specifications	SR	√	
x		Centre line in relation to the centres at the base	As required / agreed	B/A	Physical	Min. once per shift/ Min. once per day	As per specifications	SR	√	
xi		Internal wall faces in relation to the concrete at the base	As required / agreed	B	Physical	Once per shift	As per specifications	SR		
xii		Wall thickness	As required / agreed	B	Physical	Once per shift	As per specifications	SR	√	To be recorded in tabular form and on graphs immediately after each monitoring
xiii		Twist	As required / agreed	B	Physical	Once per shift	As per specifications	SR	√	
xiv		Verticality of the structure	As required / agreed	B/A	Physical	Every day in morning/ Random	As per specifications	SR	√	
xv		Check for Tolerances for chimney construction	As required / agreed	B	Physical	For every day monitoring	As per specifications	SR	√	
9	**EMBEDDED PARTS (INCLUDING LAYING OF RAILS & ANCHOR FASTENERS) –If Applicable.**									
i		Material	As agreed / required	B	Review of MTC/ test reports	Each batch/lot of delivery	As per Tech Specs and Const. Drawings	SR/MTC	√	
i		Position / alignment / levels of embedded parts / bolt hole / pipe sleeves / rails / PVC pipes / etc. as per TS and construction Drg.	As agreed / required	B	Physical/ measurement	100%	As per Tech Specs and Const. Drawings	SR/ Protocol	√	Exposed surface of the embedded parts other than holding down bolts are to be painted with as per technical specifications.
ii		Welding / tying of embedment to reinforcement	As agreed / required	B	Physical/ measurement	Random in each shift	As per Tech Specs and Const. Drawings	SR		
10	**JOINTS IN CONCRETE, DAMP PROOF COURSE**									
i	JOINTS IN CONCRETE	Joint material - bitumen impregnated fibre board, PVC water stops, Sealing compound, Expanded polystyrene board, Hydrophilic strip, Acrylic polymer etc. (as given in technical spec)	As per manufacturer Standards	A	Review of MTC/ test reports	Each batch/lot of delivery	Tech Specs and Const. Drawings, IS 1838, IS 1834, IS12200	SR/MTC	√	
ii	DAMP PROOF COURSE	Material - Hot bitumen and water proofing materials etc. (as given in technical spec).	As agreed / required	A	Review of MTC/ test reports	Each batch/lot of delivery	Tech Specs and Const. Drawings, IS 702	SR/MTC	√	
iii		Acceptance of installation of Joints material & Acceptance of damp proof course.	As agreed / required	B	Acceptance	Each installation randomly	Tech Specs and Const. Drawings		√	
11	**GROUTING**									
i		Material	As agreed / required	A	Review of MTC/ test reports	Each batch/lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ii		Compressive strength of grouting material before its use.	As agreed / required	A	Physical	Each batch/lot of delivery	Tech Specs and Const. Drawings	SR/LB/ TR	√	
iii		Compressive strength of cubes after grouting.	As agreed / required	A	Physical	Random	Tech Specs and Const. Drawings	SR/LB/ TR	√	
iv		Acceptance of the grouts : Mixing, placement, application and grout pressure (as applicable)	As agreed / required	B	Physical	Each grout section	Tech Specs and Const. Drawings	SR	√	
12	**MASONARY WORKS**									
12.1	**Test on Bricks**									
i		Compressive strength, water absorption, efflorescence.	As agreed / required	A	Measurement/ Physical Test	As per relevant IS Code/ One Sample for 30,000 nos. or part thereof	IS: 1077, IS:13757, IS: 12894 / Tech Specs and const. Drawings	SR/LB/ TR	√	
ii		Dimensions , shape, warpage.	As agreed / required	B	Measurement/ Physical Test	As per relevant IS Code/ One Sample for 30,000 nos. or part thereof	IS: 1077, IS:13757, IS: 12894 / Tech Specs and const. Drawings	SR/LB	√	Warpage test is applicable for facing bricks only as per IS:2691.
12.2	**Modular aerated panel**									
i	**Material**	As required	As agreed / required	A	Review of test report	Each batch/lot of delivery	Tech Specs and Const. Drawings	SR/LR	√	
12.3	**Autoclaved Aerated Concrete (AAC) block**									
i		Material	As agreed / required	B	Review of MTC	Each batch/lot of delivery	Tech Specs /IS 2185 Part III and Const. Drawings	SR/MTC	√	
ii		Compressive Strength and Density	As agreed / required	A	Physical	As per relevant IS Code/ One Sample for 10,000 nos. or part thereof	Tech Specs /IS 2185 Part III	TR	√	
iii		Dimensions, shape	As agreed / required	B	Physical	As per relevant IS Code/ One	Tech Specs /IS 2185 Part III	TR/SR	√	
12.4	**Test on Mortar**									
i	Sand	Grading	As agreed / required	B	Test	once per 100 Cum or part thereof	IS:2116	SR/LB	√	
ii		Compressive strength	As agreed / required	B	Test	At random	IS 2250-1981, Tech Specs and Const. Drawings	SR/TR	√	
12.5	**Masonry construction**	Workmanship, verticality and alignment	As agreed / required	B	Visual/ Physical	100%	IS 2212, IS 1905 , Tech Specs and Const. Drawings	SR/LB		
13	**PLASTERING- MATERIAL AND WORKMANSHIP**									
i	Sand	Deleterious Material	As agreed / required	B	Physical	Once per source	IS : 2386 (Part-I &II) & IS :2116, Tech Specs and	SR/TR	√	
ii		Grading	As agreed / required	B	Physical	50 Cum./or part thereof	Tech Specs and Const. Drawings	SR/TR	√	
iii		Silt content	As agreed / required	B	Physical	One per 100 cum., or part thereof	CPWD/ Tech Spec/ IS 2386/ IS 456/ IS 383	SR/LB/ TR	√	
iv	Stone grit plaster/ granular textured coat finish (if applicable)	Material	As agreed / required	B	Review of MTC	For each lot received at site	Tech Specs and Const. Drawings	SR/MTC	√	
v	**Galvanised wire mesh (if applicable)**	Galvanized hexagonal wire netting for lath plastering	As agreed / required	B	Review of MTC/ test reports	Each batch/lot of delivery at site	Tech Specs and Const. Drawings	SR/MTC	√	
vi		Thickness, Trueness and finishing of plaster, grooves etc.	As agreed / required	B	Visual/ Measurement	Random in each shift	Tech Specs and Const. Drawings	SR/LB	√	
14	**PAINTING SYSTEM - CONCRETE WORKS (including Chimney) AND PLASTERED MASONARY SURFACES**									
i	Materials and accessories- Oil Bound, Acrylic Emulsion, Chemical Resistant, Oil Resistant Paint etc. as applicable (as given in technical spec).	Shade, type from brand and manufacturer as approved by EIC.	As agreed / required	A	Review of MTC/ test reports	Each batch/lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ii	Surface preparation	As required	As agreed / required	B	Physical / visual	Random in each shift	Tech Specs and Const. Drawings	SR		
iii	Acceptance of painted surfaces	Shade, finish, WFT	As agreed / required	B	Physical/visual	Each surface at random	Tech Specs and Const. Drawings	SR	√	
14.2	**PAINTING SYSTEM - STEEL WORKS (OTHER THAN STRUCTURAL STEEL WORKS)**									
i		Painting Materials and accessories	-	A	Review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ii		Surface preparation	As agreed / required	B	Physical / visual	Each Erection Mark	Tech Specs and Const. Drawings, Relevant code/ standards	SR	√	
iii		Primer Thickness	Elcometer	B	Measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR	√	
v		Acceptance of painted surfaces : DFT, Finish, Shade	Elcometer	B	Visual and measurement	Each Erection Mark	Tech Specs and Const. Drawings	SR	√	
15	**SHEETING, INSULATION & ALLIED WORK**									
i		Material : Profiled Colour coated Metal Deck & Cladding sheets	As agreed / required	A	Review of MTC / Test reports	Each lot received at site	Tech Specs and/ Const. Drawings/ profiled drawing	MTC/TR	√	Co-relation with MTC/TR (Video-jet printing or coil no. or any other means) may be verified with the lot received at site.
ii		Insulation material (other than Chimney insulation), galvanized wire net, aluminium foil, fasteners	As agreed / required	A	Review of MTC/ test reports	Each lot received at site	Tech Specs and/ Const. Drawings	SR / LB/MTC	√	All tests as per specification
iii		Insulation material (for Chimney insulation)	As agreed / required	A	Review of MTC/CHP/MDCC reports	Each lot received at site	Tech Specs and/ Const. Drawings	MTC/CHP/ MDCC/Inspection report	√	
iv		Installation, lap alignment & workmanship.	As agreed / required	B	Visual/ Physical	Random in each shift	Tech Specs and/ Const. Drawings	SR		No gas cutting of colour coated sheets acceptable .

v		Finishing and acceptance	As agreed / required	B	Visual/ Physical	Each installation	Tech Specs and/ Const. Drawings	SR/LB	√	
16	**DOORS , WINDOWS, VENTILATORS & GRILLS**									
i	Steel doors	Materials & Check for shape tolerances thickness, welding & finishing of sections as per TS	As agreed / required	B	Visual/ Physical / test report	For each lot received at site	Tech Specs and Const. Drawings	SR / LB/TR	√	Review of test report
ii	Wood/Timber	Moisture content & anatomy	As agreed / required	A	Physical	For each lot received at site	Tech Specs and Const. Drawings/ IS 287	SR/LB	√	Tests to be carried out from Employer acceptable third party lab. like Forest Research Institute Dehradun. Frequency of check may be decided by EIC based on quantity and requirement.
iii	Wood work in frames	Check for dimensions, surface finish	As agreed/ required	B	Physical	Random for each installation	Tech Specs and Const. Drawings	SR	√	
iv	Flush Door shutter	End emersion test, knife test, adhesion test	As agreed/ required	A	Review of MTC/test reports	For each lot received at site	IS 2202, Tech Specs and Const. Drawings	SR/MTC	√	The required tests to be carried out from Employer acceptable third party lab. like Forest Research Institute Dehradun in addition to review of MTC/TR. Frequency of check may be decided by EIC based on quantity, requirement and IS 2202.
v	Particle Door		As agreed / required	A	Review of MTC/ test reports	For each lot received at site	IS:12823, Tech Specs and Const. Drawings	SR/MTC	√	The required tests to be carried out from Employer acceptable third party lab. like Forest Research Institute Dehradun in addition to review of MTC/TR. Frequency of check may be decided by EIC based on quantity, requirement and IS 12823.
vi	Anodised aluminium works (Door & Window)	Materials- Aluminium sections, Coating	As agreed / required	A	Visual/ Physical / test report	For each lot received at site	IS: 1948, IS: 1949, IS:733, IS1285, IS:1868, IS:11857/ Tech Specs and Const. Drawings	SR / LB	√	Randomly one sample of each type may be send to Employer acceptable third party testing lab. for testing requirements as per TS and IS codes. Anodization shall be as per Tech. Spec. Frequency of check may be decided by EIC based on quantity, requirement and relevant IS code.
vii	Fire proof doors	Material & Receipt inspection	As agreed / required	A	Review of MTC/ purchase order (unpriced copy) / drawings of suppliers / certificate of CBRI/CPRI/GOV. LAB. &	For each source & For each lot received at site	Tech Specs and Const. Drawings	SR/MTC	√	The door drawing proposed for supply should have been tested and approved by CBRI Roorkee/CPRI/GOV. LAB. for the similar dimensions for minimum fire rating as required in Tech. spec.
viii	Rolling shutters	Surface finish and thickness of plate of approved make and DFT	As agreed / required	B	Physical / visual / review of MTC	Random for each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
ix	Steel windows / Grills/ Louvre	Material fabrication and fixtures	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	IS: 1038 / IS:1361, IS: 7452 and Tech Specs and Const. Drawings	SR/MTC	√	
x	Doors / Windows Sections	Material - Rolled Steel, Z Sections,T-iron frames sections, Plates etc.	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	
xi	Glass and glazing, Reflective toughened glass as per TS.	Material	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	IS: 14900, IS:1081, IS: 3548, IS:5437 Tech Specs and Const. Drawings	SR/MTC	√	
xii	Curved dome on roof/ Poly Carbonate Sheet	Materials - As per tech spec.	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	Randomly one sample of each type may be send to Employer acceptable third party testing lab. for testing requirements as per TS and IS codes. Frequency of check may be decided by EIC based on quantity, requirement and Relevant IS code.
xiii	False Ceiling	Materials - As per tech spec.	As agreed / required	A	Review of MTC/ test reports	For each lot received at site	Tech Specs and Const. Drawings	SR/MTC	√	Randomly one sample of each type may be send to Employer acceptable third party testing lab. for testing requirements as per TS and IS codes. Frequency of check may be decided by EIC based on quantity, requirement and Relevant IS code.
xiv		Installation finishing and acceptance	As agreed / required	B	Visual / physical	Random	Tech Specs and Const. Drawings	SR		
17	**WATER PROOFING (Roof / Basement Treatment)**									
i		Methodology for the application of water proofing system	As required	B	Review	for each type of treatment	Tech Specs and Const. Drawings	SR	√	
ii	Graded under bed	Levels / slopes	As required	C	Physical	100%	Tech Specs and Const. Drawings			
iii	Elastomeric coatings	Material- Primer coat, finishing coat	As required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
iv	Wearing course	Materials - As per tech spec.	As required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
v		Acceptance of water proofing work	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings			
18	**Fencing and Gates**									
i	PVC coated chain link fencing (IS 2720), Welded wire mesh (IS 1566), Reinforced barbed tape galvanised (IS 2629) etc.	Materials	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
ii	Structural steel, painting system, caster wheel, ball and bearing, fixtures and fasteners	Materials	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
iii		Alignments, erection painting, DFT etc. and acceptance of the installation and working	As agreed / required	B	Physical / measurements	Each installation	Tech Specs and Const. Drawings	SR	√	
19	**FLOOR FINISHES AND ALIED WORKS**									
i	Cement Concrete Flooring	Glass/ PVC strips in joints	As agreed / required	B	Physical	Random in each shift	Tech Specs and Const. Drawings	SR		
ii	Ceramic tiles, vitrified tiles, glass mosaic, acid alkali resistant tiles, heavy duty cement concrete tiles (Materials as per TS)	Materials	As agreed / required	B	Review of MTC / test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications. In case non-availability of MTC, sample to be tested as per relevant IS code.
iii	Interlocking Blocks	Materials	As agreed / required	A	Review of MTC / test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
iv	Kota Stone, Granite and Marble	Materials: Quality, texture, thickness, colour for each lot of delivery	As agreed / required	B	Physical	Each lot of delivery	Tech Specs/ BOQ and Const. Drawings	SR/TR	√	
v	Metallic / non-metallic hardener	Material	As agreed / required	B	Review of MTC / test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/TR/MTC	√	
vii	Acid / alkali and oil resistant high built seamless epoxy based resin and treatment	Material	As agreed / required	A	Review of MTC / test reports	Each lot of delivery	Tech Specs and Const. Drawings	TR/MTC	√	work to be done by skilled manpower
		Surface preparation (as applicable)	As agreed / required	B	Physical	Random in each shift	Tech Specs and Const. Drawings, IS 2395			
viii	Rubber Flooring	Material	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings / IS 809	TR/MTC	√	MTC shall contain all the parameters specified in the technical specifications
ix		Finishing and acceptance of all above BOI	As agreed / required	B	Physical	100%	Tech Specs and Const. Drawings	SR		
20	**WATER SUPPLY / SANITORY INSTALLATIONS**									
i	Material	Sanitary items and fixtures i,e. water closets, urinals, wash basins, sinks, mirrors, shelves, towel rail, soap containers, geyser, water cooler, etc, water supply / sanitation pipes (GI/ MS/ SCI/ CI / RCC), manhole cover and frames, Over head / loft type etc. as per TS	As agreed / required	B	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/TR/MTC	√	

ii		leakage of pipes	As agreed / required	B	Physical	Each installation	Tech specs and const drawings	SR	√	
iii		Acceptance of installations of all sanitary items and fixtures	As agreed / required	B	Acceptance	100%	Tech Specs and Const. Drawings	SR		
20.2	**RCC Pipes**									
i	Material (As per TS)	RCC pipes	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/TR/MTC	√	To be procured from BIS Approved Sources having valid BIS License.
ii		Acceptance and leakage	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR		
20.3	**Water Storage Tanks**									
i	Material (As per TS)	Over head / loft type	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Const. Drawings	SR/TR/MTC	√	To be procured from BIS Approved Sources having valid BIS License.
ii		Acceptance and leakage	As agreed / required	B	Acceptance	Random	Tech Specs and Const. Drawings	SR		
21.0	**SPECIAL ITEMS**									
21.1	**Earthing Mat (Grounding System)**									
i	Material (As per TS)	Earthing mat	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	As per relevant IS and Tech. Specs / Manufacturer's, IS 3043	SR/TR/MTC	√	
ii		Weld sizes & length	Visual/Tape	B	Visual/ Measurement	100%	Tech Specs and Const. Drawings			Employer approved electrodes shall be used
iii		D P test	DP test Kit	A	Physical	10% at random of the offered lot	Tech Specs and Const. Drawings	TR	√	
iv		Earth test	Earthing test kit	A	Physical	100%	Tech Specs and Const. Drawings,	SR/TR	√	
21.2	**Bitumen layer for tank foundation**									
i	Material (As per TS)	Grade of bitumen	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	As per relevant IS and Tech. Specs /MTC	SR/MTC	√	APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES
ii	Acceptance and workmanship	Application / workmanship	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR		
21.3	**Composite Aluminium Panels and structural glazing**									
i	Material (As per TS)	Type of aluminium panels / structural glazing / fasteners and fixtures / silicon sealant	As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Technical specifications / drawings	SR/TR/MTC	√	MTC shall cover all the properties / parameters as per technical specifications
ii	Acceptance and workmanship	Installation / workmanship	As agreed / required	B	Physical	Random	Technical specifications / drawings	SR		
21.4	**Pressure Release Valves**									
i	Material (As per TS)		As agreed / required	A	Review of MTC/ test reports	Each lot of delivery	Technical specifications / drawings	SR/TR/MTC	√	
ii	Acceptance and workmanship	Acceptance / Installation / workmanship	As agreed / required	B	Physical	Random	Tech Specs and Const. Drawings	SR	√	
21.5	**ANTI WEED TREATMENT**									
i	Material (As per TS)	Anti-weed treatment materials	As agreed / required	B	Review of MTC/ test reports	Each batch of delivery	Tech Specs and Const. Drawings	SR/TR/MTC	√	
ii		Execution of treatment	As agreed / required	B	Physical	Random check for each treatment	Tech Specs and Const. Drawings	SR		
23	**PILING WORK (If Applicable)**									
23.1	**Execution**									
i		Borehole diameter	As required	B	Physical	100%	As per appd. Drawings and technical specification	SR/LB	√	
ii		Pile layout	Total station	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√	
iii		Recording ground level and pile termination level	As required	B	Measurement	Random	As per appd. Drawings and technical specification	SR/LB	√	
iv		Cleaning/Flushing of pile bore	As required	B	Measurement	Each pile	IS 2911/ Tech. Specs.	SR/LB	√	
v		Size of bore and During boring of pile record commencement of SPT/ core recovery to ensure socketing length equivalent in terms of the Diameter of the pile below the socketing horizon.(if applicable)	As required	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√	
vi		Pouring of concrete to project above cut off level.	As required	B	Measurement	100%	As per appd. Drawings and technical specification	SR/LB	√	
23.2	**Testing**									
i		Bentonite	IS:2720	A	Physical / Test report	Once per lot	As per IS:2720, IS 2911/ tech. Specs.	SR/TR	√	One sample from each source (brand/manufacturer) to be tested at Employer acceptable third party lab.
ii		Density check on sample of mud collected from pile bore bottom	IS 2911	B/A	Physical	Each pile/ Randomly 1 in 10 piles	IS 2911/ Tech. Specs./approved PILING METHODOLOGY	SR/LB	√	Tests to be done before placing of concrete.
ii		Slump test of concrete	IS:1199	B	Physical	Every 2 hrs at pouring point of concrete	IS:2911, As per appd. Drawings and technical specification	SR/LB/TR	√	
iii		Concrete Cube strength Test	IS:456	A	Physical	One set of 6 cubes per 50 Cum or part thereof for each grade of concrete per shift whichever is earlier.	IS:2911, As per appd. Drawings and technical specification	SR/LB/TR	√	
iv		Initial pile load test, Vertical (Compression), Lateral (horizontal) and pull-out (tension).	IS:2911 / as required	A	Testing	As per Technical Specification/IS standard	IS:2911, As per appd. Drawings and technical specification	SR/LB/TR	√	
v		Routine pile tests (VERTICAL LOAD TEST (COMPRESSION) and LATERAL LOAD TEST (horizontal))	IS:2911 / as required	A	Testing	As per Technical Specification/IS standard	IS:2911, As per appd. Drawings and technical specification	SR/LB/TR	√	
vi		Pile Integrity Tests (PIT)	PEM / as required	A	Testing	100%	IS:2911, As per appd. Drawings and technical specification and suppliers manual	Test Report	√	
22.0	**GEOTECHNICAL INVESTIGATION WORK**									
i		Deployment of Employer approved Geotechnical Investigation Agency - Equipment, Manpower etc.	As required / agreed	B	Physical	Once before commencement of work	As per technical specifications and relevant IS Codes	SR	√	
ii		Execution of Geotechnical Investigation - locations, type etc. as per scheme	As required / agreed	B	Physical	Each Location	As per technical specifications , approved drawing and relevant IS Codes	SR	√	
iii		Collection of disturbed and undisturbed samples , their packing and storage	As required / agreed	B	Physical	each sampling	As per technical specifications , approved drawing and relevant IS Codes	SR		
iv		Conducting filed tests as per investigation scheme- such as, SPT/ERT/SCPT/PLT/PMT etc. if applicable	As required / agreed	B	Physical	each field test	As per technical specifications , approved drawing and relevant IS Codes	SR	√	
v		Submission of Employer approved Final Geotechnical investigation report along with recommendations.	As required / agreed	B	Physical	After completion of investigation work	As per technical specifications and relevant IS Codes	-	√	
23	**ROAD WORKS**									
23.1	**Tests on Embankment, Subgrade Construction and Cut Formation**									
A)	**Suitability of Borrow Fill material**									
i		Sand Content	As per IS 2720	A	Physical	Once per each type of source or change of source subject to a min. of 2 samples	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Part IV)	SR/TR	√	
ii		Plasticity Test	As per IS 2720	A	Physical	Once per each type of source or change of source subject to a min. of 2 samples	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Part V)	SR/TR	√	
iii		Density Test	As per IS 2720	A	Physical	Each soil type to be tested, 2 tests	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Part VIII)	SR/TR	√	
iv		Deleterious Content Test	As per IS 2720	B	Physical	As and when required by Engineer in charge	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Part XXVII)	SR/TR	√	
v		Moisture Content Test	As per IS 2720	A	Physical	Two Tests	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Part II)	SR/TR	√	

vi		CBR Test	As per IS 2720	A	Physical	One CBR test (Avg. of three specimens) or closer as and when required by EIC	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Part XVI)	SR/TR	√	
vii		Free swell Index	Measuring Cylinder	A	Physical	Once per each type of source or change of source	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Part XI)	SR/TR	√	
B	**Compaction**									
i		Standard proctor Test	As per IS: 2720	A	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Pt.VII)	SR/TR	√	
ii		Moisture content of fill before compaction	As per IS: 2720	B	Physical	Random	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Pt.II)	SR/TR	√	
iii		Dry density by core cutter method --- OR--- Dry density in place by sand displacement method	As per IS: 2720	A	Physical	One in every 2000 SQM area for each compacted layer.	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 2720 (Pt. XX)/ IS 2720 (Pt. XXVIII),	SR/TR	√	
iv		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR		Template, straight edge
23.2	**Granular Sub-Base (GSB) (if applicable)**									
i		Grading of aggregate	Set of IS Sieves	B	Physical	One test per 400 cum	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
ii		Atterberg limits	Atterberg limits determination	A	Physical	One test per 400 cum	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iii		Moisture Content prior to compaction	As required / agreed	B	Physical	One test per 400 cum	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iv		Density of compacted Layer	As required / agreed	B	Physical	one test per 1000 sqm.	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
v		Deleterious Constituents	As required / agreed	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
vi		CBR	As required / agreed	B	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR		Template, straight edge
23.3	**Water Bound Macadam (WBM)**									
i		Aggregate Impact Value	Aggregate Impact value Test Apparatus	A	Physical	One test per 1000 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
ii		Grading of aggregate	Set of IS Sieves	B	Physical	One test per 250 cum	As per Tech Specs and Const. Drawings, Section	SR/TR	√	
iii		combined Flakiness and Elongation Indices	Flakiness & Elongation test gauge	B	Physical	One test per 500 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iv		Atterberg limits of binding material	Atterberg limits determination	A	Physical	One test per 50 cum of binding material	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
v		Atterberg limits of screenings	Atterberg limits determination	A	Physical	One test per 100 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
23.4	**Wet Mix Macadam (WMM) for base course and sub-base course**									
i		Aggregate Impact value	Aggregate Impact value Test Apparatus	A	Physical	One test per 1000 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
ii		Grading of aggregate	Set of IS Sieves	B	Physical	One test per 200 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iii		Combined Flakiness index and elongation index	Flakiness & Elongation test gauge	B	Physical	One test per 500 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
iv		Atterberg Limits of portion of aggregate passing 425 micron sieve	Atterberg limits determination	A	Physical	One test per 200 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	
v		Density of compacted Layer	As required / agreed	B	Physical	one set of three tests per 1000 sqm.	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification,	SR/TR	√	Template, straight edge
23.5	**Premix Bituminous Macadam (BM)**									
i		Quality of binder	As required / agreed	A	Physical	Number of samples per lot and tests as per IS:73, IS:217 and IS:8887 as applicable	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 73	SR/TR	√	APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES
ii		Aggregate Impact Value / Los Angeles Abrasion value	Aggregate Impact Value/Los Angeles Test apparatus	A	Physical	One test per 200 cum of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iii		Combined Flakiness Index and elongation index of aggregates	Flakiness & Elongation test gauge	B	Physical	One test per 350 cum for each source	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
v		Water absorption of aggregate	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vi		Water sensitivity of mix	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vii		Grading of aggregates	Set of Sieves	B	Physical	Two test per day per plant both on individual constituents and mixed aggregate from dryer	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
viii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
ix		Percentage of fractured faces	As required / agreed	B	Physical	one test per 100 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
x		Binder content	Bitumen extractor	A	Physical	Periodic, subject to a min of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xi		Control of Temperature of binder and aggregate for mix and of the mix at the time of laying and rolling	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xii		Rate of spread of mixed materials	As required / agreed	B	Physical	At Regular Interval	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR		Template, straight edge
23.6	**Bituminous Concrete**									
i		Quality of binder	As required / agreed	A	Physical	Number of samples per lot and tests as per IS:73 or IRC:SP:53, IS:15462	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 73	SR/TR	√	APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES
ii		Aggregate Impact Value / Los angels abrasion value	Aggregate Impact Value/Los Angeles Test apparatus	A	Physical	One test per 350 cum of aggregate for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iii		Flakiness Index and elongation index of aggregates	Flakiness & Elongation test gauge	B	Physical	One test per 350 cum of aggregate for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iv		Soundness Test (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
v		Water absorption of aggregate	As required / agreed	B	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vi		Sand equivalent test	As required / agreed	B	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vii		Plasticity Index	As required / agreed	B	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	

viii		Polished stone value	As required / agreed	B	Physical	One test for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
ix		Percentage of fractured faces	As required / agreed	B	Physical	One test per 350 cum of aggregate when crushed gravel is used	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
x		Mix Grading	Set of Sieves	B	Physical	One set for individual constituent and mixed aggregate from dryer for each 400 tonnes of mix subject to minimum of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xi		Stability and voids analysis of mix including theoretical maximum specific of loose mix	As required / agreed	B	Physical	Three tests for stability, flow value, density and void contents for each 400 tonnes of mix subject to minimum of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xii		Moisture Susceptibility of mix (AASHTO T283)	As required / agreed	A	Physical	One test for each mix type whenever there is change in the quality or source of coarse or fine aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xiii		Temperature of binder in boiler, aggregate in dryer and mix at the time of laying and compaction	Thermometer	B	Physical	At regular intervals	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xiv		Binder content	Bitumen extractor	A	Physical	One set for each 400 tonnes of mix subject to minimum of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xv		Rate of spread of mixed materials	As required / agreed	B	Physical	After every 5th truck load	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
xvi		Density of compacted Layer	As required / agreed	A	Physical	One test per 700 Sqm of area	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
		Lines, grade and cross section	As required / agreed	B	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR		Template, straight edge
23.7	**Premix surfacing and Seal coat**									
i		Quality of binder	As required / agreed	A	Physical	Number of samples per lot and tests as per IS:73, IS:217 and IS:8887 as applicable	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification, IS 73	SR/TR	√	APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES
ii		Aggregate Impact Value / Los Angeles Abrasion value	Aggregate Impact Value/Los Angeles Test apparatus	A	Physical	One test per 200 cum of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iii		Combined Flakiness Index and elongation index of aggregates	Flakiness & Elongation test gauge	B	Physical	One test per 100 cum of aggregate for each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iv		Stripping value of aggregate (Immersion tray test)	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
v		Water absorption of aggregate	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vi		Grading of aggregates	Set of Sieves	B	Physical	Two test per day per plant both on individual constituents and mixed aggregate from dryer	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
vii		Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	A	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
viii		Polished stone value	As required / agreed	B	Physical	one test of each source and whenever there is change in the quality of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
ix		Temperature of binder at application	Thermometer	B	Physical	At regular interval	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
x		Binder Content	Bitumen extractor	A	Physical	Two tests per day per plant	As per Tech Specs and Const. Drawings, Section	SR/TR	√	
xi		Percentage of fractured faces	As required / agreed	B	Physical	One test per 100 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
23.8	**Tack Coat/ Prime coat**									
i		Quality of binder	As required / agreed	A	Physical	Number of samples per lot and tests as per IS:73, IS:217 and IS:8887 as applicable	IS 73,Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	APPROVED SOURCE FOR MATERIAL PROCUREMENT SHALL BE ALL GOVERNMENT REFINARIES
ii		Binder temperature for application	Thermometer	B	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR	√	
iii		Rate of spread of binder	As required / agreed	B	Physical	Three tests per day	As per Tech Specs and Const. Drawings, Section	SR/TR	√	
23.9	**RCC Pavements**									
	Quality checks for Materials used for Pavement concrete		As per Table 900-6 of MORTH Spec.							
	Quality checks for concrete used for Pavement concrete		As per Table 900-6 of MORTH Spec.							
23.10	**Alignment, Level, Surface regularity and rectification**									
i		Horizontal alignment, Surface levels and Surface regularity	As required / agreed	B	Physical	As per section 900 of MOSRTH specification	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR/TR		
ii		Rectification	As required / agreed	B	Physical	Each rectification	As per Tech Specs and Const. Drawings, Section	SR/TR	√	
24	**Raw Water Reservoir**									
A	**Preparation of foundation surface**									
i		For embankment foundations	Visual	B	Physical	100%	IS:2720 & Tech. Spec.	SR/TR		The foundation shall be free from all organic material, vegetables and weak layers of compressive materials as per Technical spec.
B	**Compaction of Filling / Embankment Works**									
i	Suitability of fill material (if applicable)	Grain size analysis, Organic Matter, Liquid Limit, plastic limit, Shrinkage limit & Free Swell Index and chemical analysis(like Organic Matter, Calcium carbonate, pH value, Total soluble sulphate etc.) as required in TS	As per IS: 2720	B	Physical	Once per each type of source or change of source subject to a min. of 2 samples	IS:2720 (Pt.IV), IS:2720 Pt.XXII, IS:2720 (Pt.XI)/relevant part, Tech Specs and Const. Drawings	SR/TR	√	Test report along with the recommendations regarding suitability of the fill material from NTPC acceptable laboratories to be submitted to EIC for review and acceptance. Geo technical investigation report may also be considered as basis for suitability of fill material if available as per the discretion of EIC.
ii	**Standard proctor Test**	Optimum moisture content (OMC) and max. dry density (MDD) of filling/backfilling materials	As per IS: 2720	A	Physical	One in every 10000 cum for each type and source of fill materials	IS 2720 (Pt.VII), Tech Specs and Const. Drawings	SR/TR	√	Frequency may be modified by EIC as per the requirement.
iii	Moisture content	Moisture content of fill before compaction	As per IS: 2720	B	Physical	Random	IS 2720 (Pt.II), Tech Specs and Const. Drawings	SR/TR	√	
iv	**In-situ Dry Density**									
a	For foundation surface compaction			A	Physical	Once for every 250 metre length	IS: 2720 , Technical Specification and Construction Drawing	SR/TR	√	
b	For cut off trench and core shell			A	Physical	Once for every 250 metre length in each layer separately	IS: 2720 , Technical Specification and Construction Drawing	SR/TR	√	
c	for Embankment filling & compaction works			A	Physical	i) Once for every 250 metre length of Embankment in each layer (layer of compacted thickness as given in Technical spec./BOQ.) ii) Once for every 50 metre width of Embankment or part thereof in each layer separately	IS: 2720 , Technical Specification/BOQ and Construction Drawing	SR/TR	√	
d	For trimmed slope (both side)			A	Physical	Once for every 250 metre length of Embankment	IS: 2720 , Technical Specification and Construction Drawing	SR/TR	√	
C	**Permeability**		As per Relevant IS	A	Physical	Once for every 5000 cum for cut off trench , core and/or as per requirement of Technical spec./BOQ	IS: 2720 , Technical Specification/BOQ and Construction Drawing	SR/TR	√	
D	**Embankment Geometry**									
i		Top width	As per Tech. Spec.	B	Physical	Once for every 100 metre length of trimmed completed Embankment.	Technical Specification and Construction Drawing	SR/TR	√	
ii		Outer Slope	As per Tech. Spec.	B	Physical	--do--	Technical Specification and Construction Drawing	SR/TR	√	
iii		Inner Slope	As per Tech. Spec.	B	Physical	--do--	Technical Specification and Construction Drawing	SR/TR	√	

E	**Coarse Aggregate for aggregate filters**									
i		check for gradation	IS: sieves	B	Physical	Once for each stack and each change of source	for aggregate filter gradation meeting the filter criteria as per Technical Specification.	SR/TR	√	
ii		specific gravity	pycnometer	B	Physical	Once for each stack and each change of source	IS:2386 Part I, and IS:1122 and Technical Specification	SR/TR	√	
iii		crushing value	as required	B	Physical	Once for each source	IS:2386 Part IV Technical Specification	SR/TR	√	
iv		soundness	Chemicals, balances etc.	B	Physical	Once for each source	IS:2386 Part V , IS:1126 Technical Specification	SR/TR	√	
v		impact value	as required	B	Physical	Once for each source	IS:2386 Technical Specification	SR/TR	√	
vi		water absorption	weight balance etc.	B	Physical	Once for each source	IS:2386 Technical Specification	SR/TR	√	
F	**Sand for filters blanket and chimney**									
i		gradation- grain size analysis	sieve set	A	Physical	once for every 10000 cum or change of source whichever is earlier	for sand filter gradation meeting the filter criteria as per Technical Specification.	SR/TR	√	
ii		specific gravity	pycnometer	A	Physical	Once for each source	IS:2386 part I and Technical Specification	SR/TR	√	
iii		Filter criteria	relevant IS Codes	A	Physical & Lab Test	once for every 10000 cum or change of source whichever is earlier	IS:9429 and Technical Specification	Lab. TR	√	
iv		Silt Content	as required	B	Physical	once for every 1000 cum	CPWD/IS 2386/IS 456/IS 383 & Tech. Spec.	SR/TR	√	
v		**All other tests as required in Technical Spec. need to be tested before use.**								
G	**Rock Material for Rip Rap, Rock Toe and Random Rubble Masonry**									
i		Specific gravity	as required	B	Physical	Once for each source	IS:1122 and Technical Specification	SR/TR	√	
ii		soundness	Chemicals, oven balance etc.	B	Physical	Once for each source	IS:1126and Technical Specification	SR/TR	√	
iii		Impact Value	Impact Value testing apparatus	B	Physical	Once for each source	IS:2386 and Technical Specification	SR/TR	√	
iv		Water absorption	Balance, oven	B	Physical	Once for each source	IS:2386 and Technical Specification	SR/TR	√	
v		slake Durability	as required	B	Physical	Once for each source	IS:10050 and Technical Specification	SR/TR	√	
vi		placement profile thickness	as required	B	Physical	Random in each shift	IS:8237 and Technical Specification	SR/TR	√	
25	**HDPE LINING**									
i	Material		As agreed / required	A	Review of MTC / Test reports/ CHP	Each lot received at site	Tech Specs and/ Const. Drawings	MTC/TR/CHP	√	Co-relation of material with CHP or Roll no. or any other means may be verified with the lot received at site.
ii	Material Thickness		As agreed / required	A	Physical	Each Roll	Tech Specs and Const. Drawings	SR	√	Lowest individual of 10 values shall not be less than Nominal -10%.
iii	Installation & Laying of HDPE Lining System		As agreed / required	B	Physical	100%	Technical Specification, const. Drawings and Installation procedure	SR	√	HDPE manufacture shall submit the HDPE Liner Installation procedure to EIC.
iv	NDT Test for HDPE Liner (Air Pressure testing or vacuum Box testing)		As agreed / required	A	Physical	All field seams	Technical Specification, const. Drawings and Manufacturer Recommendation	SR/TR	√	
v	Destructive Seam Testing for HDPE Liner		As agreed / required	A	Physical	One test for every 150m length of seam or as directed by EIC as per TS.	Technical Specification, const. Drawings and Manufacturer Recommendation	SR/TR	√	
26	**GEOTEXTILE**									
i	Material		As agreed / required	A	Review of MTC/Lot	Each lot of delivery	Tech Specs and/ Const. Drawings	MTC/TR	√	
ii	Identification of Material		As agreed / required	B	Visual	Each lot of delivery	Technical Specification, const. Drawings and Manufacturer Recommendation	SR		All rolls of the geo-textile shall be identified with permanent marking on the roll or packaging, with the manufacturers name, product identification, roll number and roll dimensions.
iii	Acceptance of Installation		As agreed / required	A	Physical	Random	Technical Specification, const. Drawings and Manufacturer Recommendation	SR	√	
27	**INSTRUMENTATION**									
i		Instruments (piezometer, Water Level Sounder, surface settlement etc. as required in TS)	As agreed / required	A	Review of MTC	Each delivery at site	Tech Spec and drawings	TR/MTC	√	
ii		Installation of the instruments at required location	As agreed / required	B	Physical	100%	Tech Spec and drawings/ IS 7356 Part I	SR		
iii		check for functioning of instruments after installation.	As agreed / required	A	Physical	100%	Tech Spec and drawings	SR	√	The instruments shall be accepted by the Engineer only after all the instruments have been demonstrated to be in working condition and initial set of measurement of piezometer shall be taken.
		LEGENDS : * Records identified with tick (√) shall be essentially included by supplier in QA documentation. # Class A : Critical, Class B : Major, Class C : Minor. Class 'A' checks shall be witnessed by Employer FQA and Execution Engineer, Class 'B' checks shall be witnessed by Employer Execution Engineer, Class 'C' checks shall be witnessed by Main contractor engineer. CLASS 'A' & 'B' CHECKS SHALL BE NTPC CHP STAGE.					For Employer Use	Employer DOC NO. :		
Main-supplier		SR - Site Register, TR- Test Report, LB-Log Book, IR - Inspection Report, MTC - Manufacturer's Test Certificate. Surveillance of Class 'A' checks shall be perform By Employer Head (FQA), Class 'B' by Employer FQA Engineer and for class 'C' Another Executing Engineer authorised by Head (Executing Deptt)					एनटीपीसी NTPC A Maharatna Company	REVIEWED BY	APPROVED BY	APPROVAL SEAL