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MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

e-TENDER FOR

DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd Call)

VOLUME- III

TECHNICAL STANDARDS & SPECIFICATIONS

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY
ENGINEERING DIVISION
MMRDA NEW OFFICE BUILDING, 2nd FLOOR,
BANDRA – KURLA COMPLEX,
BANDRA (EAST), MUMBAI – 400 051

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
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283

DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

VOLUME III

TECHNICAL STANDARDS & SPECIFICATIONS
INDEX

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M.M.R.D.A.

VOLUME-03

1 PREAMBLE

1.1.1 The Technical Specifications contained herein shall be read in conjunction with the other Bidding Documents as specified inVolume-I.

1.2 SiteInformation

1.2.1.1 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.

1.2.1.2 The area in which the work is located is in plain/rolling terrain, and lies in Mumbai city.

1.2.2 General Climatic Conditions

1.2.2.1 The temperature in this region is asunder:

a) During summer months, the maximum temperature is 41^0C
b) During winter months, the minimum temperature is 10^0C

1.2.2.2 The average annual rainfall in the area is above 2000mm.

1.2.3 Seismic Zone

The work is located in Seismic Zone-III as defined in IRC: 6

2 Technical Standards &Specifications

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

Part A:-The General Technical Specifications shall be the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" (Fifth Revision,
April, 2013) issued by the Ministry of Road Transport and Highways (formerly the Ministry of Surface Transport) Government of India, and published by the Indian RoadsCongress.

Where reference is made in the Contract to specific standards codes to be met by the materials, plant, and other supplies to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards as on date of tender and codes in effect shall apply, unless otherwise expressly stated in the contract. Where such standards and codes are national, or relate to a particular country or region, other internationally recognized standards which ensure a substantially equal or higher performance than the standards and codes specified will be accepted subject to the Engineer's prior review and written approval. Difference between the standards specified and the proposed alternative standards must be fully

Chief Engineer,
Engineering Division
M.M.R.D.A.

described in writingby the Contractor and submitted to the Engineer at least 28 days prior to the date when the Contractor desires the Engineer's approval. In the event the engineer determines that suchproposed deviationsdo not ensure substantially equal performance, the Contractor shall comply with the standards specified in the documents.

Part B - Amendments/Modifications/Additions to Existing Clauses of General 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-A below and Additional Specifications for particular item of works not already covered inPart-A

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-A, where Amended / Modified / Added upon, and incorporated in Part-B referred to above,
Such Amendment / Modification / Addition supersedes the relevant Clause or part of the Clause.

The Additional Specifications shall comprise of specifications for particular items of works not already covered inPart-A.

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.

In so far as Amended / Modified / Added Clause may come in conflict or be inconsistent with any of the provisions of the said MORT&H Specifications under reference, the Amended /Modified /Added Clause shall always prevail.

The following Clauses in the "SPECIFICATIONS FOR ROAD AND BRIDGEWORKS (Fifth Revision, April 2013") have been amended /modified/ addedupon:102,108,110,111,120,201,301,305,811,901,1012,1014,1101,1119,1503,1514,1515,1704,1705, 1801 & 1805

J. KUMAR INFRA PROJECTS LTD MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

PART C:- The Clauses SP-1 to SP-14 have been added to the 'Specifications for Road and Bridge Works (Fifth revision, April2013).

CLAUSESP-1	**PLANT AND EQUIPMENT FOR AGGREGATES AND CONCRETE-DELETED**
CLAUSESP-2	**FIXING DOWEL BARS INCONCRETE**
CLAUSESP-3	**CURING USING LIQUID MEMBRANE FORMING COMPOUND - DELETED**
CLAUSESP-4	**ADDITIONAL TECHNICAL SPECIFICATIONS FOR ROAD SIGNS - DELETED**
CLAUSESP-5	**ADDITIONAL SPECIFICATIONS FOR TRAFFIC MANAGEMENT ANDDIVERSION-DELETED**
CLAUSESP-6	**SPECIFICATIONS FOR INTER-LOCKING CONCRETE PAVINGBLOCKS-DELETED**
CLAUSESP-7	**EXTERNAL LIGHTING INSTALLATION**
CLAUSESP-8	**TRAFFIC SIGNALSSYSTEMS**
CLAUSESP-09	**GEOTECHNICALINVESTIGATIONS (DETAILED EXPLORATION)**
CLAUSESP-10	**ADDITIONAL SPECIFICATION FOR PROTECTIVE COATING FORCONCRETE**
CLAUSESP11	**STRUCTURAL STEEL WORKS**
CLAUSESP12	**CONCRETEGRADES**
CLAUSESP13	**TMT / HYSD BARSMANUFACTURER**

In the absenceof 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 and in case of any dispute arising out the interpretation of the above, the decision of the Engineer shall be final and binding on the Contractor.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

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Part A:- The General Technical Specifications shall be the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" (Fifth Revision, April, 2013) issued by the Ministry of Road Transport and Highways (formerly the Ministry of Surface Transport) Government of India, and published by the Indian RoadsCongress.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

PARTB **AMENDMENTS/MODIFICATIONS/ADDITIONS TO EXISTING CLAUSES OF GENERAL TECHNICALSPECIFICATIONS**

SECTION 100 **GENERAL**

CLAUSE102 (Addition) **DEFINITIONS**

The following abbreviations shall be added in this Clause:
"MORTH" : Ministry of Road Transport and Highways
"NHAI" : National Highways Authority ofIndia
"MMRDA" : Mumbai Metropolitan RegionDevelopmentAuthority

CLAUSE108 **SITEINFORMATION**

Clause108.4 (Addition) Add following after cl108.3:

"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 ofwork."

CLAUSE110 **PUBLICUTILITIES**
Add following at the end of 110.2

Clause110.2 The contractor will make necessary payments to the respective service provider/authorities for shifting of utilities, wherever required and also in cases where payments are not required to be made for suchshifting.

Clause111 **Precautions for Safeguarding the Environment Add following two clauses-**

Clause111.14 **Dust Control during Construction (Addition)**
The Contractor shall make adequate provision, including frequentspraying of water, to mitigate dust nuisance from on-site equipment during the construction of theworks.

Clause111.15 **Sanitation (Addition)**
The Contractor shall make adequate sanitation facilities for labour and Contractor's camp including provision of lavatories, sewage disposal, and solid waste collection and disposal.

CLAUSE120 **FIELDLABORATORY**

Clause120.2 **Description (Modification/Addition / Substitution)** Add the words "uninterrupted in third line of first paragraph before "amenities like water-supply "Replace the words "indicated in the drawings" in the first sentence of second paragraph of this Clause with the words "As per

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Chief Engineer,
Engineering Division
M.M.R.D.A.

provisions indicated in this clause and at a location approved by the Engineer."

SECTION 200 SITECLEARANCE

CLAUSE201 CLEARING AND GRUBBING

Clause201.1 Scope (Addition)

Add the following at the end of this clause:

"After cutting of trees, the wood shall be the property of the Employer and shall be carted and stacked as directed by the Employer."

CLAUSE202 DISMANTLING CULVERTS, BRIDGES AND OTHER STRUCTURES/ PAVEMENTS

Clause202.5 Disposal of Materials (Modification)

This Clause shall read as under

All materials obtained from dismantling structures & utilities shall be the property of contractor and shall be removed and disposed off as per directions of Engineer.

Clause202.6 Measurements for Payment (Addition)

Add the following items after item (vi) "(vii) Footpaths and Median Linear Meter",

SECTION300 EARTHWORK, EROSION CONTROL AND DRAINAGE CLAUSE 301 EXCAVATION FOR ROADWAY ANDDRAINS

Clause301.1 (Addition) Scope

Add the following as second paragraph under thisclause:

"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."

CLAUSE305 EMBANKMENT CONSTRUCTION

Clause305.2.2.2 (Modification) Borrow Materials

add following at the end of this clause

"No borrow area shall be made available by the Employer for this work. The arrangement for the source of supply of the material for embankment and subgrade as well as compliance to the different environmental requirements in respect of excavation and borrow areas as stipulated, from time to time, by the Ministry of Environmental and Forest, Government of India and the local bodies, as applicable, shall be the sole responsibility of the Contractor. No earth, except when the road is in cutting, shall be borrowed from the Right of Way."

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Chief Engineer, Engineering Division M.M.R.D.A.

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

CLAUSE 811 **CONCRETE CRASH BARRIER**

Clause 811.2.1.2 Replace "M-25 by M-45".

Clause 901.15 **Site Trial**

(Additional) The Contractor shall carry out full-scale site trials on all earthwork and pavement items proposed for the Works using the equipment and methods proposed by the Contractor for constructing the Works. The trials shall be carried out with the agreement and in the presence of the Engineer or his authorized representative.

The trials shall be carried out to enable the Contractor to demonstrate the suitability of his mixing and/or compaction equipment to provide the specified material and compact the same to the specified density and to confirmthat the other specified requirements of the completed earthworks and pavement courses can beachieved.

Each trial area shall be at least 1000 (approx. 15m x 75m length) square meters and shall be laid to the specified depth for the material. It may form part of the works if so ordered by the Engineer provided it complies with the specification. Any trial areas, which do not complywith the Specification, shall be removed.

The Contractor shall allow in his programme for conducting site trials and for carrying out the appropriate tests on them. The trials on earthworks and each pavement layer shall be undertaken at least 14 days ahead of the Contractor proposing to commence full scale work on earthworks and the pavement layers.

The following data shall be ordered at each site trial:

- The composition and grading of the material, including the bitumen content and properties, ifappropriate;
- If appropriate, the moisture content at the time oflaying;
- If appropriate, the temperature at the time of laying androlling;
- The type and size of compaction equipment and the number ofpasses;
- The maximum density or target density as appropriate and the density achieved in thetrial;
- The maximum compacted thickness oflayer;
- The surface levels and the surfaceirregularities
- Calibration of machinery for TMC and efficientresults;
- Any other relevantinformation

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Chief Engineer,
Engineering Division
M.M.R.D.A.

Not less than ten sets of tests for each type of test shall be made on each500 square meters of trial area, and provided nine out of ten sets of results meet the specified requirements for the material/work inClause

903, the site trial shall be deemed successful. The above data recorded in thetrial shall become the agreed basis on which the particular material shallbe provided and processed to achieve the specifiedrequirements.

If, during execution of the Works, the construction controls type of tests indicatethat the requirements for a material are not consistently being achieved, then work on that layer shall stop until the cause is investigated. Such investigation may include further laboratory and site trials on the material to determine a revised set of data, as above which, when agreed by Engineer, shall be the basis on which all subsequent material will be provided and processed to achieve the specified requirements.

Approval by the Engineer to a set of data recorded, as above in a site trial shall not relieve the Contractor of responsibility to comply with the requirements of Technical Specifications.

CLAUSE1012 **CONCRETE ADMIXTURES**

CLAUSE1012.3 (Addition) Add this Clause after Clause1012.2

After selecting a few acceptable brands from MORT&H approved list of Manufacturers &types of admixture based on the manufacturer's data / technical literature, independent acceptance tests should be carried out for the same using the approved combinations of cement / sand / aggregatesintended foruse intheProject.After establishing the basic acceptability using strength criteria (compressive & 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 admixtures for the project site conditions. A spectroscopic signature of accepted product should be obtained and preserved for comparison for acceptance of the production lots.

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

WORKMANSHIP

CLAUSE1014 **STORAGE OF MATERIALS**

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 initial dosage is permitted (including addition in transitmixers).

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

Chief Engineer,
Engineering Division
M.M.R.D.A.

manufacturer's Quality Assurance Plan during process of production should be obtained and filed for reference / record.

Clause1014.3 **Aggregates**

(Addition) 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."

SECTION 1100 **PILE FOUNDATIONS**
CLAUSE 1101 **DESCRIPTION**
(Addition)

- Piling work shall be cast-in-situ bored piles of diameter as shown on the drawing. Boring / drilling, socketing of piles shall be done by using hydraulically operated rotary drilling machinesonly.

- M.S. Liner shall be provided to all piles of thickness as shown on drawing and painted with coal tar epoxy paint on outer face i.e. face in contact withearth.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

293

CLAUSE1119 (Addition)	**RATE** **Add the following at the end of thisclause** Cost of pile concrete includes cost of initial and routine test on pile and no separate payment will be paid for these tests.
SECTION1500	**FORM WORK**
CLAUSE1503	**DESIGN OF FORM-WORK**
Clause1503.2	Add the following at the end of this 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-stratum."

Clause1514 (Additional Clause)	**SPECIAL ARCHITECTURAL FINISHES** **Materials add following clause** Where special architectural finishes have been specified which require special patterns, grooves, ridges, surface finishes etc., and which are to be obtained by casting concrete against forms, need specially designed forms and special finishing using suitable materials. These forms can be made from materials specified in IRC-87, relevant IS codes with special workmanship/controls. Use of any other material is to be permitted only afterspecific written approval from the Engineer. **Design and Workmanship, Removal, Protection and Reuse** The design and workmanship of these formwork has to be got approved fromthe Engineer.The method of removing formwork without damaging the 'form- finished' surface, use of de-bonding agents, the protection and repair of formsand forms-surfaces, and Limit on re-use etc. Are to be as per specification/drawings in absence of which the proposed details are to be got approved from the Engineer. All such methods will have to be suitably improved based on the result of mock-up or field use. The final procedure and details shall be improved till the specified / desired architectural finish isobtained. **Mock-up** After design and before incorporation in the main work, the effectiveness and success in achieving the desired finish has to be demonstrated / confirmed by casting the mock-up. The approved 'mock-up' surface shall be retained till the end of the project and then the 'mock-up' should be dismantled/removed from the work site and disposed off as directed by the Engineer.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

	Measurement and Payment No separate payment will be paid for this item.
Clause1515 (Additional Clause)	**TOLERANCES** All works shall be carried out true to the lines, levels and grades shown on the drawings and within the tolerances specified below. The forms shall be so designed and erected that the following tolerances are not exceeded unless more stringent and specific specifications have been required by the design and specified in the drawings / instructions. The contractor shall establish, erect and maintain in an undisturbed condition until final completion and acceptance of the project, control points and bench marks necessary and adequate to establish thesetolerances.

Sr. No	Element	Limits
1	For all elements, departure from established alignment	10 mm
2	Departure from established grades	10 mm
3	Variation from plumb or specified batter in lines and surfaces of piers, walls and abutments	10mm in 3 m. if exposed 20mm in 3 m. if backfilled
4	Variation from level or indicated grade in slabs, beams, horizontal and railing offsets	10mm in 3 m. if exposed 20mm in 3 m. if backfilled.
5	Variation in cross sectional dimensions of columns, piers, slabs, walls, beams and similar parts	-5mm, + 10mm
6	Variation in slab thickness	-5mm, + 10mm
7	**Footings**:	
8	Plan dimensions	-15mm, + 30mm
9	Misplacement or eccentricity	2% of footing width in the direction of displacement and not exceeding 30mm.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Element	Limits
10	Reduction in thickness	5% of specified thickness unless specified to be more stringent.
11	Variations in size and locations of slab or wall openings	10mm
12	The Alignment Tolerances shall be as under:	
13	Tolerance in direction where `d' is the dimension of members	
14	Member with a depth of upto200 mm	± d/40
15	More than 200 mm	5 mm

SECTION1700 (Addition) **STRUCTURAL CONCRETE**

Add following at the end of this clause

"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.

Admixtures shall be procured only from manufacturers approved by MORT&H".

SECTION 1800 **PRE-STRESSING**

1801 **Description**

Add the following after first paragraph of section 1801

1801.1 The work specified in this Section shall also consist of furnishing, installing, stressing and grouting pre-stressing strand and HS Bars in accordance with the drawings and the requirements of these specifications or as approved by the Engineer.

It shall also include the furnishing and installing of any appurtenant items necessary for the particular pre-stressing system used, including but not limited to anchorage assemblies, additional reinforcing bars required to resist stresses caused by anchorage

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer, Engineering Division M.M.R.D.A.

assemblies, ducts, vents, inlets, outlets and grout used for pressure grouting ducts.

1801.2 Contractor Proposed Options

The Contractor may propose for consideration by the Engineer certain variations from the pre-stressing systems shown in the contract document.

1801.3 Restrictions to Contractor Proposed Options

Materials and devices used in the pre-stress system shall conform to the requirements of the following Materials Section of this Specification.

The not compressive stress in the concrete after all losses is at least as large as that provided by system shown on theplans.

The distribution of individual tendons at each section generally conforms to the distribution as shown on theplans.

The ultimate strength of the structure with the proposed pre-stressing system meets the requirements ofIRC-112

Stresses in the concrete and pre-stressing steel at all sections and all stages of construction meet the requirements of the Design Criteria noted on the plans.

Compliance with all provisions of the Design Criteria, as noted on the plans. The Contractor fully redesigns and details, as required, the elements where the alternate pre-stressing system is proposed to be used.

The Contractor shall submit complete shop drawings including the pre-stressing scheme and system, reinforcing steel, and concrete cover, and design calculations (including short and long term pre-stress losses) for the Engineer'sapproval.

15.2 mm diameter strand and 12.7 mm diameter strand may be substituted for each other on an equal force basis within any tendon size shown by the designer.

1801.4 Shop Drawings

The Contractor shall submit detailed shop drawings, which include, but are not limited to:

1) A complete description of and details covering, each of the pre-stressing systems to be used for permanent and temporary tendons. This shallinclude:

a) Designation of the specific pre-stressing steel, anchorage devices, bar couplers, duct material and accessoryitems.

b) Properties of each of the components of the pre- stressing system.

KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer, Engineering Division M.M.R.D.A.

c) Details covering assembly of each type of pre-stressing tendon.
d) Equipmenttobeusedinthepre-stressingsequence.
e) Procedure and sequence of operations for pre-stressing and securing tendons.
f) Procedure for releasing the pre-stressing steelelements.
g) Parameters to be used to calculate the typical tendon force such as, expected friction coefficients, anchor set and pre-stress steel relaxation curves.

2) A table detailed the pre-stressing jacking sequence, jacking forces and initial elongations of each tendon at each stage of erection for allpre-stressing.

3) Complete details of the anchorage system for pre-stressing including certified copies of the reports covering tests performed on pre-stress anchorage devices as required in the following Materials Section D, and details for any reinforcing steel needed due to stresses imposed in the concrete by anchorageplates.

4) For the operation of grouting pre-stressing tendons; the materials and proportions for grout, details of equipment for mixing and placing grout and methods of mixing and placinggrout.

5) Calculations to substantiate the pre-stressing system and procedures to be used including stress-strain curves typical of the pre-stressing steel to be furnished required jacking forces, elongation of tendons during tensioning, and seating losses. These calculations shall show a typical tendon force after applying the expected friction coefficient, and anticipated losses including anchor set losses. Elongation calculations shall be revised when necessary to properly reflect the modulus of elasticity ofthetendon material as determined from in place friction tests in accordance with Section 5.7, Division II, AASHTO Guide Specifications for Design and Construction of Segmental Concrete Bridges.

6) Complete details of the apparatus and method to be used by the Contractor for the test.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
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M.M.R.D.A.

1805 **WORKMANSHIP**

Add following after second paragraph of 1805.1 Protection of Pre-stressing Steel

Replace the entire Section with the following:

All pre-stressing steel shall be protected against physical damage at all times from manufacture to grouting or encasing in concrete. Pre-stressing steel that has sustained physical damage at any time shall be rejected. Any reel that is found to contain broken wires shall be rejected and the reel replaced.

Pre-stressing steel shall be packaged in containers or shipping forms for protection of the steel against physical damage and corrosion during shipping and storage. A corrosion inhibitor, which prevents rust or other results or corrosion, shall be placed in the package or form, or shall be incorporated in a corrosion inhibitor carrier type packaging material,or

When permitted by the Engineer, a corrosion inhibitor may be applied directly to the steel. The corrosion inhibitor shall have no deleterious effect on the steel or concrete or bond strength of steel to concrete. Inhibitor carrier type packaging material shall conform to the provisionsofU.S. Federal Specifications MIL-P-3420. Packaging or forms damaged from any cause shall be immediately replaced or restored to original condition.

The pre-stressing steel shall be stored in a manner which will at all times prevent the packing material from becoming saturated with water and allow a free flow of air around the packages. If the useful life of the corrosion inhibitor in the package expires, it shall immediately be rejuvenated orreplaced.

At the time the pre-stressing steel is installed in the work, it shall be free from loose rust, loose mill scale, dirt, paint, oil, grease or other deleterious material. Removal of tightly adhering rust or mill scale will not be required. Pre-stressing steel which has experienced rusting to the extent that it exhibits pits visible to the naked eye shall not be used in the work.

KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

The shipping package or form shall be clearly marked with the heat number and with a statement that the package contains high-strength pre- stressing steel , and care is to be used in handling. The type and amount of corrosion inhibitor used, the date when placed, safety orders and instructions for use shall also be marked on the package orform.

If the period of time between installation of pre-stressing steel and grouting of the tendon will exceed 10 calendar days, the pre-stressing steel shall be protected from corrosion during the entire period it is in place but un grouted as providedbelow:

When the plans provide for pre-stressing steel to be installed in one unit with a length of pre-stressing steel left projecting to be threaded into another until during erection, all of the pre-stressing shall be protected from corrosion from immediately after it is installed in the first unit until the tendon is grouted in the second unit as providedbelow:

When corrosion protection of in-place pre-stressing steel is required, a corrosion inhibitor which prevents rust or other results of corrosion shall be applied directly to the pre-stressing steel. The corrosion inhibitor shall have no deleterious effect on the pre-stressing steel or grout or bonding of the pre-stressing steel to the grout. The inhibitor shall be water soluble. The corrosion inhibitor, the amount and time of initial application, and the frequency of reapplication shall be subject to the Engineer's approval.

KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

PARTC
ADDITIONAL TECHNICALSPECIFICATIONS

CLAUSESP-1 PLANT AND EQUIPMENT FOR AGGREGATES AND CONCRETE -DELETED

CLAUSE SP-2 FIXING DOWEL BARS INCONCRETE

1 Scope

The work shall consist of fixing HYSD bars in the existing concrete deck slab/other concrete components to facilitate bonding of astructural component with an existing one.

At least 14 days before start of the work, the contractor shall furnish detailed methodology of construction including sources of supply of material, tools, equipment and appliances be used on work, details of personnel and supervision.

The contractor's personnel shall be qualified and experienced in repair and rehabilitation work of such nature.

2 Materials

HYSD bars shall conform to Section 1000.

The grout material used for fixing HYSD bars in drilled holes in concrete shall be obtainedfromareputedmanufacturerandgroutmixshallbepreparedin conformity with the manufacturer's recommendations. The material shall be either of thefollowing:

(a) Two / three component low viscosity epoxy resin system, having required characteristics of bonding with concrete and resistances to moisture penetration (Resicrete 21 or Resicrete 212 of M/S Structural Waterproofing Co. or SIKADUR BTP of M/S Sika Qualcrete or equivalent).

(b) Cement grout in powder form consisting of cement, good quality sand and admixtures when mixed with required amount of water forms a pourable mix to be used for bonding HYSD bars in concrete (EXCEM – E1manufactured byM/SStructuralWaterProofing Company or M/S SIKADUR orequivalent).

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

The epoxy resin system shall conform to Clause 2803.

The cement grout shall basically be shrinkage compensated, chloride free and of very high strength (50 MPa at 28 days). The mix should be capable of pumping or pouring and shall have excellent bond strength with concrete and steel (bond strengthof15MPawithHYSDbarsat28days).

3 Construction Operations

The construction operation shall be in the following sequence, and shall be supervised bythe Contractor's Engineer well experienced in such works:

(i) Drill holes of required diameter and depth at desired locations as shown on drawings.
(ii) Clean the hole with air blast through air nozzle of 6-mm dia connected to air compressor to remove the drilled powder, which may remain inside the drilled hole.
(iii) Mix the required quantity of grout so that the work could becompleted within the normal setting time as specified by themanufacturers.
(iv) Pour required quantity of mixed grout in theholes.
(v) Insert the dowel rod in the hole where grout has been placed. Move the rod up and down several times to drive out entrapped air, ifany.
(vi) Allow the curing time as per manufacturersspecifications.
(vii) Inclined dowels shall be straightened to match their intended profile only after the grout has finally set and required strength has beenachieved.

4 Measurements for Payment

Measurement for fixing HYSD bars in concrete involving drilling in concrete and fixing HYSD bar with suitable fixing agent shall be measured in number of such HYSD bars fixed in position.

5 Rate

The contract unit rate for fixing of HYSD bars in existing concrete slab/other components shall include cost of all material, labour, tools and plants, drilling required diameter hole in concrete, placing in position, temporary works, testing and curing and other incidental expenses for the satisfactory completion of the work as per the specifications.

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Engineering Division
M.M.R.D.A.

CLAUSE SP-3 CURING USING LIQUID MEMBRANE FORMING COMPOUND - DELETED

CLAUSE SP-4 ADDITIONAL TECHNICAL SPECIFICATIONS FOR ROAD SIGNS – DELETED

CLAUSE SP-5 ADDITIONAL SPECIFICATIONS FOR TRAFFIC MANAGEMENT AND DIVERSION - DELETED

CLAUSE SP-6 SPECIFICATIONS FOR INTER-LOCKING CONCRETE PAVING BLOCKS - DELETED

CLAUSE SP- 7 EXTERNAL LIGHTING INSTALLATION

1 Scope

The scope of Bidder/ Contractor shall be design, manufacture, packing, delivery at site with all accessories, items, equipment complete, installation, testing, commissioning of the entire street lighting system for the Flyover portion and the ROB.

The Bidder/ Contractor shall coordinate with local supply authority for supply to Pillar Boxes necessary to cater to all street lighting distribution networks. As such the scope of Bidder/ Contractor shall start from design, fabrication, supply at site, installation, testing, commissioning of Pillar Boxes and to complete alldown stream distributions including payment of service connection charges for obtaining required nos. of electricmeters.

All the materials shall be brand new and the bidder shall follow all the relevant Indian Standard Codes, International Codes as applicable and the Indian Electricity Rules and Acts as amended up to date together with thisdocument.

The document here provides the basic specification forthe equipment, components, instruments, and auxiliaries, accessories to achieve the control, protection, and requirement of the system and the job in totality shall be as per best practices with relevant I.S. specifications & National lighting codes, 2010 and PWD specifications for Electricalwork.

2 General

The street lighting installation for the project shall be carried out by use of outdoor type, LED fittings of 130-150 watt, weatherproof luminairs (IP 66), to be mountedonoctagonal/conicalsteelpolesasapprovedbytheEngineerhotdipgalvanized inside & outside.

Electric power supply at 415 volt, three phases, four wires, 50 Hz to be for each circuit shall be fed from the designated feeder Pillar Box.

Electric power shall be distributed to the street lighting poles through electric cables laid below ground and/ or through DWI pipe buried under ground and/ or through GI pipe laid in crash barrier and shall be so distributed that equal load balance in all

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Chief Engineer; Engineering Division M.M.R.D.A.

0008 303

three phases isachieved.

Individual control MCB with Pole junction box shall beprovided on each pole. The terminal box shall be weather proof, having gasketed cover. Moreover Junction Boxes shall be inserted in crash barrier near each pole for looping main cable and branching of the poledistribution.

The street light poles shall be earthed individually with Rod electrode type earth station & 2 Nos. of G I wires shall be used for earthing purpose or else for poles on crash barrier two nos. earthing shall be connected with the earth network for eachpole.

Electric cable required for the street lighting installation shall be 1100 Volt grade, minimum 25 sq.mm 4 core ISI mark, armored, XLPE insulated PVC sheathed stranded Aluminumconductor.

For automatic ON/OFF operation of the street lights, programmable type automatic timer shall be provided in the street light feeder pillars. They should have energy saving feature.

All street lights shall be controlled from the outdoor type street light control panel/feeder pillars the locations of which shall be decided as per site suitability and approval of the Client during detail engineering and execution period. The location of the Feeder Pillar Box shall be decided during execution depending on the location of availability of supply point from supplyauthority.

3 Lighting Poles

The street lighting installation for the project shall be carried out by use of out door type, weatherproof luminaries, to be mounted on octagonal / conical hot dip galvanized poles inside &out side. The street light poles shall be fabricated from heavy duty cold rolled sheets and shallbe continuously tapering.

Height of street lighting pole shall be 7.5 meter or 9 meter or more as per design requirement for the road widths and shall be approved from Engineer. Hot dipgalvanization at inside and outside shall conform to BS 729 Part I, BS 5135, IS 2629-1985, IS: 2633-1972 etc.

The galvanization shall be 65 microns and the same shall be recorded and results shall be furnished whilebidding.

The street light poles shall be provided with suitable size of foundation plate, with suitable opening for 3 - 4 cables and holes for foundation bolts.
The terminal box shall be provided with Epoxy terminals and MCB's shall be concealed inside the pole.

The pole fabrication shall conform to the drawings and where such drawing is not available, the Contractor shall make such drawing and get it approved beforefabrication.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

For fixing earth wire, bolts shall be welded to the pole and provided with suitable nut, washer and springwasher.

The pole shall be manufactured and tested as per relevant IS and test certificates shall be submitted to Engineer-in-Charge forapproval.

4 Pole TerminalBox

The junction box enclosure shall be made up of cast Aluminum weather proof, splash proof, and vandal proof enclosure suitable for mounting in pole internally with suitable clamping/fixing arrangement. The enclosure shall have recessed hinged door with neoprene gasket and lockingarrangement.

Each enclosure shall be adequately sized to house terminal blocks to loop in and out 2-3 Nos. 4C x 25/35 mm2 cables, Neutral link and MCB s of suitable rating as per load requirement with base. All above components to be rigidly mounted on back plate.

Suitably sized removable type gland plate for armoured cables to accommodate heavy duty double compression brass gland with all accessories for effective earthling / bonding of cable armour and pole body shall be provided. The box shall have earth terminal on inside and outside for connecting earthwire.

3C x 2.5 mm^2 stranded copper conductor, heat resistant PVC insulated cable to be provided from the pole terminal box to each street light fitting.

5 Pole Bracket

The pole bracket shall be decorative type as approved by the Engineer suitable for erection of street lighting luminaire.

Pole bracket shall be made from 40 mm diameter 'B' class galvanized Iron pipes.
A stopper shall be provided with 3 nos. holes at 120 degrees for proper fixing of the bracket on the pole top.

6 Street Lighting Fittings: LED

Green Line Extra BRP 32264LED CW 125 FGS S1 PSU GR 137 Watt LED of M/S Philips or equivalent from M/S GE, M/S Bajaj, M/S Crompton, M/S Shredder.

All the luminaires shall be mechanically strong, electrically safe, and chemically inert of atmospheric pollution, vibration proof and aesthetically good.
The assembly shall be such that easy installation, operation and maintenance shall bepossible.

The housing shall be pressure die cast with options of cover glass and poly carbonatecover.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

Shall comply to IS 1944, IEC 60598, IS 10322.

The spread, throw and glare control mark of the luminaires shall be compatible to the lane width.

7 Street Light Control Panel/FeederPillar

The control panel shall be suitable for outdoor installation and all relevant codes of practices shall be applicable. The pillar shall be weather proof and water proof and shall be suitable for IP65.
The control panel shall be made from 14 SWG CRCA sheet steel.

The control pillar shall have 2 separate compartments with separate doors. One compartment shall be for incoming supply switch gears and energy meter etc., and shall have sealing arrangement. The other compartment for consumer use shall have control and power switchgears for outgoing. All the equipment in the pillar box shall be erected on 2 mm thick galvanized iron plate, and this plate shall be properly connected to the earth bar. Energy saving features shall alsobe there.

All power and control wiring inside the control pillar shall be with stranded copper conductor wires with lugs / ferrules as per requirement and clamped at both theends.
For termination of incoming and outgoing cables, epoxy insulators with studs andlocknuts shall be provided.

A detachable gland plate made out of 3 mm thick galvanized iron/Aluminum sheet shall be provided at the pillar bottom.

Timer control for switching streetlights ON / OFF is required to be provided.

Contractor to provide KWH meter and CT's as approved by the power supply company and get the same calibrated before installation. Certificate shall be submitted after commissioning theequipment.

Entry of cable to pillar box shall be from bottom and PVC shrouds shall be provided between phases,distributors.

Feeder pillar foundation shall be M30 Grade Concrete, 500 mm above ground level.

8 Pole Foundation

The pole foundation shall be of concrete grade M30 and size shown in the drawing with necessary excavation in all types of soil, murum or rock.

A octagonal shaped plinth of size shown on the drawing above ground level shall be provided. The plinth shall be plastered smoothly and painted with 2 coats of Cement paint from all sides. The plinth shall be of concrete grade M30 and it shall be cast along withfoundation.

The foundation shall have 2/3/4 nos. of G I class B pipe embedded for cables. The design for the pole foundations for the poles required to be grouted in bridge slab and

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Chief Engineer;
Engineering Division
M.M.R.D.A.

shall be got approved from the Engineer and such arrangement shall be made during slabcasting.

9 Earthling works:

The earthling system for feeder pillar & poles shall follow IS 3043.

10 The following work will be carried out by theContractor

The work tobe carried out under this contract comprises of design, manufacture, inspection / testing, supply, transportation, storage, erection, testing commissioning of street lighting system with galvanized octagonal poles distances not exceeding 25 m on either side of the flyovers, on one side of ROB, slip road, with feeder pillars for controlling theluminaires.

The poles using 8 SWG GI wire to be run along with the cable, cabling to the individual fittings / poles AYFY / YFY/ XLPE armored / PVC flexible cable.Illumination scheme shall be designed to ensure minimum average illumination level of 40 Lux for flyovers along with approaches and 40 to 50 Lux for road junctions. Street lights shall be planned on alternate circuitbasis.

The Contractor shall carryout and complete the said work under this contract in every respect in conformity with the current rules and regulations of the local electrical authority, the Indian Standard Institution and with the directions of and to the satisfaction of the Engineer. The Contractor shall furnish all the labour and install all materials, appliances, equipment necessary for the completion and testing of the whole electrical installation as specified herein and shown on the drawings and bill of materials. This also includes any material, appliances, equipment not specifically mentioned herein or noted on the drawings as being furnished or installed but which are necessary and customary to make the installation complete in all respect. Further all the liaison work with the Supply Authorities for obtaining electrical load sanction, obtaining the release order from supply authority and all other co-ordinations with other authorities as and when required, shall be done by the contractor without any extracost.

Contractor has to submit detail drawings to the Engineer for approval before commencement or work. All the drawings are to be prepared in Auto CAD (Latest release only).

The Contractor shall also be responsible for getting approvals from the various bodies such as Supply Authority, Electrical Inspector, etc. and any other statutory bodies as and when required. The cost invoked for getting the necessary approvals is to be included in the cost of the overallwork.

No separate payment towards the same will be paid to the Contractor.

11 Documents to be submitted by the bidder / vendor /contractor:

a) All catalogues of all the major items e.g. luminaries, auto-timers, MCCB, MCB, Cables, Octagonal poleetc.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

307

b) The voltage drop calculation of the cablingnetwork.
c) Earthling calculation.
d) Lighting design output by software
e) Pillar Box GA with all technicaldetails.
f) Single Line Diagram for the street lighting distributionnetwork.

Barring above the client may ask for any other documents relevant with the project work and the same shall be submitted.

The tender document drawing(s) provide(s) basic guideline and the bidder /contractor / vendor shall have the responsibility to design the system following thestandard guidelines and the guidelines laid in this document and the works shall be executed after the drawings and documents are approved by client.

12 Safety Measures:

Scaffolds: Suitable scaffolding arrangement shall be provided for workmen for all works that cannot be safely done from the ground. When a ladder is used, it shall be of rigid construction made either of good quality wood or steel. The steps shall have minimum width of 450 mm and a maximum rise of 300 mm. Suitable hand holds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than ¼ to 1 (1/4 horizontal and 1vertical).

Scaffolding or staging more than 4 meters above the ground floor, swing or suspended from an overhead support or erected with stationery support shall have a guard rail properly attached, bolted, braced and otherwise secured at least one meter high above staging and extending along the entire length of the outside and end there of with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened to prevent it from swaying from the building orstructure.

Working platforms, gangways and stairways shall be so constructed that they do not sagunduly.

Every opening in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing.

Whenever there are open excavations in ground, they shall be fenced by suitable railing and danger signals installed at night so as to prevent persons slipping into theexcavations.

Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 meters in length; width between side rails in rung ladder shall in no case be less than 290 mm for ladders up to and including 3 meters in length. For longer ladders this width shall be increased by at least 20 mm for each additional meter oflength.

Other Safety Measures:

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Chief Engineer,
Engineering Division
M.M.R.D.A.

All personnel of the Contractor working within site shall be provided with safety helmets. All welders shall wear welding goggles while doing welding work and all metal workers shall be provided safety gloves. Persons employed on metal cutting and grinding shall wear safetyglasses.

Adequate precautions shall be taken to prevent danger fromelectrical equipment. No material on any of the sites of work shall be so stacked or placed astocausedangerorinconveniencetoanypersonorthepublic.

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Engineering Division
M.M.R.D.A.

CLAUSE SP-8 TRAFFIC SIGNALSYSTEM

1.0 GENERAL

1.1 Traffic signals on each approach of the junction shall be installed at the junctions shown in Drawing Volume. The layout of each junction together with the initially proposed phase and stage proposals is shown in the drawings.**[DELETED]**

1.2 The Contractor shall be responsible for supply of all equipment, it's installation and testing and full maintenance during the defects liabilityperiod.

1.3 The Specification for the traffic signals, signal heads shall be almost identical to that used for the ATC system. This has been done to ensure that the signals will be functionally compliant with ATC. No specific requirement exists for inbuilt ability for ATC communication, but the possibility of an ATC mode of control is included.

1.4 The traffic signals in NMMC & TMC area are installed and maintained by them. The Contractor shall consult the respective Corporation and get the signal work done from them or its licensed agency as per the latest practice used by them. The payment to be made for signal installation its supply arrangement etc. shall be included in the scope of theContract.

The expenditure on shifting / relocation of existing signals shall also be considered in the contract price.

1.5 This contract for traffic signal equipment is associated with and is part of the contract for civil construction of the highways and junctions. The signals contractorshall ensure that the ducts and other civil provisions included in the civil works are appropriate and adequate for his purposes. The Engineer will not entertain any requests for additional works to make good shortages in the civil works that were not identified at the biddingstage.

1.6 It will be expected that the signal contractor shall be appointed at the early stageof work and he shall liaise with the civil contractor during the contract period to ensure that adequate civil provision is made and that work on site proceeds in an orderly and appropriate manner. In particular it will be expected that the signals contractor will ensure that he does not commence works on site until the site is ready and the equipment can be installed without risk of subsequent damage by completion of unfinished civilworks.

1.7 After completion of the work the Contractor shall hand over the signal system to respective Corporation.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

CLAUSE SP9 GEOTECHNICAL INVESTIGATIONS (DETAILED EXPLORATION)

1. SCOPE OF PROPOSEDINVESTIGATIONS

The exploratory Geotechnical Investigations are required to be conducted at location. All geotechnical investigation shall be done through MMRDA/PMC approved reputedAgency.

Preliminary investigations have been carried out along the alignment. It is proposed to carry out detailed explorations as per Section 2400 of MORTH Specifications for Road and Bridge Works (2001). This work shall be considered incidental to the foundation works and nothing extra shall bepaid.

The scope of the geotechnical investigation is discussed below and is given in the Bill of Quantities.
The present scope of work includes drilling of exploratory boreholes, collection of disturbed and undisturbed samples, conducting Standard Penetration Tests and Vane Shear Tests and all other required laboratorytests.

2. SPECIFICATIONS

FIELDWORK

a) Boreholes

The borehole diameter shall be of adequate size (at least 150 mm) to obtain 100 mm diameter undisturbed samples from the borehole. The borehole depths are likely to vary depending on location. The probable maximum depth is likely to be about 55 to 60m.

Field testing in boreholes includes Vane Shear Tests and Standard Penetration Test as stipulated by the engineer during execution.

Sampling in boreholes includes undisturbed and disturbed sampling of all types of materials, rock cores and groundwater. All field and laboratory testing shall be conducted in accordance with relevant IS Codes and as stipulated by the Engineer.

b) Drilling In Soils Other Than Rock

The boreholes should be drilled at the locations indicated on the drawing to be furnished by theEngineer.

Rotary drilling rig preferably hydraulically operated, with drill pipes and drill bits, swivel type double tube core barrels of M-series with matching diamond bits/triple tube core barrels or type as required by the Engineer, undistributed soil samplers like push sampler/piston samplers, SPT equipment, drilling mud chemicals, all consumables and all other accessories and spares as required for investigations in all kinds of soils and rocks shall be mobilized by the contractor. The rotary drill method shall be preferred to shell and augur method while boring in soil. Calyx type drilling rigs shall not be allowed under any circumstances. The method of advancing the borehole insoil overburdenby establishing the sides of the boreholes by drilling mud (Bentonite) is considered preferable to casing of the borehole. Drilling should be carried out in such a

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Chief Engineer,
Engineering Division
M.M.R.D.A.

311

manner as to limit disturbance of the soil to be sampled or tested to a minimum.Washing tools should have proper side jets and under no circumstances will bottom discharging tools be permitted. The insert casing shall be sufficient to allow for in- situ sampling and testing with standard sampling and testingtools.

Electronic theodolite and other necessary survey equipment shall be mobilized along with necessary personnel for operation of the same for positioning of the borehole locations and measuring groundlevels.

All personnel required for round-the-clock operations including a graduate engineer in each shift should be available at site. All such personnel mobilized for each shift of 12 hours shall have minimum of three years of experience in the same type of job. The project in-charge shall be a post-graduate geotechnical engineer with minimum of five years of experience in the same type of job.

The borings shall be carried out in accordance with relevant Indian
Standard Code of Practice and the requirements stated herein. The boring, sampling and in-situ testing shall be carried out in a manner approved by the Engineer who shall have the right to order alternative procedures if he is not satisfied with the quality or accuracy of thework.

The observations during boring shall be put down in such a manner, so that each change in strata is accurately determined to the satisfaction of the Engineer. During the boring operation, particular attention shall be paid to the disturbed material washed up or brought up by the shell and auger, and these shall be described in the boring logs. These disturbed materials should be preserved in polythene bags with tagsstating borehole reference, depths, nature of soil etc.

The work of drilling in soil shall be carried out in such a manner that disturbed as well as undisturbed samples of soil can be conveniently collected at the required depths/intervals, and penetrometer tests can be carried out if required. The Contractor shall adopt such a method, which will permit the collection of samples indicating the grain size distribution of natural strata without loss of fines, covering the entiredepths.

Water samples shall be collected from the boreholes. Water samples shall be collected prior to addition of Bentonite to boreholes. If this is not possible then prior to collection of water samples, the borehole shall be dewatered by about half a meter depth and water allowed rising back prior to sampling. Ground water level for each borehole shall be checked during boring operation and shall be recorded in bore log.

The drilling operations may be interrupted for collecting the samples, probing and conducting penetrometer tests etc. The casing pipes shall not be removed unless directed by the Engineer. Even after removal of the casing, a piece of pipe should be left in the borehole to identifythe location.

The Contractor shall ensure that sand-blow conditions do not develop while drilling, sufficient surcharge of water or drilling mud should be maintained all throughout the

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Chief Engineer,
Engineering Division
M.M.R.D.A.

drillingoperation.

In the exploration programme the contractor shall associate with the provisions of IS: 1892.

c) Undisturbed SoilSamples

In overburden undisturbed samples shall be recovered from the borings at intervals not exceeding 3m and at every change of strata. The undisturbed sampling shallconform to IS Code 2132 (1972). Undisturbed samples shall be collected in returnable tubes of 100mm internal diameter. Attempts should be made to collect undistributed soil sample of 500mm to 600mm inlength.

The sample tube shall have a proper identification mark painted on it (e.g. borehole reference, depth, location, arrow mark indicating bottom end of the sample tube etc.). The moisture in undisturbed samples shall be carefully preserved by sealing both ends of the sample tube by applying a double coat of cotton waste and paraffin wax.

d) Disturbed Soil Samples

Disturbed soil samples shall be collected from boreholes. These shall include soil samples collected from the split spoon samples and also from the cutting edges of UDS. The samples shall be stored in plastic bags.

e) Drilling in Rock

In general, boreholes should be taken to relatively hard strata. Should rock be encountered in soil borings, it shall be proven by core drilling for a penetration of at least 3 m, or as directed by the Engineer. Rock cores shall be retrieved in minimum NX size by using swivel type double or triple tube core barrels with a suitable core catcher and diamond bit. Single tube core barrels orcalyx type drills will not bepermitted.

Drilling mud or any other fluid likely to aggravate core slips shall not be used.

If required, in all types of rock, the borings will be extended more than the depths specified above, as directed by the Engineer. When drilling in all types of rock, instructions given in IS 4078, 4464, 5313 and 6926 shall befollowed.

During the drilling operation, particular attention should be paid to get the core recoveries and rock quality designations of the highest standards. Percentage core recovery and RQD should be indicated continuously from the depth starting from the level of highly weathered rock. If the core is broken by handling or during drilling, the fresh broken pieces shall be placed together and counted as one piece. This has to be done as the cores come out during drilling, with the permission ofEngineer.

Soil samples and rock cores collected continuously to full depth of boreholes should be clearly marked with good quality oil paint. They shall be designated by number, arrows, depths, borehole to which it belonged etc. for the purpose of identification at a later date. Sketch pens or marker pens shall not be used for writing numbers on corepieces.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer, Engineering Division M.M.R.D.A.

When bedrock is encountered, drill hole shall continue atleast three meter s in sound rock to ensure the continuity of the strata. If weathered or soft rock is met with, drill hole shall continue 5 meter s into the rock layer. However if heavily shattered rock due to various weathering process or weak rock zone susceptible to erosion when subjected to action of flowing water or any other types of rock which cannot be recommended as a founding strata is met with continuing 6 to 7 meter s then the drilling shall continue through the weak zone well into the sound rock below the top weak zone. Such incidences shall be brought to the attention of the Engineer and no borehole shall be terminated without the approval of the Engineer.

The characteristics/strengthof rock with respecttoweathering, hardness, joints and bedding and rock quality designation (RQD) as presented in Tables 2,3,4 and 5 in Appendix I of IRC 78-1983 shall be followed and the same shall be indicated in the borelogs.

Drilling through rock being a specialized work, every care shall betaken to notice and record any small change during drilling. The time required to drill through a certain depth, amount of core recovery, physical condition, length of pieces of core, joints, colour of water residue, weathering, and evidence of disturbance and other effects shall be carefully noticed and entered in the drill/core log. The directions given in IS 5319 – "Guide for Core Drilling Observation" may be followed while preparing the corelogs.
The core boxes provided by the Contractor shall be sturdy and of good qualityG.I.M.S. 18 Gauge and shall be made according to the sketchon Page 6 of IS 4078 (1980) with locking arrangements and compartments. The core boxes shall be painted inside with oil paints. Each and every core piece extracted from the core barrel shall be placed in core boxes in the proper sequence of occurrence from top downwards. The starting and finishing depth of each run shall be recorded on the core box compartments in oil paint as the cores are placed. They shall be sequentially numbered on the four sides and the lid. The name of the project, drill-hole reference, and the depth of the core obtained shall be prominently painted on the lid with oilpaint.

The depth of cores below ground level shall be indicated at about every 1.5m interval by writing the depth in indelible ink on wooden spacers that shall be inserted in their correct positions in the box. Similarly, the exact depth of any change in stratum and failure to recover the core etc. shall be recorded. The labeling of core samples of rock shall be done in accordance with the Appendix D of IS 4078 of 1980 or as directed by theEngineer.

Each core box shall house samples not more than 6 m long in total. While placing the core samples in the wooden boxes, it should be ensured that the direction and sequence of core placement is not altered. The core run shall be restricted to 500 mm to 600mm length at a time and the core sample removed as directed by the Engineer. The cores and core boxes shall be transported to a storing place as indicated by theEngineer

The Contractor shall submit five copies of cabinet size (160mmx120mm) colour

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Chief Engineer, Engineering Division M.M.R.D.A.

photographs of the selected cores as specified by the Engineer.

An arrangement should be made for collection of wash water by installing a top socket with a cross pipe at the top of the casing before the start of rock drilling. The side of the casing should be well packed near the top of the hole to prevent leakage. Wash water should be collected in buckets and allowed to settle. A record of wash water shall be maintained indicating colour, change in colour and type of wash water (i.e. thick slurry or cleanwater)

The number of revolutions per minute for the rock drilling shall be kept low (about 200 RPM) for "NX" size bits, with suitable reduction gear and bit pressure kept to a minimum without rod vibration on "chatter". The rate of penetration for every 250 mm shall be observed during rock drilling andrecorded.

Field bore logs shall be submitted to the engineer after completion of each borehole at site or as demanded by theengineer.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

- **IN-SITU TESTING**

The item covers conducting in-situ test and may include;

- Standard PenetrationTests
- Field Vane ShearTests

a) Standard Penetration Test in Boreholes

The Standard Penetration Test [SPT] shall be carried out in boreholes at intervals as directed by the Engineer. Intervals shall not exceed 3 m according to Indian Standard Code ofPractice.

For details of the sampling tube (spoon) and equipment and procedure for conducting a penetrometer test, the IS Code 2131 (1963) shall apply. The driving monkey should be provided with suitable arrangement for controlling the height of fall. It should be ensured that blowing in of fine sand is avoided while conducting penetrometer tests. For this purpose, it may be necessary to use mud (Bentonite) circulation or create surchargepressure.

For SPT the blow count shall be recorded at intervals of 150 mm, for a total penetration of 60mm. The SPT blow count shall be reckoned as the total number of blows for the second and third penetration increments of 150 mm.

Every attempt shall be made to recover the full sample from the standard split spoon sampler. Where sample recovery is poor or nil, a representative sample shall be preserved from the sludge pump/bailersample.

Whenever a sample recovery is recorded, the following details shall be noted along with usual record of blow counts. This information shall be recorded for each borehole, in a format approved by the Engineer.

- Penetration and blow counts(meters)
- Recovery(meters)
- Logging of silt and fine sand, if any,observed.
- Description of soilsample.

In the case of stiff to medium clay where a sample is recovered in the form of a "cake" a suitable length of cake shall be wrapped with a layer of bandage cloth and coated with paraffin wax to preserve the sample.

The identification tag for the sample shall be carefully secured to the plastic container in which samples arepreserved.

b) Field Vane ShearTest

Field Vane Shear Test shall be conducted as stipulated in the relevant IS codes. During boring operation, when soft clay layers are encountered the same shall be

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Chief Engineer,
Engineering Division
M.M.R.D.A.

brought to the notice of the Engineer who shall decide whether Vane Shear Tests are to be conducted in suchstrata.

- **LABORATORYTESTING**

  All the specified laboratory tests shall be conducted in a nationally accredited laboratory in consultation with the Engineer. Such laboratory should have recognition from the National Highways Authority of India, Government of India. The relevant Indian Standard Codes of Practices for Soil Testing shall befollowed.

  For preparing the laboratory test schedule, a list of all soil and rock core samples collected from each borehole shall be submitted to the Engineer with records of bore logs and in-situ tests in duplicate. One of the copies shall be returned to the Contractor indicating the tests to be conducted. All the consolidation and permeability tests on collected samples shall be conducted at the laboratory of reputed institutes like IIT or as approved by theengineer.

  The results including plots and tables shall be submitted along with the report. Test observations and calculations shall be made available to the engineer if demanded.

- **Preparation of TestSpecimens**

  Preparation of test specimens for the various tests shall be carried out as per the procedures laid down in the various relevant Codes of Practice.

  In case of soft to firm cohesive undisturbed soil samples, test samples for all typesof shear tests shall be prepared strictly by hand trimming or soil lathe. Care shall be taken against bending of soil samples at the time of horizontal ejection of the samples from the sampling tubes. Samples shall be ejected from thesampling tubes preferably in the same direction of travel in which the samples entered the sampling tubes.

  Similarly test specimens for consolidation tests shall also be prepared to the required size by hand trimming only and the ring of the consolidation apparatus shall be inserted by pressing gently with the hands and carefully removing the material around the ring. In no case the ring shall be forced into the soil. Great care shall be taken during the trimming of the sample from the top and the bottom of the ring. The test specimen shall be prepared in the same orientation as that of the actual strata so that the laboratory test load compresses the soil in the same direction relative to the soil strata as the applied load in the field.

- **Index PropertyTests**

  Laboratory tests shall be carried out in consultation with the Engineer and as per relevant parts of IS: 2720 to find out the following index properties:
  Natural Moisture Content Sieve and Hydrometer analyses Atterberg Limits
  Specific gravity
  Bulk and Dry Density
  The soil samples to be tested shall be selected by the Engineer.

- **Tri-axial Test**

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Engineering Division
M.M.R.D.A.

Unconsolidated, un drained tri-axial test shall be conducted on the undisturbed samples selected by the Engineer. The test shall be conducted as per IS: 2720 (Part X). Each test shall be conducted on a minimum of three specimens at different cell pressure (1.0, 2.0 and 3.0kg/cm2).

The moisture content before and after the test and the bulk and drydensities of each specimen shall be determined. The rate inserted by the tenderer in thebillof quantities for the tri axial compression test shall include for all the above items.

The stress-strain diagrams as well as the Mohr circle envelopes shall be included in the report.

- **ConsolidationTest**

  IS: 2720 (Part XV) selected by the Engineer. The loading on the test specimens shall be applied in the following stages: 0, 0.1, 0.25, 0.5, 1.0, 2.0, 4.0, 8.0 kg/sq.cm. Unloading of the test specimens shall be done in suitable stages. The co-efficient of consolidation (Cv), the coefficient of volume compressibility (Mv), compression index (Cc) and the coefficient of permeability (k) shall be determined andreported.

- **Unconfined CompressionTest**

  Rock samples having L/D ratio not less than 2 shall be prepared and tested under soaked condition for uniaxial crushing strength as per IS:9143 and IS:9221.The stress-strain relationship and modulus of elasticity shall also be reported. Bulk and dry densities, porosity, water absorption, specific gravity shall also be determined on rock samples as perIS:1124.

- **Chemical Analysis**

  Chemical analysis of soil and water samples shall be carried out for pH value, sulphate content (SO3) and chloride content (Cl) in ppm andpercentage.

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M.M.R.D.A.

3. **CODES ANDSTANDARDS**

All field and laboratory work shall be carried out strictly in accordance with IS Codes of Practice and these specifications, unless otherwise approved by the Engineer in writing. In case of conflict, the IS Codes of Practice shall prevail unless otherwise instructed in writing by the Engineer.

4. **REPORTINGREQUIREMENTS**

The work includes the preparation and submission of an Investigation Report containing plans showing the location of boreholes including coordinates and levels, plans showing boreholes, project details and description of work carried out, bore logs, core logs, field test results and laboratory test results. Report should also contain interpretation of test results, recommendations for founding levels and bearing capacities, potential settlements and groundimprovement.

The recommendations shall especially cover the Foundation types, founding levels and bearing capacity for the structures as identified in the project description and as shown in the drawings. The foundation types and founding levels shall be clearly identified.

Report shall also cover Safe Bearing Capacity and settlement analysis for shallow foundations, retaining walls, pile capacity and ground improvement techniques.

The report shall include commends on aggressive chemical content of soil and ground water and recommendations for deciding level of protection necessary for concrete and steel buried parts.

CLAUSESP-10 **ADDITIONAL SPECIFICATIONS FOR PROTECTIVE COATINGS FOR CONCRETE**

Description This work shall consist of the application of protective coating for exposed concrete structures specified on the Drawings or otherwise directed to be protected. The work includes, but not limited to, the preparation of surfaces, application and curing of the primer and coating, protection of the work and furnishing all labour, equipment and materials needed to perform the work.

Materials

a) Coating on external surfaces of Deck / Girder /box.

The protective coating shall comprise of epoxy – phenolic primer and an intermediate coat of epoxy – phenolic interpenetrating polymer network system and a top coat of interpenetrating polymer network compatible polyurethane, the IPN system of CBRI Roorkee know-how. The total dryfilm thickness shall not be less than 250 microns and the system shall have the following properties.
Bond Strength with concrete, N/mm2:>2.5 BS3900-E-10-9
Tensile Strength ,N/mm2:> 15

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Chief Engineer,
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M.M.R.D.A.

ASTM D-2370
Elongation%:> 15
ASTM D-2370
Water Vapour transmission, mg / cm2 / mm / 24 hr< 0.15 ASTM D-1653
UV – Resistance: Excellent

b) Coating on sub-structure exposed toatmosphere.

The coating shall comprise of two coats of aliphatic acrylic solvented system having the following properties.
DFT: 200 microns in 2coats
Adhesion(ASTM-D-4541-6.01) : 30 kg / cm^2minimum
Water Vapour Permeants (ASTM-D-1655): Min 20 g/sq.m / day at 75% RH at 250C.
Water Penetration Test (Immersion Method) : Nil
Resistance tochloride: Negligible Less than 10-7cm2/sec.

c) Coating on sub-structure in contact with earth, Coal tarepoxy.

The coating shall consist of two coats of tar – extended epoxy system of CECRI Karaikudi know-how having 300-350 microns in 2 coats and having following properties.
Base Tar extended epoxy – amine adduct Quick curing two component Colour: Black
Volume ofSolids:80% (minimum)
Drying time (touchdry):2 hours
D.F.T. in two coats:300 – 350microns
Chemical resistance: Excellent against chlorides, salts, sulphate, alkalies.
Salt spray test:Should pass as per ASTM-B-117 1000 hrs minimum
Adhesion:3.8 KN minimum as per ASTM-D- 4541
ResistanceImpedance :108
Surfacepreparation:As per manufacturers specification or as per relevant IScodes.

d) Coating System

1) Coating on External surfaces of Deck / Girder /Box.

Interpenetrating polymer network system of CBRI Roorkee know-how system consists one coat of Epoxy Phenolic primer of DFT 50 microns and one coat of Epoxy Phenolic interpenetrating polymer network (IPN0 coating of DFT 100 microns and one coat of polyurethane of DFT 100 microns IPN compatible system (Total

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Chief Engineer,
Engineering Division
M.M.R.D.A.

DFT minimum 250 microns) the IPN system of CBRI Rookie Know-how or any other epoxy coating system approved by the Engineer. The system shall have minimum 5 years field experience in Indianconditions.

2) Coating on sub-structure exposed toatmosphere.
Two coats each of 100 microns DFT (Total 20 microns) of Aliphatic Acrylate based solvented waterproof, anti-fungal coating system or any other equivalent coating system approved by the Engineer. The system shall have minimum 5 years field experience in Indianconditions.

3) Coating on substructure in contact with earth.
Applying two coats of coal tar epoxy system each coat of DFT 150 microns each (Total minimum DFT 300 microns) as per Central Electrochemical Research Institute Karaikudi system. The system shall have minimum 5 years field experience in Indian conditions.

4) Coating on inside of P.S.C. Boxgirder
Internal concrete surface of box girder shall be painted with three coats of cement based paint approved by the Engineer.

Construction Requirements

All surfaces shall be dry and free from contamination such as oil, grease, loose particles, decayed matter, laitance, all traces of mould release oils and curing compounds. Where application over existing coatings is required, trials shall be conducted to ensure compatibility and retention of bond between the underlying coating and thesubstrate.

It is essential to produce an unbroken coating of the material. Surfaces containing blowholes or similar areas of pitting shall first be filled using acementations fairing coat and allowed to cure for 48 hours before application of the coatingmaterial.
Minimum application rates and over coating times are to be observed: as per manufacturer's recommendations or as approved by theEngineer.

The primer shall be allowed to dry for a minimum of 12 hours at 200C or longer at lower temperatures, before application of the coating. Under no circumstances shall the primer be over coated until the surface is properly dry.

Storageand

All products shall have a shelf life of at least 12 months. It shall be

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Precautions

stored in cool, dry conditions, away from sources of heat and flames, in the original unopenedpacks.

Precautions must be observed during the use of the system in accordance with the manufacturer's recommendations.

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M.M.R.D.A.

CLAUSE SP-11 STRUCTURAL STEEL WORKS

1. General

Fabrication and Erection of Steelwork shall be done according to Indian Railway Standard – "Specification for Fabrication and erection of Steel girder Bridges and Locomotive Turn-Tables" – Serial NoB1-2001.

The above specifications shall be read in conjunction with the Indian Railways codes / standards, Metro Railway specifications, specifications given hereafter, CPWD specifications 1996 and other relevant reference specifications described in the section 1 of these specifications. **However, in case of any contradiction, Railway Standard B1 shallprevail.**

Definitions:

Definitions of the various terms used in the specification for steel work shall be the same as given in the Railway Standard B1-2001- "Specification for Fabrication and erection of Steel girder Bridges and LocomotiveTurn-Tables"

Contractor's responsibilities

The Contractor will provide all materials and equipment required to complete the works in every respect, whether such materials are required as part of the permanent structures or temporary for fabrication or erection or maintenance including specifically structural steel plates, shapes, flats, bars, welding rods, rivets, bolts and nuts, paint, welding sets in the shop and at site, all workshop facilities, derricks, cranes, pulley blocks, wire ropes, slings, hemp or manila ropes, winches, small tools and tackles, jacks, erection cleats and temporary braces or supports and all other materials required to deliver the Works complete in every respect.

All labour required for fabrication and erection for any cleaning, making good, rectifying, hauling, and painting and for any other ancillary work required to complete fabrication and erection.

The Contractor shall observe all safety requirements for erection of structural steelwork as covered in IS: 7205.

2. Drawings

(i) The Engineer will supply to the Contractor profile drawings showing sizes of all structural members and typical connection details.

(ii) Should there be any discrepancy in the drawings the Contractor is to refer the matter to the Engineer. The Contractor shall further provide a drawing showing the accurate setting out to line and level of all the anchor bolts intended for the work in sufficient time for their inclusion in the work so as to maintain the building program.

(iii) The Contractor is to prepare all the necessary fabrication shop drawings and these shall be submitted to the Engineer in duplicate and be approved by him before fabrication is commenced. All such drawings shall show the dimensions of all parts, method of construction, welding and bolting. A further set of all approved fabrication drawings shall be supplied by the Contractor for use of the Engineer as required.

(iv) Approval by the Engineer of drawings or any other particulars submitted by the Contractor shall not relieve the Contractor of full responsibility for any discrepancies, errors or omissions therein. The Contractor shall at his own expense supply such additional copies of his working drawings as are required for the use of the interestedparties.

3. Material

(i) Structural Steel

All structural steel shall be of tested quality and shall conform to one of the following standards:

a) IS 2062 E 350 BR class killed and normalized /control-cooled
b) Rolled-up sections can be used of grade E-250
Note: Plates less than 12 mm thick need not be normalized or control-cooled
c) Steel for bolts shall comply with HSFB property class 8.8 as specified in IS.

d) The dimensions of all rolled sections must agree with the contract drawings or as agreed to between the Purchaser and the Contractor.
e) The rolling and cutting tolerances shall be in accordance with 15:1852 or as agreed to between the Purchaser and the Contractor if closer tolerances are desired they shall be shown in thedrawing.
f) All the steel sections used in the' fabrication must have mill test certificate dearly indicating the specification to which the steel conforms and whether steel is killed and normalized. All tile cast mark numbers/ heat mark numbers shall be recorded along with the number of plates in a register as soon as the plates are received in the workshop. Whenever the steel is received without any test

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M.M.R.D.A.

certificate, a sample test piece from plate of each cast mark number is to be cut and sent for testing. Only when it is established that the plates are of required specification these shall be processed forcutting.

g) Use of steel of any quality other than those mentioned above would require the prior approval of theEngineer.

Pins and Expansion Rollers

The following codes shall also be applicable

IS:34	Basic carbonate of lead for paints.
IS:51	Zinc chrome forpaints.
IS:57	Red lead for paints and other purposes.
IS:75	Linseed oil, raw andrefined.
IS:77	Linseed oil, boiled forpaints.
IS:102	Ready mixed paint, brushing, red lead, non-setting, priming.
IS:104	Ready mixed paint, brushing, zinc chromepriming.
IS:123	Ready mixed paint, brushing, finishing, semi-gloss, for general purposes to Indian Standard colours.
IS:209	Zincingot
IS:210	Grey ironcasting
IS:549	Split pins
IS:808	Dimensions for hot rolled steel beam, column, channel and angle sections.
IS:813	Scheme of symbols forwelding
IS:814	Covered electrodes, for, manual metal-arc welding of carbon and carbon manganesesteel.
IS:816	Code of practice for use of metal-arc welding for general construction in mildsteel.
IS:817	Code of practice for training and testing of metal arcwelders
IS:818	Code of Practice for safety and health requirements in electric and gas welding and cutting operations
IS:822	Code of procedure for inspection ofwelds.
IS:823	Code of procedure for manual metal arc welding of mild steel
IS:887	Animaltallow.
IS:958	Temporary corrosion preventive grease, soft, film cold, application.
IS:962	Code of practice for architectural and buildingdrawings.
IS:1030	Carbon steel castings for general, engineeringpurposes.
IS:1148	Hot rolled steel rivet bars (upto 40mm dia) for structural purposes.
IS:1149	High tensile steel rivet bars for structuralpurpose.
IS:1363	Hexagonheadbolts,screwsandnutsofproductgradeC.
IS:1364	Hexagon head bolts, screws arid nuts of product grade A and B. (all parts)
IS: 1367 (all parts)	Technical supply conditions for threaded fasteners.
IS: 1387	General requirements for the supply of metallurgical materials

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Chief Engineer, Engineering Division M.M.R.D.A.

IS: 1458 Railway bronze ingots and castings.
IS:1599 Method for benttest
IS:1673 Mild steel wire cold headingquality.
IS:1730 Steel plates, sheets, strips and flats for structural and general engineeringpurposes-dimensions.
IS:1745 Petroleum hydrocarbonsolvents.
IS:1852 Rolling and cutting tolerances for hot rolled steel products. IS:1875Carbon steel billets, blooms, slabs and bars forforging.
IS:1929 HotforgedSteelrivetsforhotclosing(12to36mmdiameter).
IS:2002 Steelplatesforpressurevessels for intermediateandhigh temperature service includingboilers.
IS:2004 Carbon steel forging for general engineering purposes. IS:2016 Plainwashers
IS:2062 2011 – Hot Rolled Medium and High Tensile Structural Steel specification.
IS:2074 Readymixedpaint,airdrying,redoxide-zincchrome,priming
IS:2339 Aluminium paint for general purposes, in dualcontainer
IS:2590 Primary aluminium in gots for re-melting for general engineering purposes.

IS:2638 Flat splitcotters.
IS:3063 Fasteners single coil rectangular section spring washers.
IS:3502 Steel chequered plates.
IS:3613 Acceptance test for wire flux combination for submerged arc welding
IS:3640 Hexagon fitbolts
IS:3658 Code of practice for liquid penetrant flawdetection
IS:3664 Code of practice for ultrasonic pulse echo testing by contact and immersion methods
IS:3696 Safety codes for scaffolds and ladders
IS:3757High strength structuralbolts
IS:4353 Submerged arc welding of mild steel and low alloy steels – recommendations Ferritic and martensitic steel casting for use at low temperatures
IS:4899
IS:5369 General requirements for plain washers and lockwashers.
IS:5334 Code of practice for magnetic particle flaw detection of welds
IS:5372 Taper washers forchannels.
IS:5374 Taper washers for I beams.
IS:5666 Etchprimer.
IS:5905 Sprayed aluminium and zinc coatings on iron andsteel.
IS:6586 Recommended practice for metal spraying for protection of iron steel.
IS:6610 Heavy washers for steelstructures.
IS:7215 Tolerances for fabrication of steelstructures
IS:7283 Hot rolled bars for production of bright bars and machined parts for engineering applications.
IS:8629 Code of Practice for Protection of Iron and Steel structures from atmospheric corrosion
IS:9954 Pictorial surface preparation standards for painting of steel surfaces
IS:9595 Metal-arc welding of carbon and carbon manganese steels recommendations.
IS:2843 Tolerances for erection of steelstructures

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Chief Engineer,
Engineering Division
M.M.R.D.A.

IRS Specifications

R19 Wheels and axles for carriages andwaqons.
M-3 Class I, II,III & IV steel forgings, blooms for forgings and Billets for rerolling.
M-28 Classification, testing and approval of metal-arc welding electrodes for use on Indian Railways.
M-39 Classification, testing approval of sub-merged arc welding wire flux combination.
M-41 Corrosion resistancesteel.
M-42 High strength low alloy structural steel with enhanced corrosion resistance.
M-43 High strength low alloy structural steel rivet bars with enhanced corrosionresistance.
T-12 Flat bottom railway rails.
P-31 Zinc chromate read-oxideprimer.

RDSO's Specifications

M&C/PCN/102196	Epoxy zinc phosphate primer.
M&C/PCN/103I86	Epoxy micaceous iron oxide
M&C/PCN/109/88	Polyurethane redoxide.
M&CIPCN/110/88	Polyurethane aluminium.
M&C/PCN/111188	High build Epoxy paint.

The Contractor shall supply to the Engineer copies of the manufacturer certificate that the steel brought to the site for incorporation in the works is of a quality fully complying with the specification. If required by the Engineer, the Contractor shall arrange for testing of the steel samples as per IS: 1608 -1599.

(ii) Welding Electrodes

Welding electrodes used for the works shall conform to IS:814/latest and shall be supplied by manufacturer approved by the Engineer and shall be of the grade approved by the Engineer. All Electrodes shall be kept under dry conditions. Any electrode which has part of its flux coating broken away or is damaged shall berejected.

(iii) Bolts and Nuts

Bolts and nuts used for the works shall unless otherwise specified be black bolts and nuts supplied by manufacturer approved by the Engineer and shall conform to IS: 1367.

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M.M.R.D.A.

(iv) Washers

Plain washers shall be made of mild steel conforming to IS:5369 (1975), unless otherwise specified. One washer shall be supplied with each bolt and, in case of special types of bolts; more than one washer as needed for the purpose shall be supplied. An additional double coil helical spring washer, conforming to IS: 6755 (1980), shall be provided for bolts carrying dynamic or fluctuating loads and those indirect tension.

Tapered washers, conforming to IS: 5372 (1975) and IS: 5374 (1975), shall be used for channels and beams respectively wherever required.

For all other material required for the works, the approval of the Engineer shall be obtained by the Contractor prior to the use of the material in theworks.

4. Workmanship and Fabrication:

4.1 The whole work shall be representative of the highest class of workmanship. The greatest accuracy shall be observed in the design, manufacture and erection of every part of the work to ensure that all parts will fit accurately together on erection. For manufacture of the components of all spans to be made strictly interchangeable as specified in clause 33, approved set of same jigs and assembly fixtures shall be used. The- tolerances in manufacture shall be in accordance with as shown in Appendix II. The Contractor shall state which of the following alternative methods of manufacture he/ she intends to adopt

i) The whole of work to be erected complete and pieces marked to.place.
ii) All spans to be made strictly interchangeable as specifiedhereafter

The Contractor shall maintain a master steel tape of approved make for which he/ she has obtained a certificate of accuracy from any National Test House or Government recognized institutions competent to doso.

4.2 Templates

The templates throughout the work shall be of steel. The template shall be used for marking of cutting material and as well as profile machining for girders of railway loading. Templates shall be used for marking of drilling holes in steel structures other than girder of railway loadings. In case where actual materials from a bridge have been used as templates for drilling similar pieces the Engineer / his representative will decide whether they are fit to be used as part of the finished structure.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

4.3 Flattening and Straightening

All steel materials, plates, bars and structural shall have straight edges flat surfaces and be free from twist. If necessary, they shall be cold straightened or flattened by pressure before being worked or assembled unless they are required to be of curvilinear form. Pressure applied for straightening or flattening shall be such as it would not injure the material and adjacent surfaces or edges shall be in close contact or at uniform distance throughout.

Flattening and straightening under hot condition shall not be carried out unless authorized and approved by the Engineer / hisrepresentative.

4.4 Planning andShearing

Except where otherwise indicated, cutting of all plates and sections shall be affected by shearing or sawing, all edges shall be clean, square and true. Wherever possible the edges shall be cut in a shearing machine, which will take the whole length of the plate in onecut.

Should the inspection find it necessary, the cut edges shall be ground afterwards.

Planning or machining of the edges or surface shall be carried out when so specified in the contract drawings or where specifically ordered by the Engineer. Where machining is specified, the plates or all sections shall be cut in the first instance to such a size so as to permit not less than 3mm of metal being removed from each sheared edge or end, in the case of plates or sections of 12mm or less in thickness and not less than 6mm or metal being removed in the case of plates and sections exceeding 12 mm in thickness.

The butting ends of all booms and struts where spliced shall be faced in an end milling machine after members have been left completely fabricated. In the case of compression members the face shall be machined so that the faces are at right angle to the axis of the members and the joint when made, will be in close contact throughout. At the discretion of the Engineer / his representative, a tolerance of O.4mm may be permitted at isolated places on the buttingline.

4.5 FlameCutting

Flame cutting by mechanically controlled torch/torches shall be accepted both in the case of mild steel and high tensile steelwork. Provided the edge as given by the torch is reasonably clean and straight, plates may be cut to shape and beams and other sections cut to length with a gas culling torch, preferably oxyacetylene gas should be used.

Chief Engineer,
Engineering Division
M.M.R.D.A.

All flame cut edges shall be ground to obtain reasonably clean square and true edges. Draglines produced by flame cut should be removed.

Unless machining has been specifically provided for, special care is to be taken to ensure that ends of all plates and members are reasonably in close contact and the faces are at right angles to the axis of the members and joints, when made, are also reasonably in closecontact.

Use of multi-head flame cutting machine having multiple oxy acetylene torches is desirable for higher productivity and reducing the distortion due to cutting operation. Plasma arc cutting method can also be employed. This process offers less heat input causing less distortion:

4.6 Drilling

All, holes shall be drilled. Holes for countersunk heads of rivets, bolts or screws shall be drilled to the correct profile, so as to keep the heads flush with the surface Holes for countersunk heads of rivets, bolts or screws shall be drilled to the correct profile so as to keep the heads flush with the surface.

Holes for turned bolts, should be 1mm under drilled in shop and should be reamed at site to suit the diameter of turnedbolt.

Where the number of thicknesses to be riveted exceeds three or the total thickness is 90mm or more, the rivet holes, unless they have been drilled through steel bushed jigs, shall be drilled out in place 3mm all round, after assembling. In such cases the work shall be thoroughly boltedtogether.

The steel bushes shall be case hardened by an approved process and checked for diameter after the heat treatment. The bores of bushes shall initially have a tolerance of–0.1mm, 0.1 mm. The tolerance shall be checked from time to time and when the bores exceed a tolerance of –0mm, +0.4mm, the bushes shall be rejected. For this purpose, go and no-go gauges are to be used. Tolerances for checking jigs from master plates shall be+Omm-0.13mm.

The work shall be taken apart after drilling and all burrs left by the drill and the 'sharp edges of all the rivet holes completelyremoved.

4.7 Parts inContact

All steel work intended to be riveted or bolted together shall be in contact over the whole surface.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

Drifts as shown in Fig. 2 may be used for drawing light members into position but their use on heavy members should be restricted to securing them in their correct positions. In no case, shall drifting be allowed to such an extent that holes are distorted.

Drifting to enlarge unfaired holes is prohibited. The holes that will have to be enlarged to admit rivets should be reamed provided the Engineer permits such reaming after satisfying himself about the extent of inaccuracy' and the effect of reaming on the soundness of the structure. The Employer / Engineer retains the right to reject all steel work if the holes are not properlymatched.

4.8 Making ofJoints

Cleaning of permanent contact surfaces:– Surfaces which will nave permanent contact, shall be removed of paints and mill scale down to bare metal, clean and dried and immediately a coating of red lead to IS:102 shall be applied. Care shall be taken to see that all burrs are removed and no surface defects exist before the Parts are assembled.

Bolting and Drifting- Only barrel drifts as per Fig. 2 (please refer sketch at the end of this section) shall be used in erection. They may be used for drawing light members into position; but their use on heavy members shall be restricted to securing them in their correct position. Any apparent error in shop work, which prevents the assembling and fitting up of the parts by the proper use of these drifts, shall be investigated immediately, As all work, is rigidly inspected in the manufacturers wok before dispatch, these difficulties should not arise and the cause should be first be sought In the use of incorrect components or the transposition of a correct part. It is usually important that parts should be correctly handled. Should error still persist, the matter shall be immediately reported to the Engineer who will decide what action is to be taken. No reaming shall be undertaken without the written authority of the Engineer, except for the under drilled holes meant for turned bolts. If approved, the Contractor shall supply, at his/her own expense, any special rivets that maybe required. Copiesofall correspondence relative to the recourse to reaming and the-use of over-size rivetsshall invariably be sent by the Engineer for information to the inspectorate concerned.

Joints shall normally be made by filling not less than 50% of the holes with service bolts and barrel drifts in the ratio of four to one. The service bolts are to be fully tightened up as soon as the joint isassembled.

Special methods of erection other than described in Appendix III In cases where the joints have to withstand stresses arising from special method of erection, provision is to, be made to take the whole stress that will or may occur. Cylindrical drifts and turned bolts shall be used to withstand such stresses and no reliance is to be placed on the service bolts for this purpose. Upto maximum of 40% of the holes of each member of the joint are to be filled with drifts and balance of strength required,is to beat tained with turn bolts. The position and number of the (trifts and bolts will be intimated by the Engineer. The 'condition of clause 20.1 must be observed and the bolt fully tightened up as soon as the joint ismade.

Where the manufacturing of girders has been done in accordance with clause 33

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Chief Engineer, Engineering Division M.M.R.D.A.

relating-to steel girder bridges, the erection shall be done in accordance with Appendix III. However, if the Contractor desires to adopt any other methodof erection, tie/she shall submit the scheme and obtain the approval of the Engineer. It shall be ensured that when in position; the girder has the camber as perdrawing.

Emergency Jointing:- In the event of an emergency arising such as the staging is in danger of being carried away by floods before the riveting can be completed, the joints shall be made secure by filling 40% of the holes with cylindrical drifts and equal number with service bolts fully tightened.

4.9 Erection and Equipment

The Contractor shall provide at his/ her own cost all tools, machinery, equipment and erection material necessary for the expeditious execution of the work and shall erect the structural steel and iron work, in every respect as covered by the contract and in accordance with the drawings and specifications,

If any labour, material, plant staging haulage and storage facilities are to be provided by the Employer / Engineer details of such items and the conditions under which these are to be supplied shall be clearly specified, in the contract agreements. In the absence of any such provisions in the agreement, the Contractor shall make his/ her own, arrangement for suchitems.

Before starting the work, the Contractor shall advise the Engineer fully as to the method he/ she, proposes to follow and the amount and character of equipment he/she proposes to use, which shall be subjected to the approval of the Engineer. The approval of the Engineer shall not be considered as relieving the Contractor of the responsibility for the safety of his/her method or equipment or from carrying the work in full accordance with the drawings and specifications.

All temporary work shall be properly designed and substantially constructed for the loads, which it will be called upon to support. Adequate allowance and provision of a lateral forces and wind 'loads shall be made according to local conditions and ensure that support shall not settle during erection.

Careful and periodical inspection of plants shall be made by the Contractor to ensure that all, tackle, ropes chains and other important lifting gear and machinery are in good order and fit for service and well up to the capacity for which they are required.
When chains are used for lashing, care must be taken to protect the edges of members to avoid the marking and distortion otherwise caused.

Span erected upon staging shall be supported upon suitable blocks, which shall ensure that the girders shall be at the correct elevation and alignment when completed. If other methods of erection be adopted where staging in situ is not employed special means shall be used to ensurethis.

The method used for lifting and slinging flexible members shall be brought to the notice of the Engineer and shall be Subject to his/her approval.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Temporary bracing shall be provided to take care of stresses from erection equipment or other loads carried during erection.

4.10 Bearings and Anchorages

Bed plates shall be set to required level and fixed accurately in position by giving full and even bearing by setting them on a layer of cement sand and cast iron chips as approved and directed by the Engineer.

The Contractor shall drill the holes where necessary and set the anchor bolts. The bolts shall be set accurately and fixed with cement grout or any other grouting material as approved by the Engineer completely filling the holes.

4.11 Rivets and Riveting

The dimensions on the drawings referred to the diameters of the rivet holes and their finished rivets. The rivet holes shall be 1.5 mm greater than the diameter of the rivet bars used, The rivets shall be made to IS:1929, The shanks of the un driven rivets shall be made of a length sufficient to fill the holes thoroughly and form the head. The clearance i.e. the difference in diameter between the rivets measured under head before being heated and the rivet hole shall not be less than 0.75mm. Before riveting is commenced all works shall be properly bolted so that the sections riveted are in close contact throughout. Rivets shall completely fill the holes and shall be machine driven by means of pressure or percussion riveters of approved design.

All rivets shall be properly heated to straw heat for the full length of the, shank, firmly backed and closed. The head of the rivet, particularly in long rivets, shall beheated more than the point and in no case shall the point be heated more than the head. Sparking or burnt rivets shall not be used. Where it is impossible to back up by normal method of holding up double gunning may be resorted to. Alternatively pneumatic holding device may beused.

Gauges for rivet dimensions and contours shall be provided by the Contractor for the use of the Engineer / hisrepresentative.

Rivets when driven shall completely fill the holes, have the heads concentric with the shanks and shall be in full contact with the surface. Driven rivets when struck, sharply on the head with the 110-gm. rivet testing hammer, shall be free from movement or vibration.

While riveting bunt-up member's great care should be exercised to ensure that the set of holes for field rivets in each flange of the built-up member, is aligned dead-square in relation to that in the other flange and not 'aborrated'. Use of assembly fixtures shall be made to ensure this.

All loose and burnt rivets and rivets with cracks badly formed, eccentric or deficient heads shall be cut out and replaced. Permissible deviation of driven rivets shall be as per Appendix-IV. Rivets shall also be cut out when required for the examination of the

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work. Actual method of cutting out shall be approved by the Engineer. Re-cupping and caulking shall in no circumstances be resortedto.

Riveting shall not be started until such time as the Engineer has personally satisfied himself that the alignment of the girders is correct, the verticals plumb laterally, the camber according to that shown on the camber diagram with camber jacks screwed tight, all the joints and cover plates well up, service bolt tightened field rivet holes coinciding. Special care should be taken that service bolts are frequently re-tightened as the rivetingproceeds.

All field rivets shall be tested as directed by the Engineer.

Where practicable all riveting shall be done by pneumatic or hydraulic riveting machine. The working pressure to be employed when using pneumatic or hydraulic tools shall be approved by the Engineer. Hand riveting shall only be done when sanctioned by the Engineer. In such cases means shall be adopted to ensure the rivets being used in their entire length so as to fill the rivet holes completely, the snap being used only to give the correct form ofhead.

When all the rivets of joints have been finally passed, they shall be painted with one coat of ready mixed zinc chrome primer to 18:104 followed by one coat of ready mixed paint red oxide zinc chrome primer to 15:2074 or as other primer directed by the Engineer. Finishing coat shall be given with paint as decided by theEngineer.

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4.12 Field Rivets, Bolts, Nuts· and Service Accessories

The work is to include supply of all units, bolts, nuts, washers etc. required to complete erection at site with an allowance for wastage etc. of 12.5% of the net number of field rivets, bolts and washers required subject to a minimum number of five in each item.

The Contractor shall be responsible for supplying site rivets of approved length. The length of such rivets shall be verified by snapping a few rivets of each length in the presence of the Engineer / his representative. In the case of rivets with long grips (with grip exceeding 6 times the diameter) specimen rivets on the test piece shall be cut to see if the holes are totally filled even though the rivets are tight under the usual hammer tests.

Black hexagonal bolts (Service bolts) with nuts and ordinary platter's washers .and drifts for use in the erection of the work shall also be supplied at 60% (45% bolts and 15% drifts) of the number of field rivets per span in each size (this includes wastage). The Employer / Engineer may however, specify a reduction in the quantities of service bolts etc. if more than one span of each type isordered.

4.13 Smithed Work

All joggles shall be performed by pressure, Craned sections or knees can be formed by forging or by gas cutting and, Wilding by any approved electric arc process, Any bending, forging, cutting or welding shall be carried out in such a manner as not to impair the strength in the metal. Forging shall be annealed as Indicated in the drawing.

If drop forging through dies is resorted to, excessive forging in one Operation shall be avoided. Where necessary, a series of intermediate stage dies shall be manufactured and used.

4.14 Welding

Welded construction work shall be carried out generally in accordance with the provisions of Indian Railway Standard Welded Bridge Code and subject to further specifications given in the following paragraphs.

All welds should be done by submerged arc welding process either fully automatic or semi-automatic. Carbon dioxide welding or manual metal arc welding only be done only for welds of very short runs or of minor importance or where access of the locations of weld do not permit automatic or semi-automatic welding.

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Engineering Division
M.M.R.D.A.

Except for special types of edge preparation, such as single and double 'U' single and double 'J' the fusion edges of all the plates which are to be joined by welding may be prepared by using mechanically controlled automatic flame cutting equipment and then ground to a smooth finish. Special edge preparation should be made by machining or gouging.

Welding procedures:- The welding procedure shall be such as to avoid distortion and minimize residual shrinkage stresses. Properly designed jigs should be used for assembly. The welding techniques and sequence, quality, size of electrodes. Voltage and current required shall be as prescribed by manufacturers of the material and welding equipment.

Site welding should not be undertaken except in special circumstances with the approval of the Engineer. Site welding should be confined to connections having low stresses, secondary members, and bracingsetc.

Manual metal arc welding may be done taking adequate precautions as per IS: 9595 and under strict supervision.

4.15 Sequence of' Welding Pass

For fabrication of welded composite girders channel shear connectors shall be weld on top flange plate prior to assembly of I-section. This facilitates correction of any distortion of flange plate developed during the welding of channel shear connectors.

In making a typical I-section four fillet welds are to be made. The welding sequence to be followed is indicated by number 1 to 4 as shown in the Fig.3.

Whenever a square butt weld in a 10 or 12mm thick plate is required to be made the sequence to be adopted is shown in Fig. 3.

4.16 Bolts, Nuts and Washers

Bolts, Nuts and Washers shall be in accordance with the following specifications:-
Black hexagonal bolts to 15:6639 and Nuts to 15:1363.
Precision and turned bolts with nuts and hexagonal screws to IS:1364.
Plain washers to 15:2016 and IS:5369.
Spring washers - IS:3063.
Taper washers - 15:5372 and 15:5374.

Manufacture, workmanship, Marking, Packing etc. for Bolts and Nuts shall comply with the requirements of 15:1367.

Where the head and nuts bear on timber.square washers having the length of each side not less than three diameters of the bolt and the thickness not less than one quarter of the diameter, shall be provided. Steel wrought iron or malleable cast iron taper washers shall also be provided for al heads and nuts bearing on beveled surfaces.

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For black (service) bolts a clearance (difference in diameter) of 1.5mm for all sizes of bolts shall beallowed.

Where turned bolts are required they shall be carefully turned and shall be parallel, throughout the barrel. Holes for turned bolts should be 1 mm under-drilled in shop and should be reamed at site to suit the diameter of the turned bolts.

The following limits of tolerances shall be permitted upon the diameter of the shank of turned bolts arid, of the holes which they are to fit:

Limitoftolerance	Shank ofbolt(mm)	Hole(mm)
High	0.000	+0.125
Low	–0.125	0.000

The shank of each turned bolt shall be of such a length that it is in full contact with the work, throughout, the screwed portion being made at least 1.5mm less in diameter than the shank or to suit the next smaller size of screw thread. The shank portion shall be joined to the threaded portion by a 45° chamfer within the thickness of the washer. Washers with perfectly flat faces should be provided with all turnedbolts.

The washers under the nut shall have a hole of 1.5mm larger in diameter than the shank of the bolt and shall have a thickness of not less than 6mm so that the nut when screwed up, shall not bear on the shoulder of thebolt.

4.17 Connecting Pins

All connecting pins shall be finished accurately to gauge and parallel throughout. Straight and with smooth surface entirely free from flaws and of sufficient length to ensure that, all parts connected thereby shall have a full bearing on the pin. They shall be turned. to a smaller diameter at the end for the thread and driven to place with a pilot nut where necessary to preserve thethread.

4.18 PinHoles

Pinholes shall be bored smooth straight and true to gauge and at right angles to the axis of the member. Boring shall only be done after the member has been rivetted up and the diameter of the pin shall not be less than that of the hole bymore than 0.5mm.

4.19 Bearing and Expansion Gear

All steel bed and bearing plates or plates over saddle castings; shall be made perfectly level and all rivet heads on their bearing surfaces shall counter sunk and dressed flush.

The saddles knuckle-bearers and roller bed-plates shall be planed on all bearing surfaces and elsewhere as indicated on the Contract Drawings and all bolt holes shall be drilled. The bottom edge of ribs should be machined and welded to the bottom slabs after which the top edges of the ribs should be machined as a whole and top plate welded. Subsequently the top and bottom surfaces should be machined to specified tolerances as given in appendix VI. Generally in connection with bearing gear all meeting surfaces including the sides of the roller frames, shall machined, all bolts

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M.M.R.D.A.

except anchor bolts d and fitted, all washers faced, the knuckles and pins polished to smooth surface end the whole finished in the style of first class machinedwork.

Tolerances shall be as specified in Appendix VI and shall be shown on the drawings.

4.20 Erection in Contractor's Works

The work shall be temporarily erected complete at the Contractor's work for inspection by the Engineer / his representative, with the exception of such riveting as has to be done at site, so that accuracy of fit and perfection of workmanship may be assured. The work shall be put together with sufficient numbers of parallel drifts or turned bolts or both to bring the pieces into place. When so erected all holes left to be filled at site shall be so fair that a parallel gauge turned to a diameter 0.8 mm less than that of the hole, of a length equal to the depth of the hole, can be passed through them without difficulty. No drift shall be used anywhere in the work larger in any part than the hole in which it is to be driven. Holes for turned bolts, which have been 1mm under-drilled in shop, should be reamed at site by the erectingagency.

4.21 Interchangeability

Every span is to be temporarily erected complete in Contractor's works adopting the method of giving camber as explained in clause 34 and all parts as marked to their place, unless the whole of the work is made completely interchangeable by the use of steeljigsandhardsteelbushescontrolledby mastergauges,inwhichcasethefirstspanmust be completely erected to test the accuracy of the templates. Further spans or part span assemblies built from parts selected at random by the Engineer / his representative shall be erected from time to time to check the accuracy of the work as the Engineer / his representative mayrequire.

If the work is considered interchangeable by the Engineer / his representative a simplified scheme of marking will be permitted, i.e. all pieces which are identical shall bear one distinguishing mark irrespective of the span to which they belong. Should the interchangeability not to the satisfaction of the Engineer/his representative, the whole of the spans must be erected complete and an parts marked to their place without additional charge. The tenderers must state in their tenders whether they intend to adopt complete interchangeability or not.

Under special arrangement with the Employer / Engineer, it shall be permissible for approved portions of the work to be dispatched before complete erection of the first span, provided the Contractor satisfies the Engineer / his representative that Such portions of the work are strictly interchangeable and will assemble correctly and accurately in the completestructure.

4.22 Camber

In order to ensure that the fabrication and erection of main girders shall be such as to eliminate secondary stresses in the loaded span, the nominal length (i.e. the lengths which will give no camber) of member shall be increased or decreased by the amount shown on the camber diagram supplied by the Employer /Engineer.

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M.M.R.D.A.

For setting of the angles of intersection of the chords and web members and also for templating the gusset, full size of panels with nominal lengths of the members, shall be used. Similarly, the machining of all chords butts shall be to suit the nominal outline as defined in clause No. 34.1.

The procedure for erecting, the span at Contractor's work shall be as specified. The site riveting holes shall be riveted or bolted and drilled as specified in Appendix III.

When supported, on blocks or staging, the girders shall be erected to the camber specified in the fabrication drawings according to which the girders have been manufactured. A camber diagram indicating the relevant height of each panel point when erected on blocks at the manufacturing works shall be supplied by the Engineer.

The cambering of the main girders along with pre-stressing, when all panel points are supported on the blocks or staging shall be carried out in accordance with Appendix 'A' of Steel BridgeCode.

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M.M.R.D.A.

Special methods of erection, such as cantilever erection or erection by floatation, will require special erection drawings approved by the Engineer, which must not be deviated from.

In the case where the girders are erected on yielding supports such as a 16 service span, due allowance shall be made for the anticipated yield when the camber blocks are set out.

Frequent checks shall be made of the camber of girders during erection and care taken to see that the camber as per drawing is obtained when the girder is completely assembled. When span is supported on ends and intermediate supports are removed the dead load camber shall be recorded and entered in bridge register. This will, provide the reference to compare the camber checked during technical inspection to ascertain the loss of camber.

4.23 Testing

The Engineer / his representative shall be empowered, at his/ her discretion to make or have made under the supervision, any of the tests specified in the specifications mentioned herein in addition to such other tests as he/she may consider necessary at any time upto the completion of the contract and to such an extent as he/ she may think necessary to determine the quality of all materials used therein. In doing so, he/ she shall be at liberty any reasonable procedure he/ she may think fit to select, identify, have cut-off and take possession of test pieces from the material either before during or after its being worked up into the finishedproduct.

He shall also be empowered to call for a duly authenticated series of mechanical tests to be obtained from the maker for this material used in the work and to accept the same in lieu of other tests to the extent he/she deems fit. The Contractor shall supply the material required for the test pieces and shall also prepare the test pieces necessary.

The test shall be carried out by the Contractor, for which Contractor shall provide all facilities including supply of labour and plant. Engineer / his representative may at his/her discretion direct the Contractor to dispatch such tests pieces as he/ she may require to the National test House or elsewhere as he/ she may think fit for such testing purposes.

4.24 Check on Tests Made at Contractor'sWork

The Engineer / his representative, may at his/ her discretion, check test results obtained at Contractor's work by independent tests at National test House.

The Engineer / his representative shall at all times be empowered to examine and check the working of the Contractor's plant before and after using it. Should the Contractor's plant be found in the Engineer / his representative's opinion, unreliable he/ she is empowered to cancel any tests already carried out in this contract and have Test House or elsewhere, as he/ she may thinkfit.

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M.M.R.D.A.

4.25 Analysis

The Contractor shall supply authenticated copies of analysis of any materials used in the contract when required to do so by the Engineer / his representative who shall be empowered to accept them to the extent he/ she thinks fit. In addition to the above samples may at the Engineer / his representative's discretion be subjected to complete analysis at the National test House or elsewhere as the Engineer / his representative may determine the cost of the same to be borne by theEmployer.

4.26 Inspection –General

The Engineer / his representative shall have free access to the works of the Contractor at all reasonable times and shall be at liberty to inspect the process of manufacture at any such time and to reject in whole or part, any work or material that does not conform to the provisions of this Specification and may order the same to be removed, replaced or altered at the expense of the Contractor. All gauges and templates necessary to satisfy the Engineer / his representative of the complete interchangeability of parts must be supplied by the Contractor free ofcost.

4.27 Erection Mark

Every portion of the work shall be distinctly stenciled with paint with letter size not less than 10 mm for guidance in the erection in the field, and stamped with the letters specified in the drawings. In the case of non-interchangeable work, the system of marking shall be in accordance with the drawings prepared by the tenderer and approved by theEmployer.

4.28 Weight of Steelwork for Payment

Payment shall be made on the tendered weight to be calculated in accordance with the nominal weight of the sections as specified on the contract drawings. An addition in weight for welds and rivet heads should either be specified in the schedule or be made as follows:

a. 3% in case of riveted or composite (riveted and welded) work;and
b. 1% in case of purely weldedwork.

Gusset areas shall be calculated on the basis of minimum enveloping rectangle and skew cuts will be considered as containing rectangle for purposesof calculating weights.

4.29 Rivet and BoltLists

The Contractor shall also supply, without charge, three complete lists of the rivets, bolts, service bolts, washers and drifts required for erecting the work at site, showing the parts of the work to which the various rivets and bolts belong and having each item marked so as to indicate the particular case in which it will befound.

5. Supplementary specifications forsteelworks

i. For all the works, workmanship shall be of first class quality, throughout, in conformity with IRS B1-2001 or latest edition, and true to line, level and dimension as shown in the drawings or instructed by the Engineer.

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ii. All parts assembled for bolting shall be in close contact over the whole surface and all bearing stiffeners shall bear tightly at top and bottom without being drawn or caulked. The component parts shall be so assembled that they are neither twisted nor otherwise damaged as specified cambers if any shall be provided.Drilling done during assembling shall not distort the metal or enlarge holes. The butting surfaces at all joints shall be so cut and milled so as to butt in close contact throughout the finished joints.

iii. Cutting shall be done automatically. Hand flame cutting will not bepermitted.

iv. The edges and ends of all cut/sheared flange plates, web plates of plate girders, and all cover plates, and the ends of all angles, tees, channels and other sections forming the flanges of plate girders, shall beplaned/ground.

v. Holes for bolts shall be drilled to conform to clause 10 of IS : 7215 (1974). Punching of holes will not be permitted. All drilling shall be free from burrs. No holes shall be made by gas cuttingprocess.

vi. All welding for the works shall be carried out by first class welders and shall be in accordance with IS : 816, IS : 819, IS : 1024, IS : 1261, IS : 1323 and IS : 9595. The Engineer may at his discretion order periodic tests of the welder and/or of the welds produced by them. All such tests shall be carried out by the Contractor at hiscost.

vii. Safety requirements should conform to SP:70, IS : 7205, IS : 7273 and IS : 7269 as applicable and should conform to safety, economy andrapidity.

viii. As much work as possible shall be welded in shops. The pieces shall be manipulated to ensure down hand welding for all shop joints as far as possible. All parts to be welded shall be arranged so as to fit properly on assembly. After assembly and before the general welding is to commence the parts are to be tack welded with small fillet or butt welds as the case may be. The tack welding must be strong enough to hold the parts together but small enough to be covered by the general welding. The welding procedure shall be so arranged that the distortion and shrinkage stresses are reduce to aminimum.

ix. All joints required in structure to facilitate transport or erection shall be shown on the drawings or as specified by the Engineer. Should the Contractor need to provide joints in locations other than those specified

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Chief Engineer,
Engineering Division
M.M.R.D.A.

by the Engineer he shall submit his proposals and obtain the prior sanction of the Engineer for such joints. The lengths of structural shall be the maximum normally available in the market jointing of shorter length in order to make up lengths required shall not be permitted.

x. Each piece of steel work shall be marked distinctly before delivery, indicating the position and direction in which it is to be fixed. Three copies of a complete marking plan are to be supplied to the Engineer before erectioncommences.

xi. In the case of welded fabrication any distortion remaining in the member after welding operations are completed shall be rectified by and/or at the expense of the Contractor to the approval of theEngineer.

xii. All members of trusses and lattice girders shall be straight throughout their length, unless shown otherwise on the drawings, and shall be accurately set to the lines shown on the drawings. Sheared edges of gussets or other members to be straightened and dressed wherenecessary.

xiii. Templates and jigs used throughout the work shall be all steel. In cases where actual materials have been used as templates for drilling similar pieces, the Engineer shall decide whether they are fit to be used as parts of the finished structure.

xiv. Apart from the requirements of welding specified under the above sub clauses, sections above, the Contractor shall ensure the following requirements in the weldedjoints.

a) Strength-quality with parentmetal.
b) Absence ofdefects

c) Corrosion resistance of the weld shall not be less than that of parent material in an aggressiveenvironment.

xv. No gasket or other flexible material shall be placed between the holes. The holes in parts to be joined shall be sufficiently well aligned to permit bolts to be freely placed in position. Driving of bolts is not permitted. The nuts shall be placed so that the identification marks are clearly visible after tightening. Nuts and bolts shall always be tightened in a staggered pattern and, where there are more than four bolts in any one joint, they shall be tightened from the centre of the joint outwards.

6. Testing of Welds

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Engineering Division
M.M.R.D.A.

i) Butt welds - Radiographic testing of 50% of welds as per IS1182.

ii) Fillet welds - Ultrasonic testing of 10% ofwelds.

iii) All welded connections shall be inspected as perIS:822

iv) All welds shall be tested by "dye penetrationtest".

v) Agency for testing of weld shall be approved by the Engineer prior to testing.

vi) Defective welds shall be repaired or replaced as decided by the Engineer. The repaired or replaced welds shall be tested using the same methods as above. Additionally, when defective welds are found, the cause of the defective welding shall be determined and the contractor shall institute immediate correct iveaction.

vii) No extra payment shall be made for the tests indicatedabove.

7. Painting to Structural Steelwork:-

A. Protection of Steel Works (IS :8629):

i) SandblastingwherespecifiedshallbecarriedoutinaccordancewithIS:1477.

ii) Painting work shall be carried out in accordance with IS : 8629 (Parts I to III). Painting shall be applied under the temperature requirement specified by the manufacturer.

iii) The steel work, prior to delivery, shall be cleaned form scale, rust, dirt and oil / grease etc., but means of chipping, scraping and wire brushing using skilled operators as described in the painting systems below. The cleaning shall proceed each day over the extent of surfaces which can be painted on that day. The paint shall be applied by brushing or spraying as per approval of theEngineer.

iv) Paint brushes round/oval and flat shall be conforming to IS : 487 and IS : 384 codes respectively, if painting with brushing is approved byEngineer.

v) The spraying equipment shall be compatible with the paint material, fitted with necessary gauges and controls and approved by theEngineer.

vi) Site weld locations shall be left free from paint within 50mm of the weld position, and contact surfaces in connection using High Strength Friction

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Chief Engineer,
Engineering Division
M.M.R.D.A.

Grip Bolts shall not be painted. Immediately after completion of erection all damaged paint shall be scraped off and made good to the approval of theEngineer.

vii) The workmen shall also clean down and apply one coat of primer to all site bolts, site bolted connections and site weld locations and the paint work generally shall be left in sound condition for any subsequent painting.

viii) All paints and primers shall be of best quality and in original sealed containers as packed by the paint manufacturer conforming to the relevant Indian Standards and shall be procured directly from the manufacturers. All paint to be used shall be stored under cover in such conditions as will preserve it from extreme of temperature and the paint shall be used and applied strictly in accordance with the manufacturer's instructions.

ix) In addition, the following specification shall apply to the shop painting of contact and in accessible surfaces:

a) Surfaces to be painted shall be thoroughly cleaned from scale, rust, dirt, grease etc. bymeans of sand/grit/shot blasting or other equivalent means.

b) Surfaces which are to be brought permanently into close contact or made inaccessible either in the shops or upon erection shall, after cleaning, be given two coats of Red Lead Priming Paint. The surfaces shall be brought into contact while the paint is stillwet.

c) Contract surfaces in connection using High Strength Friction Grip bolts shall not be painted or oiled and shall be free from dirt, loosed scale, burrs, pits and any other defects which would prevent the solid seating of the parts and would interfere with the development of friction between them.

d) All enclosed surfaces of box members shall be completely sealed by oiling or by coating with approved bitumen paint and all such members and tubes shall have their ends closed by suitable plates welded inposition.

x) Surfaces in contact during shop assembly shall not be painted. Surfaces which cannot be painted, but require protection, shall be given a rust inhibitive grease conforming to IS:958 (1975), or solvent deposited compound conforming to IS:1153 (1975) or IS:1674 (1960), or treated as specified in thedrawings.

xi) Surfaces to be in contact with concrete shall not bepainted.

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B. Coating:-

i) No part of the work shall be painted or coated, packed or dispatched, until it has been finally inspected and approved by the Engineer. Dry Film Thickness shall be measured by elcometer or any other approvedmethod.

ii) When so specified by the Purchaser, the whole of the work except machined surfaces shall be given protective coating using one of the systems of painting or metalizing. Prior to the application of protective coating, the surface of work shall be carefully prepared removing mill-scale, rust, etc. using wire brushes, sand or grit blasting as stipulated and approved by theContractor.

iii) For locations where girders are exposed to corrosive environment i.e. flooring system of open web girders in all cases, girders in industrial, suburban or coastal areas etc., protective coating by metalizing followed by painting by using epoxy based paints as per the following painting schedule shall beapplied:

iv) SurfacePreparation:-

a) Remove oil/grease from the metal surface by using petroleum hydrocarbon solvent toIS:1745.

b) Prepare the surface by sand or grit blasting to Sa 2-1/2 to IS:9954 i.e. near white metallicsurface.

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Chief Engineer, Engineering Division M.M.R.D.A.

v) Painting:-

(a) Primer Coat:- Apply by brush/airless spray two coats of Epoxy Zinc Phosphate primer to RDSO Specification No. M&C/PCN/102/86 to 60 microns min, dry film thickness(DFT) giving sufficient time gap between two coats to enable the first coat of primer to harddry.

(b) Intermediate Coat:- Apply by brush/ airless spray one coat of Epoxy Micaceous Iron Oxide paint to RDSO Specification No. M&C/PCN/ 103/86 to 100 microns minimum DFT of 100 and allow it to harddry.

(c) Finishing Coat:- Apply by brush/airless spray two coats of polyurethane red oxide (red oxide to ISO 446 as per IS:5) to RDSO Specification M&C/PCN- 109/88 to 100 microns minimum DFT giving sufficient time gap between two coats to enable the first coat to hard dry. The finishing coats to be applied in shop and touched after erection, ifnecessary.

8. Erection & Site Work

i. The Contractor shall be responsible for checking the alignment and level of foundation and correctness of foundation bolt centers, well in advance of starting erection work, and shall be responsible for any consequences for non-compliance thereof. Discrepancies if any shall immediately be brought to the notice of the Engineer for hisadvice.

ii. The structure should be divided into erectable modules as per the total scheme. This should be pre-assembled in a suitable yard/platform and its matching with members of the adjacent module checked by trial assembly beforeerection.

iii. Immediately prior to erection any rust in the paint area shall be removed by power wire brushing to a standard equivalent toSA3.

iv. During erection the rough handling of fabricated materials such as bending, straining or pounding with sledges shall be avoided. Any damage to the structure during transportation or erection shall be immediately rectified by the Contractor at his own cost. The straightening of bend edges of plates, angles and other sections shall be done by methods which will not causefracture.

v. Following the completion of the straightening, the surface of the member shall carefully be inspected for damage and got approved bythe Engineer before furtheruse.

vi. The Contractor shall be responsible for accurately positioning, leveling and plumbing of all steelwork and placing of every part of the structure

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Chief Engineer,
Engineering Division
M.M.R.D.A.

inaccordancewith the approved drawings and to the satisfaction of the Engineer. Allstanchionbase, beam and girder bearings etc. shall be securely supported on suitable steel packs. All reference and datum points shall be fixed near the work site for facilitating the erectionwork.

vii. All equipment used by the Contractor shall be sufficient for the purpose and for the erection of the steel work, in the time specified in the contract. Any lifting or erecting machinery shall be to the approval of the Engineer and shall be removed from the site if he considers such appliances dangerous or unsuitable for their functions. The approval of the Engineer shall not relieve the Contractor of the responsibilities for the loads to which the erection equipment shall be called upon to carry. Adequate arrangement shall be made to resist wind loads and lateral forces arising at the time oferection.

viii. The Contractor is entirely responsible for the safety and stability of the structure during erection and shall arrange that sufficient tack bolts, braces or guy ropes are used to ensure that work will remain rigid until final bolting, riveting or welding is completed. The Contractor shall supply and fix, without extra charge, any temporary bracing which may benecessary.

ix. All steelwork shall be erected in the exact position as shown on the drawings. All vertical members shall be truly vertical throughout and all horizontal members truly horizontal, fabrication being such that all parts can be accurately assembled and erected. No permanent bolting, welding or grouting shall be done until proper alignment has been obtained and checked by theEngineer.

x. At stanchion splices and at other positions where concrete cover to the steel is liable to be restricted, bolts will be placed with their heads on the outside of the members.

xi. All field assembly bolting and welding shall be executed in accordance with the requirements for shop fabrication excepting such as manifestly apply to shop conditions only. Where steel has been delivered painted the paint shall be removed before field welding for a distance of at least 50 mm on either side of the joints. The number of washers on permanent bolts shall not be more than two for the nut and one for the bolthead.

xii. Only workmen experienced and skilled in steel erection shall be employed for the work. The safety of the workmen as well as that of the structure is Contractor's prime responsibility.

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9. Rectification of damaged materials

Any error in shop work which prevents the proper assembly and lifting up of the parts by moderate use of drift pins or reaming or cutting shall be immediately reported to the Engineer and his approval of the method of rectification obtained in writing. Wrongly fabricated material whose erection in the field necessitates extra work shall be the responsibility of the contractor. The entire costs of such operation including the replacement of defective members, if required, shall be borne bythe contractor.

10. Inspection

i. The contractor shall inform the Engineer of the progress in fabrication and as to when individual pieces are ready for inspection. All gauge templates necessary to satisfy the Engineer shall be supplied by the contractor. The Engineer may at his discretion check the results obtained at the contractor's works by independent tests and should the material so tested be found unsatisfactory, the cost of such tests shall be borne by thecontractor.

ii. Structural steel and components viz. bolts, nuts, washers, welding consumables, etc. should be tested for mechanical and chemical properties as per the requirement of the relevant IS or any other specified codes/standard.

iii. During Inspection, the component/member shall not have any load or external restraint.

11. Grouting of steel bases

i. Before grouting of stanchion bases, the contractor shall take the following action:
   a) Inform the Engineer.
   b) Clean all holes, openings, recesses and the top of foundations of all dirt, mud, water, oil or other extraneousmatter.
   c) A frame shall be placed in position around the base plate with a provision for placing or injectinggrout.
   d) The contractor shall provide screed bars or mild steel flats and fix them in mortar.
   e) Holes shall be provided on the stanchion bases for escape ofair.

ii. Grouting of steel beams, steel stanchions, bases and bearings and encasement of steel work will be carried out by the contractor after the steelwork has been finally aligned and leveled and approval of the Engineer obtained.

iii. The bolt sleeves shall be grouted as a separate operation using neat

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cement grout of a creamy consistency, which shall be poured in so as to completely fill the holes. "Non-shrink" cements, additives of approved makes shall be used for all grouting operations.

iv. The space between the top of the foundations and the underside of the base plate shall be completely filled with a mix 1:2 cement sand mortar and finished flush with edge of the base plate,either:
   a) Mixed as a stiff mortar well rammed into place from allsides.
   b) Mixed as thickly as possible consistent with fluidity and poured under a suitable head and tamped until the space has been properlyfilled.

11 Holding down and Anchorbolts

i) The holding down and anchor bolts should conform to the requirements laid down in IS:5624 or as directed by theEngineer.

ii) Installation: Individual bolts in groups of holding down bolts shall be positioned accurately within a tolerance of +6 mm. The bolts shall be set vertically to a tolerance of not more than 1 in250.

iii) During the casting of concrete the contractor shall ensure that space between the bolt and sleeves is kept clean after removal of shuttering. The contractor shall provide and fix timber plugs to maintain this space in a clean condition. The projecting threads of bolts shall be protected by approved wrapping materials.

iv) Grouting of bolt tubes shall be carried out after the steelwork or equipment have been aligned, plumbed andleveled.

12 Tolerances

i. All tolerances shall be in accordance with IS: 7215unless otherwise specified.

ii. The maximum deviation for line and level shall be + 3.0 mm for any part of the structure including for location of columncenters.

iii. The maximum deviation from plumb for columns shall be +3.0 mm in 10.0 m height subject to a maximum of +6.0 mm in a total height of 30.0m.

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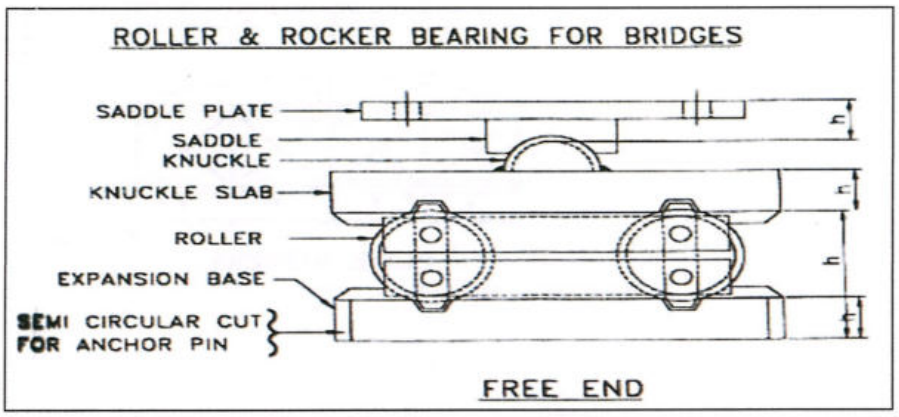
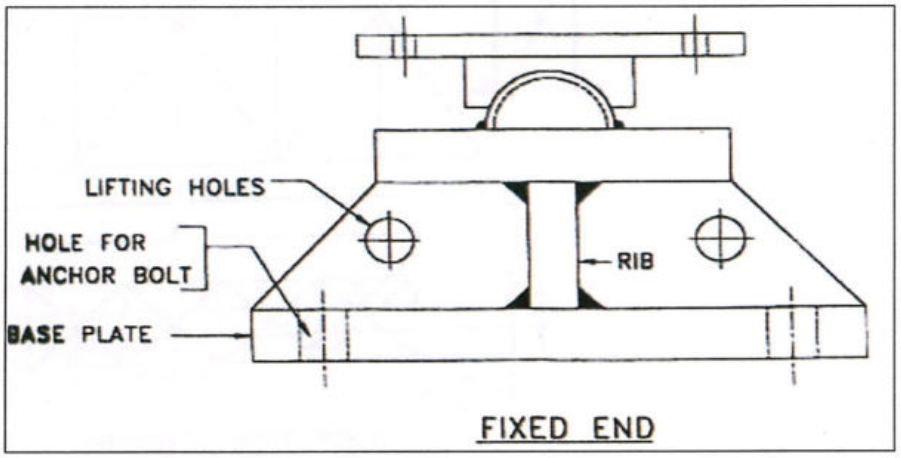
iv. The deviation at the centre of the upper chord member from vertical plane running through the centre of the bottom chord shall not be more than 1/1500 of span but in no case more than 10.0mm. The lateral displacement of top chord at centre of span form vertical plane running through centre of supports shall not be more than 1/250 of the depth of truss but in no case more than 20.0mm.





h = HEIGHT OF COMPONENT CASTING AS GIVEN ON CONCTRACT DRAWING.

The tolerance on the height of any component casting shall not exceed 0.5mm.

FIG.-4
(REF. CLAUSE 31)

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FIG.–1

MANUFACTURING TOLERANCES IN GIRDERS

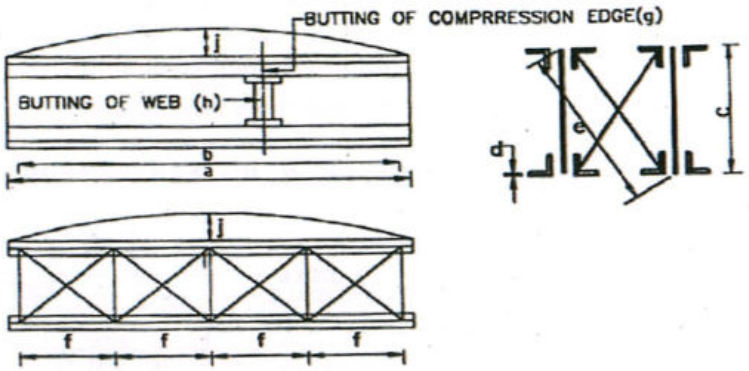
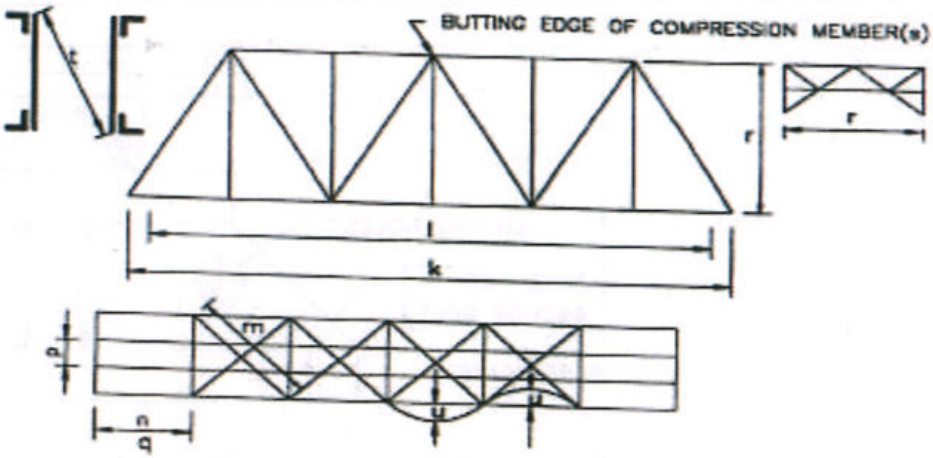
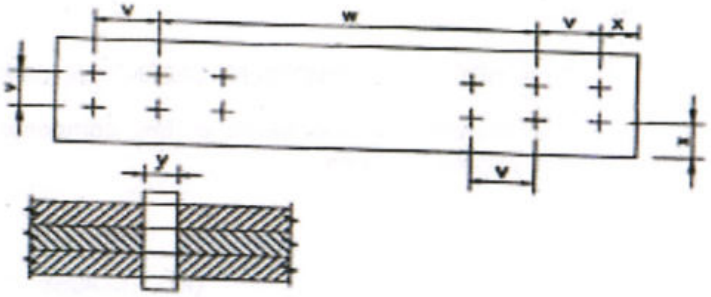


PLATE GIRDERS



OPEN WEB GIRDERS



HOLES IN MEMBERS

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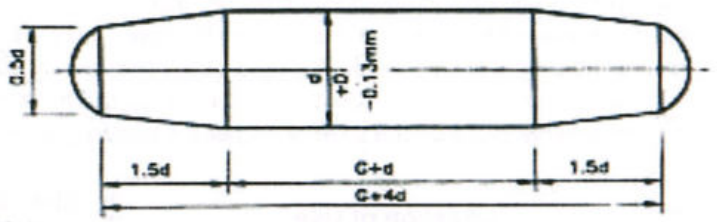
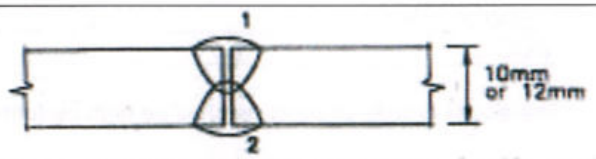
PARALLEL BARREL DRIFT

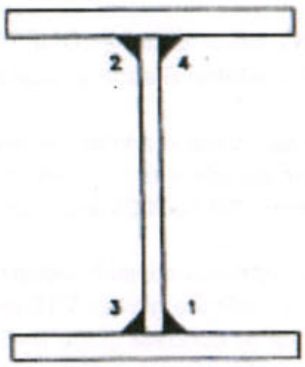


d. IS THE NOMINAL DIAMETER OF THE HOLE.
C. IS THE COMBINED THICKNESS OF THE METAL THROUGH WHICH THE DRIFT HAS TO PASS.
STEEL– IS: 1875 OR IS: 7283

FIG.–2
(REF. CLAUSE 19 & 20)



Sketch showing sequence of square butt welding



Sketch showing the sequence of fillet welding for fabricating the I–section

FIG.–3
(REF. CLAUSE 27)

a. No sub-punching shall be allowed in the main truss' members of openweb

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CLAUSE SP-12 CONCRETE GRADES

High performance Concrete (HPC) shall be used for all structural concrete members. However, the application of the concrete member, its purpose, and the mix design to be made of HPC shall require the Engineer's approval. Applicable specifications for HPC shall be IRC, BS EN, AASHTO and MoRTH or other approved international standard. The minimum concrete grades to be used for components of the bridge shall be as per the followingtables:-

Location of Use	Min. Grade (MPa)	Max. size of Aggregate (mm)
Concrete for Foundation including bored Pile	M 45	20
Pile Caps	M 45	20
Walls, Abutments	M 55	20
Piers & Pier Caps	M 55	20
PSC Girder & Deck Slab	M 55	20
Parapet & Median	M 40	20
Retaining Wall	M 30	20
PCC	M 15	20

* The above grades of concrete shall be high performance concrete.

Ordinary Portland Cement (OPC) of grade 43 and above shall be used in the concrete mix. Prior approval for use of cements of other quality shall be obtained from the Engineer. Any of the following shall be permitted to be used as part replacement of OPC with the approval from Engineer:-

a) Microsilica / Silica fume / ALCOFINE1203
b) Ground Granulated Blast Furnace Slag(GGBS)

If ultrafine additives (mineral admixture) are used, its particle size (d_{95}) shall be less than 11 microns and mean particle size (d_{50}) not more than 6 microns. The ultrafine mineral admixtures shall comply with IRC:SP-70-2005 and IRC: 112-2011.

The minimum cementitious content (including PFA/GGBS and Ultrafine additive) shall be 400kg / cum for all concrete grades M45 and above. Maximum water to binder ratio shall not exceed 0.38 for all concrete grade M45 and above. When PFA is incorporated in the concrete as a separate material, it shall not exceed 40% of the total cementitious content. If GGBS is incorporated in the concrete as a separate material, it shall not be less than 50% and more than 70% of the total cementitious content. The maximum content of PFA and GGBS in the plain cement concrete (PCC) shall be limited to 70% and 80%respectively.

Use of Microsilica / Silica fume / ALCOFINE 1203 or equivalent:-

a) Mineral admixture as mentioned above shall be permitted in the design mix. It shall comply with ASTM C 1240 "Specification for Silica fume for use in Hydraulic Cement concrete and Mortar." It shall be obtained from proven, reliable and approved manufacturer / supplier to the satisfaction of theEngineer.

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b) Adequate and complete dispersal of the mineral admixture during the concrete mixing shall be ensured.
c) When the mineral admixture is used in powder form the Contractor shall take all precautions against potential health hazards during handling of thematerial.
d) Chilled water and / or ice shall be used in the concrete mix depending on the ambient temp.,dimensions of the concrete element, rate of pouring and design mix constituents.
e) Special profuse curing arrangements shall be made for dissipation of the heat of hydration. The water curing shall be continued for a period of 14days.
f) The concrete design mix and arrangement for mixing, transportation, and curing of concrete shall be subject to the approval of theEngineer.

Concrete Mix proportion:-

Concrete shall be proportioned to obtain workable mixes for intended purpose and to meet the strength and finish requirements. The contractor shall propose and conduct a program of trial mixes for all grades of concrete to demonstrate their suitability for use in the works and to meet specifications. Concrete shall be proportioned to obtain workable mixes for intended purpose and to meet the strength and finishrequirements.

Concrete mix proportioning may be done by methods given in IS 10262, SP-23, ACI 211.1 or on the basis of past experience or by any other suitable method so that the final product meets the specified requirements for green as well as hardened concrete. Efforts shall be made to keep cement content as well as unit water content as minimum as possible, with the use of suitable quality of approvedadmixtures.

Trial mixes and mockups:-

Laboratory trail mixes shall be made as a condition of final approval of the mix design. All specified properties shall be verified in accordance with the specified test methods.In addition, the Contractor shall be responsible for conduction a field trail batch of the concrete. At least 30 days prior to the first placement in the permanent works of the high performance concrete, a full size trial batch of concrete shall be produced and tested. Field trail batches of concrete shall originate from each production facility that will be used to supply concrete to the project. Trial batches shall be delivered to the site as directed by the Engineer. When the concrete is delivered in a ready mix truck, the volume of the trail batch shall be the volume of concrete normally supplied by the truck. Field mockups shall be constructed as required by the Engineer to verify all techniques to be used for transport, placement and consolidation, finishing and curing of the concretemember.

When materials are to be delivered in bulk form, bagged materials shall not be used on trial mixes ormockups.

Delivery Tickets:-

With each batch of concrete the supplier shall provide a copy of the delivery ticket, on which shall be printed, stamped or written the following information:-

- Location and name or number of the concrete productionfacility.

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- Serial number of deliveryticket
- Date
- Class or designation of theconcrete
- Trucknumber
- Name of the contractor the concrete is suppliedto
- Name of theproject
- Time of batching, or of first mixing of cementitious material andaggregates
- Time at which concrete discharge must becompleted
- Moisture correction for aggregatemoisture
- Quantities of each admixturecomponent
- Total batchvolume
- Maximum water that may be added to the mix at the dischargesite
- Quantities of materials added at the site, including water and admixtures ifany

□ Specified compressive strength (or other specified performance criteria)

CLAUSE SP-13 TMT / HYSD BARSMANUFACTURER

- TMT / HYSD manufacture shell be having Iron Making Facility using Iron Ore as basic raw material, along with the sponge iron plant & necessary refining facility shell be in-house.

  Or

  Billets used for the TMT / HYSD rolling shell be procured from the plant having Iron Making Facility using Iron Ore as basic raw material, along with the sponge iron plant & necessary refining facility shell be in-house.

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- TMT bar manufacture shell be having the valid BIS license along with the Testing facility of Chemical & Mechanical properties.

CLAUSE SP-14 FUSION BONDED COATING

1.0 Reinforcing Bars

The reinforcing bars to be provided with Fusion Bonded Epoxy Coating shall conform to specifications given under MORTH clause 1009.3.2.1 and I.S. Specifications 13620. Steel used in the works shall be Thermo Mechanically Treated high yield strength bars of grade FE-500 conforming to IS:1786-2008 manufactured by primary manufacturers i.e. SAIL, TISCO, Rashtriya Ispat Nigam Limited and Jindal only. Inspite of producing test certificates by Contractor for the proper quality of reinforcing bars, the quality of steel could also be tested by the FBE coating firm at plant site for bend test before doing coating and that if the reinforcing bar fails in bend test, then it shall not be provided with FBEC and in that case, cost of conveyance of such steel to plant and removing form plant shall be of the Contractor. The rechecking quality of steel, for bend test will be done by the coating agency in the presence of Contractor provided the Contractor choose to remain present. Reinforcing bars to be coated shall be fresh from rolling mills as far as possible. If the bars are very much rusted in quality before providing FBEC, such bars shall have a loss of weight at Contractor's risk.

To ascertain the loss in weight of reinforcing bars on account of removal of rust during coating, random weighment before and after coating shall be done and that loss in weight shall be borne by the Contractor.

2.0 Coating Bars with FBEC

The FBEC coating shall be done confirming to I.S. Code 13620:1993 with additional stipulations as under.

2.1 The Fusion Bonded Epoxy Coating shall be carried out by an authorized FBE coating agency approved by Department.

2.2 Coating plant should have sufficient experience of coating as per relevant specifications and shall have supplied to a project where minimum 10000

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357

MT. materials should have supplied.

2.3 The Coating plant should be ISO Certified.

2.4 Patch-up materials shall be procured in sealed containers with certificates from coating agency for supply of such patch-up materials.

2.5 The tender rate for FBE coating shall include using PVC coated G.I. Binding Wires of 18G.

3.0 Tests for FBE Coating on Reinforcing Bars

3.1 The Contractor shall produce certificate from the FBE coating agency that the quality of powder epoxy material and other components of FBEC conform to I.S. 13620:1993. Such certificates shall accompany each delivery challan of coated bars while leaving the plant. The Contractor may also carry out such tests at plant jointly or separately of the coating agency to confirm use of proper quality of coating material.

3.2 The coated reinforcement bars shall be tested at plant by the Contractor. Test reports shall be jointly signed by authorized representatives of Contractor and the coating agency. The tests on coated bars shall be as per I.S. for the following tests:

(a) Thickness

(b) Continuity

(c) Adhesion

The frequency of tests shall be for the thickness of coating minimum two bars of each size from each production shifts. Random tests shall be made for continuity of coating.

3.3 In spite of above tests and test certificates produced by the Contractor and coating agency, the Department / Owner reserves the rights to carry out independent tests at coating plant for cross checking. The Contractor's agreement with coating agency shall include the provisions for Department's / Owner's cross checking and that if the coating quality is not approved by the Department / Owner the decision of the Department / Owner to reject or repair the coating shall be final and binding on all parties.

3.4 Thickness of Fusion Bonded Epoxy Coating shall be 175±50 microns.

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3.5 Coating Agency should carry out thickness test at site under the supervision of authority / consultant for every 100 MT supply.

3.5 Holidays in coating shall not be more than two holidays per linear foot (six holidays per meter) of coated bar.

3.6 FBCC treatment shall be provided up to substructure component only.

4.0 Handling

4.1 The coated bars shall be carefully handled in order not to drop them, not to rub them on hard surface or against another coated bar while The coated bars shall be tied to make bundles with PVC binding material to avoid damages to coating.

4.2 The coated bars shall be stacked with separation gap between ground and bars with wooden batons between rows of bars or bundles of such tied bars. Such wooden or padded contact shall be at spacing of not more than 60 cms.

4.3 The cut ends of bars shall be touched up with special touch up materials of specifications as provided by coating agency. There shall be minimum time gap to repair the cut ends and damaged portions with touch up materials and that failure to do so may cause complete rejection of the coated bars. The cut ends and damaged portions shall be touched up with repair patch-up material within four hours' time gap. All damages to coating in handling etc. shall be repaired irrespective of their size. This stipulation supersedes provision of I.S. Code. Coating Agency should provide technical know-how and depute experienced personnel to carry out the touch-up work.

4.4 Welding of epoxy coated bars will be permitted as per codel provisions. However, usage of couplers may be allowed with the permission of Engineers In Charge.

4.5 No payment will be made for coated bars which are not used in the work and that if they were paid either on account of coating of the rejectable part of bars or doing extra fabrication etc., the amount paid will be recovered from Contractor. The Contractor will be paid for the same quantity of steel bars used in the work and paid under relevant item.

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4.5 While bending the bars, the pins of workbenches shall be provided with PVC or plastic sleeves. It is preferable that Contractor install bar bending machines suitable for FBE coated bars and that each bending operation is done in a time of not less than 90 secs.

4.6 The coated steel shall not be directly exposed to sun rays and rains and shall be protected with opaque polythene sheets or such other approved materials.

4.7 While doing concreting, the workmen or trolleys shall not directly move on coated bars but can move on wooden planks placed on the bars by Contractor.

4.8 In spite of all test certificates, if the coated bars are roughly handled by Contractor either during transport, fabrication, stacking, placing and concreting etc. or handled in such a manner as to damage the coating for area or portion more than reasonable, the Engineer-in-charge or Department/Owner reserve the right to reject the FBE coated bars and that if rejected then such rejected bars shall be removed by Contractor from work site within three days. The decision of Engineer-in-charge will be final as to reject the bars with damage coating or to allow repairing the coating, or to get it recoated entirely at Contractor's cost.

CLAUSE SP-14 BRIDGE DECK WATERPROOFING

All the concrete bridge decks including in-situ and precast segmental decks shall be waterproofed using a polymer waterproofing membrane free from Isocyanates of a minimum thickness of 3 mm included the tack coat, in accordance with the requirements of the following:

i) Volume 2 Highway Structures: Design (Sub Structures and Special Structures), Materials;

ii) Section 3 Part 4 and Part 5 BA 47/99 Waterproofing and Surfacing of Concrete Bridge Decks;

iii) In addition, the waterproofing system shall have a current BBA certificate for Bridge Deck Waterproofing A sheet waterproofing system will not be permitted;

iv) The waterproofing system shall have a range of bond coats and be able to demonstrate the durability of bond to asphaltic surfacing and substrate such that the wearing course can be removed and replaced during general maintenance without the need to replace the waterproofing membrane and protection if any. The system

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must be able to demonstrate long term physical compatibility with asphaltic surfacing materials specified on the project and demonstrate sufficient shear and tensile bond to the specified thickness of surfacing material such that imposed traffic loads do not lead to a breakdown of the membrane/surfacing bond;

v) The waterproofing membrane shall be fully resistant to Sea Water, Fuel Oils, Diesel, Lubricants, Acid Rain and 30% Concentrated Sulphuric acid;

vi) The waterproofing membrane shall have resistance to Chisel Impact at 40 Degrees C, Chloride Ion Penetration max 0.04%;

vii) The waterproofing membrane shall have third party testing for Heat Ageing In accordance to BS 903 Part A2 and BS 2782 confirming minimal change of less than 10% in tensile strength @ 37degC and @ 80 Degrees C temperatures, even after 3 years test signifying durability up to the design life of the bridge

viii) The waterproofing membrane shall have Resistance to aggregate indentation @ 80 Degrees C under 500N Force to confirm less than 50% indentation as per original thickness, to confirm suitability of membrane to sustain itself during application of hot applied surfacing / wearing course;

ix) The waterproofing membrane shall have a Minimum Tensile Strength of 9MPa and Minimum Elongation at break should be 100% as per ASTM D412;

x) The waterproofing membrane shall possess a minimum 2 mm dynamic crack bridging ability;

xi) The waterproofing membrane must have an international track record use in Bridge Deck Application and shall have a current INDIAN ROADS CONGRESS Accreditation; and

xii) The Contractor shall submit to and obtain the approval from the Engineer on his proposed waterproofing system

All the steel decks of the steel bridges shall be waterproofed using the adequate materials providing the following features.

i) Waterproofing property,

ii) Adherence property,

iii) Flexibility

iv) Thermo-stability

v) Load Bearing ability

CLAUSE SP- 15 VEHICULAR CRASH BARRIERS

Various barriers to be installed along the Sewri - worli connector shall be designed in accordance with the applicable IRC design standards. The Contractor shall select, in principle, the type of the barriers on the Sewri - worli connector, which has visual continuity with the barriers of the

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adjoining road sections.

Vehicular crash barriers to be installed on both sides of the main carriageways in the bridge/viaduct section and the ramp ways of the interchanges shall be of reinforced concrete type conforming to the relevant IRC codes. The vehicular crash barriers shall be designed to withstand the impact of the potential maximum vehicular collision force and other loads in accordance with IRC standards. The vehicular crash barriers shall house three tiers of steel conduits of 100 mm diameter within the structure as indicated on the Outline Drawings for accommodating utility lines for the Sewri - worli connector. Alternatively, where approved by the Engineer, steel-fabricated vehicular crash barriers may be provided as per the applicable IRC codes.

The Contractor shall select barriers of the most suitable type and/or structure for installation under the Contract. The Contractor shall submit the proposed design of the barriers to the Engineer for approval.

Locations and structural details of the median openings to be provided at intervals shall be decided by Engineer.

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VOLUME-04

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Mumbai Metropolitan Region Development Authority

VOLUME-IV

TENDER DRAWINGS

Design and Construction of Sewri Worli Elevated Road

(2nd call)

"Design and Construction of Sewri to Worli Elevated Connector.

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SR. NO	DESCRIPTION	PAGE NO.
(A)	PLAN AND PROFILE	
1.	ELEVATED CONNECTOR	
01	PLAN AND PROFILE 0+000 TO 0+500	01/12
02	PLAN AND PROFILE 0+500 TO 1+000	02/12
03	PLAN AND PROFILE 1+000 TO 1+500	03/12
04	PLAN AND PROFILE 1+500 TO 2+000	04/12
05	PLAN AND PROFILE 2+000 TO 2+500	05/12
06	PLAN AND PROFILE 2+500 TO 3+000	06/12
07	PLAN AND PROFILE 3+000 TO 3+500	07/12
08	PLAN AND PROFILE 3+500 TO 4+000	08/12
09	PLAN AND PROFILE 4+000 TO 4+512	09/12
2.	RAMP AT NORTH AND SOUTH	
1	PLAN AND PROFILE AT NORTH SIDE	10/12
2	PLAN AND PROFILE AT SOUTH SIDE	11/12
3	PLAN AND PROFILE AT RAMP 2&3	12/12
(B)	CROSS SECTIONS	
1.	CROSS SECTIONS AT EVERY PIER OF ELEVATED CONNECTOR	
01	TYPICAL CROSS SECTIONS AT AT P1 TO P8	01/20
02	TYPICAL CROSS SECTIONS AT P9 TO P14	02/20
03	TYPICAL CROSS SECTIONS AT P15 TO P22	03/20
04	TYPICAL CROSS SECTIONS AT P23 TO P30	04/20
05	TYPICAL CROSS SECTIONS AT P31 TO P38	05/20
06	TYPICAL CROSS SECTIONS AT P39 TO P46	06/20
07	TYPICAL CROSS SECTIONS AT P47 TO P54	07/20
08	TYPICAL CROSS SECTIONS AT P55 TO P60	08/20
09	TYPICAL CROSS SECTIONS AT P61 TO P66	09/20
10	TYPICAL CROSS SECTIONS AT P67 TO P72	10/20
11	TYPICAL CROSS SECTIONS AT P73 TO P81	11/20
12	TYPICAL CROSS SECTIONS AT P82 TO 90	12/20
13	TYPICAL CROSS SECTIONS AT P91 TO P98	13/20
14	TYPICAL CROSS SECTIONS AT P99 TO P106	14/20
15	TYPICAL CROSS SECTIONS AT P107 TO P114	15/20
16	TYPICAL CROSS SECTIONS AT P115 TO P120	16/20
2.	CROSS SECTION AT EVERY PIER OF RAMPS AT NORTH AND SOUTH	
(a)	NORTH SIDE	
01	TYPICAL CROSS SECTION AT NORTH SIDE R4-1 TO R4-6-7	17/20
02	TYPICAL CROSS SECTION AT NORTH SIDE R4-6-8 TO R4-6-15	18/20
(b)	SOUTH SIDE	
01	TYPICAL CROSS SECTION AT SOUTH SIDE R1-1 TO R1-5-9	19/20
02	TYPICAL CROSS SECTION AT SOUTH SIDE R1-5-10 TO R1-5-16	20/20
(C)	ADDENDUM DRAWING	
	ADDENDUM I- UTILITY PLAN	
01	UTILITY PLAN 0 TO 500	01/08
02	UTILITY PLAN 500 TO 2500	02/08
03	UTILITY PLAN 2500 TO 3500	03/08
04	UTILITY PLAN 3500 TO 5280	04/08
	ADDENDUM II- GEOLOGICAL PROFILE	
01	PROFILE FROM 0+000 TO 1+275	05/08
02	PROFILE FROM 1+275 TO 2+525	06/08
03	PROFILE FROM 2+525 TO 3+800	07/08
04	PROFILE FROM 3+800 TO 5+000	08/08
	ADDENDUM III- RAILWAY LETTER FOR USE OF STAINLESS STEEL	
	ADDENDUM IV- LAND HANDING OVER SCHEDULE	

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NOTE :-
THIS ALL CHANGES ONLY IN TENDER DRAWINGS.

NAME OF THE WORK:
DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

CLIENT:
MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

DESIGN CONSULTANTS:

DATE: JANUARY 2019

SCALE: AS PER POSITION TENTATIVE

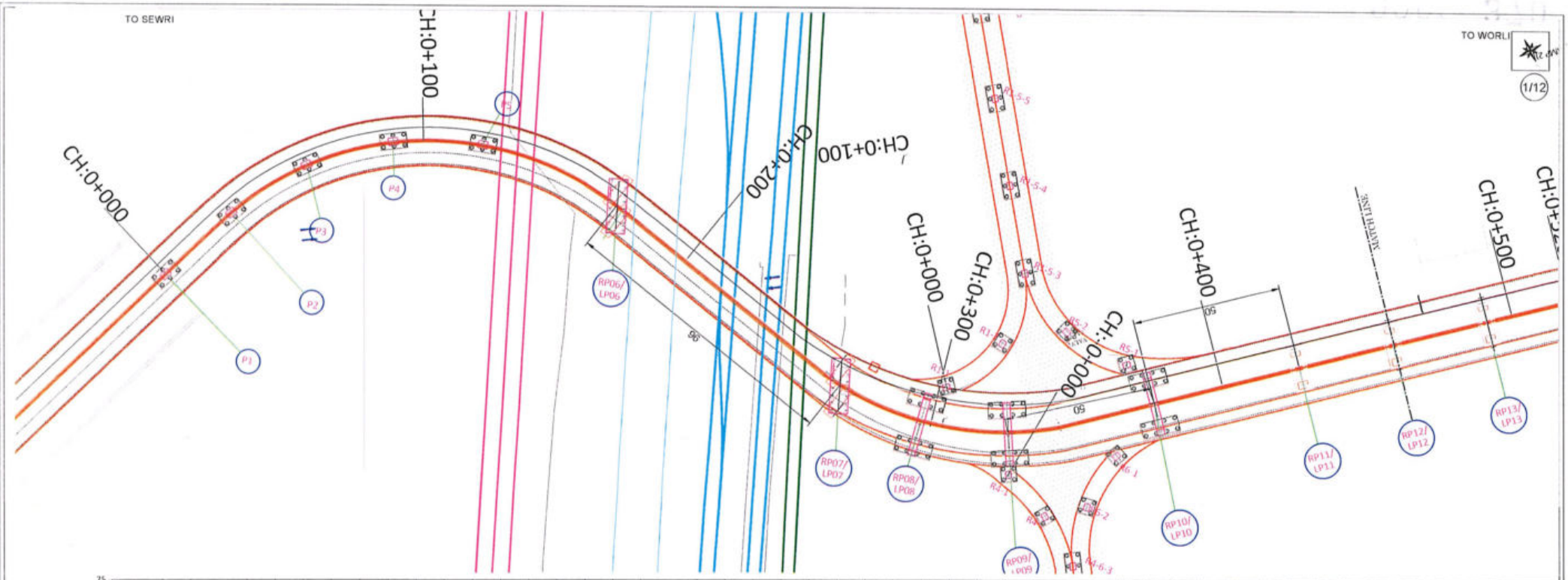
PLAN & PROFILE

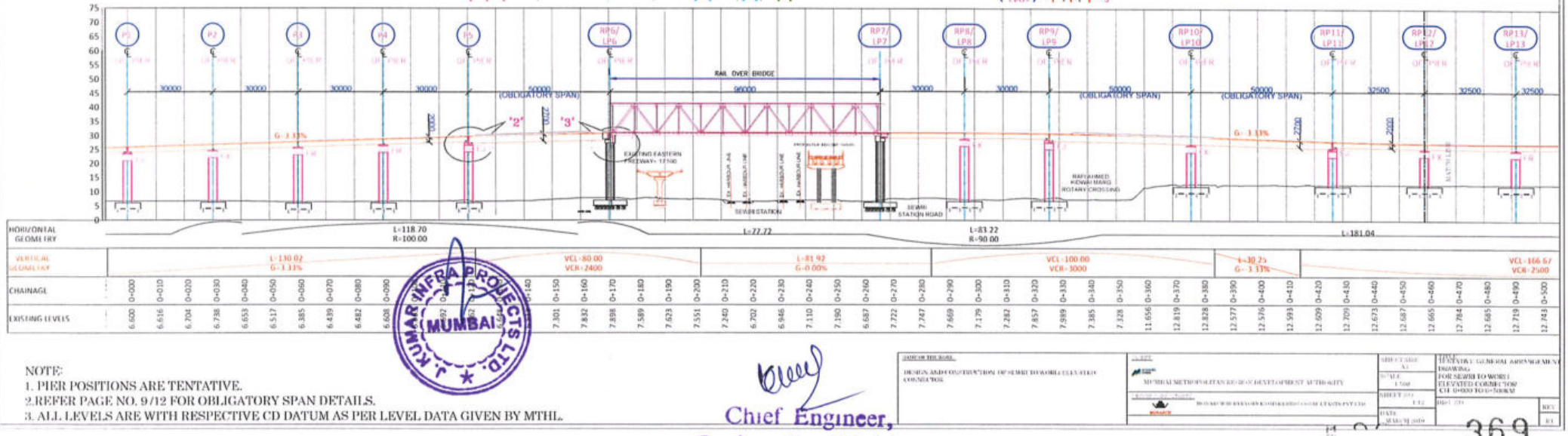
FOR SEWRI TO WORLI ELEVATED CONNECTOR.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK: "DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A1	TITLE: PLAN & PROFILE FOR SEWRI TO WORLI ELEVATED CONNECTOR
	MONARCH SURVEYORS ENGINEERING CONSULTANTS PVT LTD	SCALE: 1:1000	DWG. NO.
		DATE: JANUARY 2019	



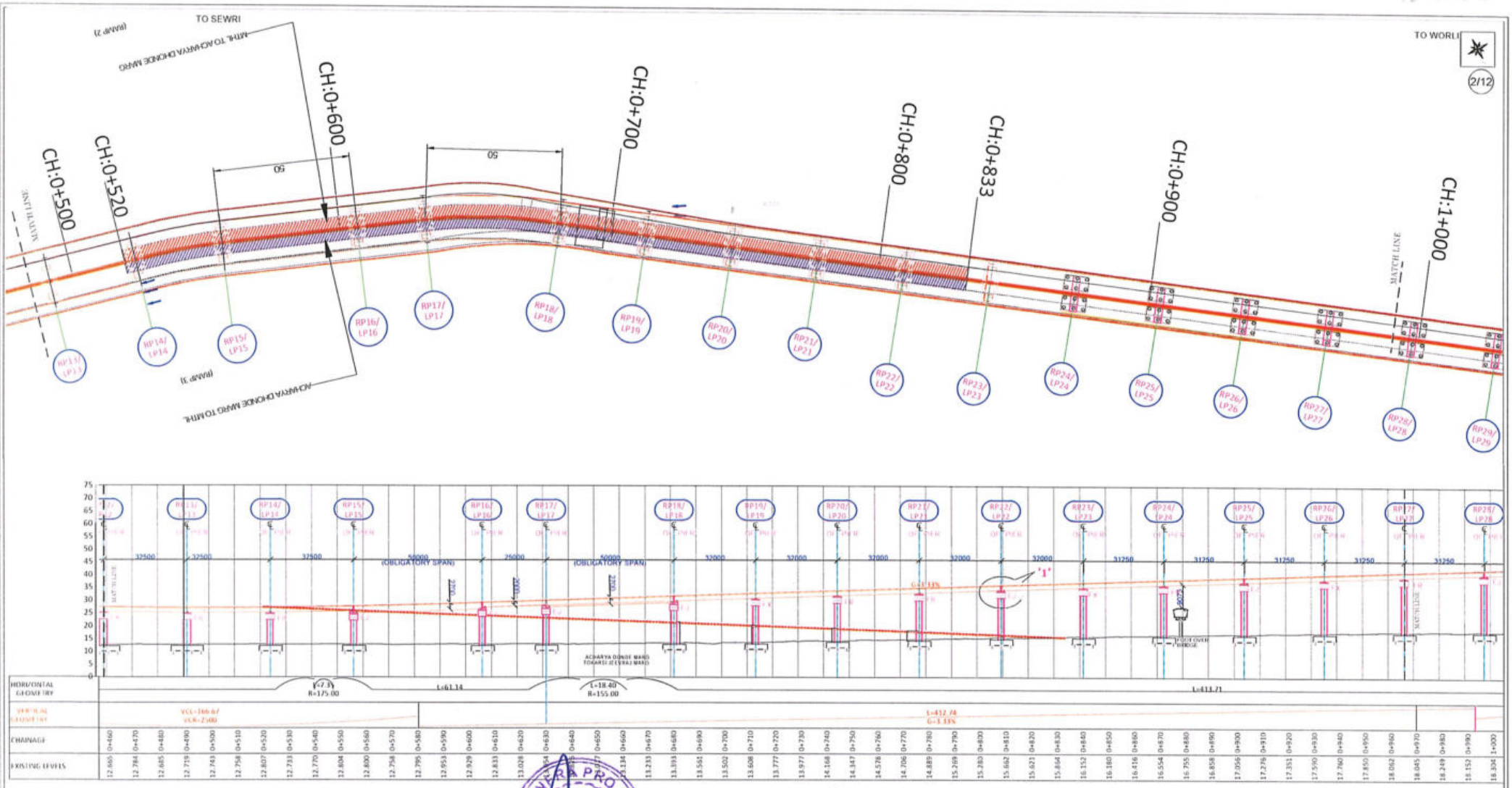


NOTE:
1. PIER POSITIONS ARE TENTATIVE.
2.REFER PAGE NO. 9/12 FOR OBLIGATORY SPAN DETAILS.
3. ALL LEVELS ARE WITH RESPECTIVE CD DATUM AS PER LEVEL DATA GIVEN BY MTHL.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

0000 370



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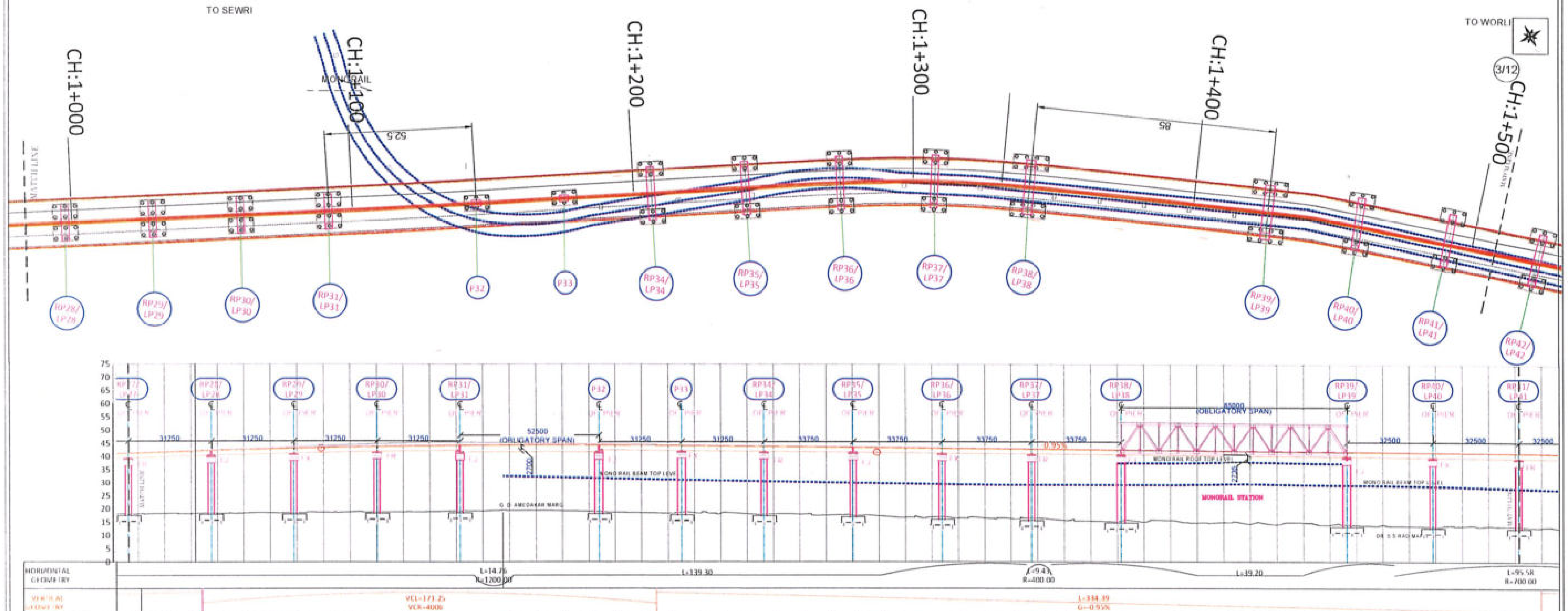
2 REFER PAGE NO. 9 /12 FOR OBLIGATORY SPAN DETAILS.
3. ALL LEVELS ARE WITH RESPECTIVE CD DATUM AS PER LEVEL DATA GIVEN BY MTHL.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

372



CHAINAGE	EXISTING LEVELS
0+970	18.045
0+980	18.249
0+990	18.152
1+000	18.304
1+010	18.368
1+020	18.507
1+030	18.453
1+040	18.634
1+050	18.720
1+060	18.690
1+070	18.742
1+080	18.814
1+090	19.097
1+100	19.135
1+110	19.308
1+120	19.306
1+130	19.173
1+140	18.927
1+150	18.538
1+160	18.423
1+170	18.275
1+180	18.457
1+190	18.217
1+200	17.998
1+210	17.911
1+220	17.835
1+230	17.538
1+240	17.564
1+250	17.263
1+260	16.773
1+270	16.759
1+280	16.411
1+290	16.473
1+300	16.310
1+310	16.362
1+320	15.589
1+330	15.335
1+340	15.167
1+350	14.998
1+360	15.567
1+370	14.701
1+380	14.858
1+390	14.297
1+400	14.130
1+410	14.726
1+420	13.958
1+430	13.836
1+440	13.996
1+450	13.450
1+460	13.201
1+470	13.492
1+480	13.457
1+490	13.291
1+500	12.894

NOTE:
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KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR

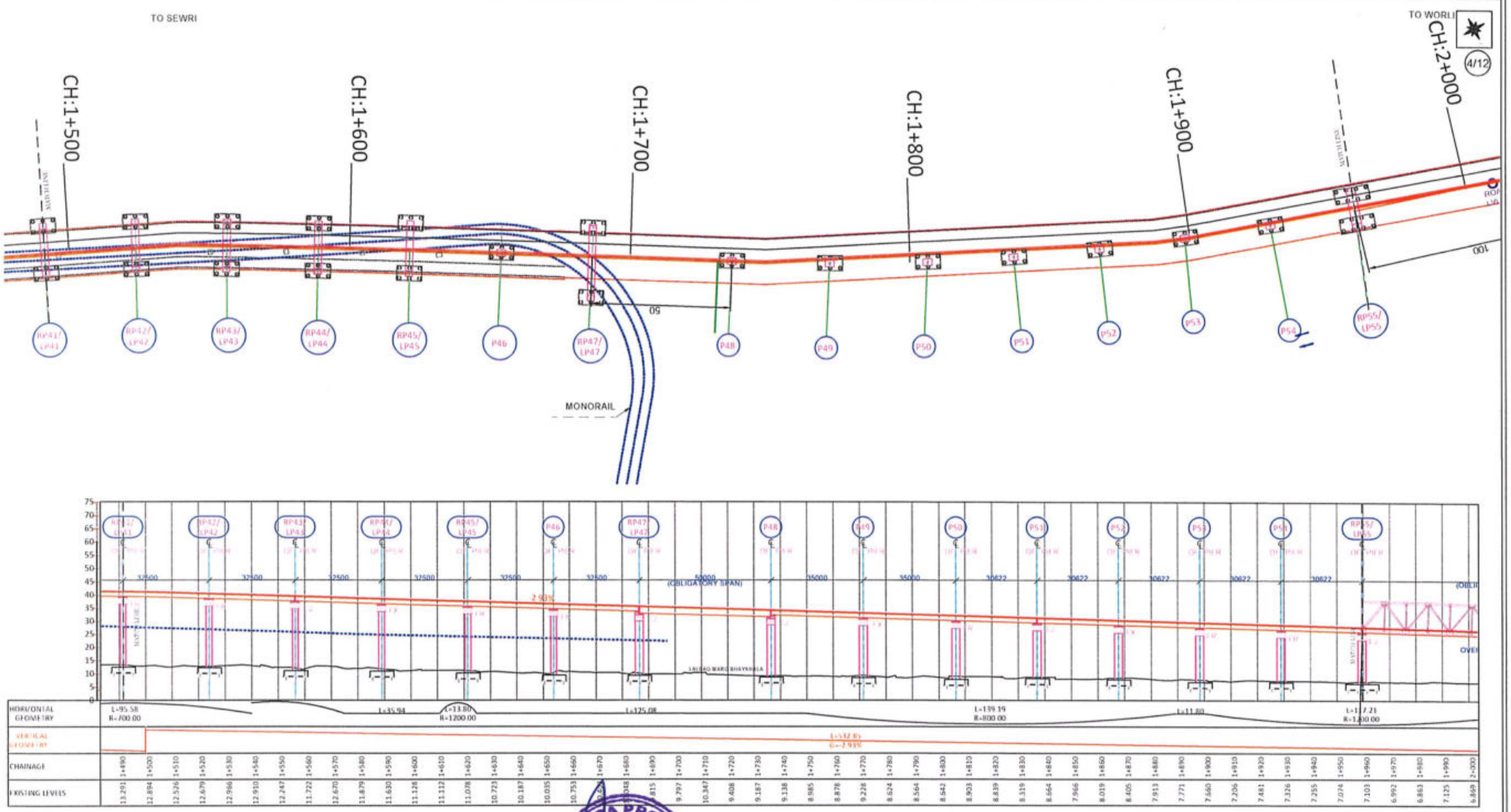
CLIENT: MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

TITLE: TENTATIVE GENERAL ARRANGEMENT DRAWING FOR SEWRI TO WORLI ELEVATED CONNECTOR CH: 1+000 TO 1+500KM

DATE: MARCH 2019

373

0000 374



NOTE:
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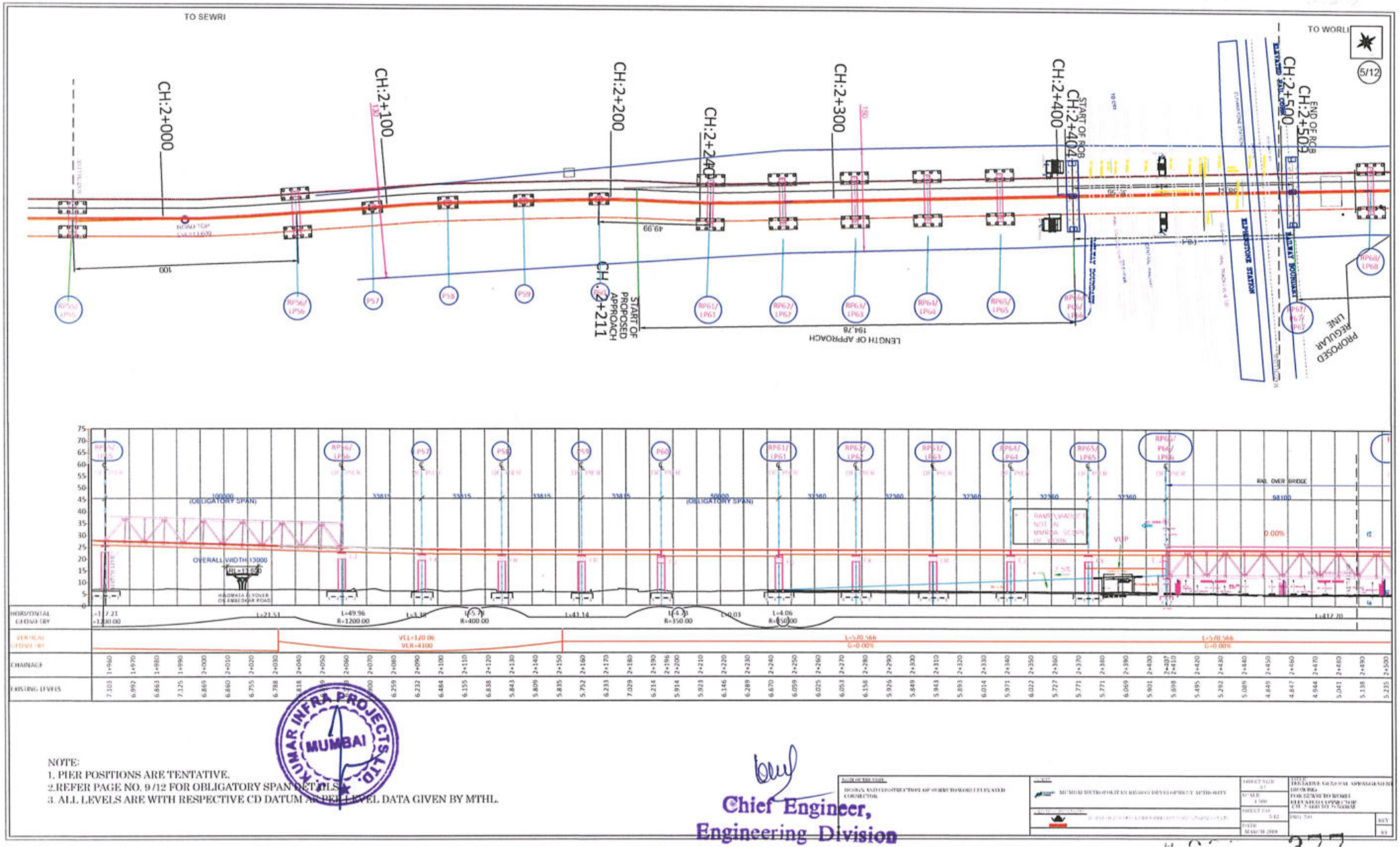
2.REFER PAGE NO. 9 /12 FOR OBLIGATORY SPAN DETAILS.
3. ALL LEVELS ARE WITH RESPECTIVE CD DATUM AS PER LEVEL DATA GIVEN BY MTHL.

J.KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY



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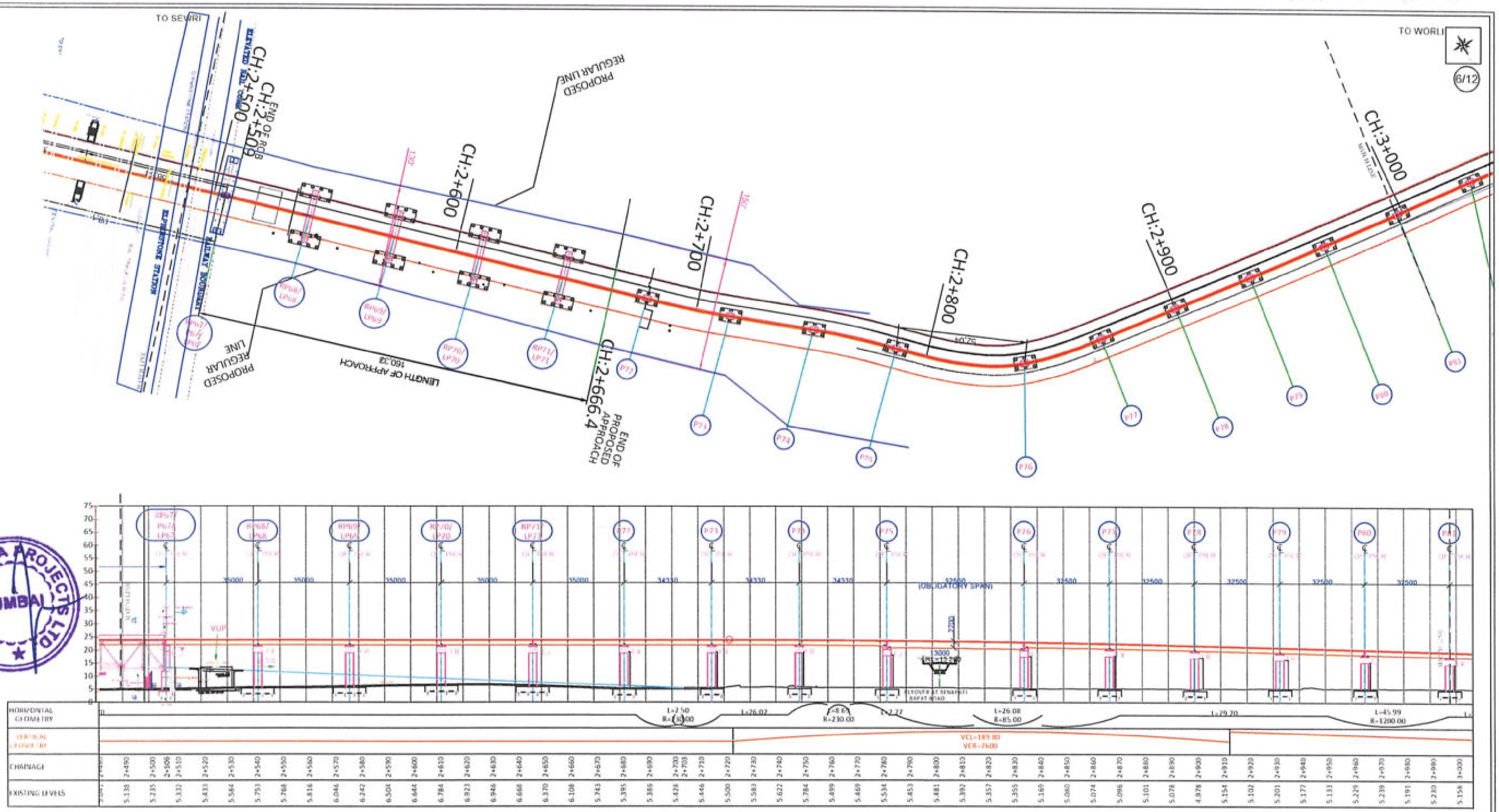
3. ALL LEVELS ARE WITH RESPECTIVE CD DATUM AS PER LEVEL DATA GIVEN BY MTHL.

KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

M.M.K.D.A.
Engineering Division
Civil Engineer.



NOTE:
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2. REFER PAGE NO. 9/12 FOR OBLIGATORY SPAN DETAILS.
3. ALL LEVELS ARE WITH RESPECTIVE CD DATUM AS PER LEVEL DATA GIVEN BY MTHL.

DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

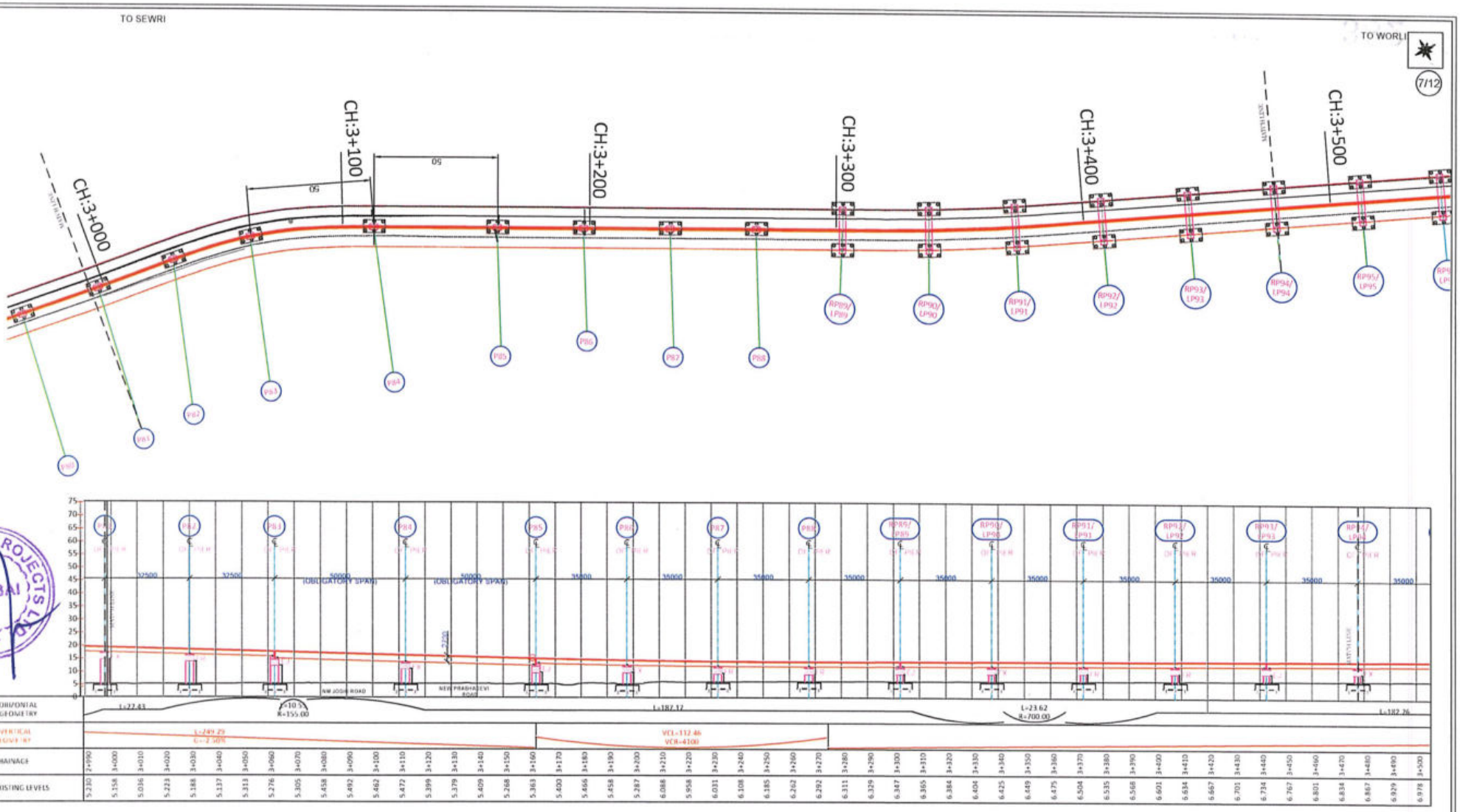
TITLE: TENTATIVE GENERAL ARRANGEMENT DRAWING FOR SEWRI TO WORLI ELEVATED CONNECTOR

SHEET SIZE A3 | DATE MARCH 2019

379

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.



NOTE:
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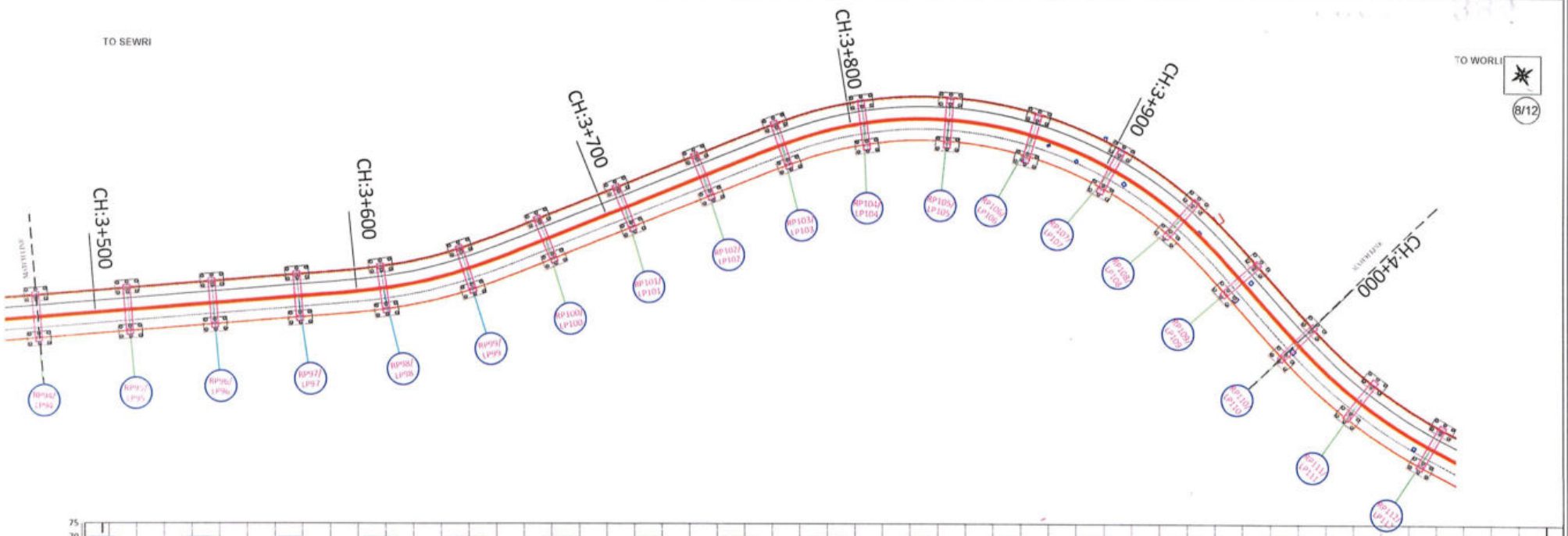
2.REFER PAGE NO. 9/12 FOR OBLIGATORY SPAN DETAILS.
3. ALL LEVELS ARE WITH RESPECTIVE CD DATUM AS PER LEVEL DATA GIVEN BY MTHL.

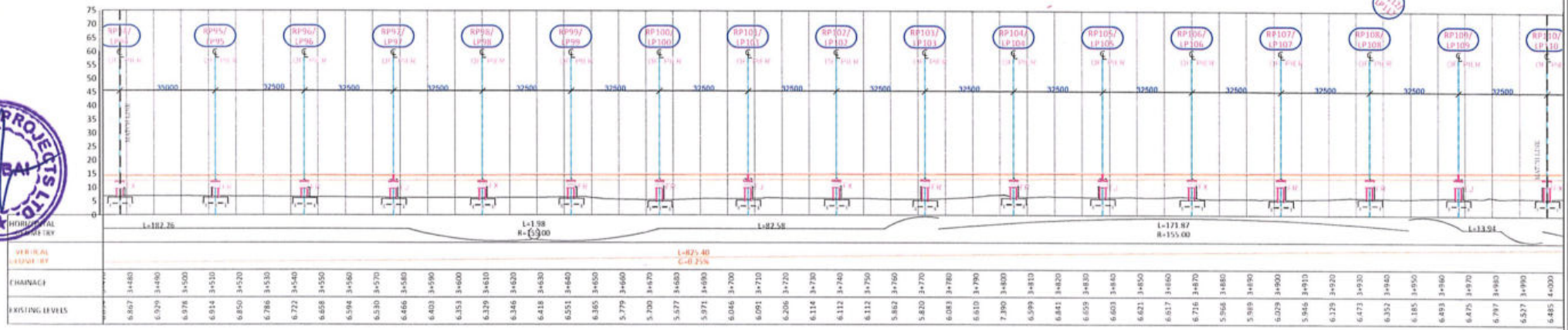
J.K. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

381

382





NOTE:
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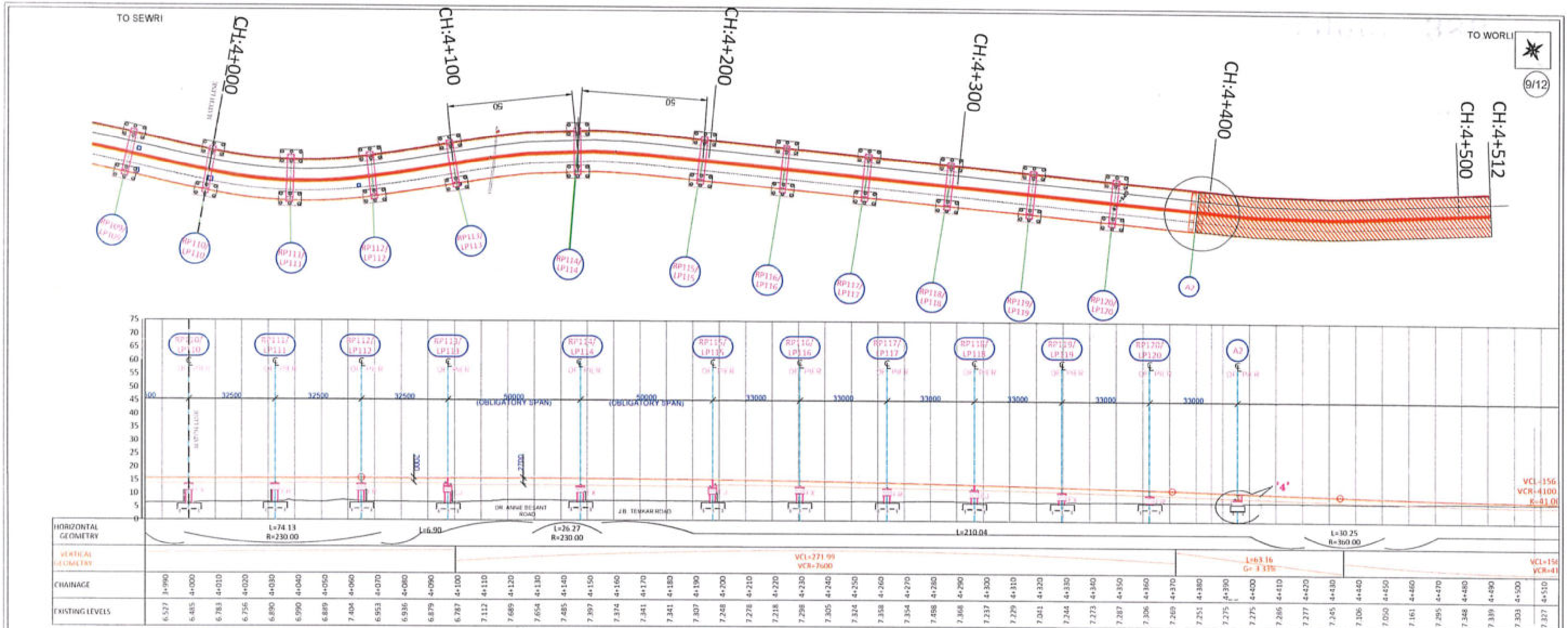
3. ALL LEVELS ARE WITH RESPECTIVE CD DATUM AS PER LEVEL DATA GIVEN BY MTHL.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

383

3847



SR.NO.	CHAINAGE		MINIMUM HORIZONTAL CLEARANCE		MINIMUM VERTICAL CLEARANCE	REMARK
	FROM	TO				
1	0+120.56	0+170.56	50 m		5.5 m	Obligatory
2	0+170.56	0+266.56	96 m		6.525 m	ROB
3	0+326.56	0+376.56	50 m		5.5 m	Obligatory
4	0+376.56	0+426.56	50 m		5.5 m	Obligatory
5	0+556.56	0+606.56	50 m		5.5 m	Obligatory
6	0+631.56	0+681.56	50 m		5.5 m	Obligatory
7	1+091.56	1+144.06	52.5 m		8.5 m	Obligatory
8	1+341.56	1+426.56	85 m	FROM RAIL TOP	8.5 m	Obligatory
9	1+686.56	1+736.56	50 m		8.5 m	Obligatory
10	1+959.67	2+059.67	100 m		5.5 m	Obligatory
11	2+195	2+245	50 m		5.5 m	Obligatory
12	2+407	2+505.1	98.1 m		6.525 m	ROB
13	2+782.66	2+835.16	52.5 m		5.5 m	Obligatory
14	3+062.66	3+112.66	50 m		5.5 m	Obligatory
15	3+112.66	3+162.66	50 m		5.5 m	Obligatory
16	4+097.66	4+147.66	50 m		5.5 m	Obligatory
17	4+147.66	4+197.66	50 m		5.5 m	Obligatory
18	0+245	0+285	40 m		5.5 m	RAMP OBLIG.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

NOTE:
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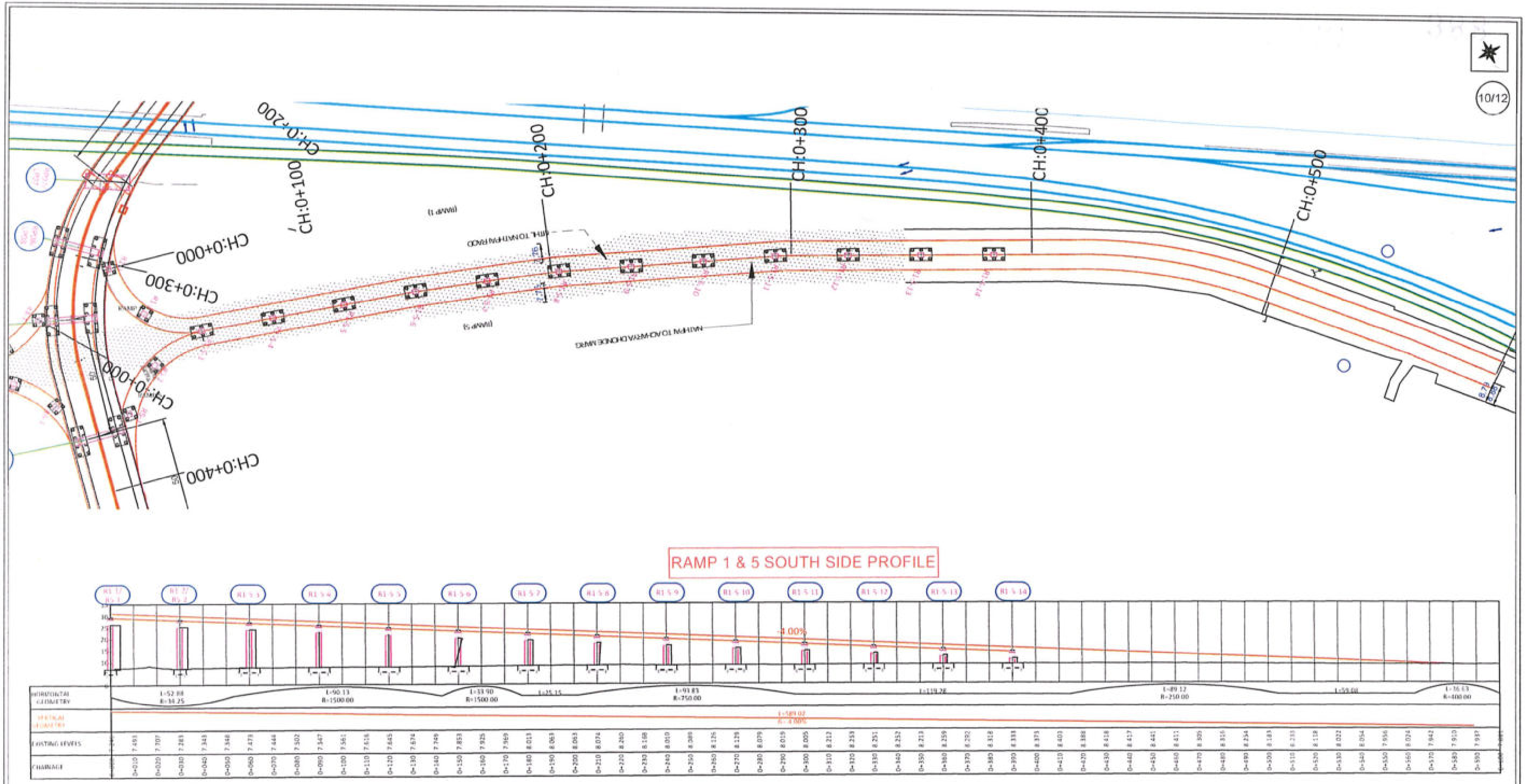
Chief Engineer,
Engineering Division
M.M.R.D.A.

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

TITLE: TENTATIVE GENERAL ARRANGEMENT DRAWING FOR SEWRI TO WORLI ELEVATED CONNECTOR

SHEET NO. 9/12

DATE: MARCH 2019



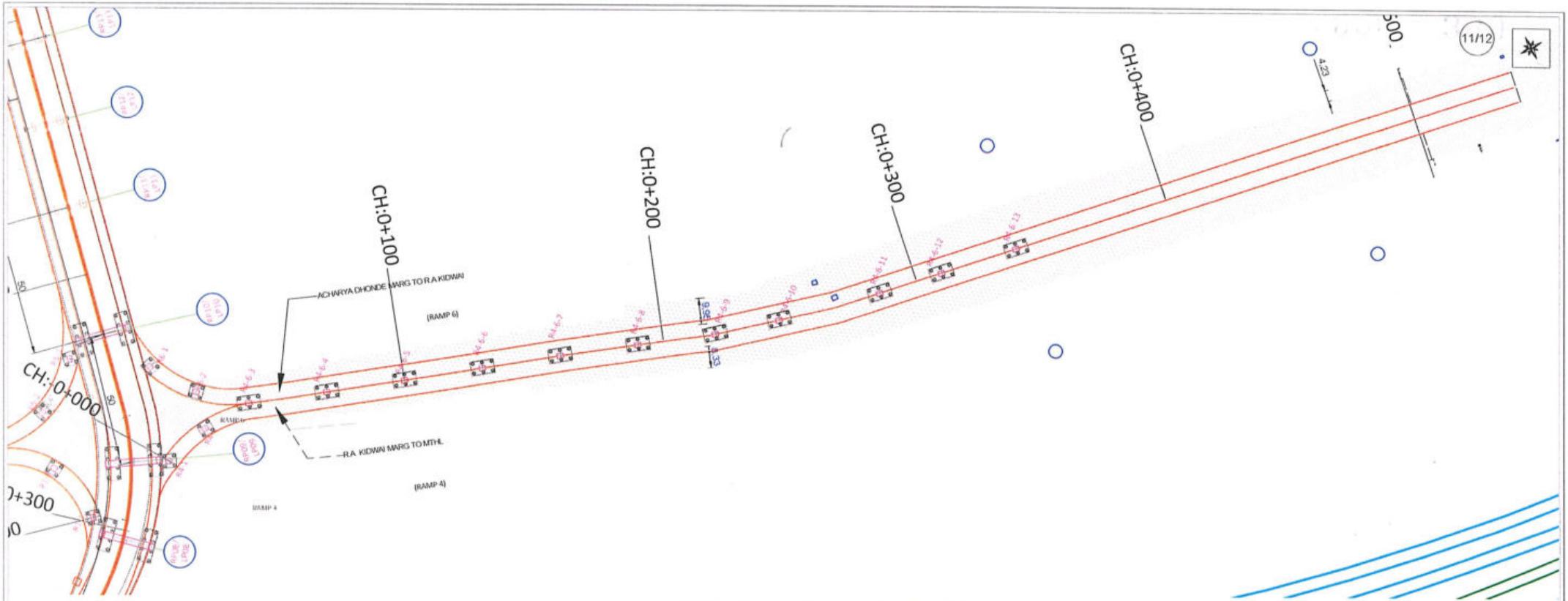
NOTE:
1. PIER POSITIONS ARE TENTATIVE.
2. ALL LEVELS ARE WITH RESPECTIVE CD DATUM AS PER LEVEL DATA GIVEN BY MTHL.

NAME OF THE WORK	CLIENT		TITLE
DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE A1 / SCALE 1:500 / SHEET NO. 10/12 / DATE MARCH 2019	TENTATIVE GENERAL ARRANGEMENT DRAWING FOR SEWRI TO WORLI ELEVATED CONNECTOR RAMP 1 & 5
	MONARCH SURVEYORS & ENGINEERING CONSULTANTS PVT LTD		DWG NO. 387 / REV R1

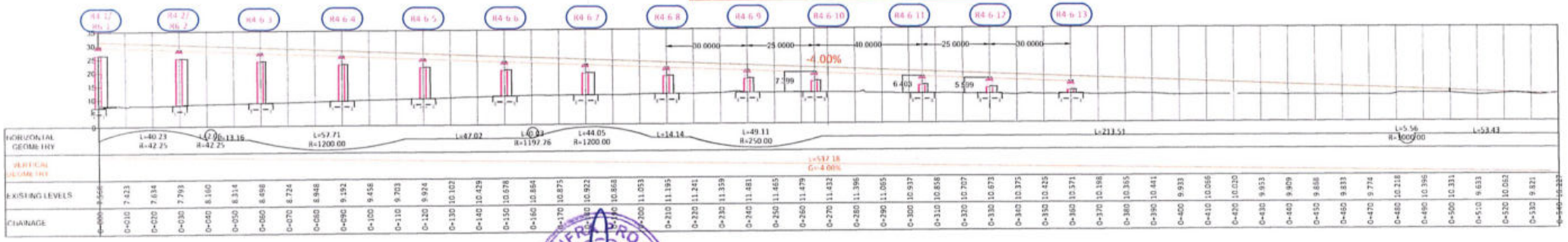
J. KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

388



RAMP 4 & 6 NORTH SIDE PROFILE



NOTE:
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J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

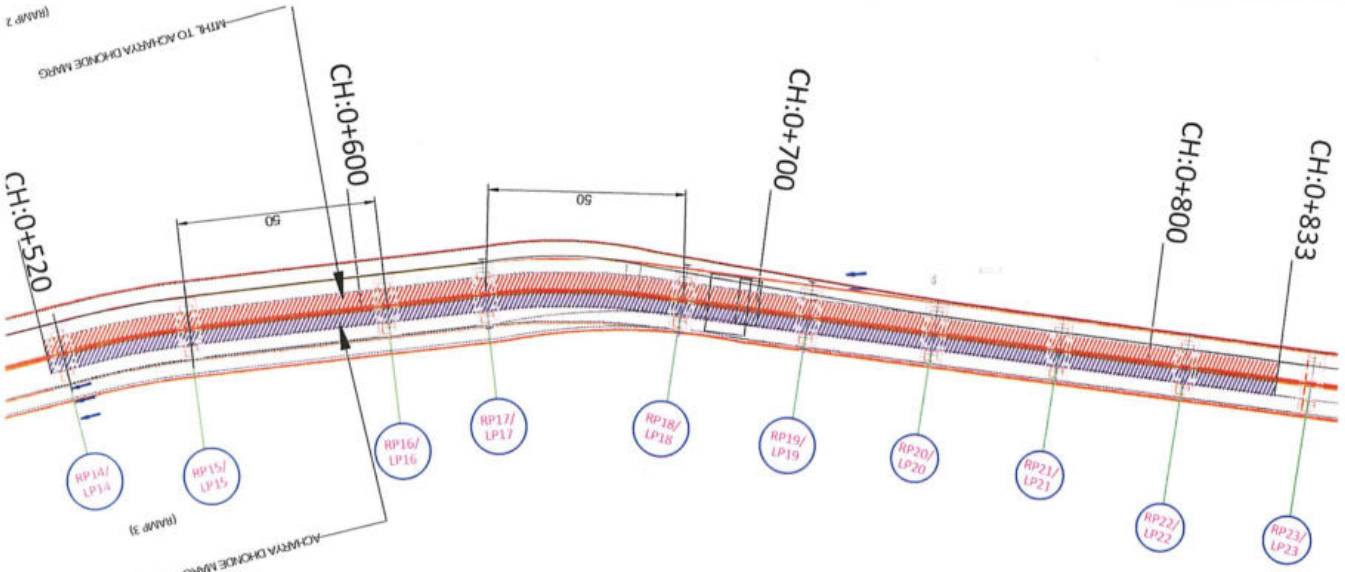
SHEET SIZE: A1
SCALE: AS SHOWN
SHEET NO: 11/12
DATE: MARCH 2010

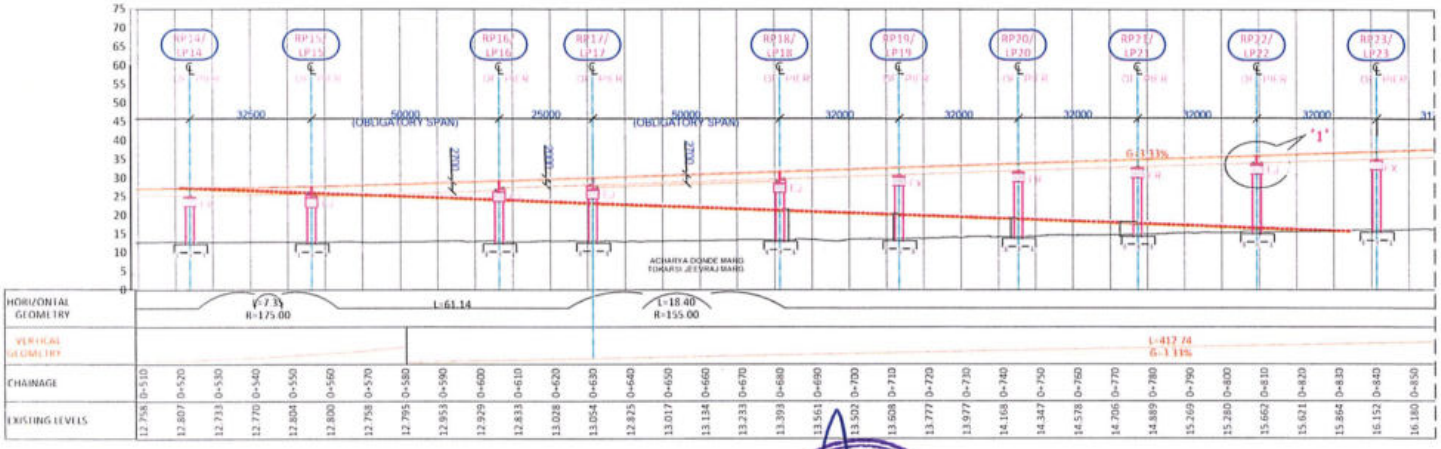
TITLE: TENTATIVE GENERAL ARRANGEMENT DRAWING FOR ALIGNMENT OF RAMP 4 & 6

389

360

Engineering Division
Chief Engineer
MWRDA





NOTE:
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J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

SHEET SIZE: A1
SCALE: 1:500
SHEET 391 OF 432
DATE: MARCH 2019

TITLE: TENTATIVE GENERAL ARRANGEMENT DRAWING FOR SEWRI TO WORLI ELEVATED CONNECTOR

DWG. NO. 391

REV.

NOTE : CENTRE LINE CO-ORDINATES OF VARIOUS LOCATION AS FOLLOWS

PIER /PORTAL NO.	NORTHING	EASTING	PIER /PORTAL NO.	NORTHING	EASTING	PIER /PORTAL NO.	NORTHING	EASTING
1	274267.63	2101845.68	45	272885.53	2102552.71	89	271447.58	2103312.11
2	274239.89	2101834.31	46	272863.65	2102576.81	90	271413.88	2103321.41
3	274211.86	2101827.92	47	272841.91	2102600.93	91	271379.78	2103329.41
4	274183.05	2101829.68	48	272808.38	2102638.01	92	271345.48	2103336.21
5	274155.67	2101839.76	49	272783.40	2102662.58	93	271311.08	2103342.91
6	274119.78	2101872.84	50	272757.76	2102686.34	94	271276.78	2103349.51
7	274070.48	2101955.21	51	272735.43	2102707.12	95	271242.36	2103356.22
8	274048.92	2101975.66	52	272713.05	2102727.87	96	271210.48	2103362.41
9	274022.87	2101989.45	53	272689.98	2102748.01	97	271178.58	2103368.61
10	273973.78	2101997.61	54	272664.98	2102765.71	98	271146.60	2103374.29
11	273924.08	2102003.31	55	272639.97	2102783.27	99	271114.21	2103375.78
12	273891.78	2102006.91	56	272556.75	2102838.60	100	271081.78	2103372.91
13	273859.48	2102010.61	57	272527.78	2102856.01	101	271049.48	2103369.31
14	273827.18	2102014.21	58	272498.85	2102873.57	102	271017.18	2103365.71
15	273795.18	2102019.51	59	272470.68	2102892.21	103	270984.88	2103362.31
16	273746.68	2102031.51	60	272442.58	2102911.01	104	270952.38	2103362.75
17	273722.38	2102037.51	61	272402.48	2102941.01	105	270920.58	2103370.21
18	273676.18	2102056.11	62	272375.76	2102959.19	106	270891.21	2103384.44
19	273647.88	2102071.11	63	272348.89	2102977.12	107	270865.60	2103404.81
20	273619.58	2102086.11	64	272321.89	2102995.12	108	270845.16	2103430.20
21	273591.38	2102101.21	65	272294.98	2103013.01	109	270829.88	2103458.91
22	273563.08	2102116.21	66	272268.08	2103031.01	110	270815.76	2103488.15
23	273534.88	2102131.21	67	272186.46	2103085.45	111	270798.95	2103516.03
24	273507.28	2102145.91	68	272157.38	2103104.91	112	270777.53	2103540.56
25	273479.68	2102160.51	69	272128.28	2103124.31	113	270753.68	2103562.61
26	273452.08	2102175.21	70	272099.08	2103143.71	114	270719.22	2103598.65
27	273424.48	2102189.91	71	272069.98	2103163.11	115	270690.98	2103639.91
28	273396.88	2102204.51	72	272040.88	2103182.51	116	270673.38	2103667.81
29	273369.28	2102219.21	73	272011.78	2103200.81	117	270655.68	2103695.61
30	273341.68	2102233.91	74	271981.88	2103217.61	118	270637.97	2103723.51
31	273314.08	2102248.51	75	271953.06	2103236.19	119	270620.27	2103751.40
32	273267.48	2102272.71	76	271906.48	2103259.51	120	270602.58	2103779.21
33	273239.68	2102287.01	77	271874.08	2103260.91	A2	270584.92	2103807.09
34	273211.98	2102301.41	78	271841.68	2103259.41			
35	273181.98	2102316.81	79	271809.18	2103258.01			
36	273151.98	2102332.41	80	271776.68	2103256.41			
37	273122.68	2102349.11	81	271744.28	2103254.11			
38	273094.58	2102367.81	82	271711.88	2103251.51			
39	273026.28	2102418.31	83	271679.48	2103250.91			
40	273001.25	2102439.01	84	271630.48	2103260.41			
41	272977.09	2102460.65	85	271582.38	2103274.01			
42	272952.90	2102482.34	86	271548.68	2103283.51			
43	272929.69	2102505.02	87	271514.98	2103293.11			
44	272907.55	2102528.78	88	271481.27	2103302.62			

NORTH			SOUTH		
PIER /PORTAL NO.	NORTHING	EASTING	PIER /PORTAL NO.	NORTHING	EASTING
R4-1	274027.876	2102003.01	R1-1	274036.976	2101968.21
R4-2	274021.216	2102020.399	R1-2	274014.247	2101961.08
R6-1	273991.776	2102009.61	R5-1	273977.739	2101982.163
R6-2	274007.113	2102022.339	R5-2	273992.64	2101964.896
R4-6-3	274018.535	2102039.495	R1-5-3	273998.858	2101941.713
R4-6-4	274025.57	2102068.66	R1-5-4	273993.192	2101912.216
R4-6-5	274032.271	2102097.854	R1-5-5	273987.548	2101882.836
R4-6-6	274038.876	2102127.11	R1-5-6	273981.876	2101853.31
R4-6-7	274045.476	2102156.41	R1-5-7	273975.064	2101824.113
R4-6-8	274052.561	2102185.565	R1-5-8	273967.792	2101795.004
R4-6-9	274059.716	2102214.699	R1-5-9	273958.783	2101766.3
R4-6-10	274064.538	2102244.378	R1-5-10	273949.768	2101737.597
R4-6-11	274067.976	2102274.01	R1-5-11	273940.757	2101708.894
R4-6-12	274069.876	2102303.91	R1-5-12	273930.026	2101680.594
R4-6-13	274071.676	2102333.91	R1-5-13	273919.131	2101652.329
			R1-5-14	273908.237	2101624.064

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

393

DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

DATE MARCH 2019

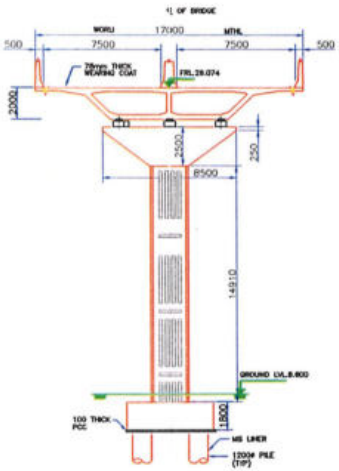
TYPICAL CROSS-SECTIONS FOR ELEVATED BRIDGE

J. KUMAR INFRAPROJECTS LTD. MUMBAI

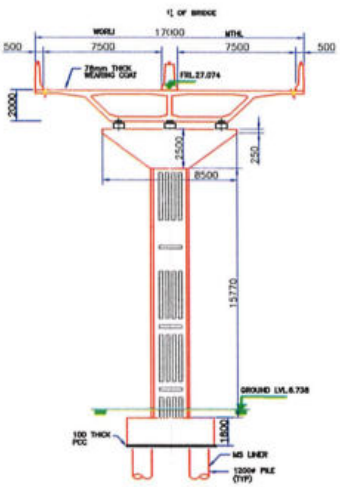
Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK:	CLIENT	SHEET SIZE	TITLE
"DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE A3 / SCALE 1:1000	TYPICAL CROSS-SECTIONS FOR ELEVATED BRIDGE
	MONARCH SURVEYORS ENGINEERING CONSULTANTS PVT LTD	DATE JANUARY 2019	DWG NO. / REV R0

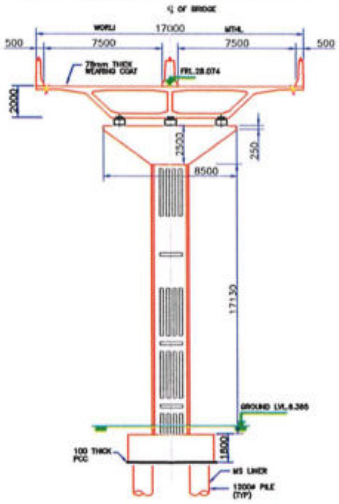
395



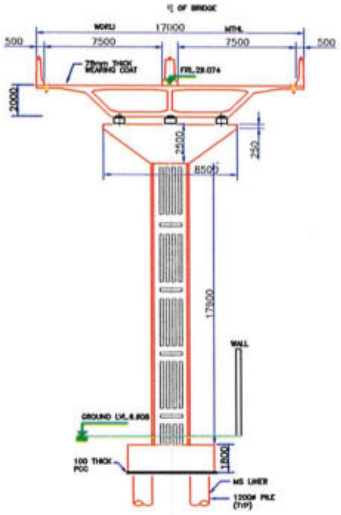
SECTION AT P1



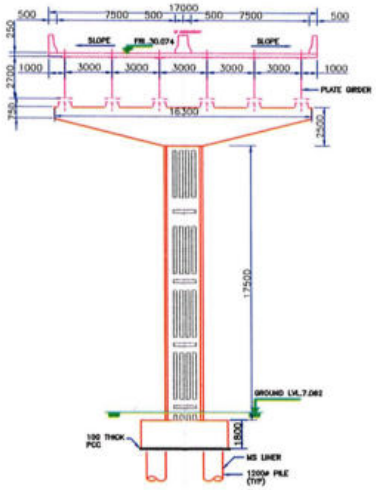
SECTION AT P2



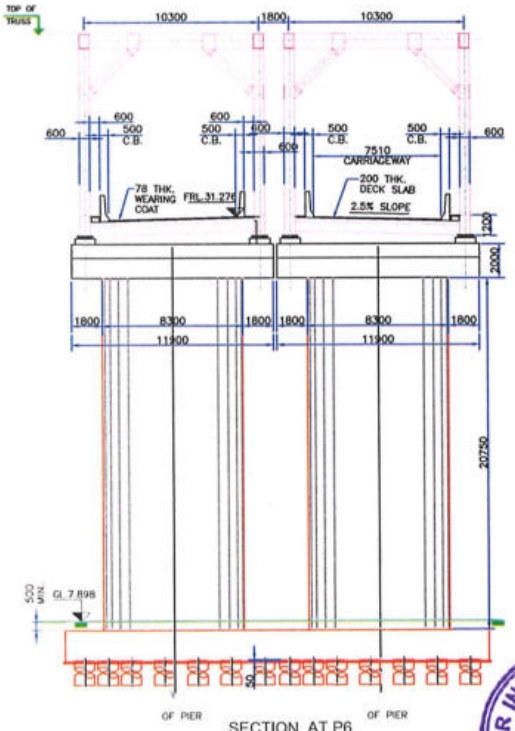
SECTION AT P3



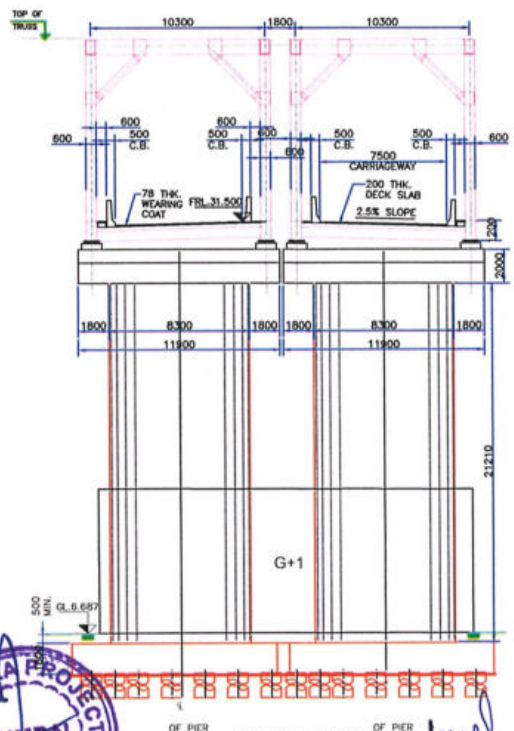
SECTION AT P4



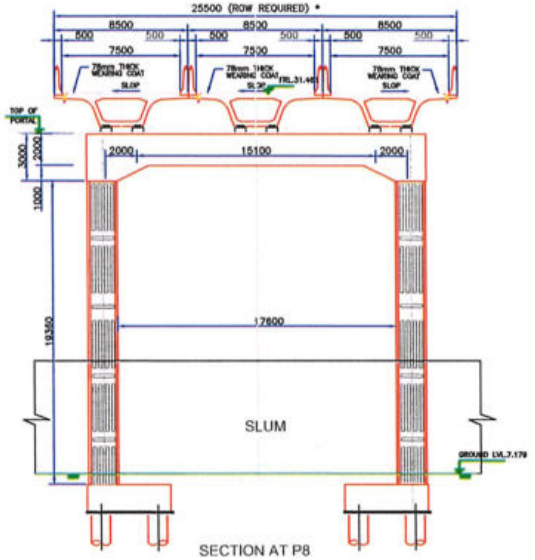
SECTION AT P5



SECTION AT P6



SECTION AT P7



SECTION AT P8

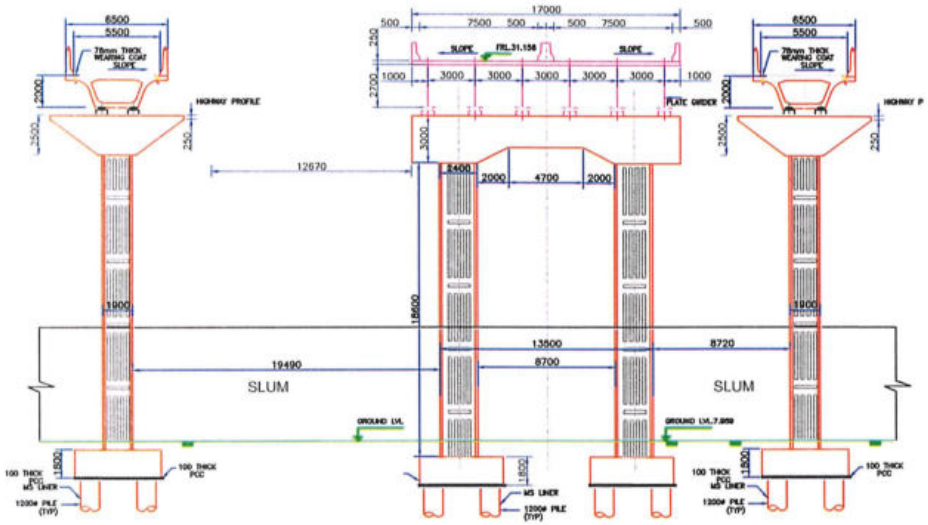
NOTE: FOR ROB (P6 & P7)
SCOPE IS LIMITED UPTO
SUB-STRUCTURE ONLY.

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE [illegible] REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS.

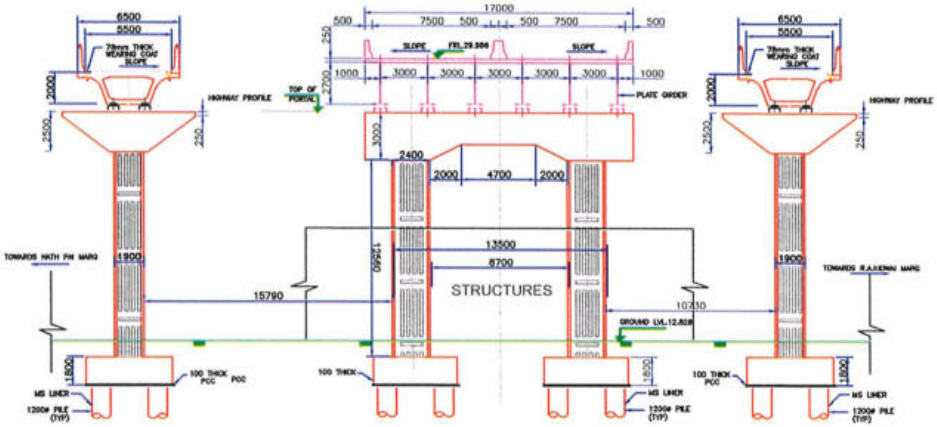
NAME OF THE WORK: "DESIGN AND CONSTRUCTION OF SLWEH TO WORLI ELEVATED CONNECTOR."	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A1	TITLE: TYPICAL CROSS SECTION AT P1 TO P8
		SCALE: 1:1000	
		SHEET NO: 1 OF 1	
		DATE: MARCH 2019	DWG. NO: REV. R1

J. KUMAR INFRAPROJECTS LTD. MUMBAI

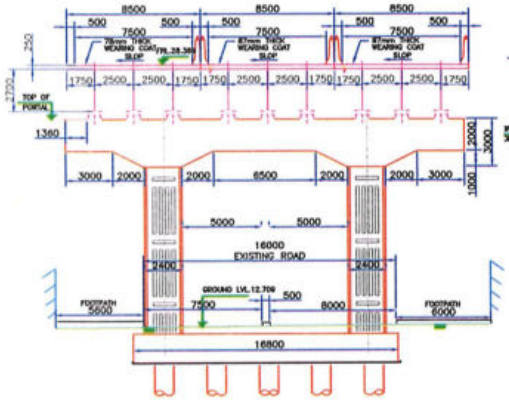
Chief Engineer,
Engineering Division
M.M.R.D.A.



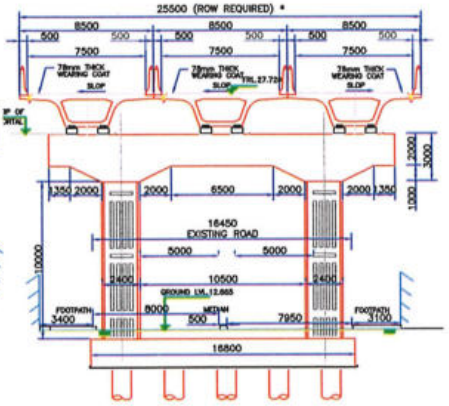
SECTION AT R1-2 SECTION AT P9 SECTION AT R4-1



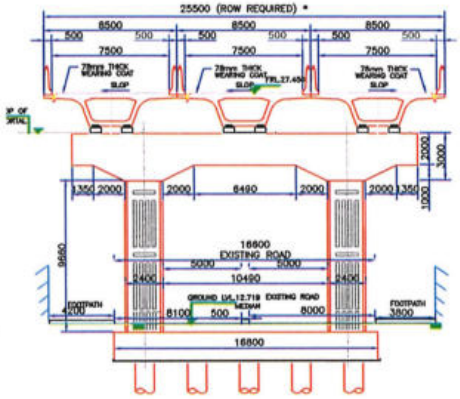
SECTION AT R5-1 SECTION AT P10 SECTION AT R6-1



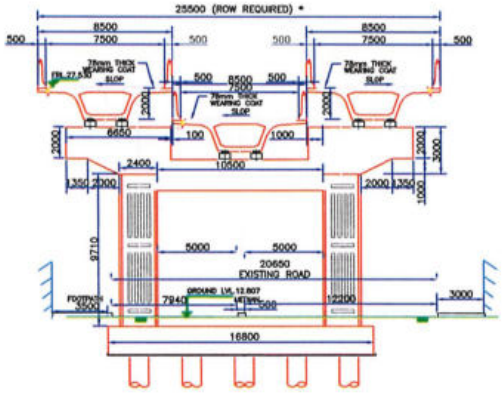
SECTION AT P11



SECTION AT P12



SECTION AT P13



SECTION AT P14

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Engineering Division
M.M.R.D.A.

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE C/S CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS.

NAME OF THE WORK: "DESIGN AND CONSTRUCTION OF SURVEY TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A3	TITLE: TYPICAL CROSS- SECTIONS AT PO TO P14
		SCALE: 1:1000	
		SHEET NO: 2.29	DRG. NO:
		DATE: MARCH 2019	REV.

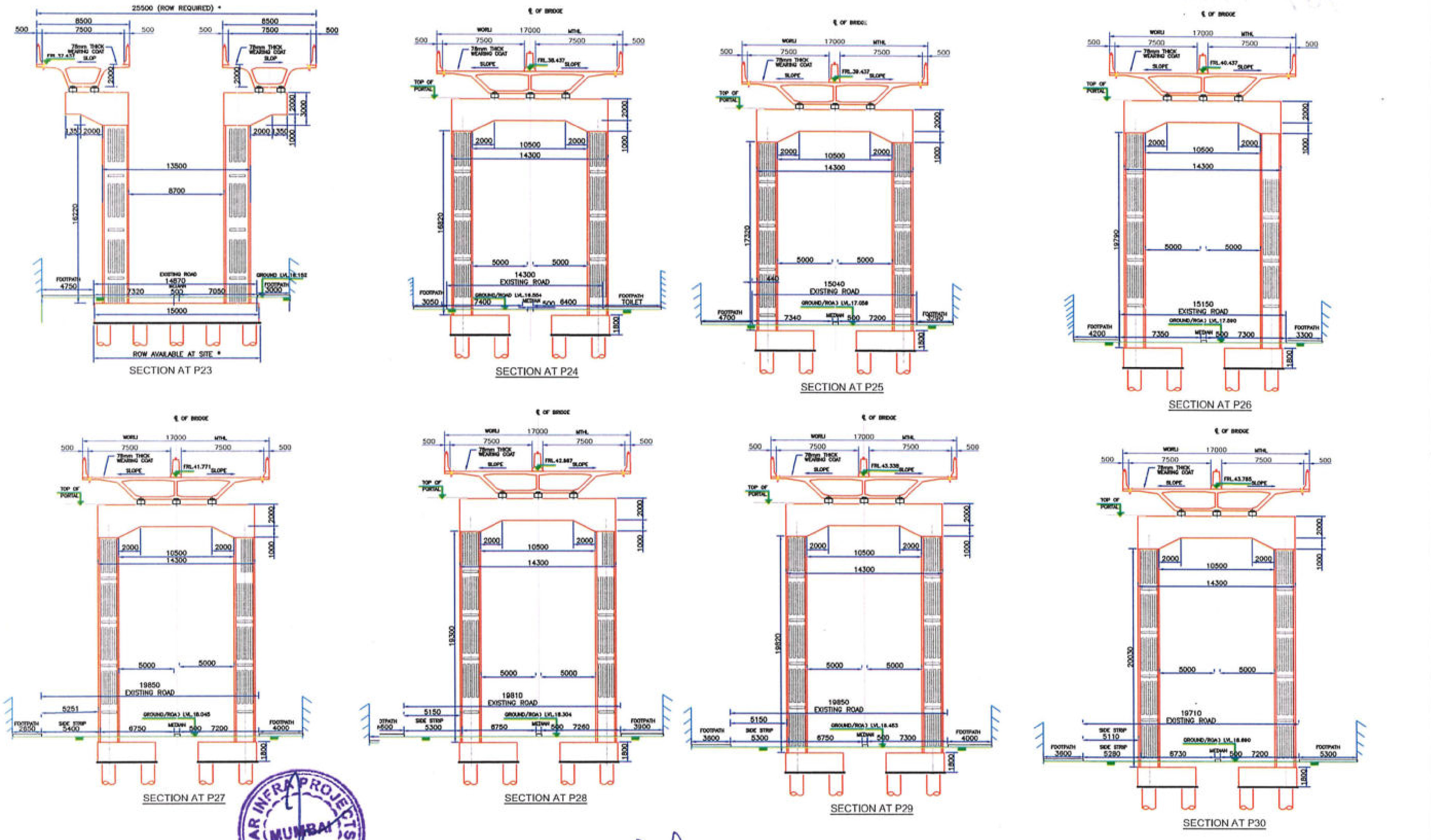
NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE ... CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS

NAME OF THE WORK:	CLIENT:		TITLE:
"DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE A1 / SCALE 1:1000	TYPICAL CROSS- SECTION AT P15 TO P22
	DESIGN CONSULTANT: RESEARCH SURVEYORS ENGINEERING CONSULTANTS PVT LTD	SHEET NO. / DATE MARCH 2018	DWG NO. / REV

KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

402



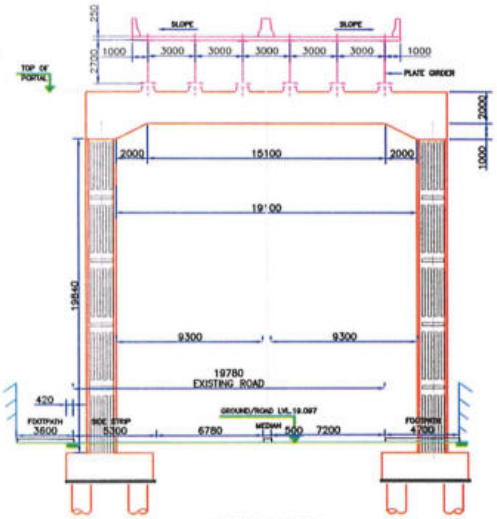
NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE C/S CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS

NAME OF THE WORK	CLIENT	SHEET SIZE	TITLE
"DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	A3	TYPICAL CROSS- SECTION AT P23 TO P30
		SCALE 1:1000	
	M/S ARCH BLUEPRINT ENGINEERING CONSULTANTS PVT LTD	SHEET NO. 4/20	DRG. NO.
		DATE MARCH 2019	REV R1

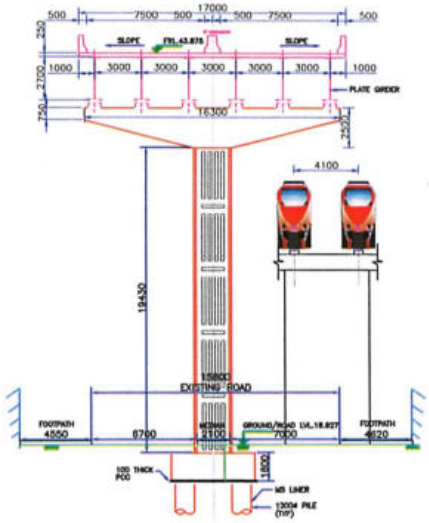
J. KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer
Engineering Division
M.M.R.D.A.

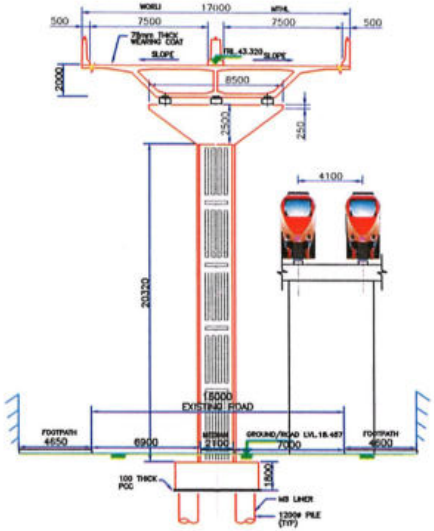
403



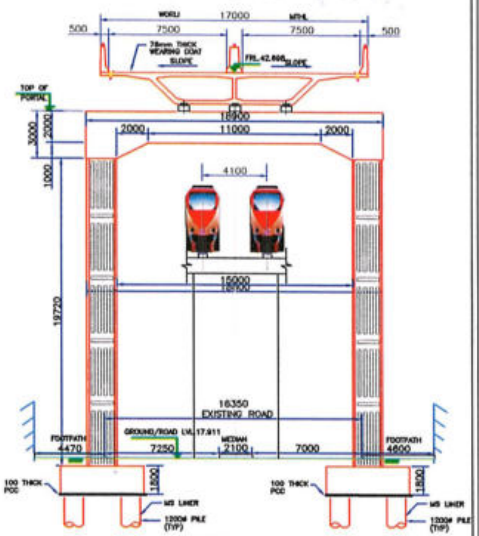
SECTION AT P31



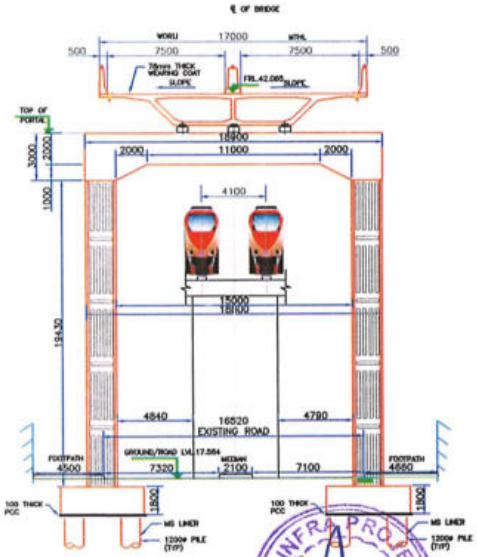
SECTION AT P32



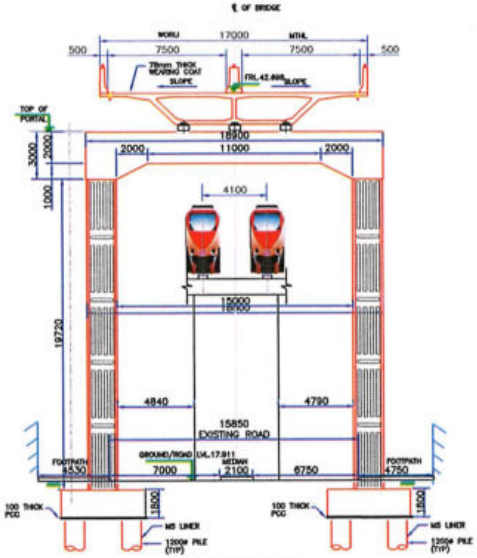
SECTION AT P33



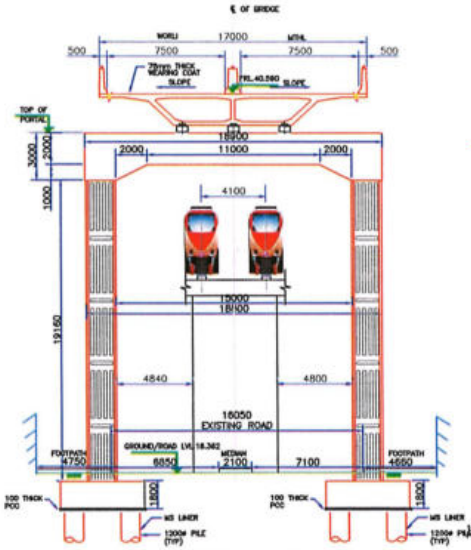
SECTION AT P34



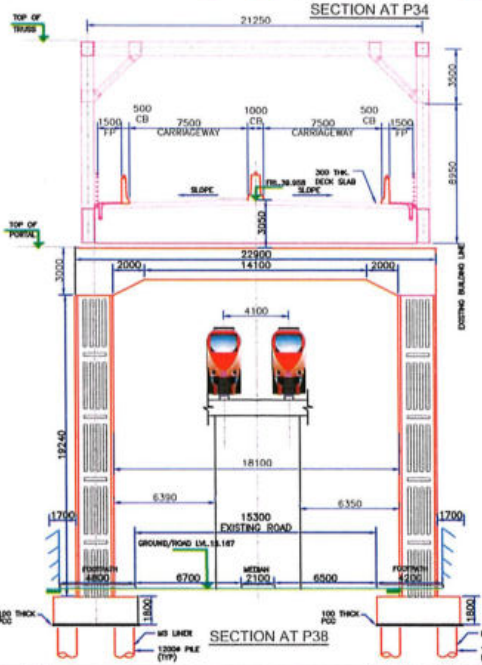
SECTION AT P35



SECTION AT P36



SECTION AT P37



SECTION AT P38

NAME OF THE WORK:
"DESIGN AND CONSTRUCTION OF SEMI ELEVATED CONNECTOR"

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

SHEET SIZE: A1
SCALE: 1:1000
SHEET NO: 5/20
DATE: MARCH 2019

TITLE: TYPICAL CROSS- SECTIONS AT P31 TO P38

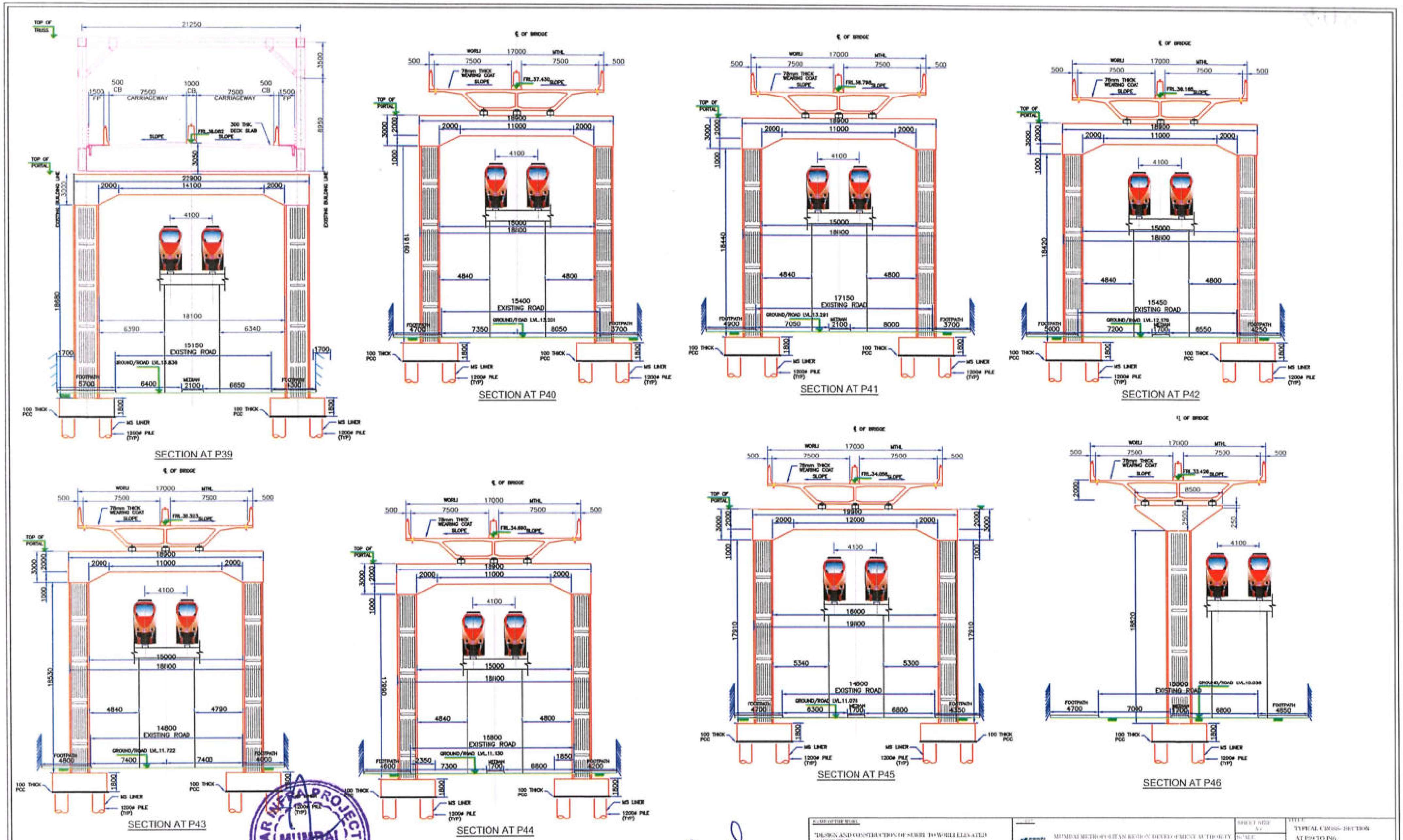
REV: R1

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS

KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

405



NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT SUITABLE C/S CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS

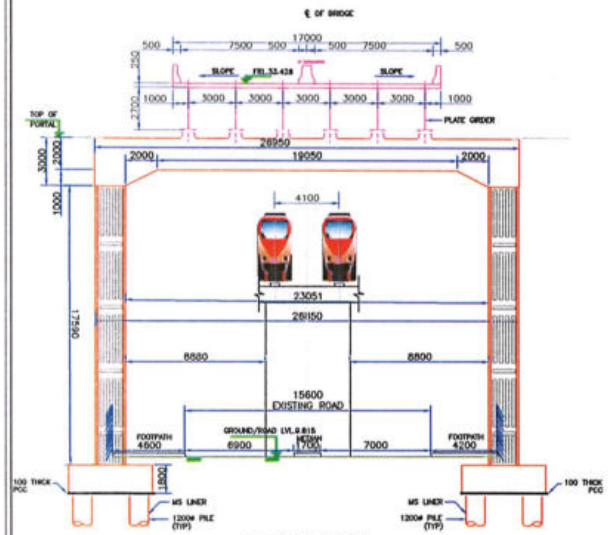
NAME OF THE WORK: "DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A3 SCALE: 1:1000	TITLE: TYPICAL CROSS SECTION AT P39 TO P46
	MONARCH SURVEYORS & ENGINEERING CONSULTANTS PVT LTD	SHEET NO: 8/20 DATE: MARCH 2018	DWG NO: / REV: R1

J. KUMAR INFRAPROJECTS LTD. MUMBAI

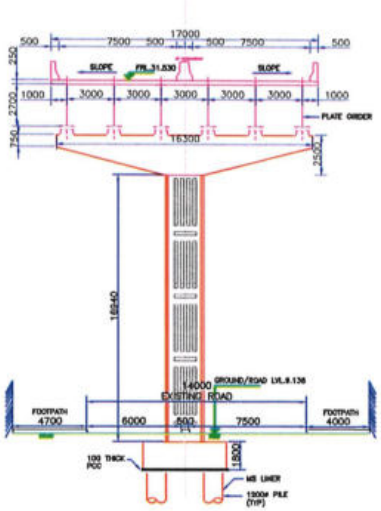
Chief Engineer,
Engineering Division
M.M.R.D.A.

407

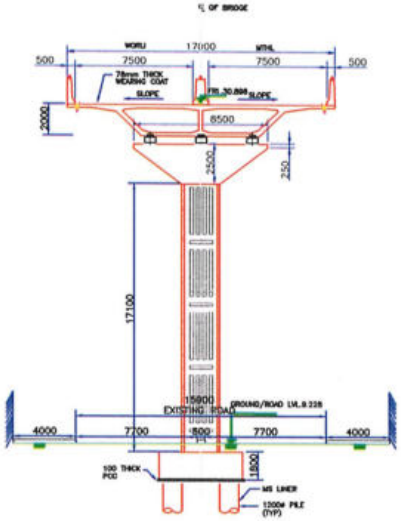
8047



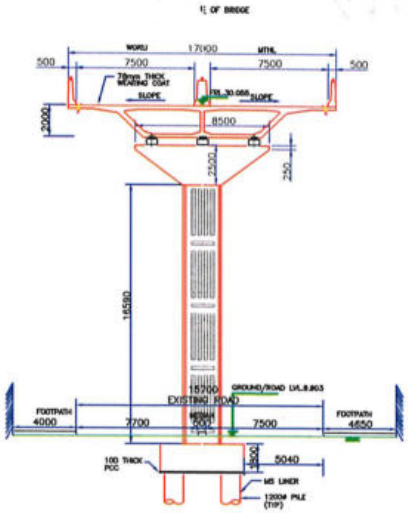
SECTION AT P47



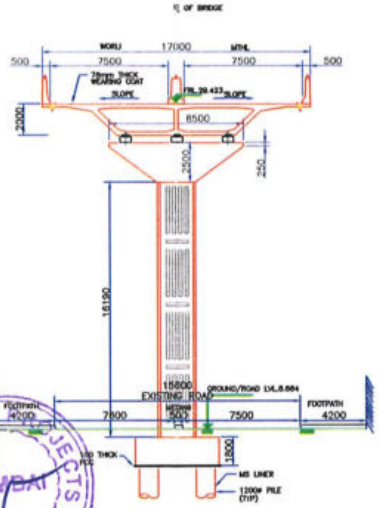
SECTION AT P48



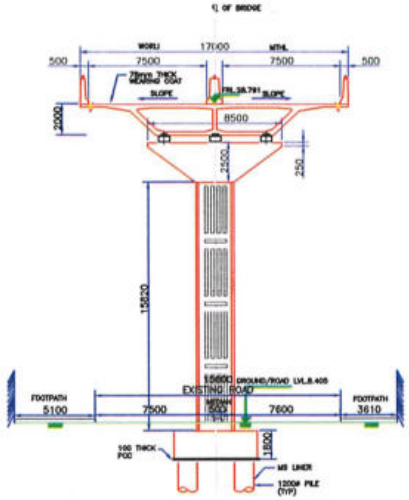
SECTION AT P49



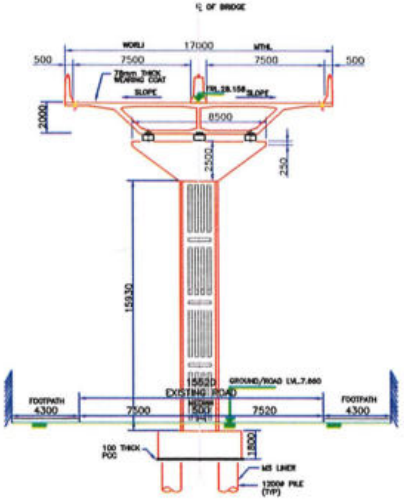
SECTION AT P50



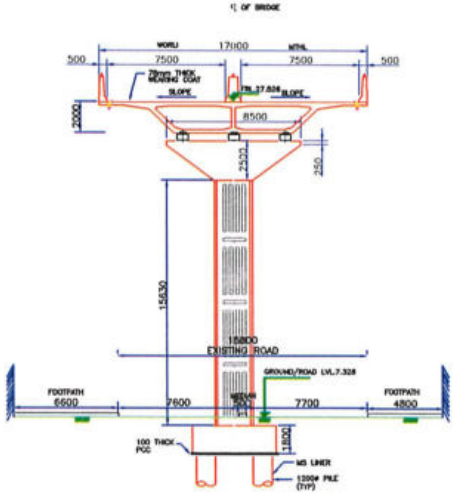
SECTION AT P51



SECTION AT P52



SECTION AT P53



SECTION AT P54

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NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS

Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK: "DESIGN AND CONSTRUCTION OF SEAWIL TO WORLI ELEVATED CONNECTOR"

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

MUKUND LTD.

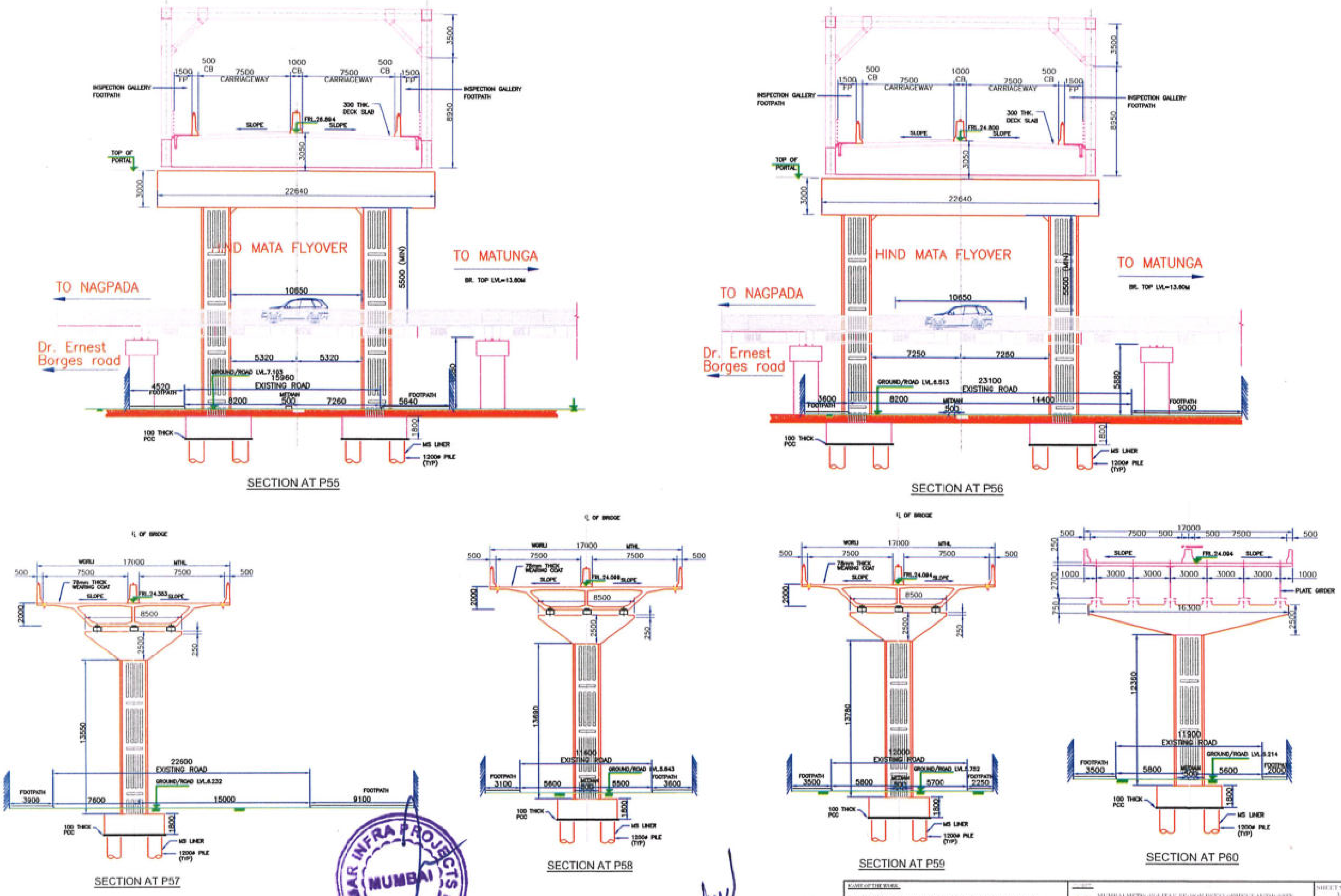
SHEET SIZE: A3
SCALE: 1:1000
SHEET NO: 2 OF
DATE: MARCH 2019

TITLE: TYPICAL CROSS- SECTION AT P47 TO P54.

DRG. NO:

REV. 01

409



NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CROSS SECTIONS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS

NAME OF THE WORK: "DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR"

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

MONARCH SURVEYORS & ENGINEERING CONSULTANTS PVT LTD

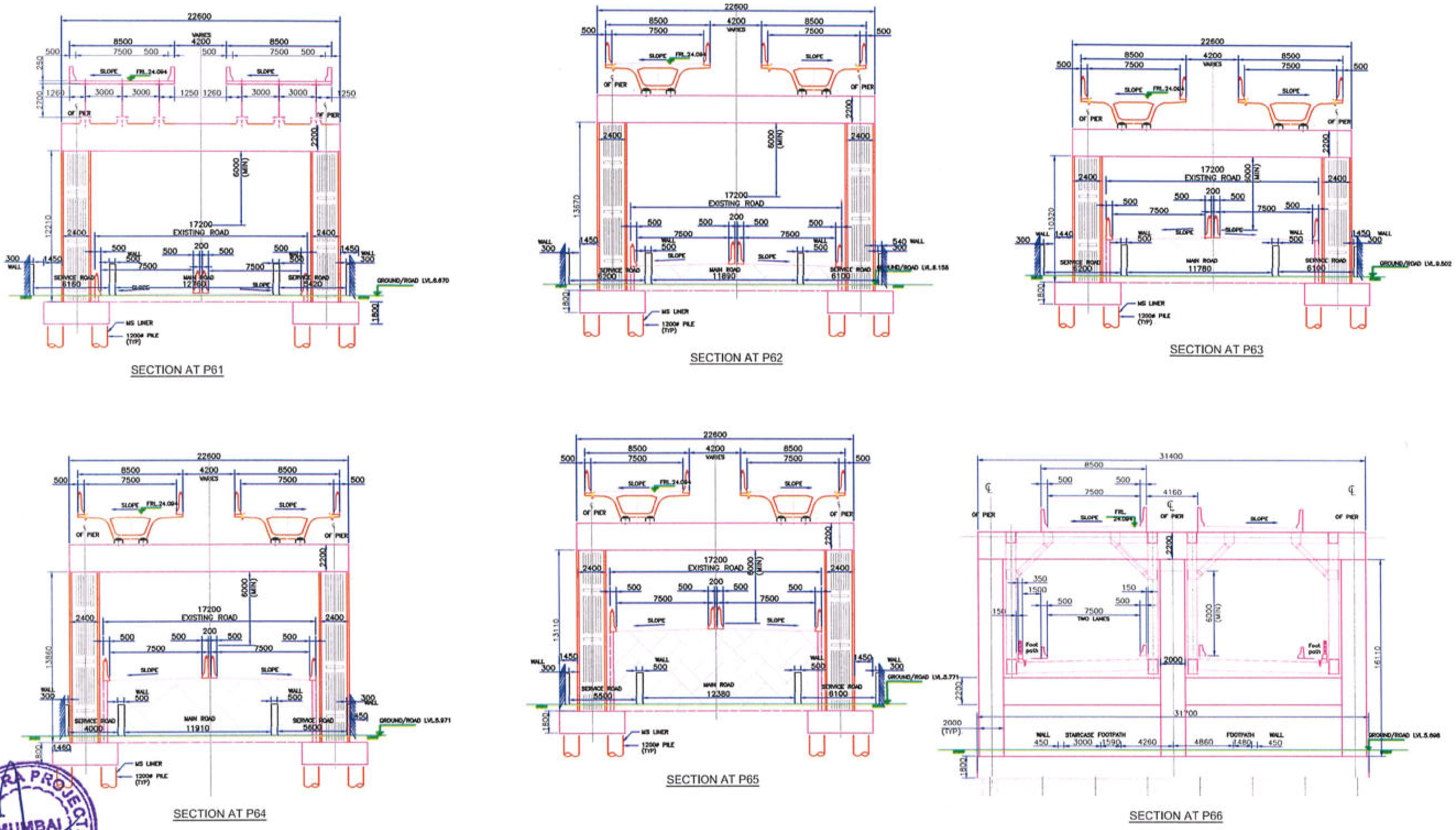
SHEET SIZE: A1 | SCALE: 1:1000 | DATE: MARCH 2019

TITLE: TYPICAL CROSS- SECTIONS AT P55 TO P60

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer, Engineering Division M.M.R.D.A.

411



NOTE: FOR ROB (P66) SCOPE IS LIMITED UPTO SUB-STRUCTURE ONLY.

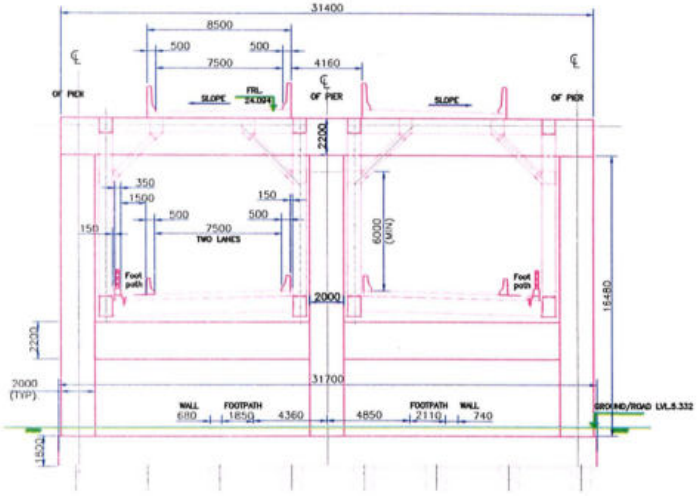
NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE C/S CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS.

"DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	DATE: MARCH 2018	TITLE: TYPICAL CROSS- SECTION AT P61 TO P66

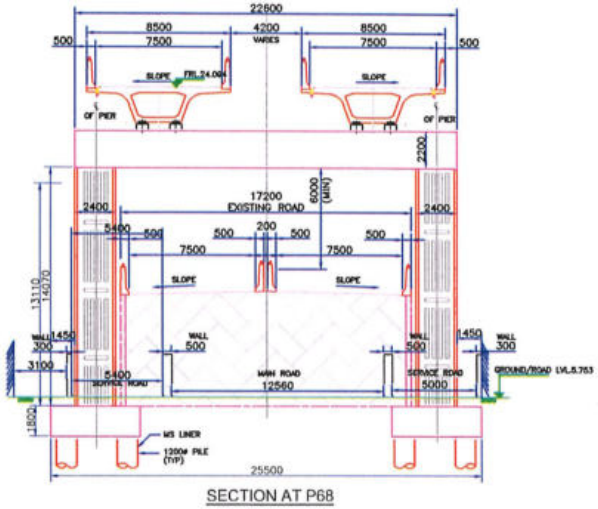
J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

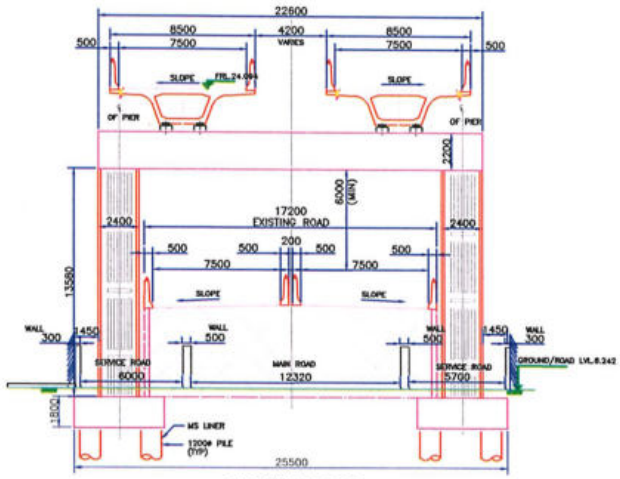
413



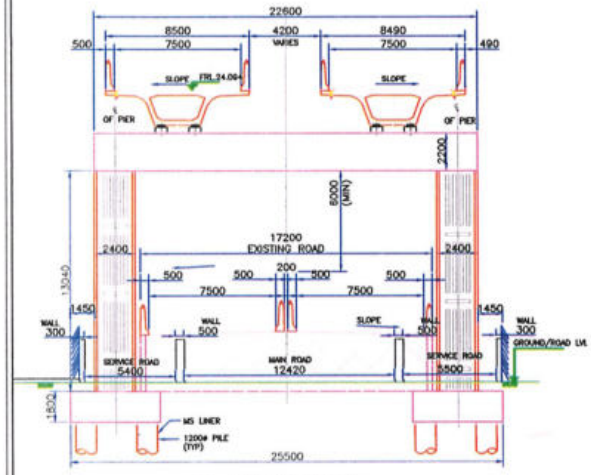
SECTION AT P67



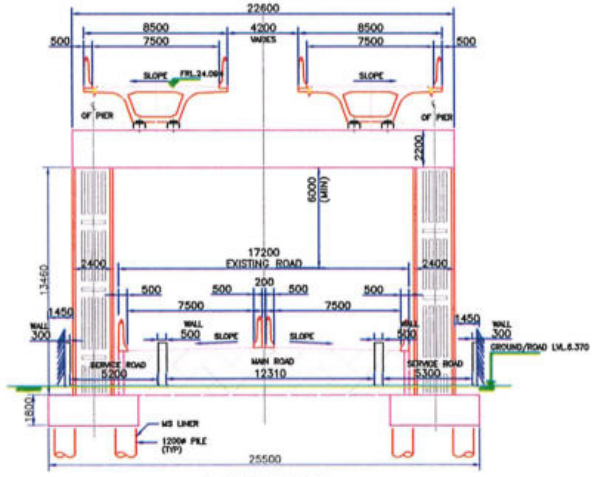
SECTION AT P68



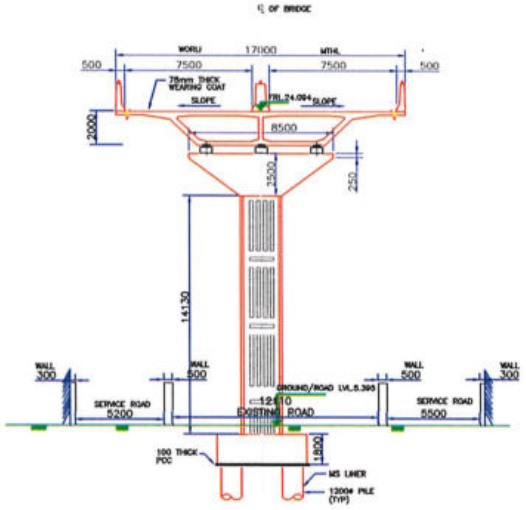
SECTION AT P69



SECTION AT P70



SECTION AT P71



SECTION AT P72

J.KUMAR INFRA PROJECTS LTD. MUMBAI

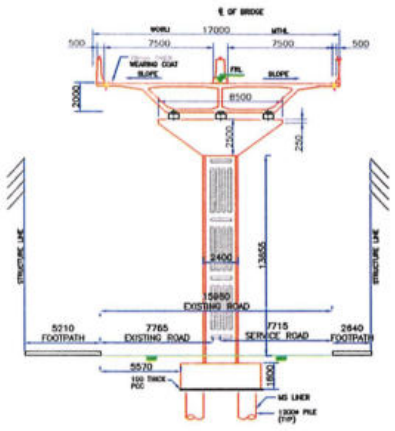
NOTE: FOR ROB (P67) SCOPE IS LIMITED UPTO SUB-STRUCTURE ONLY.

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CSS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS.

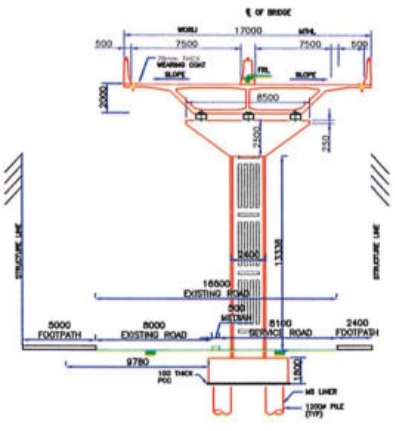
Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK: "DESIGN AND CONSTRUCTION OF SURFACE TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A1	TITLE: TYPICAL CROSS SECTIONS AT P67 TO P72
		SCALE: 1:1000	
		SHEET No: 10 of	DRG. No:
		DATE: MARCH 2019	REV. 01

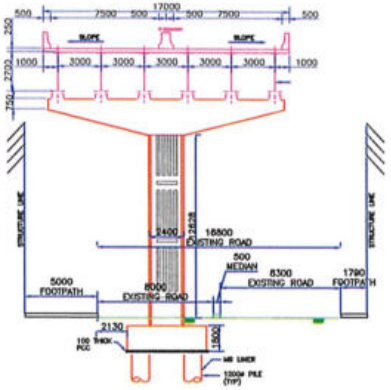
415



SECTION AT P73



SECTION AT P74



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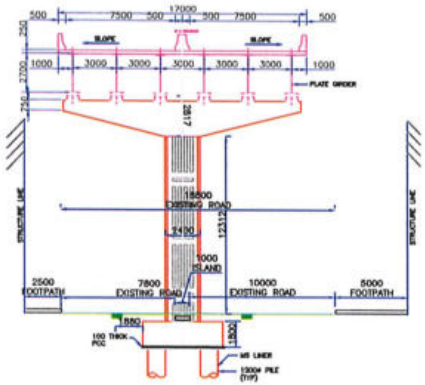

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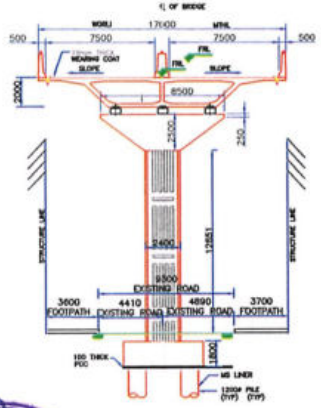
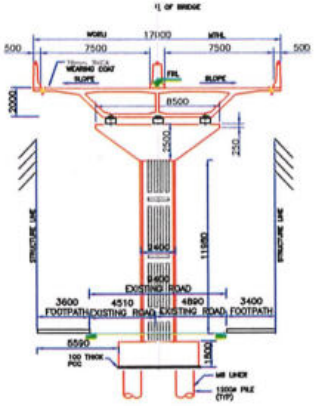


SECTION AT P77



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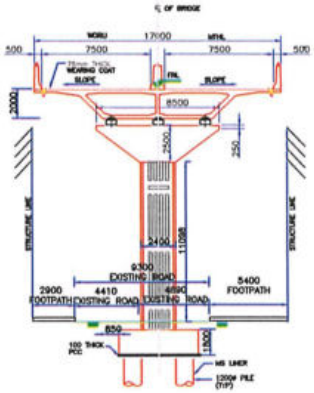
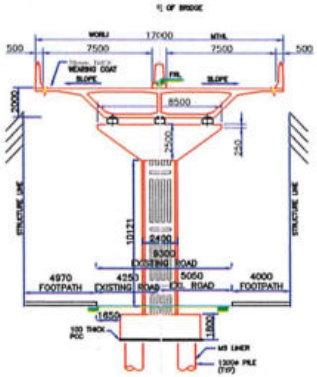
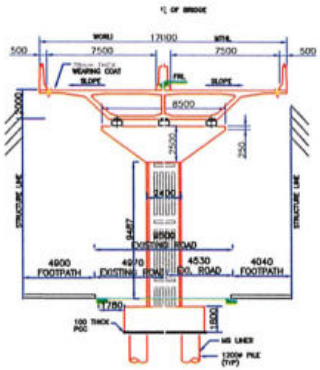


SECTION AT P79



SECTION AT P80



SECTION AT P81

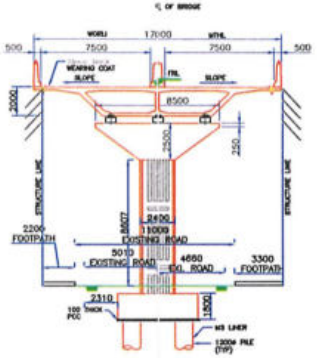
J. KUMAR INFRAPROJECTS LTD. MUMBAI

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CSS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA AND PROPOSED DEVELOPMENT EXCEPT THE OBLIGATORY PROVISIONS.

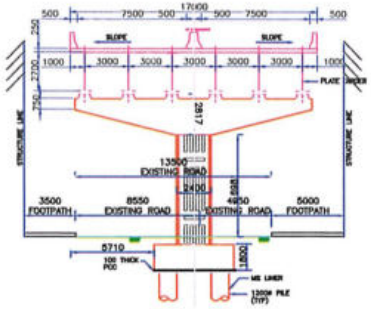
Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A3 / SCALE: 1:1000	TITLE: TYPICAL CROSS SECTION AT P73 TO P81
		SHEET NO: 11 OF	DRG. NO.
		DATE: MARCH 2019	REV.

418



SECTION AT P82



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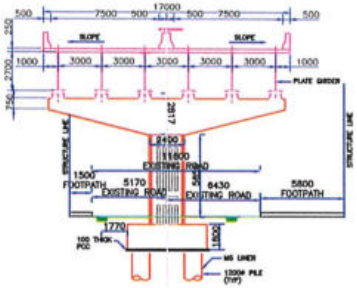

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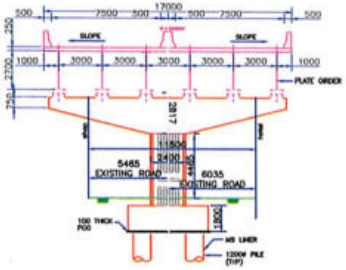

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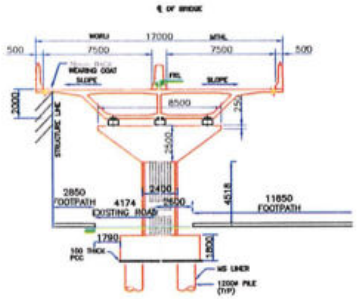
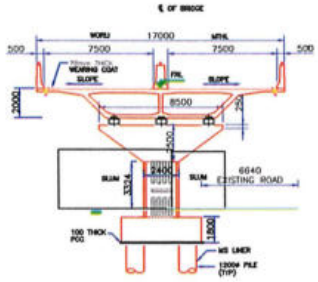
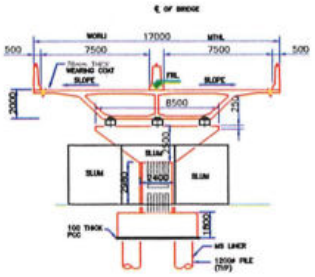


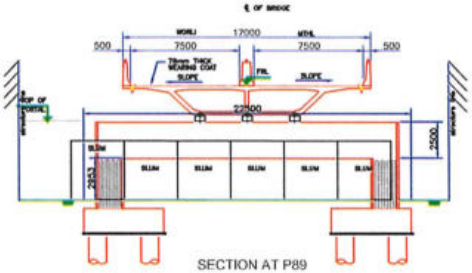
SECTION AT P86



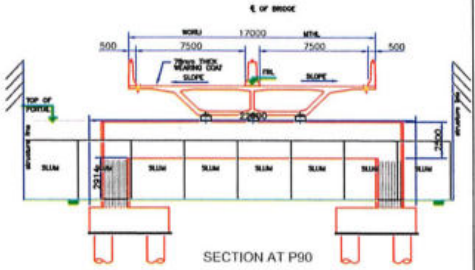
SECTION AT P87



SECTION AT P88



SECTION AT P89



SECTION AT P90

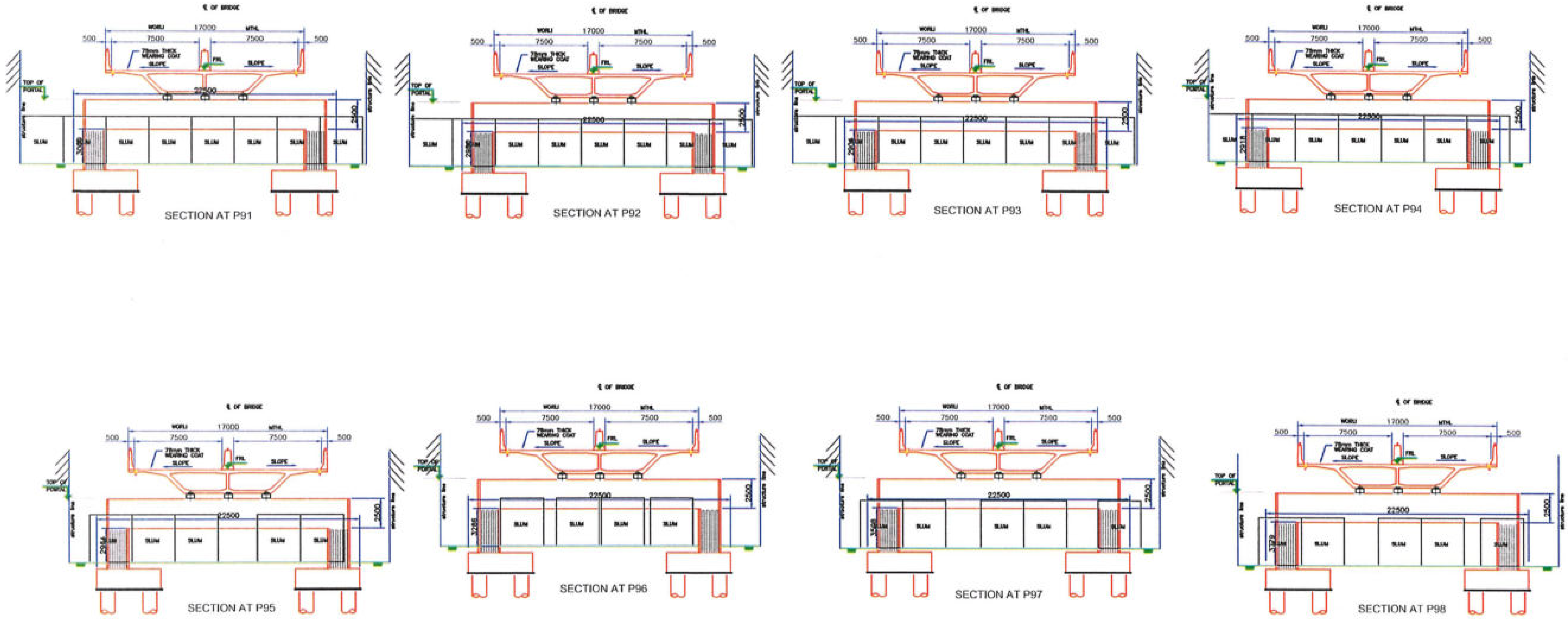
J. KUMAR INFRAPROJECTS LTD. MUMBAI

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CSS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS.

NAME OF THE WORK: DESIGN AND CONSTRUCTION OF SUKH TO WADALI ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A1 / SCALE: 1:1000 / SHEET NO: 12 OF	TITLE: TYPICAL CROSS SECTION AT P82 TO P90.
		DATE: MARCH 2019	DRG. NO: REV: 01

Chief Engineer,
Engineering Division
M.M.R.D.A.

420



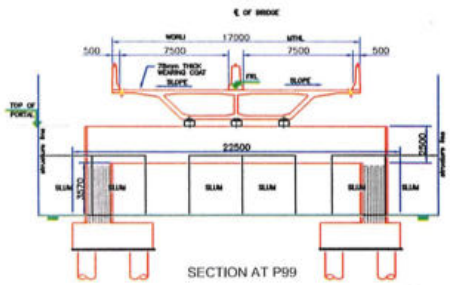
J. KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

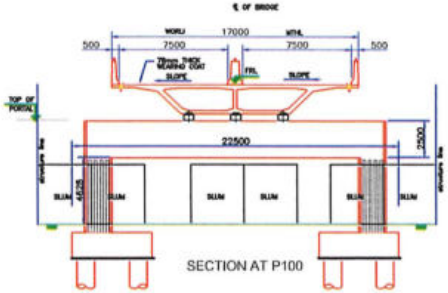
NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE C/S CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT [illegible]
THE OBLIGATORY PROVISIONS

NAME OF THE WORK: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE A3	TITLE: TYPICAL CROSS SECTION AT P91 TO P98
		SCALE 1:1000	
	[illegible] CONSULTANTS PVT LTD	SHEET NO. 11/20	[illegible] REV
		DATE MARCH 2019	R1

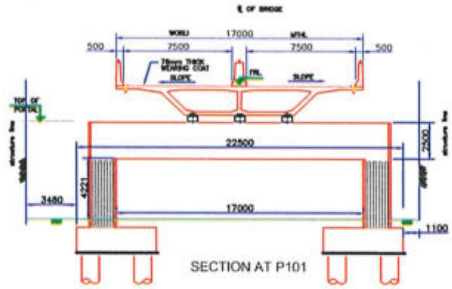
421



SECTION AT P99



SECTION AT P100



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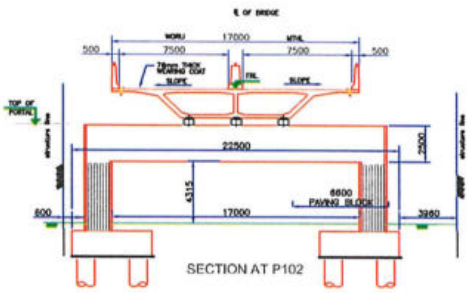
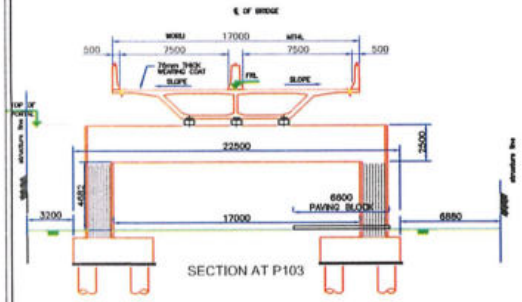
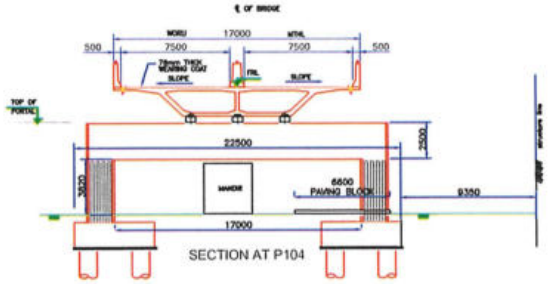


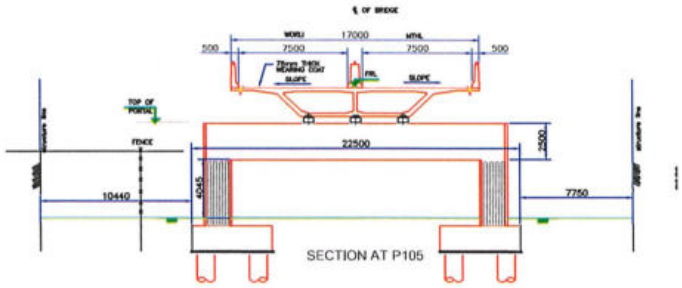
SECTION AT P102



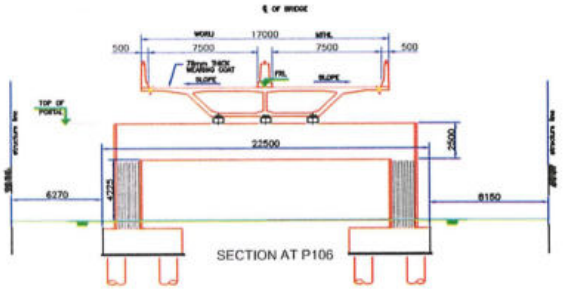
SECTION AT P103



SECTION AT P104



SECTION AT P105



SECTION AT P106

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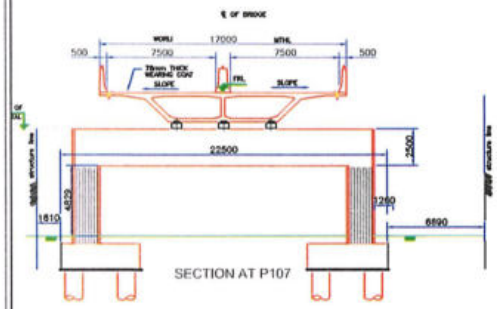
NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS.

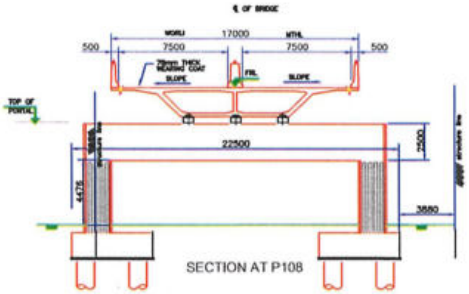
Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A3 SCALE: 1:1000 SHEET No: 11 OF DATE: MARCH 2019	TITLE: TYPICAL CROSS SECTION AT P99 TO P106 DWG No:

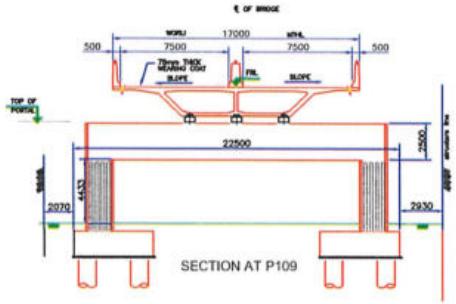
424



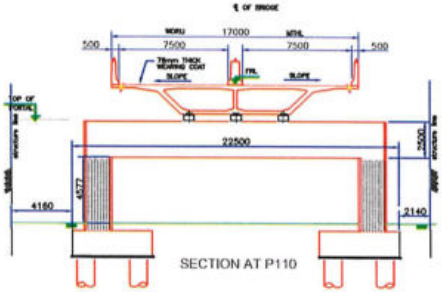
SECTION AT P107



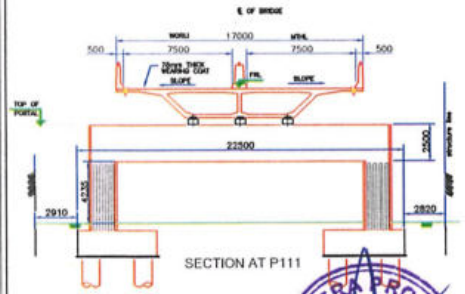
SECTION AT P108



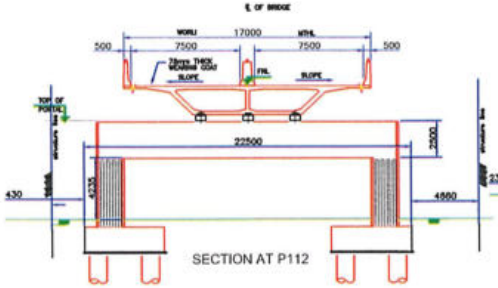
SECTION AT P109



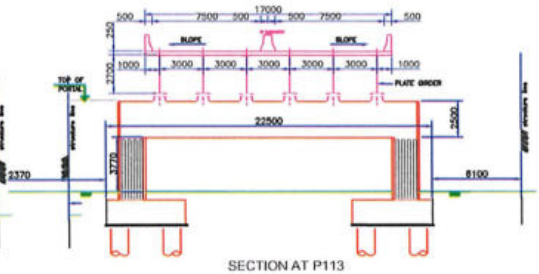
SECTION AT P110



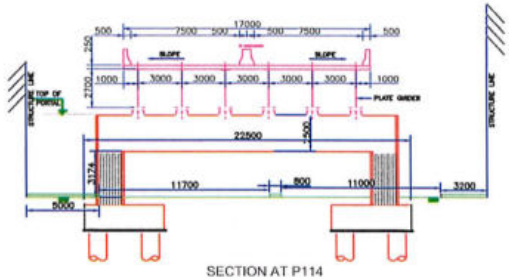
SECTION AT P111



SECTION AT P112



SECTION AT P113



SECTION AT P114

J.KUMAR INFRA PROJECTS LTD. MUMBAI

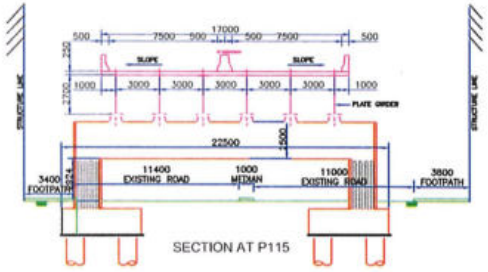
NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CSS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENTS EXCEPT THE OBLIGATORY PROVISIONS

Chief Engineer,
Engineering Division
M.M.R.D.A.

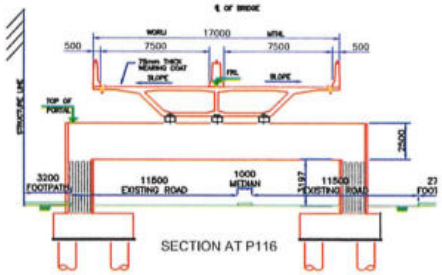
NAME OF THE WORK: DESIGN AND CONSTRUCTION OF SEAKLINK WORLI ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A1	TITLE: TYPICAL CROSS SECTION AT P107 TO P114
		SCALE: 1:100	
		SHEET No.: 15/28	DRG. No.:
		DATE: MARCH 2019	REV. A1

425

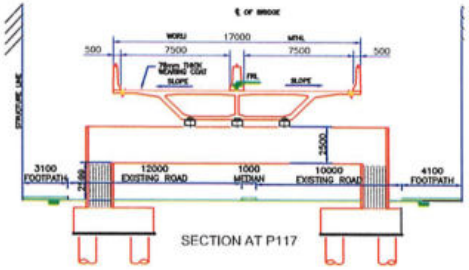
426



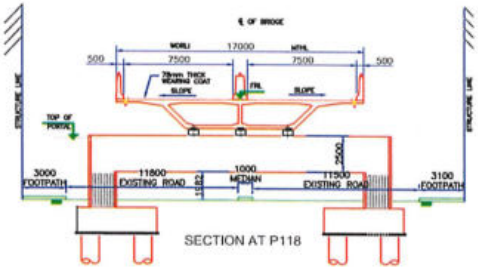
SECTION AT P115



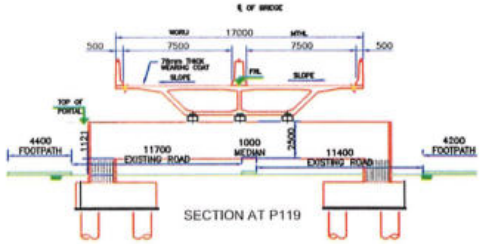
SECTION AT P116



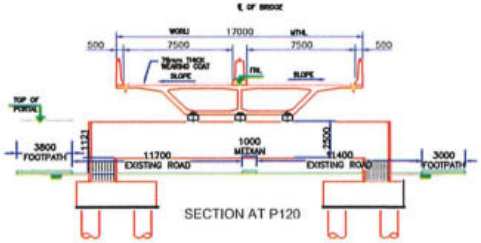
SECTION AT P117



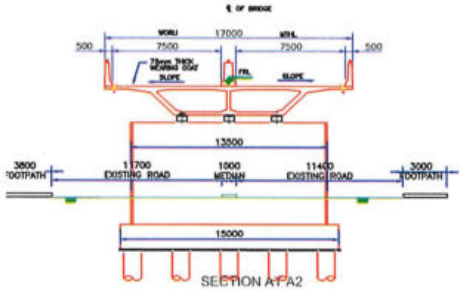
SECTION AT P118



SECTION AT P119



SECTION AT P120



SECTION AT P2

KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CSS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT STRICTLY WITHIN THE OBLIGATORY PROVISIONS

NAME OF THE WORK: DESIGN AND CONSTRUCTION OF SEWERI TO WORLI ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A3	TITLE: TYPICAL CROSS SECTION AT P115 TO P120
		SCALE: 1:1000	
		SHEET NO: 16/28	DRG. NO:
		DATE: MARCH 2019	REV. 01

828

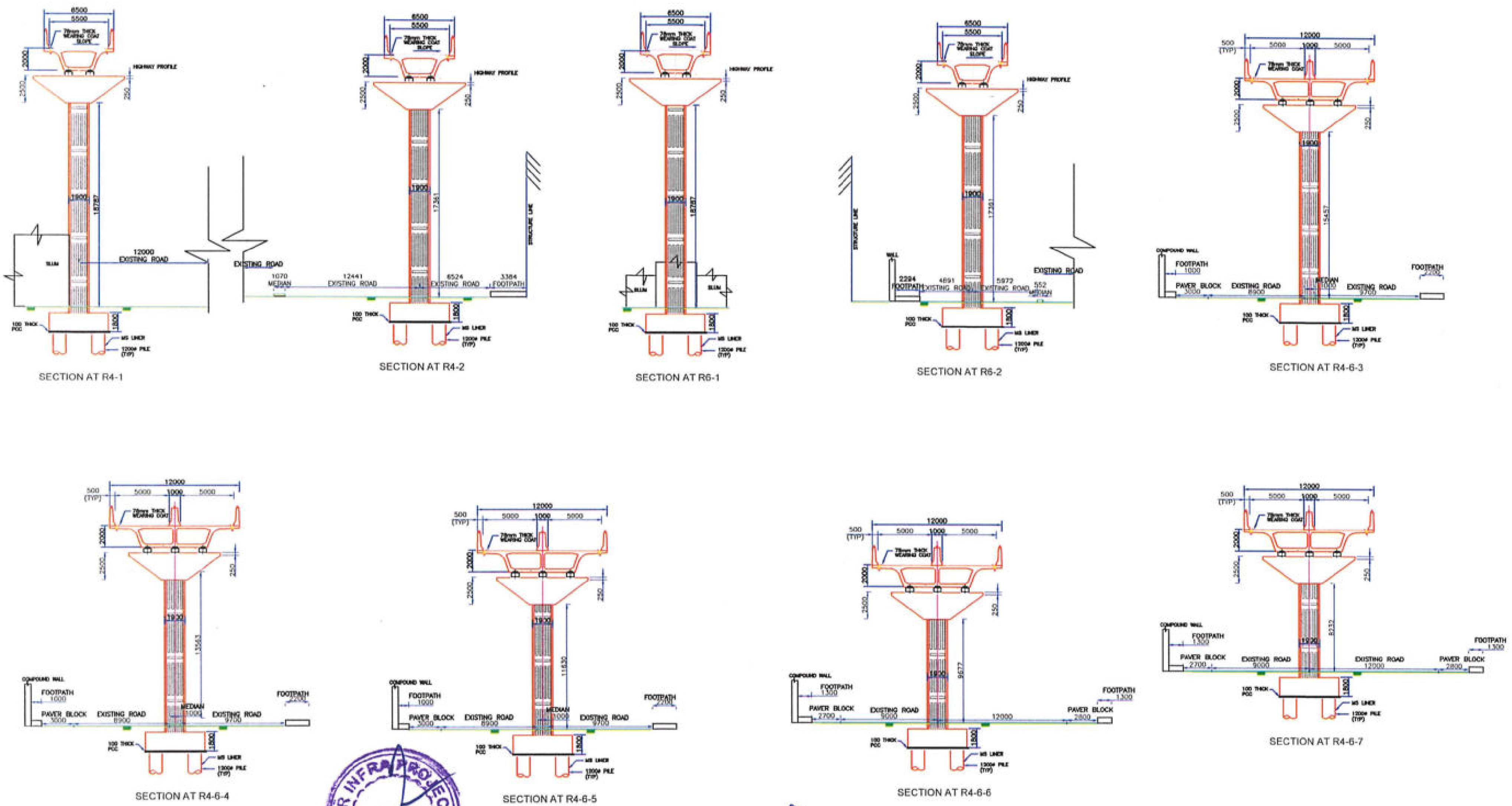
TYPICAL CROSS-SECTIONS

FOR RAMPS AT NORTH & SOUTH SIDE.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK:	CLIENT:	SHEET SIZE	TITLE:
"DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR"	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SCALE	TYPICAL CROSS SECTIONS FOR RAMPS AT NORTH & SOUTH SIDE
	MONARCH SURVEYORS & ENGINEERING CONSULTANTS PVT LTD	DATE JANUARY 2019	DWG NO



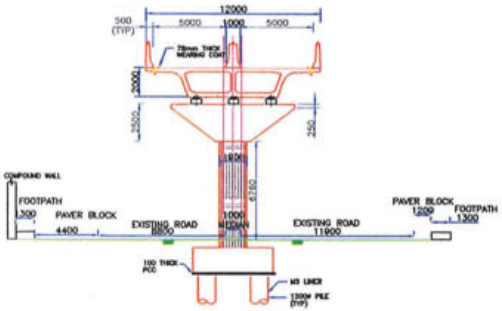
NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE C/S CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT EXCEPT THE OBLIGATORY PROVISIONS.

NAME OF THE WORK	CLIENT	SHEET SIZE	TITLE
DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	A1	TYPICAL CROSS SECTION AT NORTH SIDE R4-1 TO R4-6-7
		SCALE 1:1000	
		SHEET No. 17-20	DRG. No.
		DATE MARCH 2019	REV R0

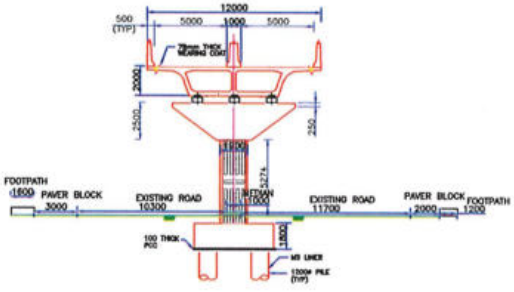
Chief Engineer,
Engineering Division
M.M.R.D.A.

J. KUMAR INFRAPROJECTS LTD. MUMBAI

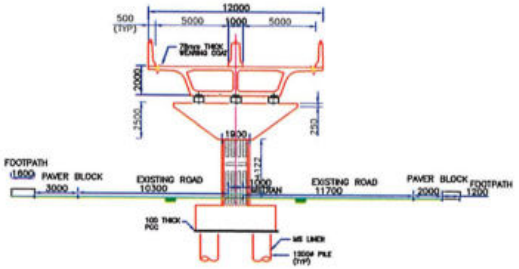
0000 431



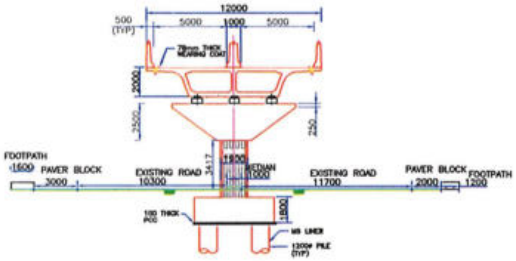
SECTION AT R4-6-8



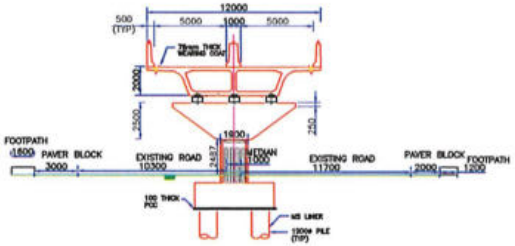
SECTION AT R4-6-9



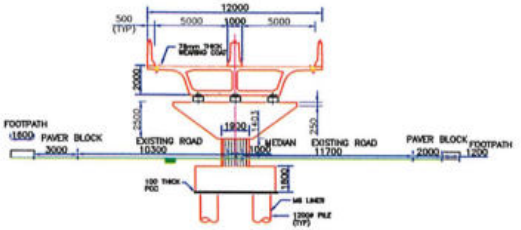
SECTION AT R4-6-10



SECTION AT R4-6-11



SECTION AT R4-6-12



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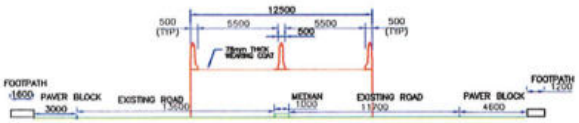


SECTION AT CH. 0+500 ON NORTH SIDE

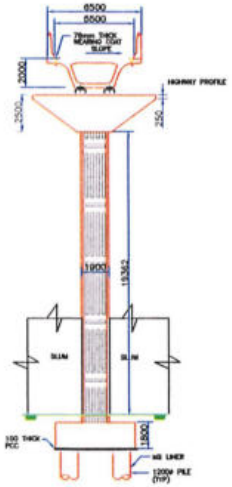
J.KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN [illegible] THE OBLIGATORY PROVISIONS

NAME OF THE WORK: UPDATION OF THE DETAILED PROJECT REPORT (DPR) FOR CONSTRUCTION OF SEWER TO WORLI ELEVATED OBJECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A3	TITLE: TYPICAL CROSS SECTION AT NORTH SIDE R4-6-8 TO R4-6-13
		SCALE: 1:1000	
		SHEET NO: 18 of	DRG. NO.
		DATE: MARCH 2009	REV. 04

434



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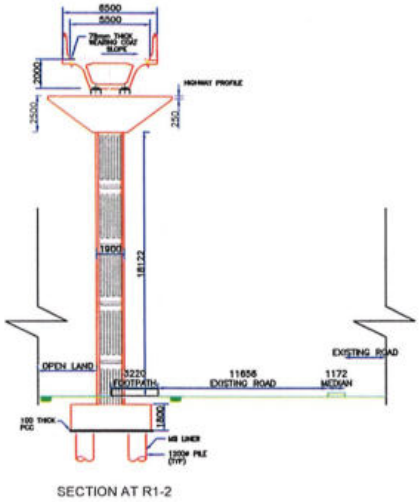

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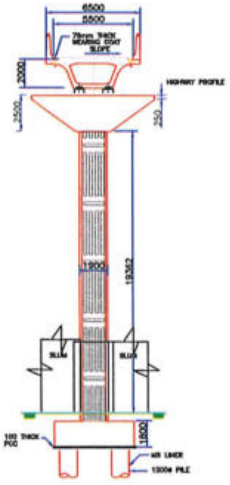

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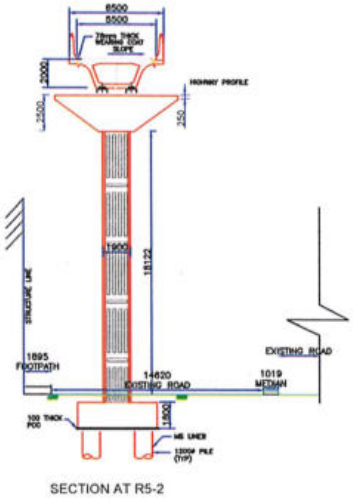
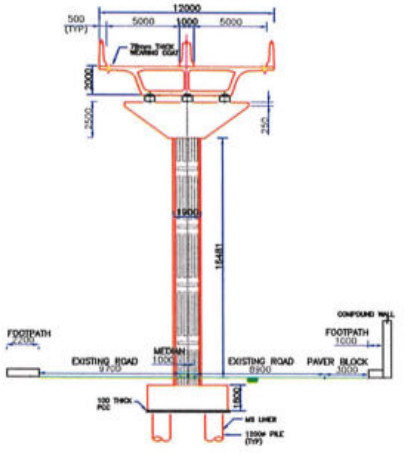


SECTION AT R5-2



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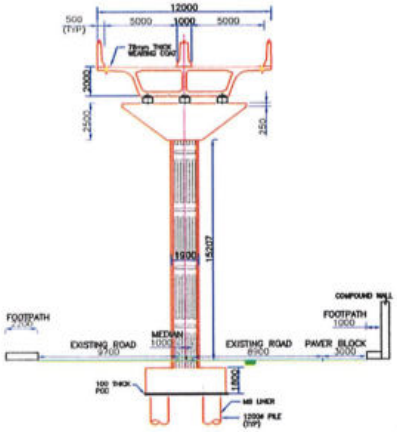

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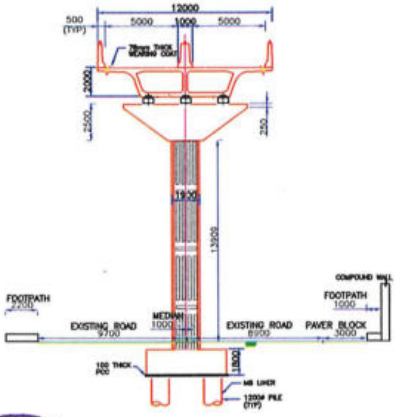
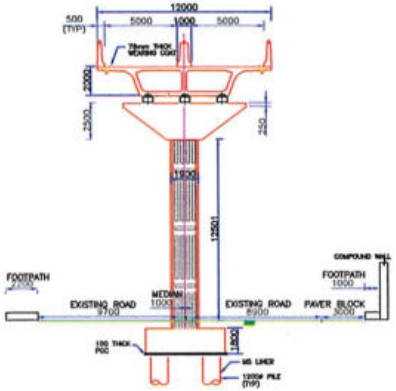


SECTION AT R1-5-5



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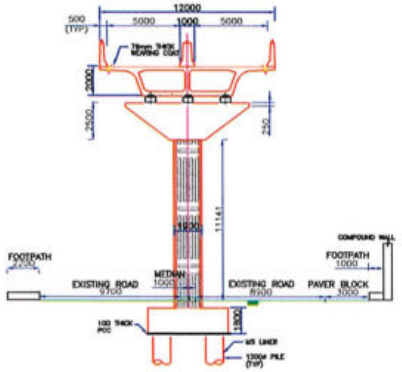


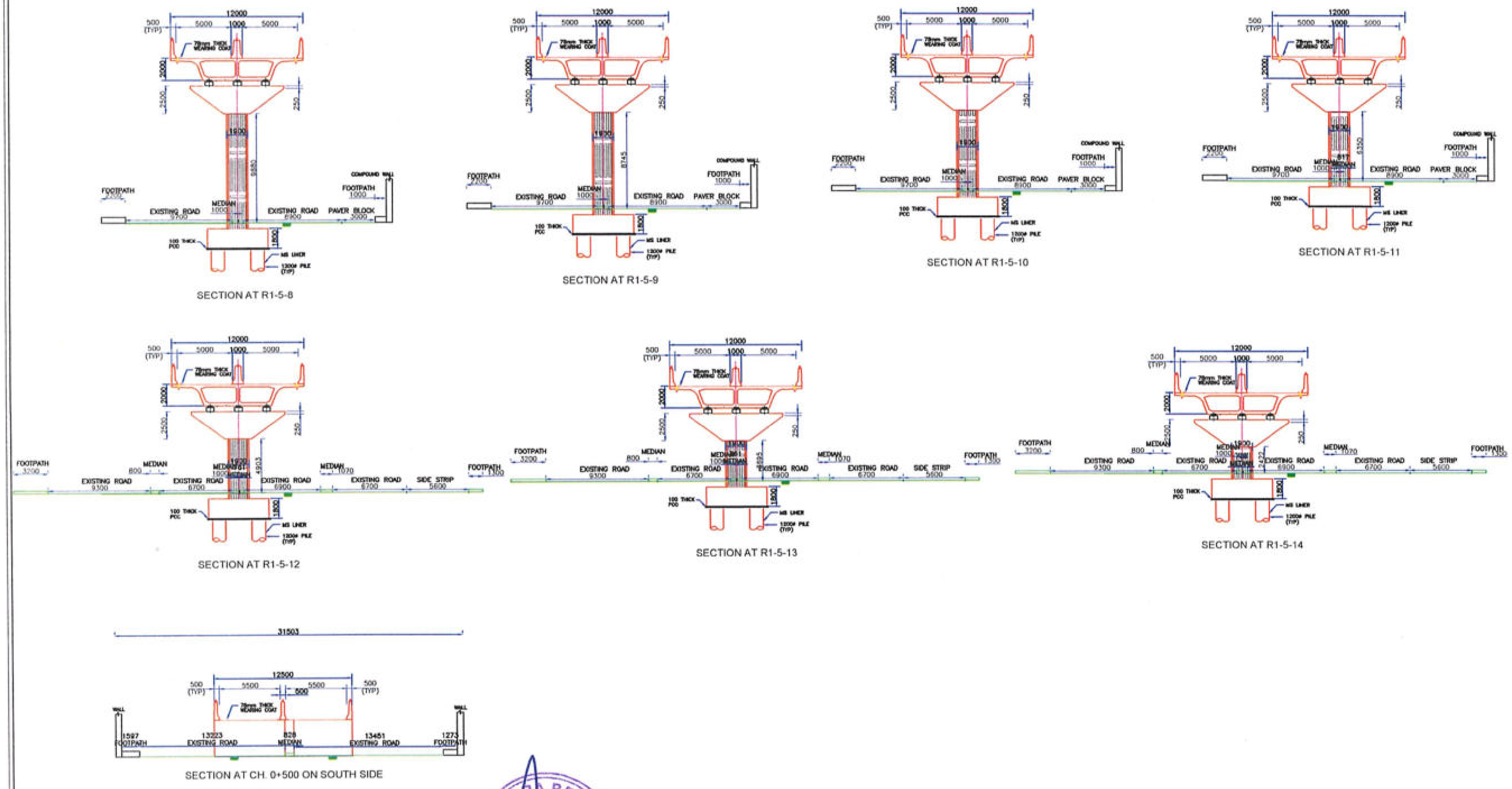
SECTION AT R1-5-7

J.KUMAR INFRA PROJECTS LTD. MUMBAI

NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE CSS CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENT AND THE OBLIGATORY PROVISIONS.

Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK: DESIGN AND CONSTRUCTION OF 35 KM ELEVATED CONNECTOR	MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY	SHEET SIZE: A1	TITLE: TYPICAL CROSS SECTION AT SOUTH SIDE R1-1 TO R1-5-2
		SCALE: 1:100	
		SHEET NO: 19/20	DRG. NO:
		DATE: MARCH 2019	REV. NO: 01



NOTE: THIS CROSS SECTIONS ARE TENTATIVE HOWEVER BIDDER MAY ADOPT THE SUITABLE C/S CONSIDERING REQUIREMENTS OF DESIGN CRITERIA MENTIONED IN TENDER DOCUMENTS & THE OBLIGATORY PROVISIONS.

NAME OF THE WORK: UPDATION OF THE DETAILED PROJECT REPORT (DPR) FOR CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

TITLE: TYPICAL CROSS SECTION AT SOUTH SIDE

DATE: MARCH 2019

Chief Engineer, Engineering Division M.M.R.D.A.

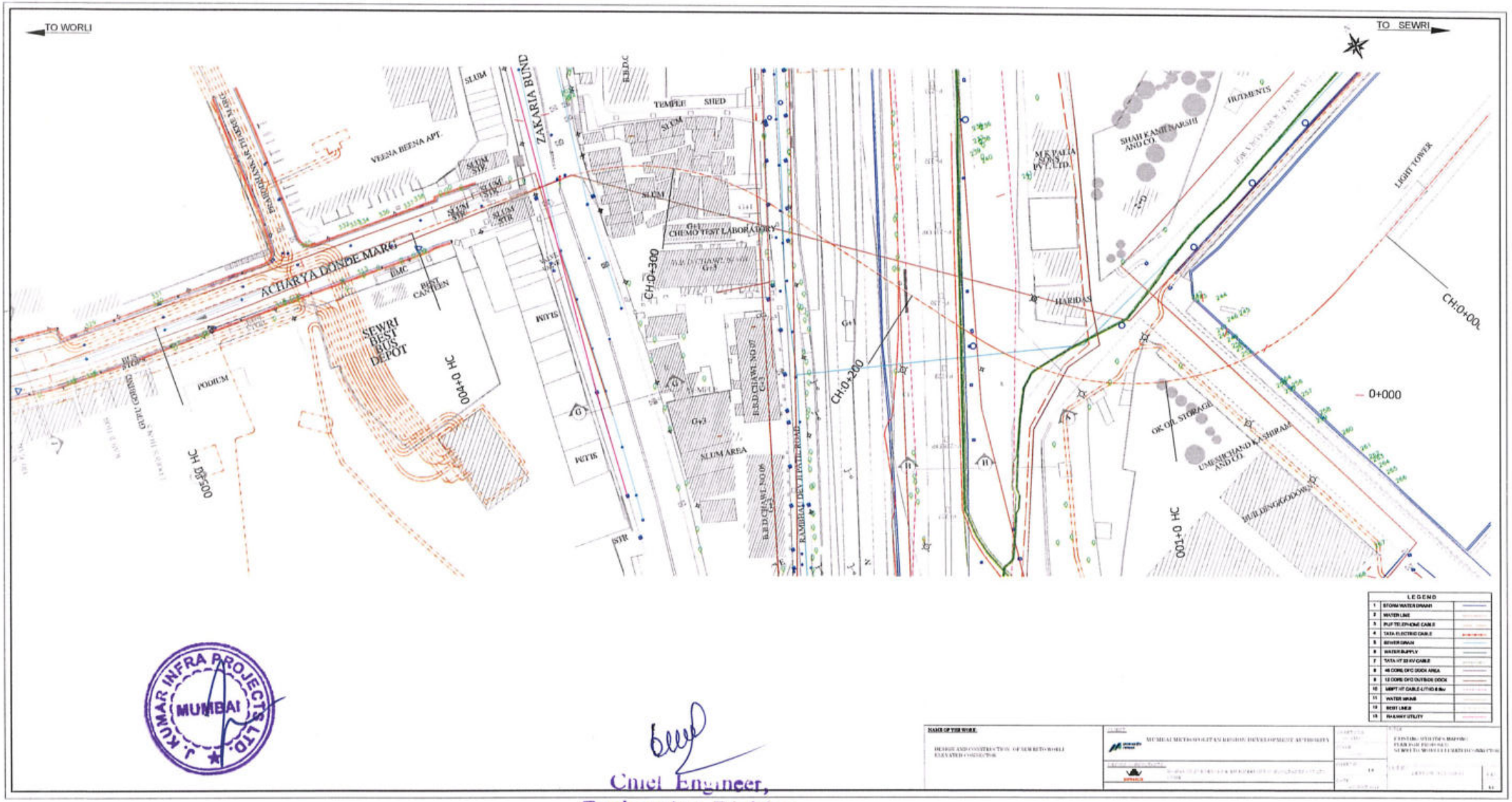
KUMAR INFRA PROJECTS LTD. MUMBAI

437

UTILITY PLAN

J. KUMAR INFRA PROJECTS LTD. MUMBAI

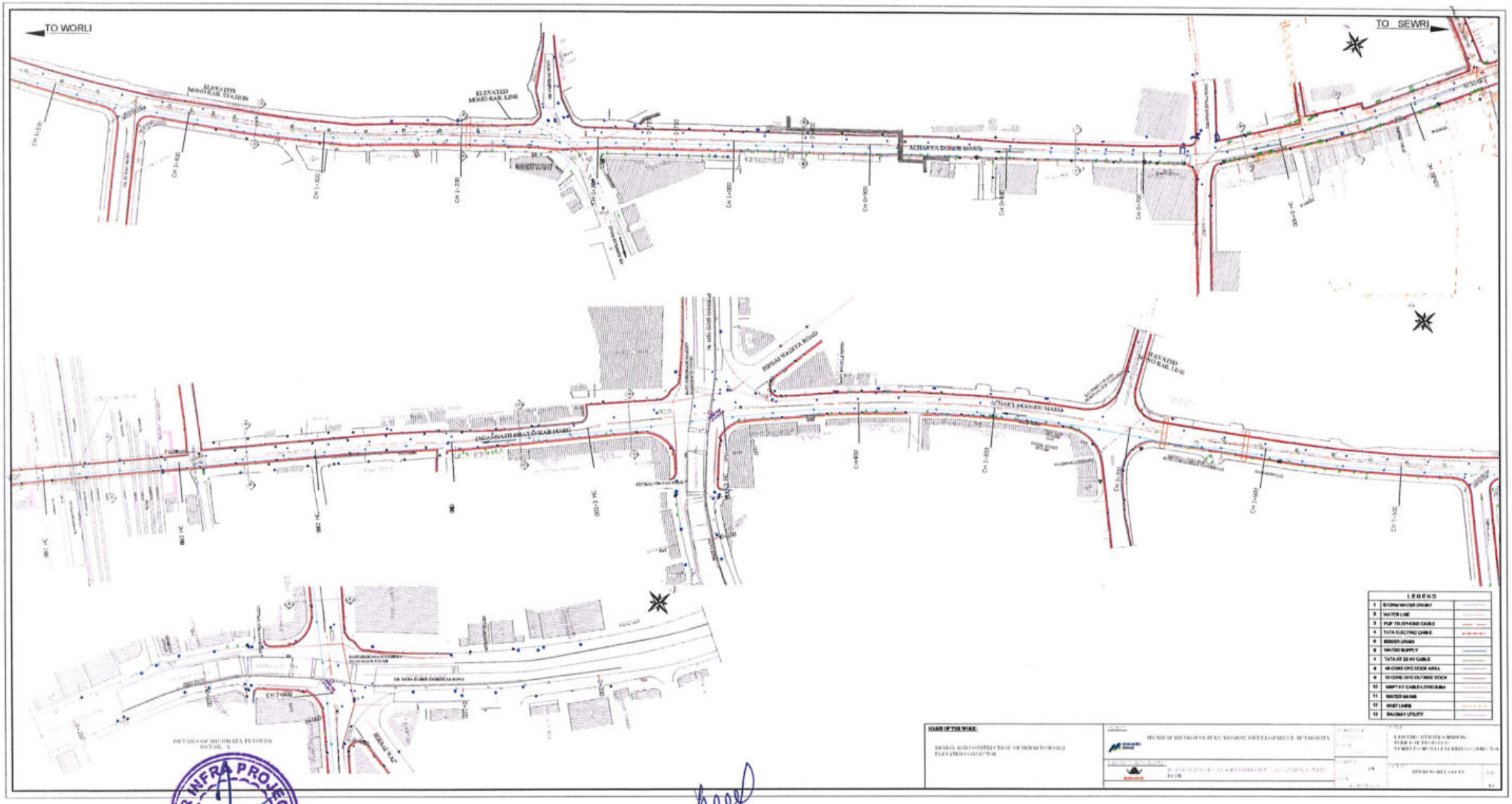
Chief Engineer,
Engineering Division
M.M.R.D.A.



J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

441



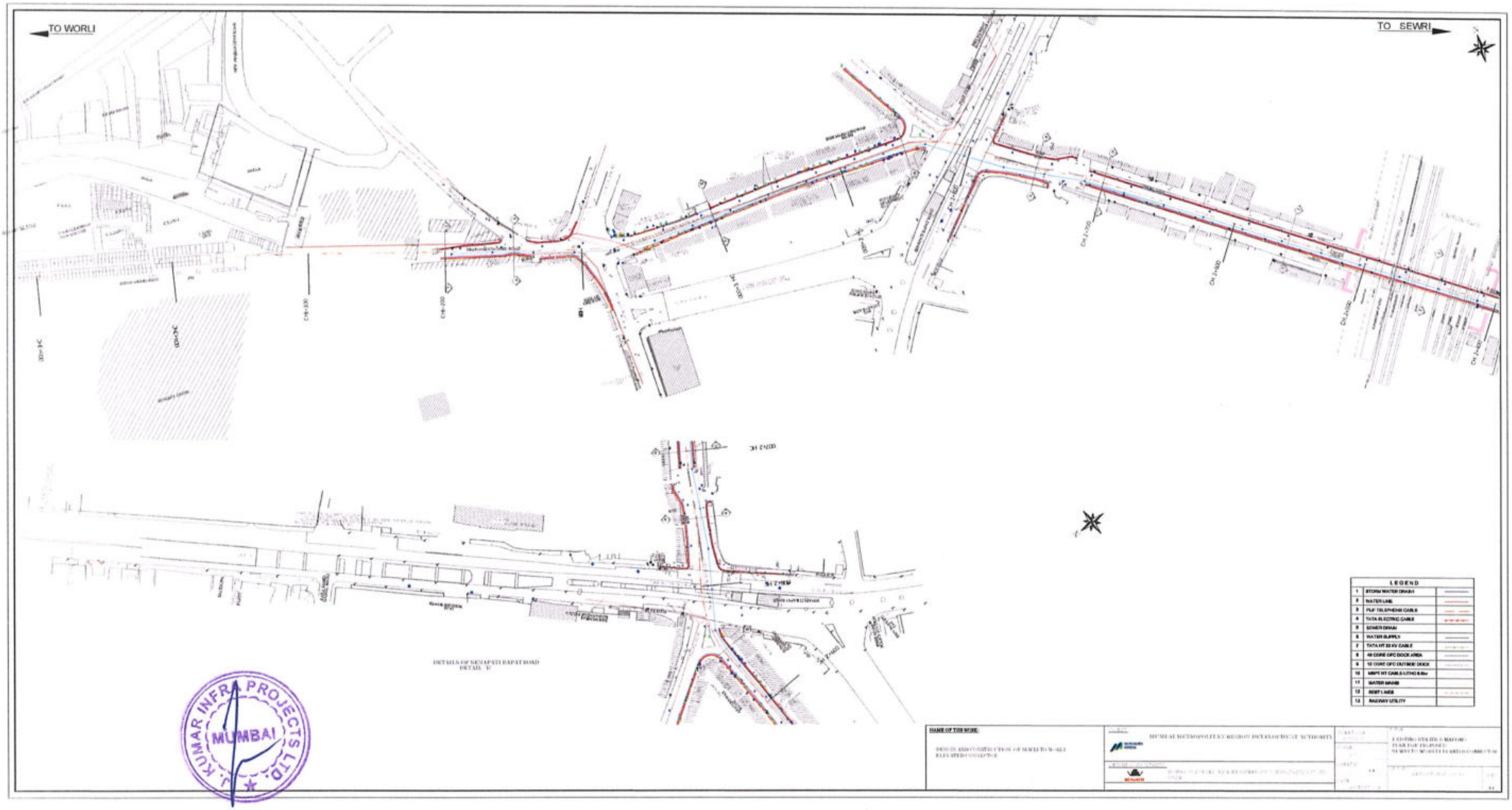
J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

443

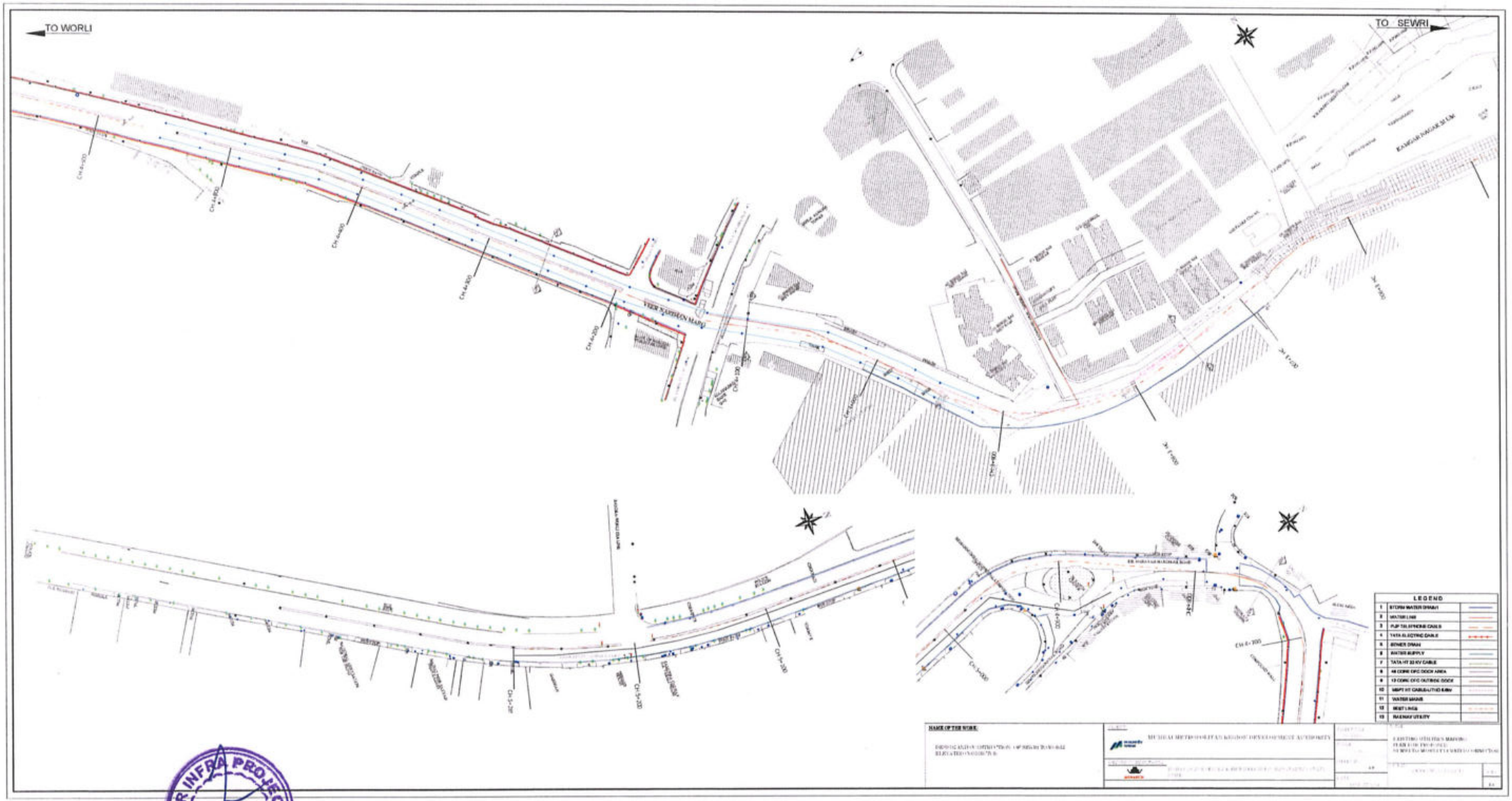
777

M.W.R.D.A.
Gurdaspur Division
Civil Engineer



Chief Engineer,
Engineering Division
M.M.R.D.A.

977



J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

447

GEOLOGICAL PROFILE

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

449

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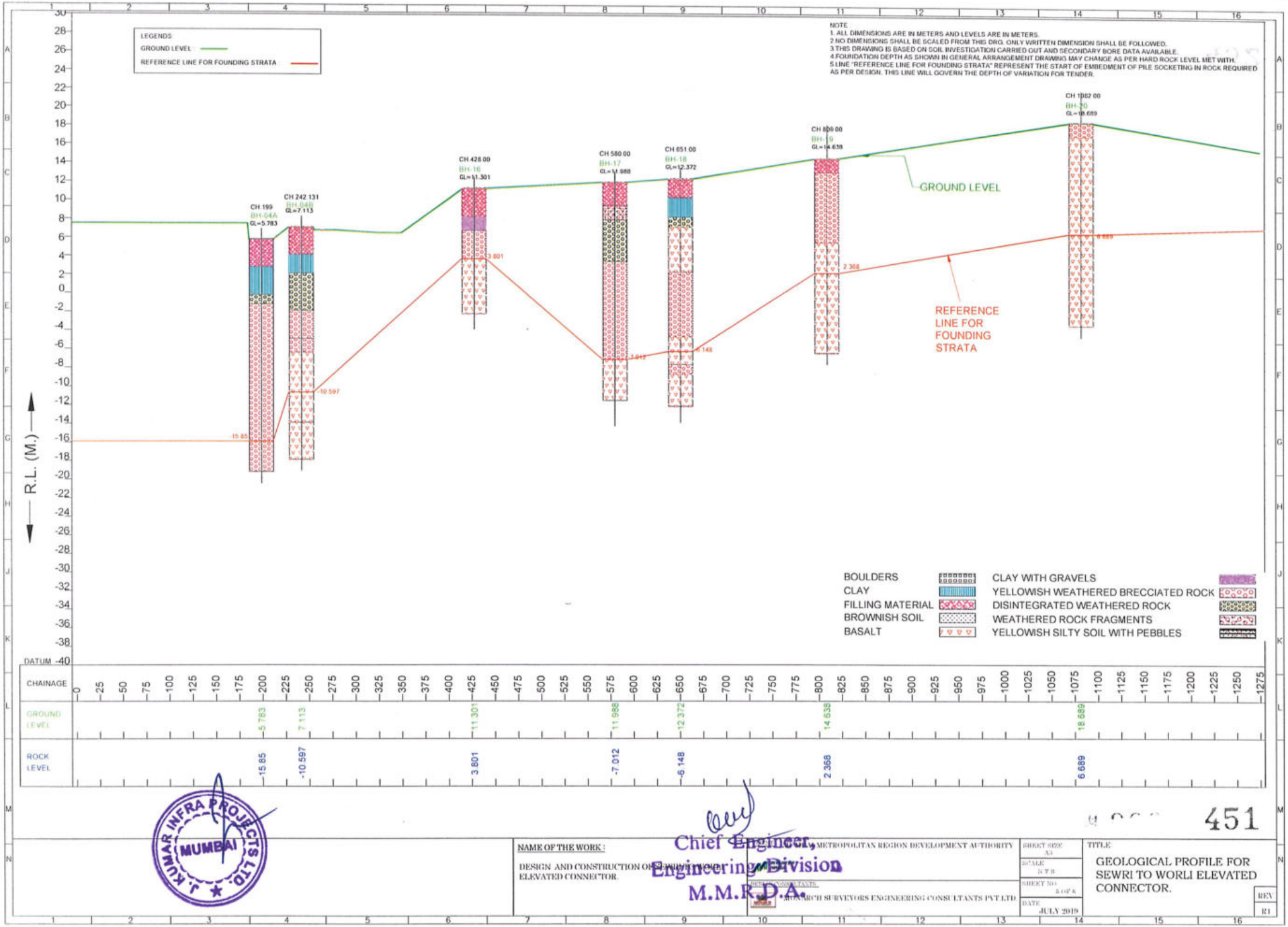


J.KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

451

NAME OF THE WORK :

DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR.

METROPOLITAN REGION DEVELOPMENT AUTHORITY

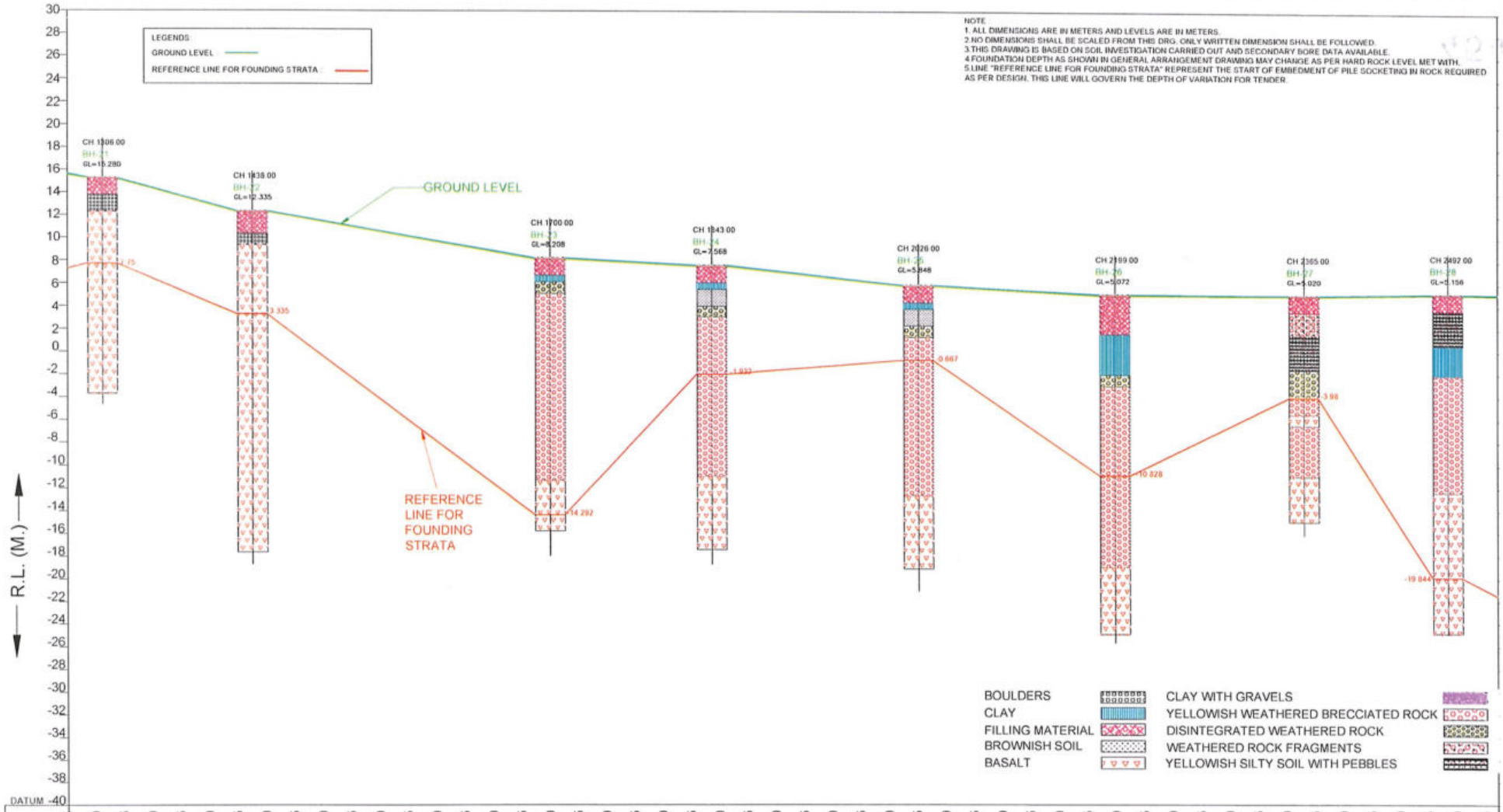
MARCH SURVEYORS ENGINEERING CONSULTANTS PVT LTD.

SHEET SIZE: A3
SCALE: N.T.S
SHEET NO: 5 OF 8
DATE: JULY 2019

TITLE

GEOLOGICAL PROFILE FOR SEWRI TO WORLI ELEVATED CONNECTOR.

REV. R1



453

L.T. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK :

DESIGN AND CONSTRUCTION OF [illegible] ELEVATED CONNECTOR.

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

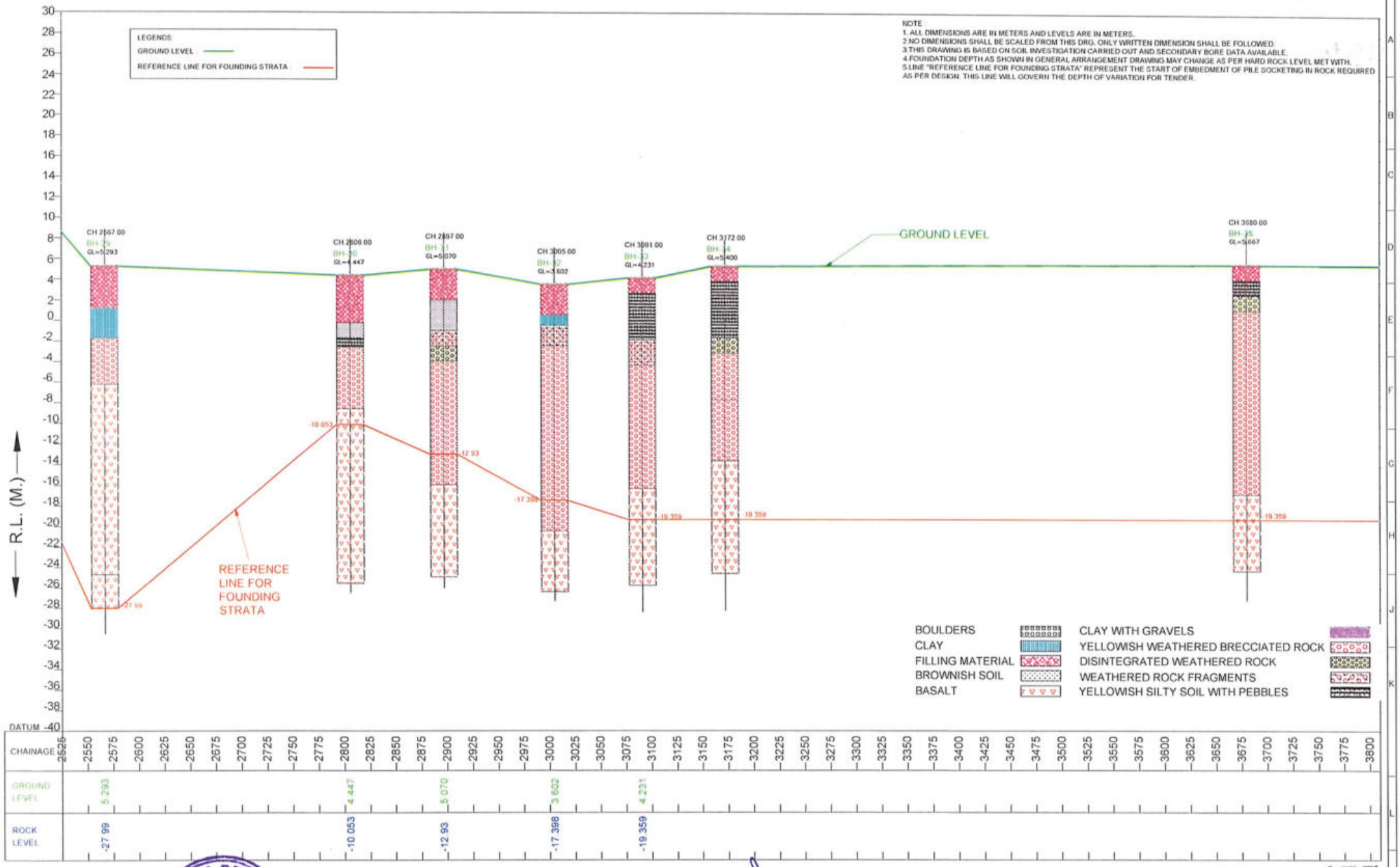
DESIGN CONSULTANTS: MONARCH SURVEYORS ENGINEERING CONSULTANTS PVT LTD

SHEET SIZE: A3
SCALE: N.T.S.
SHEET NO: [illegible] OF 8
DATE: JULY 2019

TITLE:
GEOLOGICAL PROFILE FOR SEWRI TO WORLI ELEVATED CONNECTOR.

REV: R1

454



455

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer
Engineering Division
M.M.R.D.A.

NAME OF THE WORK :

DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR.

CLIENT: MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

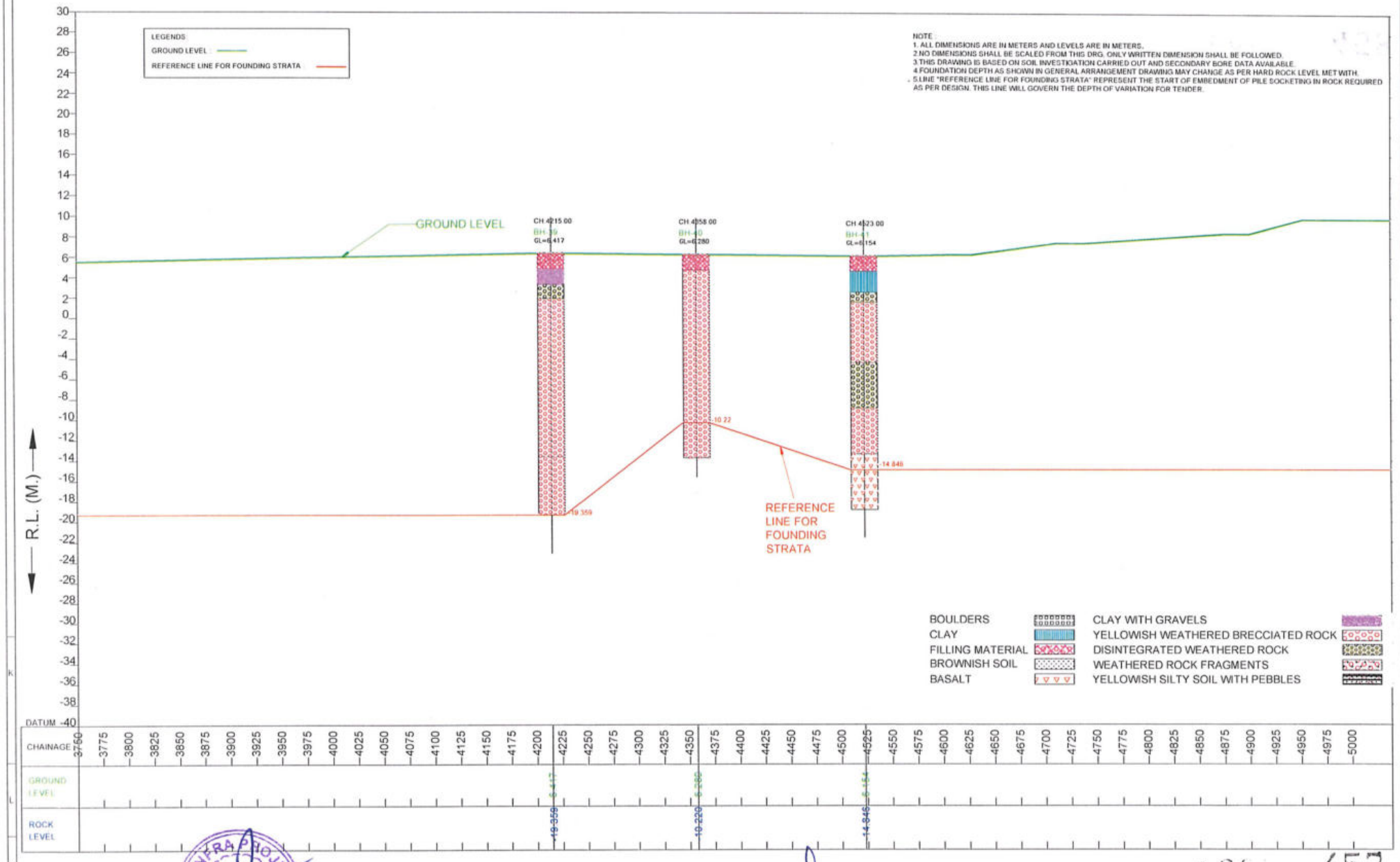
CONSULTANTS: MONARCH SURVEYORS ENGINEERING CONSULTANTS PVT LTD

SHEET SIZE: A3
SCALE: N.T.S.
SHEET NO.: 7 OF 8
DATE: JULY 2019

TITLE:
GEOLOGICAL PROFILE FOR SEWRI TO WORLI ELEVATED CONNECTOR.

REV: R1

957



457

J KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

NAME OF THE WORK :

DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR.

CLIENT : MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

MONARCH SURVEYORS ENGINEERING CONSULTANTS PVT LTD

SHEET SIZE : A3

SCALE : N.T.S

SHEET NO : 8 OF 8

DATE : JULY 2019

TITLE

GEOLOGICAL PROFILE FOR SEWRI TO WORLI ELEVATED CONNECTOR.

REV. R1

458

Sr..No	Page no	Clause No	Government Circular
1	142	3.8.1.12	The stainless steel material as specified at 5.2 pg. 154 shall be provided for ROB piers.
2	154		

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RAILWAY BOARD

No.2016/4/CE-III/BR/BSC/84/Seminar **New Delhi, dt 28.07.2017**

Principal Chief Engineers,
All Zonal Railways.

Chief Administrative Officers (Construction)
All Zonal Railways.

Sub: Use of Stainless steel reinforcement in construction of bridges

Prevention of corrosion in reinforcement is essential to ensure overall durability of RCC/PSC structures. Clause 7.1.5 of IRC-Concrete Bridge Code stipulates the corrosion resistant measures such as protective coatings of reinforcement bars etc. The issue was also discussed in 84th BSC meeting wherein it was recommended that in extreme cases, stainless steel reinforcement bars may be used.

Consequent upon issue of Indian Standard Code *"IS 16651:2017 - High Strength Deformed Stainless Steel Bars and Wires for Concrete Reinforcement – Specification"* in July'2017 and to ensure durability, it has been decided that in extreme cases, say upto 30 Km from coastal areas and in cases where corrosion is likely to reduce the life of structure, stainless steel reinforcement bars may be used ensuring that properties of stainless steel reinforcement shall not be inferior to the carbon steel reinforcement of corresponding strength class. The requisite correction slip to IRS-CBC has also been issued by RDSO.

(Surinder Kaul)
Adviser Bridges
Railway Board

Copy for information and necessary action to:

1. **CMD/RVNL, RITES, KRCL, IRCON, DFCCIL**
2. **ED/Structures/RDSO/Manak Nagar, Lucknow.**
2. **CBE/All zonal railways**

Chief Engineer,
Engineering Division
M.M.R.D.A.

Chief Engineer,
Engineering Division
M.M.R.D.A.

LAND HANDING OVER SCHEDULE

Sr No	CHAINAGE			Length	LOCATION	CLEARANCE FROM PERIOD FROM DATE OF WORK ORDER
	From	To				
1	0+000	0+450		450	Gadi adda to Bus Depot At Achrya Donde marg	6 months
2	0+450	2+100		1650	Bus Depot at Acharya Donde Marg up to parel flyover	On the date of work order
3	2+100	2+400		300	Parel flyover to Elphistone ROB	12 months
4	2+400	2+500		100	Elphistone ROB	12 months
5	2+500	2+800		300	Elphistone ROB to Senapati Bapat Marg	12 months
6	2.+800	3+100		300	Senapati Bapat marg to Dhanmil Naka	12 months
7	3+100	3+700		600	Dhanmil Naka to Kamgar nagar nagar - II (Drainage Channel road)	18 months
8	3+700	4+512		812	Century mill BLDG TO Narayan Hardikar Marg (Drainage channel marg)	On the date of work order
9	Ramp 1 (Starting at Ch 0+303.15)	R1 0+000 R1 0+060		60	MTHL To Nath pai Marg (Connecting to SWEC At ch 0+350)	12 months
9.1		R1 0+060 R1 0+600		540	MTHL To Nath pai Marg (Connecting to SWEC At ch 0+350)	On the date of work order
10	Ramp 2 (Starting at Ch 0+520)	R1 0+520 R1 0+840		320	MTHL To Acharya Donde marge	On the date of work order
11	Ramp 3 (Starting at Ch 0+520)	R1 0+520 R1 0+840		320	Acharya Donde Marge to MTHL	On the date of work order
12	Ramp 4 (Starting at Ch 0+325.93)	R1 0+000 R1 0+060		60	MTHL To RA Kidwai Marg	12 months
12.1		R1 0+060 R1 0+530		470	MTHL To RA Kidwai Marg	On the date of work order
13	Ramp 5 (Starting at Ch 0+370.25)	R1 0+000 R1 0+060		60	Nath Pai Marg to Acharya Donde marg	12 months
13.1		R1 0+060 R1 0+600		540	Nath Pai Marg to Acharya Donde marg	On the date of work order
14	Ramp 6 (Starting at Ch 0+359.94)	R1 0+000	R1 0+060	60	Acharya Donde to R A Kidwai Marg	12 months
14.1		R1 0+060	R1 0+530	470	Acharya Donde to R A Kidwai Marg	On the date of work order

J.KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Corrigendum,

CSC & CSD

Chief Engineer,
Engineering Division
M.M.R.D.A.

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

एम एम आर डी ए
MMRDA

Bandra-Kurla Complex, Bandra (East), Mumbai - 400051.
Tel: +91-22-26594076
Website : https://mmrda.maharashtra.gov.in

Corrigendum No - I

Mumbai Metropolitan Region Development Authority (MMRDA) has invited bids from eligible Bidder through e-Tendering for the following work. Following changes are made in original tender.

Sr No.	Parameter	Details
1.	Tender Number	MMRDA/ENG1/0001790
2.	Division	Engineering Division
3.	Name of Tender	Design and Construction of Sewri Worli Elevated Connector -**2nd Call**
4.	Corrigendum for	Common set of clarification & Common set of deviation

This Corrigendum No.1 shall form part of the tender document as mentioned in the tender document. This e-tender shall be available for free download on registration at **https://etendermmrda.maharashtra.gov.in.**

For any e-tendering support, mail MMRDA e-tendering Helpdesk at **etenderhelp@mailmmrda.maharashtra.gov.in** or call Helpdesk on **022-26597445.**

Date : 20.08.2019
Place : Mumbai

KUMARTHERA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Chief Engineer,
Engineering Division
M.M.R.D.A.

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Clarifications (CSC)

The Common Set of Clarifications is not part of the Bid Documents

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
M/s J. Kumar Infraprojects Ltd.				
1.	Volume 01 Page 10 Eligibility Criteria Point 9.	Estimated Cost: INR 864.37 Crore	Looking to the quantum of work, Alignment of the project, site conditions etc, we request MMRDA to review the estimated cost of work put to tender as it seems to be on lower side.	Please refer to Sr. No. 3 of the CSD
2.	Volume 01 Page 10 Eligibility Criteria Point 9.	Bid Security: INR 8.64 Crore	Looking to the current banking sector, we request you to reduce the amount of bid security to 0.5% of the estimated cost of work instead of 1%. This request is already being accepted in MMRDA and all the recently invited tenders is asking bid security as 0.5% of estimated cost like CA 07R, Line 9 CA 48, Vasai Creek Bridge, Rajnoli flyover, Metro Bhawan etc.	Please refer to Sr. No. 3 of the CSD
3.	Volume 01 Page 10 Bid Security	Bid Security	We have issued the Bid security of requisite amount and submitted the tender in the 01st call of bidding. We request you to please accept our Bid security if it fulfills the requisite validity of BG as asked in present tender. We will submit the necessary amendment of BG from the bank by mentioning the word of 02nd call in the name of work.	Please refer Sr. No. 7 of CSD
4.	Volume –I Page 35 Clause 42	Within fourteen (14) days of the receipt of notification of Security award from the Employer, the successful Bidder shall furnish the performance security in accordance with the General Conditions of Contract, subject to ITB 35.5.	Looking to the current banking sector, we request you to give at least 30 days time to submit the PBG.	Please refer Sr. No. 6 of CSD

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

465

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
5.	Volume –I Page 35 Clause 42	Within fourteen (14) days of the receipt of notification of Security award from the Employer, the successful Bidder shall furnish the performance security in accordance with the General Conditions of Contract, subject to ITB 35.5.	We request you to allow the contractor to submit the PBG as per the land handing over of site to the contractor. Contractor should allow to submit the 50% PBG within 30 days from date of receipt of LOA and balance 50% after getting at least 60% of the handing of site free from encumbrance from MMRDA. This will maintain the spirit of taking the PBG from the contractor.	Provisions in the NIT shall prevail.
6.	Volume –I Page 84 Cl. 4.15(f)	During execution of work, the Contractor shall be responsible for the day to day maintenance & Ordinary repairs of existing road as well as diverted road, storm water drains, cross culverts/drains etc. including monsoon season of the complete length of the road right from the date of the work order till handing over of road to concern authority, even though he proposes to take up the length for improvement in phases. His offer / rates shall be deemed to be inclusive of the cost of such repairs and no separate payment towards these maintenance would be payable to him.	We presume that this maintenance work is only for inside the barricading area i.e within ROW and the maintenance work outside the barricading area will be paid extra over and above the quoted price under provisional sum as per prevailing MCGM SOR as per the tender condition of Mumbai Metro projects invited by MMRDA. Copy enclosed.	Provisions in the NIT shall prevail.
7.	Volume –I Page 102 P C clause 14 Sub Cl. 14.2	The Maximum amount due to price variation will be restricted to 5% of the accepted contract value, excluding the compensation payable for the material (Bitumen, Steel & Cement).	Considering the time period of work and volatile market condition, we request you to delete the ceiling limit of price variation.	Please refer Sr. No. 14 of CSD
8.	Volume –I Page 107 P.C. clause 13.8.2	If secured advance is paid to the Contractor on any of the above base materials as per Clause 14.2.1,	We request you to provide the secured advance of 85% of the cost of materials brought to site for project work.	Provisions in the NIT shall prevail.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
9.	Volume –I Page 107 P C clause 14 Sub Cl. 14.2	The Employer shall make an advance payment as an interest bearing carrying rate of interest of 12% per annum as Mobilization Advance, after the submission of Bank Guarantee by the Contractor in accordance with this sub-clause.	We request you to make Interest free advance payment of 10% of contract amount as per the tender condition of Vasai Creek bridge, all Mumbai Metro invited by MMRDA. Copy enclosed	Provisions in the NIT shall prevail.
10.	Volume –I Page 108 P C clause 14 Sub Cl. 14.3	The percentage of retention in each interim payment shall be six percent (6%) until a limit of Retention money equal to five percent (5%) of the Contract Price is reached. The Contractor will be allowed to convert 75% of Retention Money after issue of substantial completion certificate in the form of a Bank Guarantee. The balance retention money including the converted Bank Guarantee shall be released after the issuance of Performance Certificate by the Employer.	We request you to allow the contractor to convert the Retention money into BG from start of work in such a way that the refund shall be made in tranches of not less than INR 01 Crore. This type of provision is accepted in Major Govt. tenders and also in SCLR Ph 01 project of MMRDA (Copy enclosed). This will help the contractor to maintain the cash flow and to complete the work on time. We also request to release the 75% of retention money (Cash / BG) after completion of work and balance 25% after issue of Performance certificate.	Please refer Sr. No. 15 of CSD
11.	Volume –I Page 160 Section VIII Appendix to tender	Defects Notification Period 24 months for Bituminous Road works, 60 months for Viaduct Proper & Retaining Wall,	We request you to reduce the Defects Notification Period for 24 months for complete project including viaduct in line with all Mumbai Metro projects. Copy enclosed.	Provisions in the NIT shall prevail.
12.	Volume –II Page 7 Clause D	The payment towards such alterations shall be made as per the rates given in schedule of variations irrespective of the offer of the accepted Tender.	We request you to increase / decrease the variation rates provided in tender as per the quoted offer of the successful bidder i.e. above / below percentage with respect to estimated cost. This is already accepted in SCLR Phase I tender of MMRDA. Copy enclosed	Provisions in the NIT shall prevail.
13.	Volume –II Page 7 Sr.No. 5	Variation in the plan area of the bridge deck of Steel superstructure.	We presume that this rate is applicable for variation up to 60m span length only. We request you to include one more additional rate of Rs 1,80,000/- (approx) for variation in the plan area of the bridge deck of Steel superstructure	Please refer Sr. No. 17 of CSD

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

467

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
			having span more than 60m and above as special type of arrangement are required for these type of span and incurred more cost than that mentioned at sr no 05.	
14.	Vol 04 Part 1 Cross Section: sheet 1/16, sheet 5/16, 8/16	There are two types of through type truss systems given in plan and profile: (a) Two single Through type truss (10.3m width) for each carriageway at pier location P6-P7 and P66-P67 (b) Single Through type truss (22m width) at pier location P38-P39 and P55-P56.	Shall we opt for single truss system for all above locations if it is feasible? Please Confirm	1. pier location P6-P7 Sewri ROB & pier location P66-P67 Elphinstone ROB superstructure not part tender scope. 2. Pier location P38-P39 and P55-P56. Please refer Sr. No. 16 of CSD
15	Vol 04 Part1/ Part B General	In general arrangement drawing (GAD), PSC box girder is shown for all pier locations (except at obligatory spans).	Is provision of PSC box girder is mandatory? Also Shall we opt for other superstructure type (such as PSC I-girder) if it is feasible? Please Clarify.	Provisions in the NIT shall prevail.
M/s N.C.C Ltd				
16	Volume I Pg. 107 - Clause 14	The Employer shall make an advance payment of 10% of the Contract amount as interest bearing loan after commencement of works for Mobilization	We request you to pay us an interest free mobilization advance. We further request you to grant us Plant and machinery advance @ 5% of contract price and secured advance @ 90% of the cost of the material brought at site.	Provisions in the NIT shall prevail.
17	Volume I Pg. 102 - Clause 13.8	Upper Limit of Price Adjustment - The Maximum amount due to price variation will be restricted to 5% of the accepted contract value, excluding the compensation payable for the material (Bitumen, Steel & Cement).	Considering the project duration i.e. 36 months and volatile nature of market, you are requested to kindly not to limit maximum price variation at 5% of contract price. The price variation may please be payable as per actual without any upper limit.	Please refer Sr. No. 14 of CSD

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Chief Engineer,
Engineering Division
M.M.R.D.A.

468

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
18	Volume I Pg. 117	Land for labour camps, storage yards temporary site sheds etc, will be arranged by the contractor at his own cost.	We request you to provide land for labour hutment, site offices, stores, casting yards, fabrication yards etc. nearby site at free of cost.	Provisions in the NIT shall prevail.
		Bonus/Incentive for early completion	We request you to kindly incorporate bonus / incentive clause for early completion of the works.	Provisions in the NIT shall prevail.
19	Volume I Pg. 40	The dead line for bid submission is: Date:28.08.2019, Time:- up to 10.00Hrs.	Considering the quantum and complexity of the work, the bid submission date may please be extended by at least 3 weeks from the current submission date.	Provisions in the NIT shall prevail.
M/s L&T Ltd.				
20.	Volume I Section I/ ITB page 35 Clause 41.1	Signing of Contract Promptly upon notification, and no later than twenty eight days of the receipt of the notification of award from the Employer, ... of Performance Security as per Clause 42 below.	Contract Agreement shall be signed only after Land Handing over	Provisions in the NIT shall prevail.
21.	Volume I Section I/ ITB Clause 42.1 page 35	Performance Security Within Twenty Eight (28) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the General Conditions of Contract, subject to ITB35.5.	Performance Security shall be linked to Land Handing Over or linked to percentage of land handing over for %age of PS.	Provisions in the NIT shall prevail.
22.	Volume I Section VI/ Particular Conditions (PC) Clause 1.13 (b)	Compliance with Laws The contractor shall give all notices, pay all	(1) Permits in GC only refers to Design, Execution and Completion of Works.	Provisions in the NIT shall prevail.

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
	page 74	taxes, duties and fees, and obtain all permits, such as Permission from Railways, Traffic Police, MCGM, MBPT, Utility Agencies and Environmental Agencies etc, Licenses and approvals, as required by the Laws in relation to the execution and completion of the works and the remedying of any defects : and the Contractor shall indemnify and hold the Employers harmless against and from the consequences of any failure to do so.	(2) For other permits mentioned here is responsibility of Employer. Contractor will assist the Employer in getting these permits.	
23.	Volume I Section VI/ Particular Conditions (PC) Clause 1.15 page 74	Inspection and Audit by Employer (New clause)- The Contractor shall permit the Employer or the persons appointed by the Employer to inspect the site and / or the Contractors accounts and records relating to the performance of the Contract and to have such accounts audited or the Employer or the Auditors appointed by the Employer if required by the Employer.	This is a Design & Build Contract and this clause shall not be applicable.	Please refer Sr. No. 10 of CSD
24.	Volume I Section VI/ Particular Conditions (PC) Clause 2.1(C) page 75-76	Right of Access to the Site- Availability of land in stages. The Contractor s.....other camp etc No separate payment ..... of casting yard. No land will be arranged/made available by MMRDA However the actual expenses made by contractor towards rent of casting yard will be reimbursed on production of authentic proof for the same under the	Original Clause as per FIDIC to be maintained	Provisions in the NIT shall prevail.

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470

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
		provision of Provision sum limiting to 40 Cr . The contractor has to bear charges towards Security deposit of casting yard (If any) and the same shall not be reimbursable.		
25.	Volume I Section VI/ Particular Conditions (PC) Clause 4.10 page 82	Site Data The Contractor shall be deemed to have obtained all necessary .....the data without any liability there for on the Employer.	Request to maintain the original FIDIC clause	Provisions in the NIT shall prevail.
26.	Volume I Section VI/ Particular Conditions (PC) Clause 4.12 (B) page 83	Unforeseeable Physical Conditions (b) Deleted	Request to maintain the original clause including cost compensation..	Provisions in the NIT shall prevail.
27.	Volume I Section VI/ Particular Conditions (PC) Clause 4.15 f page 84	Maintenance of existing roads / Flyovers / Bridges During execution of work, the Contractor shall be responsible for the day to day maintenance & Ordinary repairs of existing road .....the Authority to get the same carried out through any other agency at the risk and cost of the Contractor.	To be assessed in price	Provisions in the NIT shall prevail.
28.	Volume I Section VI/ Particular Conditions (PC) Clause 4.21.2 page 87	Contractor's Documents The Contractor's Documents shall comprise the technical documents specified in the Employer's Requirement.....	This is getting repeated. Clause 5.2 of FIDIC GC	Please refer Sr. No. 11 of CSD
29.	Volume I Section VI/ Particular Conditions	Contractor's operation on site	Original clause to be maintained	Provisions in the NIT

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471

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
	(PC) Clause 4.23 page 89	If the Contractor fails to remove within 84 days after the issue of the Talking-over Certificate, any remaining Contractor's.....		shall prevail.
30.	Volume I Section VI/ Particular Conditions (PC) Clause 6.1.1 page 89	Taxation The Contractor and his staff shall pay all taxes, duties, levies, outgoings etc. (present as well as future) ..... in the said State in relation to the work.	It is not possible to estimate future taxes. However would request to maintain the original FIDIC clause which is more clear.	Provisions in the NIT shall prevail.
31.	Volume I Section VI/ Particular Conditions (PC) Clause 6.1.3 page 90	Foreign Taxation The Tendered Amount by the Contractor shall include all the duties and other charges (present as well as future) .....Contract. It shall be the exclusive responsibility of the Contractor to bear the same	It is not possible to estimate future taxes. Kindly change	Provisions in the NIT shall prevail.
32.	Volume I Section VI/ Particular Conditions (PC) Clause 8.3.1 page 97	Program Planning and Execution of the Works- The Contractor needs to regulate traffic and plan the work in such a fashion that minimum inconvenience is caused to the traffic. He may even have to work in restricted working hours.....	The restricted working hours are not specified	Please refer Sr. No. 13 of CSD
33.	Volume I Section VI/ Particular Conditions (PC) Clause 13.8 page 102	Adjustment for Changes in cost Upper Limit of Price Adjustment - The Maximum amount due to price variation will be restricted to 5% of the accepted contract value, excluding the compensation payable for the material (Bitumen, Steel & Cement). General Variations in Price Index	There should be no limit on Price Escalation	Please refer Sr. No. 14 of CSD

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472

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Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
34.	Volume I Section VI/ Particular Conditions (PC) Clause 13.8 page 105	Basic rate for 2018-19(Excluding GST)	Latest basic rates to be updated	Provisions in the NIT shall prevail.
35.	Volume I Section VI/ Particular Conditions (PC) Clause 14.2 page 107	Advance Payment [Mobilization] Replace the entire clause with the following: The Employer shall make an advance payment as an interest bearing carrying rate of interest of 12% per annum	Interest free advance to be provided	Provisions in the NIT shall prevail.
36.	Volume I Section VI/ Particular Conditions (PC) Clause 14.3 page 108	Application for Interim Payments The percentage of retention in each interim payment shall be six percent (6%) until a limit of Retention money equal to five percent (5%) of the Contract Price is reached.....	Shall be replaceable against Bank Guarantee.	Please refer Sr. No. 15 of CSD.

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Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Deviations (CSD)

The Common Set of Deviations is part of the Bid Documents

<table>
<tr><th>Sr. No</th><th>Page No.</th><th>Section</th><th>Ref. Clause No.</th><th>Existing Provision in the Bid document</th><th>Modified Provision</th></tr>
<tr><td>1</td><td>7</td><td>Detailed Tender Notice</td><td></td><td>
<table>
<tr><th>Name of Work</th><th>Estimated Cost of Work (Including GST) (Rs. in Crore)</th><th>Bid Security (Rs. in Crore)</th><th>Period of Completion in Months</th></tr>
<tr><td>Design & Construction of Sewri to Worli elevated connector (2nd call)</td><td>864.37</td><td>8.64</td><td>36 (Thirty Six) (including monsoon</td></tr>
</table>
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</table>
</td></tr>
<tr><td>2</td><td>9</td><td>Detailed Tender Notice</td><td>Eligibility Criteria:</td><td>2. Average Annual financial turnover during the last 3 years (2016-17, 2017-18 & 2018-19), ending 31stMarch 2019 (in all classes of Civil Engineering construction works only) of not less than Rs. 232.00crore.
3. Experience of having successfully completion of following works during last 7 years ending last day of the month previous to the one in which bids are invited should be as follows –
Successful completion of construction of Elevated Metro / 4 lane flyover in urban area for which cost of completed work should as follows.</td><td>2. Average Annual financial turnover during the last 3 years (2016-17, 2017-18 & 2018-19), ending 31stMarch 2019 (in all classes of Civil Engineering construction works only) of not less than Rs. 235.00crore.
3. Experience of having successfully completion of following works during last 7 years ending last day of the month previous to the one in which bids are invited should be as follows –
Successful completion of construction of Elevated Metro / 4 lane flyover in urban area for which cost of completed work should as follows.</td></tr>
</table>

J. KUMAR INFRA PROJECTS LTD. MUMBAI

474

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Engineering Division
M.M.R.D.A

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				i. One similar successfully completed works costing not less than Rs.617.00 Cr. Or ii. Two similar successfully completed works each costing not less than Rs. 386.00Cr. Or iii. Three similar successfully completed work each costing not less than Rs. 309.00 Cr. And A. Must have successfully completed Elevated Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. And A. Must have successfully completed elevated metro / 4 lane flyover with precast segmental type having 1500m length in urban area as Prime contractor.	i. One similar successfully completed works costing not less than Rs.628.00 Cr. Or ii. Two similar successfully completed works each costing not less than Rs. 392.00Cr. Or iii. Three similar successfully completed work each costing not less than Rs. 314.00 Cr. And A. Must have successfully completed Elevated Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. And B. Must have successfully completed elevated metro / 4 lane flyover with precast segmental type having 1500m length in urban area as Prime contractor

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475

<table>
<tr><th>Sr. No</th><th>Page No.</th><th>Section</th><th>Ref. Clause No.</th><th>Existing Provision in the Bid document</th><th>Modified Provision</th></tr>
<tr><td>3</td><td>10</td><td>Detailed e-tender notice</td><td>9 Details of tender</td><td>
<table>
<tr><th>Name of Work</th><th>Estimated Cost of Work (Including GST)(Rs. in Crore)</th><th>Bid Security (Rs. in Crore)</th><th>Construction Period in Months</th></tr>
<tr><td>Design & Construction of Elevated Sewri-Worli connector. (2nd call)</td><td>864.37</td><td>8.64</td><td>36 (Thirty Six) (including monsoon)</td></tr>
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<tr><td>Design & Construction of Elevated Sewri-Worli connector. (2nd call)</td><td>878.53</td><td>4.39</td><td>36 (Thirty Six) (including monsoon)</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>25</td><td>Section I. Instructions to Bidders (ITB)</td><td>19 Bid Security</td><td>19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.
The relevant details are as under –
Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e-tender schedule.
And Balance amount of Rs. 8,63,00,000/- Security by providing Bank Guarantee.
Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.</td><td>19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.
The relevant details are as under –
Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e-tender schedule.
And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee.
Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.</td></tr>
</table>

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476

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Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document			Modified Provision			
				casting yard			establishing of casting yard			
				vi) Mobilizing equipment on ground such as batching plant precast segments launching girder, gantry etc.	1.0 to 3.0		vi) Mobilizing equipment on ground such as batching plant precast segments launching girder, gantry etc.	1.0 to 3.0		
				vii) Traffic diversion/ management plan with approval from Traffic Police / Branch in Mumbai.	0.2 to 0.5		vii) Traffic diversion/ management plan with approval from Traffic Police / Branch in Mumbai.	0.2 to 0.5		
							viii) Maintenance of existing road and road on which the traffic is diverted during the construction period (including monsoon) road, storm water drains, footpath etc.	0.8 to 1.2		1
				2) Site clearance including, barricading, removal of electric poles and signals and signage, demolition of existing pavement, footpath, side drains, earth works including embankment, excavation, sub grade etc as indicated by Engineer and preparation for ground improvements work if required,	0.1 to 0.2		2) Site clearance including, barricading, removal of electric poles and signals and signage, demolition of existing pavement, footpath, side drains, earth works including embankment, excavation, sub grade etc as indicated by Engineer and preparation for ground improvements work if required,	0.1 to 0.2		
				3) Pile foundations viz. including empty boring up to design founding level shown in Vol IV, caging of reinforcement, concreting of piles, pile caps, applying coal tar, Testing of Test piles and submission of report on Testing etc. includes barricading restoring road surface if required.	16 to 22		3) Pile foundations viz. including empty boring up to design founding level shown in Vol IV, caging of reinforcement, concreting of piles, pile caps,	16 to 22		
				4) Piers, pier caps, abutment, abutment cap	9.0 to 12.0					
				5) Super Structure	**45.6 to 54.4**					
				a) Pre-casting of Concrete	22.6 to 26.4					

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477

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<table>
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<tr><td>19</td><td>162</td><td>Section-VIII Appendix to Tender</td><td>13.5 CSD-I Sr. No. 41</td><td>Provisional Sums | 13.5 | i. For items a) to h) as per CSD clause 13.5 (a) Rs. 86.00 Crore
ii. For item i) as per CSD clause13.5 rental charges towards Land for casting yard limiting to Rs 40 Cr till the completion of project.
(The Cost put to tender does not include the provisional sum as above. The Contractor's offer shall not include the provisional sum))</td><td>Provisional Sum (including GST) | 13.5 | i. For items a) to h) as per CSD clause 13.5 (a) Rs. 88.00 Cr.
ii. For item i) as per CSD clause13.5 rental charges towards Land for casting yard limiting to Rs 40 Cr till the completion of project.
(The Cost put to tender does not include the provisional sum as above. The Contractor's offer shall not include the provisional sum)</td></tr>
<tr><td>20</td><td>5</td><td>Volume – II</td><td>Billing schedule</td><td>
<table>
<tr><th>Particulars</th><th>Specified limit (percentage of Contract price)</th><th>% quoted by Bidder</th></tr>
<tr><td>1) On completion and or approval of following items</td><td>6.8 to 12.4</td><td></td></tr>
<tr><td>i) Survey, Geotechnical investigation, utility diversion plan.</td><td>0.3 to 0.5</td><td></td></tr>
<tr><td>ii) Marking alignment / setting out plan</td><td>2.2 to 3.8</td><td></td></tr>
<tr><td>iii) Structural Design and working drawings for road and structural work.</td><td>0.8 to 1.2</td><td></td></tr>
<tr><td>iv) Development of casting yard</td><td>1.6 to 2.4</td><td></td></tr>
<tr><td>v) Construction of site office and laboratory and establishing of</td><td>0.7 to 1.0</td><td></td></tr>
</table>
</td><td>
<table>
<tr><th>Particulars</th><th>Specified limit (percentage of Contract price)</th><th>% quoted by Bidder</th></tr>
<tr><td>1) On completion and or approval of following items</td><td>6.8 to 12.4</td><td></td></tr>
<tr><td>i) Survey, Geotechnical investigation, utility diversion plan.</td><td>0.3 to 0.5</td><td></td></tr>
<tr><td>ii) Marking alignment / setting out plan</td><td>1.4 to 2.6</td><td></td></tr>
<tr><td>iii) Structural Design and working drawings for road and structural work.</td><td>0.8 to 1.2</td><td></td></tr>
<tr><td>iv) Development of casting yard</td><td>1.6 to 2.4</td><td></td></tr>
<tr><td>v) Construction of site office and laboratory and</td><td>0.7 to 1.0</td><td>478</td></tr>
</table>
</td></tr>
</table>

L. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
18	128			**1.0 General Scope of Work:** 1.4.1 The total length of project alignment from Sewri to Worli is 4.512 kilometer consists of following sections a) Total length of viaduct : 3360.13 m (Excluding obligatory spans) b) ROB Total length : 194.1 m c) Total length of Obligatory Spans : 840 m d) Approaches on worli side total length : 118.60 m e) Additional Approaches for Elphiston ROB at 1 St level total length : 367.51m 1.4.2 Additional Six Ramps at Sewri total length : a) Ramp1 (MTHL To Nath Pai) =592.84m b) Ramp 2 & 3 (MTHL To Donde vise versa)=309.30m c) Ramp4 (MTHL To Kidwai)=523.75m d) Ramp5 (Nath Pai to Donde)=532.15m e) Ramp6 (Donde to Kidwai)=553.98m 1.4.3 Provision of Vehicular subway at both side approaches of Elphinstone ROB The above details are tentative 1.4.4 Provision of staircase at Elphinstone ROB	**1.0 General Scope of Work:** 1.4.1 The total length of project alignment from Sewri to Worli is 4.512 kilometer consists of following sections a) Total length of viaduct : 3360.13 m (Excluding obligatory spans) b) ROB Total length : 194.1 m c) Total length of Obligatory Spans : 840 m d) Approaches on worli side total length : 118.60 m e) Additional Approaches for Elphiston ROB at 1 St level total length : 367.51m 1.4.2 Construction of six Ramps at Sewri with total length : a) Ramp1 (MTHL To Nath Pai) =592.84m b) Ramp 2 & 3 (MTHL To Donde vise versa)=309.30m c) Ramp4 (MTHL To Kidwai)=523.75m d) Ramp5 (Nath Pai to Donde)=532.15m e) Ramp6 (Donde to Kidwai)=553.98m 1.4.3 Construction of Vehicular subway at both side approaches of Elphinstone ROB The lengths mentioned above are indicative. 1.4.4 Construction of total 4 staircases on sides of both approached of Elphinstone Road ROB 1.4.5 Construction of Service roads (flexible pavement) on either sides of approaches of Elphinstone ROB including the Storm water drains and footpaths.

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479

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Engineering Division
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<table>
<tr><th>Sr. No</th><th>Page No.</th><th>Section</th><th>Ref. Clause No.</th><th>Existing Provision in the Bid document</th><th>Modified Provision</th></tr>
<tr><td>16</td><td>122</td><td>Section VII Employer s requirem ent</td><td></td><td>Design Data
Design data given hereunder, for Obligatory spans and viaduct is based on Employer's due diligence and Engineering: Contractor shall use this data for preparing his proposal keeping in mind that he has to compulsorily follow Obligatory requirements for designing the obligatory spans (steel structure), structure and viaduct.</td><td>Design Data
Design data given hereunder, for Obligatory spans and viaduct is based on Employer's due diligence and Engineering: Contractor shall use this data for preparing his proposal keeping in mind that he has to compulsorily follow Obligatory requirements for designing the obligatory spans (steel structure), structure and viaduct.
Arrangement shown in GAD is indicative contractor may opt for alternative arrangement of GAD /alternative arrangement for superstructure compulsorily following Obligatory requirements for designing the obligatory spans (steel structure), structure and viaduct within quoted price .</td></tr>
<tr><td>17</td><td>7</td><td>Volume II</td><td>Sr No 5</td><td>
<table>
<tr><th>Sr. No.</th><th>Description of variation item</th><th>Unit of measure-ment</th><th>Rate (Rs.)</th></tr>
<tr><td>5</td><td>Variation in the plan area of the bridge deck of Steel superstructure. The rate shall include all foundation ,substructure, Superstructure, Expansion joint, crash barrier, wearing coatand all other sundry items</td><td>Square meter</td><td>139500</td></tr>
</table>
</td><td>
<table>
<tr><th>Sr. No.</th><th>Description of variation item</th><th>Unit of measure-ment</th><th>Rate (Rs.)</th></tr>
<tr><td>5 a</td><td>Variation in the plan area of the bridge deck of Steel superstructure. The rate shall include all foundation, substructure, Superstructure, Expansion joint, crash barrier, wearing coat and all other sundry items (span up to 60 meter)</td><td>Square meter</td><td>139500</td></tr>
<tr><td>5 b</td><td>Variation in the plan area of the bridge deck of Steel superstructure. The rate shall include all foundation, substructure, Superstructure, Expansion joint, crash barrier, wearing coat and all other sundry items (span above 60 meter)</td><td>Square meter</td><td>185100</td></tr>
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480

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Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				extension of contract period. Consent of Traffic Police Dept. Shall be obtained to the traffic regulation and traffic diversion plan with method of construction to be adopted by the Contractor.	extension of contract period. Consent of Traffic Police Dept. Shall be obtained to the traffic regulation and traffic diversion plan with method of construction to be adopted by the Contractor.
14	102	Section VI Particular Conditions (PC)	13.8	**13.8 Adjustment for Changes in cost-** ***Upper Limit of Price Adjustment*** **-** The Maximum amount due to price variation will be restricted to 5% of the accepted contract value, excluding the compensation payable for the material (Bitumen, Steel & Cement).	**13.8 Adjustment for Changes in cost-** Deleted
15	108	Section VI Particular Conditions (PC)	Sub Clause 14.3	**Sub Clause 14.3 Application for Interim Payments Add at end of sub clause 14.3-** The percentage of retention in each interim payment shall be six percent (6%) until a limit of Retention money equal to five percent (5%) of the Contract Price is reached. The Contractor will be allowed to convert 75% of Retention Money after issue of substantial completion certificate in the form of a Bank Guarantee. The balance retention money including the converted Bank Guarantee shall be released after the issuance of Performance Certificate by the Employer.	**Sub Clause 14.3 Application for Interim Payments Add at end of sub clause 14.3-** The percentage of retention in each interim payment shall be six percent (6%) until a limit of Retention money equal to five percent (5%) of the Contract Price is reached. The Contractor will be allowed to convert Retention Money in the form of a Bank Guarantee equivalent to deduction made through RA bill. The bank guarantee shall be valid up to 28 days beyond expiry of Defect Liability period 60 Month. The converted Bank Guarantee shall be released after the issuance of Performance Certificate by the Employer. On Completion of the Work, 50% of total amount retained will be paid to the Contractor and balance 50% of retention money in form of BG will remain with employer till the completion of the Defects Liability Period and will be released after the Engineer has certified that all Defects notified by the Engineer have been corrected.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

481

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				urban area as Prime contractor	flyover with precast segmental type having 1500m length in urban area as Prime contractor
10	74	Section VI Particular Conditions (PC)	1.15	**Sub Clause: 1.15 Inspection and Audit by Employer (New clause)-** The Contractor shall permit the Employer or the persons appointed by the Employer to inspect the site and / or the Contractors accounts and records relating to the performance of the Contract and to have such accounts audited or the Employer or the Auditors appointed by the Employer if required by the Employer.	**Sub Clause: 1.15 Inspection and Quality Audit by Employer (New clause)-** The Contractor shall permit the Employer or the persons appointed by the Employer to inspect the site and / or the Contractors quality records relating to the performance of the Contract and to have such quality records audited or the Employer or the Quality Auditors appointed by the Employer if required by the Employer.
11	87	Section VI Particular Conditions (PC)	4.21.2	Written as **4.21.2 Contractor's Documents -**	**Read as** **5.2 Contractor's Documents -**
12	88	Section VI Particular Conditions (PC)	4.22	Written as **4.22 Technical Standards and Regulations-**	**Read as** **5.4 Technical Standards and Regulations-**
13	97	Section VI Particular Conditions (PC)	8.3.1	*Add Sub Clause 8.3.1 Program Planning and Execution of the Works-* The Contractor needs to regulate traffic and plan the work in such a fashion that minimum inconvenience is caused to the traffic. He may even have to work in restricted working hours. The Contractor shall plan and schedule the construction program accordingly. The Contractor should take care of all such eventualities while preparing the bid. The conditions mentioned above or any other such relevant condition not spelt out here shall not cause the reason for	*Add Sub Clause 8.3.1 Program Planning and Execution of the Works-* The Contractor needs to regulate traffic and plan the work in such a fashion that minimum inconvenience is caused to the traffic. He may even have to work in restricted working hours in certain stretches . The Contractor shall plan and schedule the construction program accordingly. The Contractor should take care of all such eventualities while preparing the bid. The conditions mentioned above or any other such relevant condition not spelt out here shall not cause the reason for

Chief Engineer,
Engineering Division
M.M.R.D.A.

482

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				less than Rs.617.00 Cr. Or ii.Two similar successfully completed works each costing not less than Rs. 386.00Cr. Or iii. Three similar successfully completed work each costing not less than Rs. 309.00 Cr. And B. Must have successfully completed Elevated Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. And C. Must have successfully completed elevated metro / 4-lane flyover with precast segmental type having 1500m length in urban area as Prime contractor.	less than Rs.628.00 Cr. Or ii. Two similar successfully completed works each costing not less than Rs.392.00Cr. Or iii. Three similar successfully completed work each costing not less than Rs. 314.00 Cr. And B. Must have successfully completed Elevated Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. And C. Must have successfully completed elevated metro / 4-lane flyover with precast segmental type having 1500m length in urban area as Prime contractor.
9	50		FORM OF QUALIFICATIONINFORMATION : First column of table	One similar successfully completed works costing not less than Rs. 617 Crore OR Two similar successfully completed works each costing not less than Rs. 386.00 Crore OR Three similar successfully completed work each costing not less than Rs. 309.00 Crore. And Must have successfully completed Elevated Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. and Must have successfully completed elevated metro / 4-lane flyover with precast segmental type having 1500m length in	Average Annual financial turnover during the last 3 years (2016-17, 2017-18 & 2018-19), ending 31st March 2019 (in all classes of Civil Engineering construction works only) of not less than Rs. 235.00 Crore Two similar successfully completed works each costing not less than Rs. 392.00 Crore OR Three similar successfully completed work each costing not less than Rs. 314.00 Crore. And Must have successfully completed Elevated Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. and Must have successfully completed elevated metro / 4-lane

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

483

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (second Call)
Common Set of Deviations (CSD)

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
5	33	Section I. Instructions to Bidders (ITB)	35.5 Additional Security Deposit	Additional Security Deposit (ASD):- Additional Security Deposit shall be calculated on estimated cost including 12% GST i.e. on Rs. 864.37 Crore.	Additional Security Deposit (ASD):- Additional Security Deposit shall be calculated on estimated cost including 12% GST i.e. on Rs. 878.53 Crore.
6	35	Section –I Instruction to bidder	42.3	42.3 Within 14 days of receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Employer the performance security of an amount equivalent to 5% of the contract price + additional security for unbalance Bid as per Sub Cl. 35.5 & 35.6 in accordance with the conditions of Contract as given in Section IX of Vol. –I.	42.3 Within 28 days of receipt of the Letter of Acceptance, the successful Bidder shall deliver to the Employer the performance security of an amount equivalent to 5% of the contract price + additional security for unbalance Bid as per Sub Cl. 35.5 & 35.6 in accordance with the conditions of Contract as given in Section IX of Vol. –I.
7	39	ITB 19.1	19.1	**ITB 19.1** The Bid Security shall be for an amount of INR 8.63Cr and shall be paid by mode of electronically transfer (1,00,000 by electronically transfer & balance Rs 8,63,00,000 through BG)	**ITB 19.1** The Bid Security shall be for an amount of INR 4.39 transfer (1,00,000 by electronically transfer & balance Rs 4,38,00,000 through BG)
8	42	Section II Qualification criteria	3	2. Average Annual financial turnover during the last 3 years (2016-17, 2017-18 & 2018-19), ending 31st March 2019 (in all classes of Civil Engineering construction works only) of not less than Rs. 232.00 Crore. 3. Experience of having successfully completion of following works during last 7 years ending last day of the month previous to the one in which bids are invited should be as follows – A. Successful completion of construction of Elevated Metro / 4 lane flyover in urban area for which cost of completed work should as follows. i. One similar successfully completed works costing not	2. Average Annual financial turnover during the last 3 years (2016-17, 2017-18 & 2018-19), ending 31st March 2019 (in all classes of Civil Engineering construction works only) of not less than Rs. 235.00 Crore. 3. Experience of having successfully completion of following works during last 7 years ending last day of the month previous to the one in which bids are invited should be as follows – A. Successful completion of construction of Elevated Metro / 4 lane flyover in urban area for which cost of completed work should as follows. i. One similar successfully completed works costing not

J. KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

484

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document			Modified Provision		
				segments in the casting yard			applying coal tar, Testing of Test piles and submission of report on Testing etc. includes barricading restoring road surface if required.		
				b) Transportation and Launching of Precast concrete segments	10 to 12		4) Piers, pier caps, abutment, abutment cap	9.0 to 12.0	
				c) Fabrication, transportation & erecting of steel superstructure including cast in-situ deck slab, etc. for Obligatory Span	13 to 16		5) Super Structure	45.6 to 54.4	
				6) Fixed items such as Crash Barrier, Bearings, Expansion Joint, deck waterproofing, wearing course, down take pipes, connecting to nearest SW drain and carrying out necessary tests on completed items.	4 to 7		a) Pre-casting of Concrete segments in the casting yard	22.6 to 26.4	
				7) Retaining structure for approach ramp including fill material and Road wearing course.	1.5 to 2		b) Transportation and Launching of Precast concrete segments	10 to 12	
				8) All electrical items including street lighting.	1.0 to 2.0		c) Fabrication, transportation & erecting of steel superstructure including cast in-situ deck slab, etc. for Obligatory Span	13 to 16	
				9) Miscellaneous items like painting of Bridge including Crash barrier kerb, road furniture including road marking, road signs, gantry & over hang signs, pitching, filter media for Pitching, Utility Ducts, M S railing & M S Ladder etc.	0.8 to 1.2		6) Fixed items such as Crash Barrier, Bearings, Expansion Joint, deck waterproofing, wearing course, down take pipes, connecting to nearest SW drain and carrying out necessary tests on completed items.	4 to 7	
				10) Cost towards the expenditure in DLP for 5 Years	0.8 to 1.2		7) Retaining structure for approach ramp including fill material and Road wearing course.	1.5 to 2	
							8) All electrical items including street lighting.	1.0 to 2.0	
							9) Miscellaneous items like painting of Bridge including Crash barrier kerb, road	0.8 to 1.2	

KUMAR INFRA PROJECTS LTD. MUMBAI

485

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision		
					furniture including road marking, road signs, gantry & over hang signs, pitching, filter media for Pitching, Utility Ducts, M S railing & M S Ladder etc.		
					10) Cost towards the expenditure in DLP for 5 Years	0.8 to 1.2	

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M.M.R.D.A.

486

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

एम एम आर डी ए
MMRDA

Bandra-Kurla Complex, Bandra (East), Mumbai - 400051.
Tel: +91-22-26594076
Website : https://mmrda.maharashtra.gov.in

Common Set of Deviation -II

Mumbai Metropolitan Region Development Authority (MMRDA) has invited bids from eligible Bidder through e-Tendering for the following work. Following changes are made in original tender.

Sr No.	Parameter	Details
1.	Tender Number	MMRDA/ENG1/0001790
2.	Division	Engineering Division
3.	Name of Tender	Design and Construction of Sewri Worli Elevated Connector -**2nd Call**
4.	Corrigendum for	**CSC –II and CSD-II**

This Common Set of Deviation -II shall form part of the tender document as mentioned in the tender document. This e-tender shall be available for free download on registration at **https://etendermmrda.maharashtra.gov.in.**

For any e-tendering support, mail MMRDA e-tendering Helpdesk at **etenderhelp@mailmmrda.maharashtra.gov.in** or call Helpdesk on **022-26597445.**

Sd/-
Chief Engineer

Date : 06.09.2019
Place : Mumbai

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Chief Engineer,
Engineering Division
M.M.R.D.A.

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Clarifications (CSC-II)

The Common Set of Clarifications is not part of the Bid Documents

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
M/s HCC Ltd				
1.	Volume 01 Page 9 Eligibility Criteria Point 3.	Experience of having successfully completion of following works during last 7 years ending last day of the month previous to the one in which bids are invited should be as follows	We understand, employer has prescribed minimum requirements to be satisfied by the prospective bidder to meet the condition of similar works criterion. But, some of the large value contracts of similar works are completed in the last 10 years in India and most of the works are currently under execution. Thereby most of the Indian contractors are opting for Joint Venture with foreign firms especially to meet such pre-qualification conditions. Therefore, we request MMRDA to please relax and consider the similar works completed over a period of "last 10 years" instead of last 7 years. This will encourage participation of larger Indian E&C firms who have a successful track record of similar project delivery, and would only widen the competition.	Please refer to Sr. No.19 & 22 of CSD II
2.	Volume 01 Page 10 Eligibility Criteria Point 9.	Estimated Cost: INR 864.37 Crore	Considering the quantum of work, Alignment of the project, site conditions etc, we request MMRDA to review the estimated cost put to tender as it seems to be on much lower side	Please refer to Sr. No.1 of CSD I
3	Volume I Section I/ ITB Clause 42.1 page 35	Within Twenty Eight (28) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the General Conditions of Contract, subject to ITB35.5	We request MMRDA to allow the contractor to submit the PBG as per the handing over of site to the contractor. Contractor should be allowed to submit the 50% PBG within 30 days from date of receipt of LOA and balance 50% after complete handing of site free from encumbrance from MMRDA	Provisions in the NIT shall prevail.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

489

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
4.	Volume –I Page 107 P C clause 14 Sub Cl. 14.2	The Employer shall make an advance payment as an interest bearing carrying rate of interest of 12% per annum as Mobilization Advance, after the submission of Bank Guarantee by the Contractor in accordance with this sub-clause	We request MMRDA to make Interest free advance payment of 10% of contract amount asper the tender condition of Vasai Creek bridge and all Mumbai Metro Tenders invited. This will help the contractor in delivering the project on time. We also request you to provide the secured advance of 85% of the cost of materials brought to site for project work.	Please refer to Sr. No. 23 & 24 of the CSD-II
5.	Volume –I Page 84 Cl. 4.15(f)	During execution of work, the Contractor shall be responsible for the day to day maintenance & Ordinary repairs of existing road as well as diverted road, storm water drains, cross culverts/drains etc. including monsoon season of the complete length of the road right from the date of the work order till handing over of road to concern authority, even though he proposes to take up the length for improvement in phases. His offer / rates shall be deemed to be inclusive of the cost of such repairs and no separate payment towards these maintenance would be payable to him.	We request MMRDA to pay the contractor for the maintenance work outside the barricading area extra over and above the quoted price under provisional sum as per prevailing MCGMSOR as per the tender condition of Mumbai Metro projects invited by MMRDA.	Provisions in the NIT shall prevail.

KUMAR INFRA PROJECTS LTD. MUMBAI

490

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
M/s J. Kumar Infraproject Ltd.				
6	General ,scope of work Clause 1.4 Page 128 & CSD-I	1.4.1Provision of staircase at Elphinstone ROB Estimated cost of work	Considering the quantum of work, Alignment of the project, site conditions etc, we had requested MMRDA to review the estimated cost put to tender as it seems to be on much lower side. MMRDA in the CSD has revised the estimated cost from Rs. 864.37 Cr to Rs. 878.53 Cr and has also increased the scope of work, which was not included in the original tender document uploaded on 05.08.2019 i.e. Construction of Vehicular subway at both side approaches of Elphinstone ROB, Construction of total 4 staircases on sides of both approached of Elphinstone Road ROB, Construction of Service roads (flexible pavement) on either sides of approaches of Elphinstone ROB including the Storm water drains and footpaths. Earlier only provisions were to be made and construction was not included in bidder scope. We therefore once again requesting MMRDA to review the estimated const put to tender and upload the realistic figure, as it seems to be on much lower side	Please refer to Sr. No.18 of CSD I
7	Volume 01 Page 10 Bid Security	Bid Security	We had issued the Bid security for requisite amount and submitted the tender in the 1st call of bidding. We are	Please refer to Sr. No.4 of CSD I

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

491

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
			ready to submit the EMD in BG as per the revised terms and condition of the recalled tender by submitting all the necessary amendment from the bank as requested in the pre bid meeting including Validity of bid security, EMD amount, name of works etc. This will help us to reduce the additional cost on our quoted price for making new BG, as all our expenses incurred in making BG for earlier tender will be lost and also making new BG will take same more time.	
8	Volume I Section I/ ITB Clause 42.1 page 35	Within Twenty Eight (28) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the General Conditions of Contract, subject to ITB35.5.	We request MMRDA to allow the contractor to submit the PBG as per the land handing over of site to the contractor. Contractor should allow to submit the 50% PBG within 30 days from date of receipt of LOA and balance 50% after getting atleast 50% of the handing of site free from encumbrance form MMRDA. This will maintain the spirit of taking the PBG from the contractor	Provisions in the NIT shall prevail.
9	Volume –I Page 107 P C clause 14 Sub Cl. 14.2	The Employer shall make an advance payment as an interest bearing carrying rate of interest of 12% per annum as Mobilization Advance, after the submission of Bank Guarantee by the Contractor in accordance with this sub-clause	We request MMRDA to make Interest free advance payment of 10% of contract amount as per the tender condition of Vasai Creek bridge and all Mumbai Metro invited by MMRDA. This will help the contractor in delivering the project on time. Copy enclosed. We also	Please refer to Sr. No. 23 & 24 of the CSD-II

J. KUMAR INFRA PROJECTS LTD. MUMBAI

492

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
			requested you to provide the secured advance of 85% of the cost of materials brought to site for project work.	
10	Volume –I Page 84 Cl. 4.15(f)	During execution of work, the Contractor shall be responsible for the day to day maintenance & Ordinary repairs of existing road as well as diverted road, storm water drains, cross culverts/drains etc. including monsoon season of the complete length of the road right from the date of the work order till handing over of road to concern authority, even though he proposes to take up the length for improvement in phases. His offer / rates shall be deemed to be inclusive of the cost of such repairs and no separate payment towards these maintenance would be payable to him.	We request MMRDA to pat the contractor for the maintenance work outside the barricading area extra over and above the quoted price under provisional sum as per prevailing MCGM SOR as per the tender condition of Mumbai Metro projects invited by MMRDA. Copy enclosed.	Provisions in the NIT shall prevail.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

493

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Deviations (CSD)-II

The Common Set of Deviations is part of the Bid Documents

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
19	9	Volume 01	Eligibility Criteria Point 3. Sr No 2 of CSD-I	3. Experience of having successfully completion of following works during last 7 years ending last day of the month previous to the one in which bids are invited should be as follows – Successful completion of construction of Elevated Metro / 4 lane flyover in urban area for which cost of completed work should as follows. i. One similar successfully completed works costing not less than Rs.628.00 Cr. Or ii. Two similar successfully completed works each costing not less than Rs. 392.00Cr. Or iii. Three similar successfully completed work each costing not less than Rs. 314.00 Cr. And A. Must have successfully completed Elevated Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. And B. Must have successfully completed elevated metro / 4 lane flyover with precast segmental type having 1500m length in urban area as Prime contractor	3. Experience of having successfully completion of following works during last 10 years ending last day of the month previous to the one in which bids are invited should be as follows – Successful completion of construction of Elevated Metro / 4 lane flyover in urban area for which cost of completed work should as follows. i. One similar successfully completed works costing not less than Rs.628.00 Cr. Or ii. Two similar successfully completed works each costing not less than Rs. 392.00Cr. Or iii. Three similar successfully completed work each costing not less than Rs. 314.00 Cr. And A. Must have successfully completed Elevated Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. And B. Must have successfully completed elevated metro / 4 lane flyover with precast segmental type having 1500m length in urban area as Prime contractor

495

J. KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (second Call)
Common Set of Deviations (CSD -II)

<table>
<tr><th>Sr. No</th><th>Page No.</th><th>Section</th><th>Ref. Clause No.</th><th>Existing Provision in the Bid document</th><th>Modified Provision</th></tr>
<tr><td>20</td><td>11</td><td>Detailed e-tender notice</td><td>10 Online e- Tender Schedule</td><td>
<table>
<tr><th>Sr. No.</th><th>Tender Schedule</th><th>Bidder Schedule</th><th>Start Date & Time</th><th>End Date & Time</th></tr>
<tr><td>1.</td><td>Tender Authorization and Publishing</td><td>---------</td><td>03.08.2019 (12.40 Hrs)</td><td>05.08.2019 (17.00 Hrs)</td></tr>
<tr><td>2.</td><td>---------</td><td>Tender Document Download</td><td>05.08.2019 (17.01hrs.)</td><td>10.09.2019 (17.00hrs.)</td></tr>
<tr><td></td><td></td><td>*Pre-bid meeting</td><td>13.08.2019 (15.00 hrs)</td><td></td></tr>
<tr><td>3.</td><td>---------</td><td>Bid Preparation and Submission</td><td>05.08.2019 (17.01hrs.)</td><td>11.09.2019 (12.00 hrs.)</td></tr>
<tr><td>4.</td><td>Tender Closing</td><td>---------</td><td>11.09.2019 (12.01hrs.)</td><td>11.09.2019 (15.00hrs.)</td></tr>
<tr><td>5.</td><td>---------</td><td>Online Control Transfer of Bid</td><td>11.09.2019 (15.01hrs.)</td><td>13.09.2019 (10.00hrs.)</td></tr>
<tr><td>6.</td><td>Opening Envelope A- Tender Fees, EMD</td><td>---------</td><td>13.09.2019 (10.01hrs.)</td><td>13.09.2019 (18.00hrs.)</td></tr>
<tr><td>7.</td><td>Opening Envelope B - Technical Bid</td><td>---------</td><td>13.09.2019 (10.01hrs.)</td><td>19.09.2019 (18.00hrs.)</td></tr>
<tr><td>8.</td><td>Opening Envelope C - Financial Bid</td><td>---------</td><td>13.09.2019 (10.01hrs.)</td><td>19.09.2019 (18.00hrs.)</td></tr>
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</table>
</td></tr>
<tr><td>21</td><td>40</td><td>ITB 22.1</td><td>22.1</td><td>For <u>bid submission purposes</u> only, the Employer's address is:
Chief Engineer,
Mumbai Metropolitan Region Development Authority (MMRDA)
2nd Floor, New MMRDA Building, Bandra-Kurla Complex,</td><td>For <u>bid submission purposes</u> only,
the Employer's address is :
Chief Engineer,
Mumbai Metropolitan Region Development Authority (MMRDA)
2nd Floor, New MMRDA Building, Bandra-Kurla Complex,</td></tr>
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L. KUMAR INFRA PROJECTS LTD. MUMBAI

496

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The deadline for bid submission is:** **Date: 11.09.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering.	Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The dead line for bid submission is:** **Date:18.09.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering.
22	42	Volume 01	Eligibility Criteria Point 3. Sr No 8 of CSD-I	2. Average Annual financial turnover during the last 3 years (2016-17, 2017-18 & 2018-19), ending 31st March 2019 (in all classes of Civil Engineering construction works only) of not less than Rs. 235.00 Crore. 3. Experience of having successfully completion of following works during last 7 years ending last day of the month previous to the one in which bids are invited should be as follows – A. Successful completion of construction of Elevated Metro / 4 lane flyover in urban area for which cost of completed work should as follows. i. One similar successfully completed works costing not less than Rs.628.00 Cr. Or ii. Two similar successfully completed works each costing not less than Rs.392.00Cr. Or iii. Three similar successfully completed work each costing not less than Rs. 314.00 Cr. And B. Must have successfully completed Elevated Metro / 4	2. Average Annual financial turnover during the last 3 years (2016-17, 2017-18 & 2018-19), ending 31st March 2019 (in all classes of Civil Engineering construction works only) of not less than Rs. 235.00 Crore. 3. Experience of having successfully completion of following works during last 10 years ending last day of the month previous to the one in which bids are invited should be as follows – A. Successful completion of construction of Elevated Metro / 4 lane flyover in urban area for which cost of completed work should as follows. i. One similar successfully completed works costing not less than Rs. 628.00 Cr. Or ii. Two similar successfully completed works each costing not less than Rs. 392.00Cr. Or iii. Three similar successfully completed work each costing not less than Rs. 314.00 Cr. And B. Must have successfully completed Elevated Metro / 4

Chief Engineer,
Engineering Division
M.M.R.D.A.

497

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. And C. Must have successfully completed elevated metro / 4-lane flyover with precast segmental type having 1500m length in urban area as Prime contractor.	lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area. And C. Must have successfully completed elevated metro / 4-lane flyover with precast segmental type having 1500 m length in urban area as Prime contractor.
23	107	Section - VI Particular Conditions	clause 14 Sub Cl. 14.2	***Sub Clause 14.2 Advance Payment [Mobilization]-*** Replace the entire clause with the following: The Employer shall make an advance payment as an interest bearing carrying rate of interest of 12% per annum as Mobilization Advance, after the submission of Bank Guarantee by the Contractor in accordance with this sub-clause. **Mobilization Advance –** The Employer shall make an advance payment of 10% of the Contract amount as interest bearing loan after commencement of works for Mobilization, when the Contractor submits a Bank Guarantee, for value of advance in the prescribed format. ***The interest rate shall be 12% per annum.*** The Bank Guarantee shall be from ***any Scheduled*** Commercial bank/Nationalized bank in favor of **"MMRD FUND" payable at Mumbai.**	Replace the entire clause with the following: ***Sub Clause 14.2 Advance Payment [Mobilization]-*** **Mobilization Advance –** The Employer shall make an advance payment of 10% of the ***original*** contract value ***in two equal (5 % + 5%) installments as interest free loan*** after commencement of works for Mobilization, when the Contractor submits a Bank Guarantee, for value of 110 % of Mobilization advance in the prescribed format . The second installment shall be made upon Contractor's submission of utilization certificate issued by Chartered Accountant stating that ninety percent (90%) of the 1st instalment has been consumed. The value of the bank guarantee taken to towards the security

J. KUMAR INFRA PROJECTS LTD. MUMBAI

498

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
					of mobilisation advance shall be 110% of the advance taken by the contractor. The Bank Guarantee shall be from any Scheduled Commercial bank/Nationalized bank in favor of **"MMRD FUND" payable at Mumbai.** The Bank Guarantees shall be valid up to the period of 24 months from date of work order.
24	107	Cl 14.2.2	14.2.2	**Recovery of Advances-** The mobilization advance and the accrued interest shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached 15% of the Contract Price less Provisional Sums. Recovery of mobilization advance ***including interest there on*** shall be completed by the time 90% of the work is completed. Failing such repayment the outstanding advance shall be recovered by encashment of respective Bank Guarantees/guarantees mentioned above. The Contractor may, at his option, repay the advance earlier by increasing percentage rate of deduction indicated above. If the Contractor furnishes more than one Bank Guarantee, pursuant to the above provision, the Bank Guarantee will be released by the Employer one by one in such a manner that the total amount of Bank Guarantees left in the hand with the Employer will be sufficient to cover the outstanding amount of advance ***and likely interest thereon.***	**Recovery of Advances-** The mobilization advance shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Mobilization Advance payments are to be set of (recovered) in equal installments against the interim payments certified by the Engineer or his representative under the Contract for the first 24 months commencing in the 7th month from date of work order until the advance payment has been fully set off . Failing such repayment the outstanding advance shall be recovered by encashment of respective Bank Guarantees/guarantees mentioned above. The Contractor may, at his option, repay the advance earlier by increasing percentage rate of deduction indicated above. If the Contractor furnishes more than one Bank Guarantee, pursuant to the above provision, the Bank Guarantee will be released by the Employer one by one in such a manner that the total amount of Bank Guarantees left in the hand with the Employer will be sufficient to cover the outstanding amount of advance.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

499

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
25	128	Volume I Section VII Employer s Requirement	Sr No 18 of CSD-I	**1.0 General Scope of Work:** 1.4.5 Construction of Service roads (flexible pavement) on either sides of approaches of Elphinstone ROB including the Storm water drains and footpaths.	**1.0 General Scope of Work:** 1.4.5 Construction of Service roads (flexible pavement) on either sides of approaches of Elphinstone ROB as per existing available width including the Storm water drains and footpaths.
26	130	Volume I Section VII Employer s Requirement	Design data for Viaduct	J Road furniture: Traffic signs and pavement markings to be provided by the Contractor shall include road side signs, over head signs, on gantries , curb mounted signs and road markings along the Elevated viaduct. All other road furniture/traffic control devices/ road safety devices shall be provided by the Contractor as per IRC SP: 87-2010	J Road furniture: Traffic signs and pavement markings to be provided by the Contractor shall include road side signs, over head signs, gantries 4 Nos for full width (IRC 67-2012) , curb mounted signs and road markings along the Elevated viaduct. All other road furniture/traffic control devices/ road safety devices shall be provided by the Contractor as per IRC SP: 87-2010
27	5	Volume - II	Billing schedule CSD-I Sr No 20	**Particulars** / **Specified limit (percentage of Contract price)** / **% quoted by Bidder** 1) On completion and or approval of following items: **6.8 to 12.4** i) Survey, Geotechnical investigation, utility diversion plan.: 0.3 to 0.5 ii) Marking alignment / : 1.4 to 2.6	**Particulars** / **Specified limit (percentage of Contract price)** / **% quoted by Bidder** 1) On completion and or approval of following items: **6.8 to 12.4** i) Survey, Geotechnical investigation, utility diversion plan.: 0.3 to 0.5 ii) Marking alignment / : 1.4 to 2.6

J. KUMAR INFRA PROJECTS LTD. MUMBAI

500

Chief Engineer,
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M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document			Modified Provision		
				setting out plan			setting out plan		
				iii) Structural Design and working drawings for road and structural work.	0.8 to 1.2		iii) Structural Design and working drawings for road and structural work.	0.8 to 1.2	
				iv) Development of casting yard	1.6 to 2.4		iv) Development of casting yard	1.6 to 2.4	
				v) Construction of site office and laboratory and establishing of casting yard	0.7 to 1.0		v) Construction of site office and laboratory and establishing of casting yard	0.7 to 1.0	
				vi) Mobilizing equipment on ground such as batching plant precast segments launching girder, gantry etc.	1.0 to 3.0		vi) Mobilizing equipment on ground such as batching plant precast segments launching girder, gantry etc.	1.0 to 3.0	
				vii) Traffic diversion/ management plan with approval from Traffic Police / Branch in Mumbai.	0.2 to 0.5		vii) Traffic diversion/ management plan with approval from Traffic Police / Branch in Mumbai.	0.2 to 0.5	
				viii) Maintenance of existing road and road on which the traffic is diverted during the construction period (including monsoon) road, storm water drains, footpath etc.	0.8 to 1.2		viii) Maintenance of existing road and road on which the traffic is diverted during the construction period (including monsoon) road, storm water drains, footpath etc.	0.8 to 1.2	
				2) Site clearance including, barricading, removal of electric poles and signals and signage, demolition of existing pavement, footpath, side drains, earth works including embankment, excavation, sub grade etc as	**0.1 to 0.2**		2) Site clearance including, barricading, removal of electric poles and signals and signage, fire hydrant box, demolition of existing pavement, footpath, side drains, earth works including embankment, excavation, sub	**0.1 to 0.2**	

Chief Engineer,
Engineering Division
M.M.R.D.A.

501

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document			Modified Provision		
				indicated by Engineer and preparation for ground improvements work if required,			grade etc as indicated by Engineer and preparation for ground improvements work if required etc.		
				3) Pile foundations viz. including empty boring up to design founding level shown in Vol IV, caging of reinforcement, concreting of piles, pile caps, applying coal tar, Testing of Test piles and submission of report on Testing etc. includes barricading restoring road surface if required.	**16 to 22**		3) Pile foundations viz. including empty boring up to design founding level shown in Vol IV, caging of reinforcement, concreting of piles, pile caps, applying coal tar, Testing of Test piles and submission of report on Testing etc. includes barricading restoring road surface if required.	**13.5 to 18.5**	
				4) Piers, pier caps, abutment, abutment cap	9.0 to 12.0		4) Piers, pier caps, abutment, abutment cap	**9.0 to 12.0**	
				5) Super Structure	**45.6 to 54.4**		5) Super Structure	**42.6 to 51.4**	
				a) Pre-casting of Concrete segments in the casting yard	22.6 to 26.4		a) Pre-casting of Concrete segments in the casting yard	19.6 to 23.4	
				b) Transportation and Launching of Precast concrete segments	10 to 12		b) Transportation and Launching of Precast concrete segments	10 to 12	
				c) Fabrication, transportation & erecting of steel superstructure including cast in-situ deck slab, etc. for Obligatory Span	13 to 16		c) Fabrication, transportation & erecting of steel superstructure including cast in-situ deck slab, etc. for Obligatory Span	13 to 16	
				6) Fixed items such as Crash Barrier, Bearings, Expansion Joint, deck waterproofing, wearing course, down take pipes, connecting to nearest SW drain and carrying out necessary tests on completed items.	**4 to 7**		6) Fixed items such as Crash Barrier, Bearings, Expansion Joint, deck waterproofing, wearing course, down take pipes, connecting to nearest SW drain etc. and carrying out necessary tests on completed items.	**4 to 7**	

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502

Chief Engineer,
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M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document			Modified Provision		
				7) Retaining structure for approach ramp including fill material and Road wearing course.	**1.5 to 2**		7) Retaining structure for approach ramp including fill material and Road wearing course.	**1.5 to 2**	
				8) All electrical items including street lighting.	**1.0 to 2.0**		8) Dismantling & Reconstruction of existing approaches of Elphinstone ROB ,removal of debris /excavated material Foundation & Sub structure of Sewri & Elphinstone ROB , Vehicular subway at both side approaches of Elphinstone ROB, Construction of total 4 staircases on sides of both approached of Elphinstone Road ROB, Construction of Service roads (flexible pavement) on either sides of approaches of Elphinstone ROB as per available width including the Storm water drains and footpaths etc.	**4 to 8**	
				9) Miscellaneous items like painting of Bridge including Crash barrier kerb, road furniture including road marking, road signs, gantry & over hang signs, pitching, filter media for Pitching, Utility Ducts, M S railing & M S Ladder etc.	**0.8 to 1.2**		9) Miscellaneous items like painting of Bridge including Crash barrier kerb, road furniture including road marking, road signs, gantries 4 No & over hang signs, pitching, filter media for Pitching, Utility Ducts, M S railing & M S Ladder etc.	**1.8 to 3.2**	
				10) Cost towards the expenditure in DLP for 5 Years	**0.8 to 1.2**		10) Cost towards the expenditure in DLP for 5 Years	**0.8 to 1.2**	

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M.M.R.D.A.

503

504

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

एम एम आर डी ए
MMRDA

Bandra-Kurla Complex, Bandra (East), Mumbai - 400051.
Tel: +91-22-26594076
Website : https://mmrda.maharashtra.gov.in

Common Set of Deviation -III

Mumbai Metropolitan Region Development Authority (MMRDA) has invited bids from eligible Bidder through e-Tendering for the following work. Following changes are made in original tender.

Sr No.	Parameter	Details
1.	Tender Number	MMRDA/ENG1/0001790
2.	Division	Engineering Division
3.	Name of Tender	Design and Construction of Sewri Worli Elevated Connector -**2nd Call**
4.	Corrigendum for	**CSC –III and CSD-II I**

This CSD-.III shall form part of the tender document as mentioned in the tender document. This e-tender shall be available for free download on registration at **https://etendermmrda.maharashtra.gov.in.**

For any e-tendering support, mail MMRDA e-tendering Helpdesk at **etenderhelp@mailmmrda.maharashtra.gov.in** or call Helpdesk on **022-26597445.**

(Dr D.T Tubhe)
Chief Engineer

Date : 17.09.2019
Place : Mumbai

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Chief Engineer,
Engineering Division
M.M.R.D.A.


Chief Engineer,
Engineering Division
M.M.R.D.A.

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Clarifications (CSC-III)

The Common Set of Clarifications is not part of the Bid Documents

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
M/s J.Kumar Infra project Ltd.				
1.	Volume 01 Page 107 Section - VI Particular Conditions clause 14 Sub Cl. 14.2 Sr No 24 of CSD-II	**Recovery of Advances-** The mobilization advance shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Mobilization Advance payments are to be set of (recovered) in equal installments against the interim payments certified by the Engineer or his representative under the Contract for the first 24 months commencing in the 7th month from date of work order until the advance payment has been fully set off . Failing such repayment the outstanding advance shall be recovered by encashment of respective Bank Guarantees/guarantees mentioned above. The Contractor may, at his option, repay the advance earlier by increasing percentage rate of deduction indicated above. If the Contractor furnishes more than one Bank Guarantee, pursuant to the above provision, the Bank Guarantee will be released by the Employer one by one	We request your kind attention to the Sr. No. 24, Clause No. 14.2.2 of the CSD II, which state that, the mobilization advance shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Mobilization Advance payments are to be set of (recovered) in equal installments against the interim payments certified by the Engineer or his representative under the Contract for the first 24 months commencing in the 7th month from date of work order until the advance payment has been fully set off. Failing such repayment the outstanding advance shall be recovered by encashment of respective Bank Guarantees/guarantees mentioned above. In this regards, we request MMRDA to delete this stringent condition of repayment of mobilization advance from the interim payments which was neither present in original tender condition nor at the time of inviting 02nd call of bidding. Repayment of advance on time based manner will defeat the spirit of providing advance to the contractor for delivering the project on time and hence not used in major tenders. MMRDA shall introduce the original clause of repayment. i.e Deductions shall commence in the next Interim Payment Certificate following that in which the	Please refer to Sr. No.31 of CSD III

KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

507

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
		in such a manner that the total amount of Bank Guarantees left in the hand with the Employer will be sufficient to cover the outstanding amount of advance.	total of all such payments to the al Sums and shall be Contractor has reached 15% of the Contract Price less Provisional completed by the time 90% of the work is completed. The clause of repayment of advance (starting from 15-20% and ending on 85-90% of work completed) clause is already being used in almost all MMRDA tenders and also in all central government tenders / state government / Government Undertaking / PSU like NHAI, MORTH,NHIDCL, DMRC, MSRDC, PWD Maharashtra etc. In view of above, we request MMRDA to review the repayment clause introduced in CSD II and incorporate the original clause for repayment of advance which will help the contractor to deliver the project successfully on time.This will enable more bidders to participate and MMRDA may get a most competitive offer.	
M/s HCC Ltd.				
2	Vol-1 Detailed e-tender notice (2nd call): page No 10	Eligibility criteria D) Similar work means substantially completed Elevated Metro / 4-lane Flyover in urban area as a prime contractor.	1. We refer to point no. 6 of Vol-1 Detailed e-tender notice (2nd call): "Similar work means substantially completed Elevated Metro / 4-lane Flyover in urban area as a prime contractor". As per recent MMRDA tenders like Design & Construction of bridge connecting Vasai & Bhayander, metro contract packages CA-48, CA-08 to CA-12, we understand that a project shall be considered to be substantially completed, it more than 80% of the value of work has been completed. Please confirm.	Please refer to Sr. No.28 of CSD III
3	Vol-1 Eligibility criteria Point 4 B.	" Must have successfully completed Elevated Metro / 4 lane flyover with one	We refer to Vol-1 Eligibility criteria Point 4 B. (S.No. 22 of CSD-II): "Must have successfully completed Elevated	NIT condition shall prevail

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

508

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
	CSD-ll Sr.No. 22	span having structural steel superstructure of length not less than 40 meters in Urban Area".	Metro / 4 lane flyover with one span having structural steel superstructure of length not less than 40 meters in Urban Area". We request you to kindly confirm whether substantially completed projects (as defined at S. No. 1 above) shall be considered as eligible for this purpose.	
4	Volume I Page -110 CSD ll S.No. 24, Clause no. 14.2.2	**Recovery of Advances-** The mobilization advance shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Mobilization Advance payments are to be set of (recovered) in equal installments against the interim payments certified by the Engineer or his representative under the Contract for the first 24 months commencing in the 7th month from date of work order until the advance payment has been fully set off . Failing such repayment the outstanding advance shall be recovered by encashment of respective Bank Guarantees/guarantees mentioned above. The Contractor may, at his option, repay the advance earlier by increasing percentage rate of deduction indicated above. If the Contractor furnishes more than one Bank Guarantee, pursuant to the above provision, the Bank Guarantee will be released by the Employer one by	We refer to S.No. 24, Clause no. 14.2.2 of the CSD ll: "The mobilization advance shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Mobilization Advance payments are to be set of (recovered) in equal installments against the interim payments certified by the Engineer or his representative under the Contract for the first 24 months commencing in the 7th month from date of work order until the advance payment has been fully set off. Failing such repayment the outstanding advance shall be recovered by encashment of respective Bank Guarantees/guarantees mentioned above." The above clause shall have adverse effect on the cash flow of the project. Hence we request MMRDA to retain the original clause of repayment i.e. "Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached 15% of the Contract Price less Provisional Sums. Recovery of mobilization advance shall be completed by the time 90% of the work is completed." This clause of repayment of advance is already being	Please refer to Sr. No.31 of CSD III

Chief Engineer,
Engineering Division
M.M.R.D.A.

509

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
		one in such a manner that the total amount of Bank Guarantees left in the hand with the Employer will be sufficient to cover the outstanding amount of advance.	used in almost all MMRDA tenders and also in central and state government tenders, PSUs like MORTH, NHAI, MSRDC etc.	
5	Section-VIII Appendix to Tender GCC 1.1.3.3	**Time for Completion** 36 months	Considering the quantum and complexity of work, site conditions etc, you would appreciate that the construction period of 36 months is on the lower side. Hence we request MMRDA to increase the construction period to at least 48 months.	NIT condition shall prevail .
6	ITB 22.1 page 40	**Bid submission date** For bid submission purposes only, the Employer's address is : Chief Engineer, Mumbai Metropolitan Region Development Authority (MMRDA) 2nd Floor, New MMRDA Building, Bandra-Kurla Complex, Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The dead line for bid submission is:** **Date:18.09.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering.	As the proposed works are to be executed on Design & Construction basis, some of the parameters need special attention, in depth study and through analysis of actual site conditions to prepare efficient design considering all the technical specifications of work. In view of the above, we request MMRDA to extend bid submission date appropriately from the current due date to enable us to submit a comprehensive and compliant bid.	Please refer to Sr. No.29 & 30 of CSD III

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510

Chief Engineer,
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M.M.R.D.A.

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
M/s NCC Ltd.				
7.	Volume 01 Page 107 Section - VI Particular Conditions clause 14 Sub Cl. 14.2 Sr No 24 of CSD-II	**Recovery of Advances-** The mobilization advance shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Mobilization Advance payments are to be set of (recovered) in equal installments against the interim payments certified by the Engineer or his representative under the Contract for the first 24 months commencing in the 7th month from date of work order until the advance payment has been fully set off . Failing such repayment the outstanding advance shall be recovered by encashment of respective Bank Guarantees/guarantees mentioned above. The Contractor may, at his option, repay the advance earlier by increasing percentage rate of deduction indicated above. If the Contractor furnishes more than one Bank Guarantee, pursuant to the above provision, the Bank Guarantee will be released by the Employer one by one in such a manner that the total amount of Bank Guarantees left in the hand with the Employer will be sufficient to cover the outstanding amount of advance.	We draw your kind attention to the Sr. no. 24, Clause no. 14.2.2 of the CSD II, which specifies the recovery of mobilization advance based on the time lapsed. It may please be noted that the condition was not there is original tender documents. We hereby request you to kindly remove the condition of recovery of advance on the basis of time lapsed and incorporate suitable condition wherein recovery of advance would be made based on the amount of work executed. This will enable more bidders to participate and MMRDA may get a most competitive offer.	Please refer to Sr. No.31 of CSD III

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
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M.M.R.D.A.

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Deviations (CSD)-III

The Common Set of Deviations is part of the Bid Documents

<table>
<tr><th>Sr. No</th><th>Page No.</th><th>Section</th><th>Ref. Clause No.</th><th>Existing Provision in the Bid document</th><th>Modified Provision</th></tr>
<tr><td>28</td><td>10</td><td>Volume 01
Detailed e-tender notice (2nd call):</td><td>Eligibility criteria
D)</td><td>D) Similar work means substantially completed Elevated Metro / 4-lane Flyover in urban area as a prime contractor.</td><td>D) Similar work means substantially completed work whose value of work done is more than 80 % of the Contract Value of the work of Elevated Metro / 4-lane Flyover in urban area as a prime contractor.</td></tr>
<tr><td>29</td><td>11</td><td>Detailed e-tender notice</td><td>10 Online e- Tender Schedule</td><td>
<table>
<tr><th>Sr. No.</th><th>Tender Schedule</th><th>Bidder Schedule</th><th>Start Date & Time</th><th>End Date & Time</th></tr>
<tr><td>1.</td><td>Tender Authorization and Publishing</td><td>---------</td><td>03.08.2019 (12.40 Hrs)</td><td>05.08.2019 (17.00 Hrs)</td></tr>
<tr><td>2.</td><td>---------</td><td>Tender Document Download</td><td>05.08.2019 (17.01hrs.)</td><td>17.09.2019 (17.00hrs.)</td></tr>
<tr><td></td><td></td><td>*Pre-bid meeting</td><td>13.08.2019 (15.00 hrs)</td><td></td></tr>
<tr><td>3.</td><td>---------</td><td>Bid Preparation and Submission</td><td>05.08.2019 (17.01hrs.)</td><td>18.09.2019 (12.00 hrs.)</td></tr>
<tr><td>4.</td><td>Tender Closing</td><td>---------</td><td>18.09.2019 (12.01hrs.)</td><td>18.09.2019 (15.00hrs.)</td></tr>
<tr><td>5.</td><td>---------</td><td>Online Control Transfer of Bid</td><td>18.09.2019 (15.01hrs.)</td><td>19.09.2019 (18.00hrs.)</td></tr>
<tr><td>6.</td><td>Opening Envelope A- Tender Fees, EMD</td><td>---------</td><td>20.09.2019 (10.00hrs.)</td><td>20.09.2019 (15.00hrs.)</td></tr>
<tr><td>7.</td><td>Opening Envelope B - Technical Bid</td><td>---------</td><td>20.09.2019 (15.01hrs.)</td><td>23.09.2019 (18.00hrs.)</td></tr>
</table>
</td><td>
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<tr><td>4.</td><td>Tender Closing</td><td>---------</td><td>01.10.2019 (12.01hrs.)</td><td>01.10.2019 (17.00hrs.)</td></tr>
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J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

513

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (second Call)
Common Set of Deviations (CSD -III)

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				8. Opening Envelope C - Financial Bid --------- 20.09.2019 (15.01hrs.) 30.09.2019 (18.00hrs.)	8. Opening Envelope C - Financial Bid --------- 04.10.2019 (10.00hrs.) 10.10.2019 (18.00hrs.)
30	40	ITB 22.1	22.1	For bid submission purposes only, the Employer's address is: Chief Engineer, Mumbai Metropolitan Region Development Authority (MMRDA) 2nd Floor, New MMRDA Building, Bandra-Kurla Complex, Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The deadline for bid submission is:** **Date: 18.09.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering.	For bid submission purposes only, the Employer's address is : Chief Engineer, Mumbai Metropolitan Region Development Authority (MMRDA) 2nd Floor, New MMRDA Building, Bandra-Kurla Complex, Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The dead line for bid submission is:** **Date:01.10.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering.
31	107	Cl 14.2.2	14.2.2 CSD –II sr No 24	**Recovery of Advances-** The mobilization advance and the accrued interest shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached 15% of the Contract Price less Provisional Sums. Recovery of mobilization advance ***including interest there on*** shall be completed by the time 90% of the work is completed. Failing such repayment the outstanding advance shall be	**Recovery of Advances-** The mobilization advance shall be repaid with percentage deductions from the interim payments certified by the Engineer or his representative under the Contract. Mobilization Advance payments are to be set of (recovered) in equal installments against the interim payments certified by the Engineer or his representative under the Contract for the first 30 months commencing in the 12th month from date of work order until the advance payment has been fully set off . Failing such repayment the outstanding advance shall be

Chief Engineer,
Engineering Division
M.M.R.D.A.

514

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				recovered by encashment of respective Bank Guarantees/guarantees mentioned above. The Contractor may, at his option, repay the advance earlier by increasing percentage rate of deduction indicated above. If the Contractor furnishes more than one Bank Guarantee, pursuant to the above provision, the Bank Guarantee will be released by the Employer one by one in such a manner that the total amount of Bank Guarantees left in the hand with the Employer will be sufficient to cover the outstanding amount of advance ***and likely interest thereon.***	recovered by encashment of respective Bank Guarantees/guarantees mentioned above. The Contractor may, at his option, repay the advance earlier by increasing percentage rate of deduction indicated above. If the Contractor furnishes more than one Bank Guarantee, pursuant to the above provision, the Bank Guarantee will be released by the Employer one by one in such a manner that the total amount of Bank Guarantees left in the hand with the Employer will be sufficient to cover the outstanding amount of advance.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

एम एम आर डी ए
MMRDA

Bandra-Kurla Complex, Bandra (East), Mumbai - 400051.
Tel: +91-22-26594076
Website : https://mmrda.maharashtra.gov.in

Common Set of Deviation -IV

Mumbai Metropolitan Region Development Authority (MMRDA) has invited bids from eligible Bidder through e-Tendering for the following work. Following changes are made in original tender.

Sr No.	Parameter	Details
1.	Tender Number	MMRDA/ENG1/0001790
2.	Division	Engineering Division
3.	Name of Tender	Design and Construction of Sewri Worli Elevated Connector -**2nd Call**
4.	Corrigendum for	**CSC –IVIand CSD-IV**

This CSD-.III shall form part of the tender document as mentioned in the tender document. This e-tender shall be available for free download on registration at **https://etendermmrda.maharashtra.gov.in.**

For any e-tendering support, mail MMRDA e-tendering Helpdesk at etenderhelp@mailmmrda.maharashtra.gov.in or call Helpdesk on **022-26597445.**

(Dr D.T Tubhe)
Chief Engineer

Date : 25.09.2019
Place : Mumbai

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Clarifications (CSC-IV)

The Common Set of Clarifications is not part of the Bid Documents

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
M/s	**HCC Ltd**			
1.	Volume –I Page -25 Section I. Instructions to Bidders (ITB) 19 Bid Security	19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. **Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.** **The relevant details are as under –** Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e- tender schedule. And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee. Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.	We refer to S. No. 4 of CSD-I regarding submission of bid security: "19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. Bidders have to make payment of Rs. 1,00,000/- as Bid security by mode of Electronic Transfer. The relevant details are as under- Bid security Payment as mentioned above has to be made through RTGS/NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e-tender schedule. And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee. Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee." Please note that there is no bank guarantee format given in the tender documents or in the subsequent corrigenda or deviations. The format is required for availing the bank guarantee from our bankers. Request you to kindly provide the same.	Please refer to Sr. No.32 of CSD IV

519

KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (second call)
Common Set of Clarifications (CSC-IV)

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
2	Volume 01 Page 40 Section - ITB Cl. 22.1 Sr No 30 of CSD-III	For bid submission purposes only, the Employer's address is : Chief Engineer, Mumbai Metropolitan Region Development Authority (MMRDA) 2nd Floor, New MMRDA Building, Bandra-Kurla Complex, Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The dead line for bid submission is:** **Date:01.10.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering	As the proposed works are to be executed on Design & Construction basis, some of the parameters need special attention, in depth study and through analysis of actual site conditions to prepare efficient design considering all the technical specifications of work. In view of the above, we request MMRDA to extend bid submission date appropriately from the current due date to enable us to submit a comprehensive and compliant bid.	NIT condition shall prevail.

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

520

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Deviations (CSD)-IV

The Common Set of Deviations is part of the Bid Documents

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
32	25	Volume –I Section I.	Instructions to Bidders (ITB) 19 Bid Security	19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. **Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.** **The relevant details are as under –** Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e- tender schedule. ***And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee.*** Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.	19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. **Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.** **The relevant details are as under –** Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e-tender schedule. ***And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee.*** **(FORM No. COF/8)** Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.
33	102	Volume –I Section VI Particular Condition	Cl 13.8 General Variations in Price Index	**Formula for HYSD/TMT, Structural Steel, and High Tensile strands Component (V5)** $V5 = \left\{ = \frac{S_0 \times (SI_1 - SI_0) \times T}{SI_0} \right\}$ Where, V_5 = Amount of price variation in Rupees to	**Formula for HYSD/TMT, Structural Steel, and High Tensile strands Component (V5)** $V5 = \left\{ \frac{S_0 \times (SI_1 - SI_0) \times T}{SI_0} \right\}$ Where, V_5 = Amount of price variation in Rupees to be

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				be allowed for HYSD / TMT, Structural Steel and High Tensile Strands component. S_0 = Basic rate of HYSD / TMT, Structural Steel and High Tensile Strands in rupees per metric tonne as considered for working out value of P. SI_1 = Average Steel Index as per RBI Bulletin during the quarter under consideration. SI_0 = Average of Steel Index as per RBI Bulletin for the quarter preceding the month in which the last date for receipt of tender, falls. T = Quantity of steel (HYSD/TMT) Structural Steel, stay Cables & HT Strands consumed during the period under consideration	allowed for HYSD / TMT, Structural Steel and High Tensile Strands component. S_0 = Basic rate of HYSD / TMT, Structural Steel and High Tensile Strands in rupees per metric tonne as considered for working out value of P. SI_1 = Average Steel Index as per RBI Bulletin during the quarter under consideration. SI_0 = Average of Steel Index as per RBI Bulletin for the quarter preceding the month in which the last date for receipt of tender, falls. T = Quantity of steel (HYSD/TMT including HT Strands) Structural Steel consumed during the period under consideration
34	86	Volume –I Section VI Particular Condition	Cl. 4.18.2	*Add Sub Clause 4.18.2 Environmental Safeguards-* The Contractor shall take action of following points and note the stipulations as under as regards environmental safeguards as stipulated by the Ministry of Environment and Forests and by the SEIAA and by local Competent Authority.	*Add Sub Clause 4.18.2 Environmental Safeguards-* The Contractor shall take action of following points and note the stipulations as under as regards environmental safeguards as stipulated by the Ministry of Environment and Forests and by the SEIAA and by local Competent Authority. The contractor shall obtain necessary environmental permissions if required other than CRZ permissions from the Competent Authority during project period .The employer will provide the necessary assistance required if any.

J. KUMAR INFRAPROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

FORM No. COF/8

BANK GUARANTEE IN LIEU OF Bid Security

To:_____*[name and address of Employer]*
_____*[Address of Employer]*

[Use Guarantor letter head or SWIFT identifier code]

Beneficiary: Mumbai Metropolitan Region Development Authority

Tender No.: MMRDA/ENG1/0001790

Date: [insert date of issue]

BID GUARANTEE No.: [insert guarantee reference number]

Guarantor: [insert name and address of place of issue, unless indicated in the letterhead]

WHEREAS _____*[name and address of Bidder* (hereinafter called the "bidder") has taken bid form , in pursuance of tender No. MMRDA/ENG1/0001790 Dated 3.08.2019 to submit bid for work of Design & Construction of Sewri to Worli elevated connector (2nd call). (Here in after called the "Tender");

We have been informed that [insert name of the Bidder] (hereinafter called "the Applicant") has submitted or will submit to the Beneficiary its Bid (hereinafter called "the Bid") for the work of Design & Construction of Sewri to Worli Elevated Connector (2nd call).

Furthermore, we understand that, according to the Beneficiary's conditions, Bids must be supported by a bid guarantee for Bid security (EMD in form of BG).

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of [insert amount and currency unit in words, (insert symbol of currency unit and amount in figures)] upon receipt by us of the Beneficiary's complying demand, supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating that either the Applicant:

(a) has withdrawn its Bid during the period of Bid validity set forth in the Applicant's Letter of Bid (hereinafter called "the Bid Validity Period"), or any extension thereto provided by the Applicant; or

(b) having been notified of the acceptance of its Bid by the Beneficiary during the Bid Validity Period or any extension thereto provided by the Applicant, (i) fails to execute the Contract Agreement, or (ii) fails to furnish the Performance Security, in accordance with the Instructions to Bidders of the Beneficiary's Bidding Documents.

This guarantee will expire and shall be returned to the Applicant: (a) if the Applicant is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the

J.KUMAR INFRA PROJECTS LTD MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Applicant and the Performance Security issued to the Beneficiary in relation to such Contract Agreement; or (b) if the Applicant is not the successful Bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the bidding process; or (ii) twenty-eight (28) days after the end of the Bid Validity Period.

Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

[Signature]

_____

[Print name and title of signatory]

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Chief Engineer,
Engineering Division
M.M.R.D.A.

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

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MMRDA

Bandra-Kurla Complex, Bandra (East), Mumbai - 400051.
Tel: +91-22-26594076
Website : https://mmrda.maharashtra.gov.in

Common Set of Deviation -V

Mumbai Metropolitan Region Development Authority (MMRDA) has invited bids from eligible Bidder through e-Tendering for the following work. Following changes are made in original tender.

Sr No.	Parameter	Details
1.	Tender Number	MMRDA/ENG1/0001790
2.	Division	Engineering Division
3.	Name of Tender	Design and Construction of Sewri Worli Elevated Connector -**2nd Call**
4.	Corrigendum for	**CSC –V and CSD-V**

This CSD-.V shall form part of the tender document as mentioned in the tender document. This e-tender shall be available for free download on registration at **https://etendermmrda.maharashtra.gov.in.**

For any e-tendering support, mail MMRDA e-tendering Helpdesk at etenderhelp@mailmmrda.maharashtra.gov.in or call Helpdesk on **022-26597445.**

(Dr D.T Tubhe)
Chief Engineer

Date : 30.09.2019
Place : Mumbai

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Clarifications (CSC-V)

The Common Set of Clarifications is not part of the Bid Documents

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
M/s HCC Ltd				
1.	Volume 01 Page 40 Section - ITB Cl. 22.1 Sr No 30 of CSD-III	For bid submission purposes only, the Employer's address is : Chief Engineer, Mumbai Metropolitan Region Development Authority (MMRDA) 2nd Floor, New MMRDA Building, Bandra-Kurla Complex, Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The dead line for bid submission is:** **Date:01.10.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering	As the proposed works are to be executed on Design & Construction basis, some of the parameters need special attention, in depth study and through analysis of actual site conditions to prepare efficient design considering all the technical specifications of work. In view of the above, we request MMRDA to extend bid submission date appropriately from the current due date to enable us to submit a comprehensive and compliant bid.	Please refer to Sr. No.35 & 36 of CSD V
M/s NCC Ltd				
2	Volume –I Page -25 Section I. Instructions to Bidders (ITB) 19 Bid Security CSD-IV Sr. no. 32	19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. **Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.** **The relevant details are as under –**	We are one of the intending bidders for the same. We are in receipt of the Common Set of Deviation-IV dated 25/09/2019 issued by you in which the Bank Guarantee Format Form No. COF/8 has been issued. In this regard, we would like to mention that we have already obtained Bank Guarantee as per standard format	Please refer to Sr. No.37 of CSD V

Chief Engineer,
Engineering Division
M.M.R.D.A.

527

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
		Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e- tender schedule. And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee. *(FORM No. COF/8)* Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.	since the earlier bid submission date was 18.09.2019. Now, it is difficult to cancel the existing BG and obtain one in new format on such short notice. Therefore, we hereby request you to kindly accept the BG already drawn in different format.	
M/s AFCONS Infrastructure Ltd.				
3.	Volume –I Page -25 Section I. Instructions to Bidders (ITB) 19 Bid Security CSD-IV Sr. no. 32	19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. **Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.** **The relevant details are as under –** Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e- tender	We Afcons Infrastructure Ltd., Mumbai are keen to participate in the bidding process of the subject. We have downloaded all documents and corrigendum, CSD etc. issued b you including CSD IV issued on 25.09.2019. In the above referred CSD you have provided the Bank Guarantee (BG) format towards bud security for the first time. As the available time for the submission is less than one week, we have already drawn a BG towards bid security in the format acceptable to MMRDA (similar to the format submitted in previous tenders of MMRDA) as there was no specific format given by MMRDA. Now to get the BG in your format we have to cancel our available BG and apply for the new BG. Additional Bank charges will be	Please refer to Sr. No.37 of CSD V

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Ref. Clause No./Page No.	Condition	Query	Clarification
		schedule. And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee. *(FORM No. COF/8)* Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.	applicable towards the fresh BG also even though it is for the same tender. As you may be aware in the present scenario getting a BG is sometimes a daunting task and also time available for the submission is short. Considering all above, we herewith request you to accept the Bank Guarantee in our format and we assure you that in case to Award of contract to us we will provide the Performance Bank Guarantee in the for format applicable for MMRDA.	
M/s Larsen & Toubro Ltd.				
4.	Volume 01 Page 40 Section - ITB Cl. 22.1 Sr No 30 of CSD-III	For bid submission purposes only, the Employer's address is : Chief Engineer, Mumbai Metropolitan Region Development Authority (MMRDA) 2nd Floor, New MMRDA Building, Bandra-Kurla Complex, Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The dead line for bid submission is:** **Date:01.10.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering	We thank you to providing us the opportunity to participate in the Tender process for the captioned project. We require some more time for technical assessment and preparation of the bid. Hence would request you to extend the bid submission by one month upto 31st October 2019.	Please refer to Sr. No.35 & 36 of CSD V

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

529

530

Name of work: DESIGN AND CONSTRUCTION OF SEWRI TO WORLI ELEVATED CONNECTOR (2nd call)

Common Set of Deviations (CSD)-V

The Common Set of Deviations is part of the Bid Documents

<table>
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<tr><td>35</td><td>11</td><td>Detailed e-tender notice</td><td>10 Online e- Tender Schedule</td><td>
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<tr><td>2.</td><td>---------</td><td>Tender Document Download</td><td>05.08.2019 (17.01hrs.)</td><td>30.09.2019 (17.00hrs.)</td></tr>
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<tr><td>8.</td><td>Opening Envelope C - Financial Bid</td><td>---------</td><td>04.10.2019 (10.00hrs.)</td><td>10.10.2019 (18.00hrs.)</td></tr>
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<tr><td></td><td></td><td>*Pre-bid meeting</td><td>13.08.2019 (15.00 hrs)</td><td></td></tr>
<tr><td>3.</td><td>---------</td><td>Bid Preparation and Submission</td><td>05.08.2019 (17.01hrs.)</td><td>15.10.2019 (12.00 hrs.)</td></tr>
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<tr><td>6.</td><td>Opening Envelope A- Tender Fees, EMD</td><td>---------</td><td>17.10.2019 (11.01hrs.)</td><td>21.10.2019 (15.00hrs.)</td></tr>
<tr><td>7.</td><td>Opening Envelope B - Technical Bid</td><td>---------</td><td>17.10.2019 (15.01hrs.)</td><td>04.11.2019 (18.00hrs.)</td></tr>
<tr><td>8.</td><td>Opening Envelope C - Financial Bid</td><td>---------</td><td>17.10.2019 (15.01hrs.)</td><td>04.11.2019 (18.00hrs.)</td></tr>
</table>
</td></tr>
<tr><td>36</td><td>40</td><td>ITB 22.1</td><td>22.1</td><td>For bid submission purposes only, the Employer's address is:
Chief Engineer,</td><td>For bid submission purposes only,
the Employer's address is :
Chief Engineer,</td></tr>
</table>

J. KUMAR INFRA PROJECTS LTD. MUMBAI

Chief Engineer,
Engineering Division
M.M.R.D.A.

Sr. No	Page No.	Section	Ref. Clause No.	Existing Provision in the Bid document	Modified Provision
				Mumbai Metropolitan Region Development Authority (MMRDA) 2nd Floor, New MMRDA Building, Bandra-Kurla Complex, Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The deadline for bid submission is:** **Date: 01.10.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering.	Mumbai Metropolitan Region Development Authority (MMRDA) 2nd Floor, New MMRDA Building, Bandra-Kurla Complex, Bandra (East), Mumbai-400 051. Telephone: 91 2226591239 Facsimile number: 91 2226594179 Electronic Mail address: **chiefengineer1@mailmmrda.maharashtra.gov.in** **The dead line for bid submission is:** **Date:15.10.2019, Time:- up to 12.00Hrs.** Bidders have to submit their bids on website by e-tendering.
37	25	Volume –I Section I.	Instructions to Bidders (ITB) 19 Bid Security	19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. **Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.** **The relevant details are as under –** Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e-tender schedule. ***And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee.*** Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.	19.1 Bidder shall furnish as part of its bid, a bid security in the amount as shown in the BDS. **Bidders have to make payment of Rs.1,00,000/- as Bid security by mode of Electronic Transfer.** **The relevant details are as under –** Bid security Payment as mentioned above has to be made through RTGS / NEFT mode using the System Generated Challan. Bidders should ensure that the payment of the bid security is made as per online e- tender schedule. ***And Balance amount of Rs. 4,38,00,000/- Security by providing Bank Guarantee.*** **(FORM No. COF/8 is indicative and EMD shall be submitted in this format preferably)** Bidders need to upload scanned copy of bid security paid receipt during bid preparation as well as scan copy of Bank Guarantee.

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

MMRDA eTendering System

Tender Title: : Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Tender No: MMRDA/ENG1/0001790

Tender Description: Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Division :

Amendment details

Amendment No: 143443

Reference No: Not Defined

Amendment Creator: Abhijeet bhisikar

Amendment Approver: Abhijeet bhisikar

Amendment Start Date: 15/10/2019

Amendment Approve Date: 15/10/2019

Sr No.	Department Schedule	Supplier Activity:	Duration	Start Date And Time	End Date And Time	Amend Start Date	Amend End Date
1	Tender Authorization and Publishing		2 Days 4 Hours 20 Minutes	03/08/2019 12:40 PM	05/08/2019 05:00 PM		
2		Tender Document Download	69 Days 23 Hours 59 Minutes	05/08/2019 05:01 PM	14/10/2019 05:00 PM		
3		Bid Preparation and Submission	70 Days 18 Hours 59 Minutes	05/08/2019 05:01 PM	15/10/2019 12:00 PM	05/08/2019 05:01 PM	15/10/2019 05:00 PM
4	Tender Closing		0 Days 4 Hours 59 Minutes	15/10/2019 12:01 PM	15/10/2019 05:00 PM	15/10/2019 05:01 PM	15/10/2019 06:00 PM

533

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M.M.R.D.A.

5		Online Control Transfer of Bid	1 Days 17 Hours 59 Minutes	15/10/2019 05:01 PM	17/10/2019 11:00 AM	15/10/2019 06:01 PM	17/10/2019 11:00 AM
6	Opening Envelope A - Tender Fees, EMD		4 Days 3 Hours 59 Minutes	17/10/2019 11:01 AM	21/10/2019 03:00 PM		
7	Opening Envelope B - Technical Bid		18 Days 2 Hours 59 Minutes	17/10/2019 03:01 PM	04/11/2019 06:00 PM		
8	Opening Envelope C - Financial Bid		18 Days 2 Hours 59 Minutes	17/10/2019 03:01 PM	04/11/2019 06:00 PM		
9	Tender Award						

Supporting Documents.

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Chief Engineer,
Engineering Division
M.M.R.D.A.

534

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

MMRDA eTendering System

Tender Title: : Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Tender No: MMRDA/ENG1/0001790

Tender Description: Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Division :

Amendment details

Amendment No: 157480

Reference No: Not Defined

Amendment Creator: Abhijeet bhisikar

Amendment Approver: Abhijeet bhisikar

Amendment Start Date: 17/09/2019

Amendment Approve Date: 17/09/2019

Sr No.	Department Schedule	Supplier Activity:	Duration	Start Date And Time	End Date And Time	Amend Start Date	Amend End Date
1	Tender Authorization and Publishing		2 Days 4 Hours 20 Minutes	03/08/2019 12:40 PM	05/08/2019 05:00 PM		
2		Tender Document Download	42 Days 23 Hours 59 Minutes	05/08/2019 05:01 PM	17/09/2019 05:00 PM	05/08/2019 05:01 PM	30/09/2019 05:00 PM
3		Bid Preparation and Submission	43 Days 18 Hours 59 Minutes	05/08/2019 05:01 PM	18/09/2019 12:00 PM	05/08/2019 05:01 PM	01/10/2019 12:00 PM
4	Tender Closing		0 Days 2 Hours 59 Minutes	18/09/2019 12:01 PM	18/09/2019 03:00 PM	01/10/2019 12:01 PM	01/10/2019 05:00 PM

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M.M.R.D.A.

535

5		Online Control Transfer of Bid	1 Days 2 Hours 59 Minutes	18/09/2019 03:01 PM	19/09/2019 06:00 PM	01/10/2019 05:01 PM	03/10/2019 05:00 PM
6	Opening Envelope A - Tender Fees, EMD		0 Days 8 Hours	20/09/2019 10:00 AM	20/09/2019 06:00 PM	03/10/2019 05:01 PM	03/10/2019 06:00 PM
7	Opening Envelope B - Technical Bid		0 Days 8 Hours	20/09/2019 10:00 AM	20/09/2019 06:00 PM	04/10/2019 10:00 AM	10/10/2019 06:00 PM
8	Opening Envelope C - Financial Bid		10 Days 8 Hours	20/09/2019 10:00 AM	30/09/2019 06:00 PM	04/10/2019 10:00 AM	10/10/2019 06:00 PM
9	Tender Award						

Supporting Documents.

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M.M.R.D.A.

536

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

MMRDA eTendering System

Tender Title: : Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Tender No: MMRDA/ENG1/0001790

Tender Description: Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Division :

Amendment details

Amendment No: 149616

Reference No: Not Defined

Amendment Creator: Abhijeet bhisikar

Amendment Approver: Abhijeet bhisikar

Amendment Start Date: 04/09/2019

Amendment Approve Date: 04/09/2019

Sr No.	Department Schedule	Supplier Activity:	Duration	Start Date And Time	End Date And Time	Amend Start Date	Amend End Date
1	Tender Authorization and Publishing		2 Days 4 Hours 20 Minutes	03/08/2019 12:40 PM	05/08/2019 05:00 PM		
2		Tender Document Download	28 Days 23 Hours 59 Minutes	05/08/2019 05:01 PM	03/09/2019 05:00 PM	05/08/2019 05:01 PM	10/09/2019 05:00 PM
3		Bid Preparation and Submission	29 Days 18 Hours 59 Minutes	05/08/2019 05:01 PM	04/09/2019 12:00 PM	05/08/2019 05:01 PM	11/09/2019 12:00 PM
4	Tender Closing		0 Days 2 Hours 59 Minutes	04/09/2019 12:01 PM	04/09/2019 03:00 PM	11/09/2019 12:01 PM	11/09/2019 03:00 PM

537

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5		Online Control Transfer of Bid	1 Days 2 Hours 59 Minutes	04/09/2019 03:01 PM	05/09/2019 06:00 PM	11/09/2019 03:01 PM	13/09/2019 10:00 AM
6	Opening Envelope A - Tender Fees, EMD		0 Days 8 Hours	06/09/2019 10:00 AM	06/09/2019 06:00 PM	13/09/2019 10:01 AM	13/09/2019 06:00 PM
7	Opening Envelope B - Technical Bid		5 Days 23 Hours 59 Minutes	06/09/2019 06:01 PM	12/09/2019 06:00 PM	13/09/2019 10:01 AM	19/09/2019 06:00 PM
8	Opening Envelope C - Financial Bid		5 Days 23 Hours 59 Minutes	06/09/2019 06:01 PM	12/09/2019 06:00 PM	13/09/2019 10:01 AM	19/09/2019 06:00 PM
9	Tender Award						

Supporting Documents.

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538

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

MMRDA eTendering System

Tender Title: : Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Tender No: MMRDA/ENG1/0001790

Tender Description: Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Division :

Amendment details

Amendment No: 159563

Reference No: Not Defined

Amendment Creator: Abhijeet bhisikar

Amendment Approver: Abhijeet bhisikar

Amendment Start Date: 28/08/2019

Amendment Approve Date: 28/08/2019

Sr No.	Department Schedule	Supplier Activity:	Duration	Start Date And Time	End Date And Time	Amend Start Date	Amend End Date
1	Tender Authorization and Publishing		2 Days 4 Hours 20 Minutes	03/08/2019 12:40 PM	05/08/2019 05:00 PM		
2		Tender Document Download	21 Days 23 Hours 59 Minutes	05/08/2019 05:01 PM	27/08/2019 05:00 PM	05/08/2019 05:01 PM	03/09/2019 05:00 PM
3		Bid Preparation and Submission	23 Days 18 Hours 59 Minutes	05/08/2019 05:01 PM	29/08/2019 12:00 PM	05/08/2019 05:01 PM	04/09/2019 12:00 PM
4	Tender Closing		0 Days 2 Hours 59 Minutes	29/08/2019 12:01 PM	29/08/2019 03:00 PM	04/09/2019 12:01 PM	04/09/2019 03:00 PM

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539

5		Online Control Transfer of Bid	0 Days 23 Hours 59 Minutes	29/08/2019 03:01 PM	30/08/2019 03:00 PM	04/09/2019 03:01 PM	05/09/2019 06:00 PM
6	Opening Envelope A - Tender Fees, EMD		0 Days 2 Hours 59 Minutes	30/08/2019 03:01 PM	30/08/2019 06:00 PM	06/09/2019 10:00 AM	06/09/2019 06:00 PM
7	Opening Envelope B - Technical Bid		12 Days 23 Hours 59 Minutes	30/08/2019 06:01 PM	12/09/2019 06:00 PM	06/09/2019 06:01 PM	12/09/2019 06:00 PM
8	Opening Envelope C - Financial Bid		12 Days 23 Hours 59 Minutes	30/08/2019 06:01 PM	12/09/2019 06:00 PM	06/09/2019 06:01 PM	12/09/2019 06:00 PM
9	Tender Award						

Supporting Documents.

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540

MUMBAI METROPOLITAN REGION DEVELOPMENT AUTHORITY

MMRDA eTendering System

Tender Title: : Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Tender No: MMRDA/ENG1/0001790

Tender Description: Design and Construction of Sewri -Worli Elevated Connector-2nd Call

Division :

Amendment details

Amendment No: 187233

Reference No: Not Defined

Amendment Creator: Abhijeet bhisikar

Amendment Approver: Abhijeet bhisikar

Amendment Start Date: 27/08/2019

Amendment Approve Date: 27/08/2019

Sr No.	Department Schedule	Supplier Activity:	Duration	Start Date And Time	End Date And Time	Amend Start Date	Amend End Date
1	Tender Authorization and Publishing		2 Days 4 Hours 20 Minutes	03/08/2019 12:40 PM	05/08/2019 05:00 PM		
2		Tender Document Download	21 Days 23 Hours 59 Minutes	05/08/2019 05:01 PM	27/08/2019 05:00 PM		
3		Bid Preparation and Submission	22 Days 18 Hours 59 Minutes	05/08/2019 05:01 PM	28/08/2019 12:00 PM	05/08/2019 05:01 PM	29/08/2019 12:00 PM
4	Tender Closing		0 Days 2 Hours 59 Minutes	28/08/2019 12:01 PM	28/08/2019 03:00 PM	29/08/2019 12:01 PM	29/08/2019 03:00 PM

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541

5		Online Control Transfer of Bid	1 Days 2 Hours 59 Minutes	28/08/2019 03:01 PM	29/08/2019 06:00 PM	29/08/2019 03:01 PM	30/08/2019 03:00 PM
6	Opening Envelope A - Tender Fees, EMD		0 Days 8 Hours	30/08/2019 10:00 AM	30/08/2019 06:00 PM	30/08/2019 03:01 PM	30/08/2019 06:00 PM
7	Opening Envelope B - Technical Bid		6 Days 8 Hours	30/08/2019 10:00 AM	05/09/2019 06:00 PM	30/08/2019 06:01 PM	12/09/2019 06:00 PM
8	Opening Envelope C - Financial Bid		6 Days 8 Hours	30/08/2019 10:00 AM	05/09/2019 06:00 PM	30/08/2019 06:01 PM	12/09/2019 06:00 PM
9	Tender Award						

Supporting Documents.

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542